

THE LAND-USE AND LAND MANAGEMENT DECISION-MAKING OF
EXURBAN LANDOWNERS IN THE ADIRONDACK PARK AND THE
GREATER YELLOWSTONE ECOSYSTEM

A Thesis

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ABSTRACT

Exurban development is an increasingly common form of residential sprawl impacting rural areas of North America, consisting of 5-40 acre tracts in deep isolation from other developments. The toll of exurbanization on the landscape may seem insignificant; yet, unique landscapes are altered through these changes. This research project examines exurban landowner decision-making in the Adirondack Park and the Greater Yellowstone Ecosystem. Regression analyses of survey data showed that environmental ethics are a weak predictor of land-use and land management practices, while attitudes toward wildlife-friendly behavior were the most significant predictor of intent to engage in such activities. Interview data showed that exurban landowners were free to engage in a broad array of land-use and land management activities on their lands with little direction or oversight from homeowners associations and regional land-use regulatory agencies. This demonstrates that while exurban landowners may possess ethics and attitudes that would lead them towards wildlife and open space conservation-oriented behaviors, an implementation gap may exist between their ethics and actions.

BIOGRAPHICAL SKETCH

John Vogel is from San Antonio, Florida, a small town of 600 in the north-central region of the state. He is the son of a consulting forester and information technology specialist. In 2010, he was awarded a Bachelor of Arts degree from Harvard University in Ecology and Land-Use Planning, with honors. He worked for the US Army Corps of Engineers as an ecologist for two and a half years focusing on ecosystem restoration and natural resource management. His master's research at the Cornell University College of Agriculture and Life Sciences focuses on exurban development patterns in rural areas of North America.

This thesis is dedicated to exurban landowners, the open spaces in which they live,
and the wildlife of various shapes and sizes that inhabit these regions.

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CHAPTER 1: INTRODUCTION

Introduction

Exurban development, consisting of detached single residential homes on 5-40 acre tracts of land located outside of the urban and suburban fringe (Theobald 2001), consumes ten times the amount of open space as urban and suburban development combined in North America (Heimlich and Anderson 2001). The purpose of this study is to examine private landowner decision-making in two exurban contexts – the northern Adirondacks of Upstate New York and the Madison Valley of Montana in the Greater Yellowstone Ecosystem – in order to contribute to our currently lacking understanding of what specific behaviors landowners undertake that may impact wildlife and open spaces in these rural, amenity-rich areas. This research sheds light on the relationship between private landowner environmental ethics, the external constraints on behavior that they must navigate, and exurban land-use and land management. The study areas are exurban regions given that the density of housing meets Theobald's precise definition; in addition, they are located in proximity to natural amenities such as mountains, rivers, and lakes.

Land management in the United States often happens on a private, local level due to the prevalence of home rule, which stipulates that jurisdiction over matters of land-use happens at the lowest levels of governance (Vanlandingham 1968). Thus, private property management in this country is, in large part, left to the discretion of private landowners. If private exurban parcels are vulnerable to the decision-making of exurban residents, then understanding an exurban individual's environmental ethic, as well as the internal and external constraints on land-use and land management, is essential.

The research questions and associated methods are as follows:

Table 1.1: Research Objectives, Questions, and Methodology

Research Objectives and Questions	Methodology
Characterize the exurban environmental ethic and exurban land-use: <ol style="list-style-type: none"> 1. What type(s) of environmental ethics do exurban residents identify with most strongly? 2. Is there a relationship between environmental ethics and the extent of land-use activities and land management on private lands in exurban areas? 3. How do attitudes, norms, and perceived behavioral controls influence exurban landowner intention to engage in wildlife-friendly behaviors? 	Four-Wave Mail Survey
Characterize exurban landowner values with respect to the natural environment and the social context that creates the environment in which exurban landowners make decisions about land management: <ol style="list-style-type: none"> 1. How do exurban landowners describe what their land means to them? 2. What are the land-use and land management activities that exurban landowners conduct? 3. How do regulatory institutions impact the land-use and land management activities practiced by exurban landowners? 	Semi-Structured Interviews and Four-Wave Mail Survey

General Literature Review

Creswell (2013) provides a useful framework for organizing the literature review, namely to identify how the literature comments on the dependent and independent variables of the conceptualized system. Exurban land-use and exurban land management are the dependent variables, in addition to intent to engage in wildlife-friendly behaviors. There are several independent variables: the environmental ethic as applied to exurban land management, or one’s values, attitudes, and beliefs towards land stewardship and conservation, social context, or the framework created by regulatory and other social institutions, such as homeowner’s associations, in which exurban private landowners must make decisions about land-use, as well as norms, attitudes, and beliefs. Therefore, I begin by noting that the literature on these variables,

especially exurban land-use and the environmental ethic, is burgeoning yet sparse in many ways. Exurban development, as a concept, is itself quite well-documented along with some of its ecological impacts in both biotic and abiotic media (Harden et al. 2005; Marcouiller and Tremble 2009). The literature has shown that, in a general sense, exurban development negatively impacts biota and other indicators of environmental quality in the settings in which it has been measured, though some species, typically generalists, have been shown to benefit (Maestas et al. 2003). The actual behaviors, or day-to-day exurban land-uses as I have termed the dependent variable, that exurban landowners engage in upon their private lands have not been well-documented save for a small number of studies (Daniels and Kirkpatrick 2011).

The micro-level, intra- and inter-personal drivers of exurban land management are poorly investigated. Understanding the actors who undertake behaviors that impact land-use is a necessary step toward deepening our knowledge of the social drivers, or the internal and external constraints, of exurban land-use. The concept of environmental ethics has been widely studied and measured but not yet in the exurban context.

Methods

This study relied on a two-phase, sequential explanatory design as outlined by Creswell (2013). This study design was appropriate because, through survey data, the goal is to first understand the exurban landowner environmental ethic as well as the actual behaviors that landowners partake in upon their land as well as certain aspects of the social context in which landowners make these decisions. Analysis of the survey data allowed follow-up interviews to be an exploration of the themes uncovered in Phase 1 as well as a means for understanding the causal mechanisms that led to land-use decisions in exurban areas. The two phases complemented each other since the first provided data that currently does not exist (as will be shown in a subsequent literature review in the thesis) and the second shed light on how the social-ecological system functions. The data collected in each phase was done according to standard procedures in mixed-methods research, outlined below.

Phase 1: Quantitative Data – Mail Survey

Phase 1 addressed the quantitative research questions and consisted of a four-wave mail survey design (Dillman et al. 2014) in which landowners living in the two exurban study areas were asked questions about their environmental ethic, their land management practices, and the factors that influence land-use decision-making. Survey data was an appropriate means of addressing the first research objective because the goal was to understand the opinions and behaviors of a particular population (Dillman et al. 2014). County property tax databases provided the sampling frame for this portion of the project; counties maintain property records on all landowners within their jurisdiction so addresses were publicly available for the mailing of surveys.

Data Analysis and Validity Procedures

Quantitative survey data was analyzed via descriptive statistics and regression analysis, as well as through measures of internal consistency (Tashakkori and Teddlie 1998), using the SPSS software package. Data analysis followed a deductive approach as outlined by Lin (1998); pre-determined research questions were answered in light of the statistical analyses of the data in order to answer the research question. The concept of the environmental ethic was operationalized using the model of de Groot et al (2011). In this study, the authors present a battery of statements relating to the human relationship with nature asking respondents to state their level of agreement or disagreement with each statement. Based on responses to those questions, I used a factor analysis to determine to what extent respondents identified with the following environmental ethics: mastery, stewardship, partnership, or participation. The environmental ethics represent a spectrum, from a person possessing a ‘mastery’ ethic believing in human dominance over the natural environment to a person possessing a ‘participation’ ethic believing that humans and nature are of equal value. These ethics were then linked to land-use practices in order to answer the quantitative research question.

Measurement error was addressed by utilizing previously established questions to measure environmental ethic and land-use behaviors and activities. Coverage error was not an

issue; tax rolls provide a complete and thorough sampling frame. Nonresponse error was minimized by the four-wave survey design and repeated follow-up to ensure a high rate of response (Dillman et al. 2014) but is acknowledged as a limitation of the study. Follow-up semi-structured interviews were used as a means of characterizing non-respondents as non-respondents were targeted for interviews.

Context effects, acquiescence bias, and social desirability response bias (Krosnick and Presser 2010; Braverman 1996) are important issues to consider given the sensitive nature of some of the questions surrounding respondents' concern for the natural environment. The issue of context effects, in which the order of questions can impact how respondents answer survey items, was addressed by breaking up the questions of environmental ethic and behavioral control with questions about land management. The reasoning was that the respondents would thus be given a respite from answering questions about their values and influences by answering fact-based questions about what they actually do on their land. Acquiescence bias, which is often a result of weak satisficing (Krosnick and Presser 2010), can occur in survey research when respondents answer a survey question by selecting options at the upper end of a Likert-scale. This was addressed by minimizing the instances in which respondents were asked to agree or disagree with a statement to three questions on the survey and by balancing the survey items to ensure wording was positive and negative. In other questions, I changed the response options to 'Not Important/Important,' and 'Negative/Positive.' Social desirability response bias can occur in instances when respondents answer survey items in ways they think they should based on norms. This type of bias can be inherent in environmental ethic questions; the means by which this issue is addressed was to minimize to the extent possible questions that could lead to social desirability response bias and to use survey batteries related to ethics that had been tested for consistency and utilized in past survey research. For example, the bulk of survey questions asked respondents about land-use activities they perform as opposed to opinion-based questions. Krosnick and Presser also give a detailed treatment of the number of points to include on rating

scales, and I addressed this issue by referring to Fishbein and Azjen's (2009) recommendation of a 7-point scale for modeling using the framework of the Reasoned Action Approach.

In regards to issues of validity and reliability, several authors provide guidance (Tashakkori and Teddlie 1998). A survey question is valid insofar as it measures a concept appropriately; a survey question is reliable insofar as it measures the concept in a consistent manner. In regards to validity, I have confidence in the measures used insofar as other experts have used them in the past to measure the same concepts with reasonable success according to statistical analyses. While it is tempting to develop one's own measure for 'hard-to-define' concepts, the inclination is to employ the concept of content validity to use past measures and expert opinions and to compare questions in our survey to previous studies in order to develop a level of confidence in measurements (Tashakkori and Teddlie 1998). A previous study used to measure the environmental ethic (de Groot et al. 2011) was used in this survey; for questions pertaining to constraints and influences on land management, I developed our own scale since there were few prior studies pertinent to this topic. With respect to reliability, I calculated a statistical measure of internal consistency, the Cronbach's alpha, to quantify this.

Phase 2: Qualitative Data – Semi-Structured Interviews

Phase 2 addressed the qualitative research question and consisted of semi-structured interviews with two groups of people. The first group consisted of representatives of agencies that govern land-use; this included town, state, and county regulatory agencies as well as members of homeowner's association board of directors. These are the people who develop and apply policies that facilitate and constrain the ways in which exurban landowners can manage their land; they further, in their roles, make decisions about land-use on a regional and landscape level. The second group of interviewees consisted of a subset of the exurban landowners themselves. Interview data sufficed to answer the second research question because thick, open-ended descriptions (Weiss 1994) from the landowners shed light on the survey data and allowed for a deeper investigation of other aspects of the social context that contributed to land-use

decision-making. Interviews with regulators similarly helped to make sense of the impact of social context on exurban land-use.

Sampling Strategy

The sampling procedure for Phase 2 consisted of a mixture of purposive sampling and sampling for heterogeneity (Tashakkori and Teddlie 1998) due to the unique nature of each of the sub-groups that will be interviewed. The goal was to conduct 25 semi-structured interviews in each field site, giving a total of 50 interviews across the two study areas. The purpose of this component of the study is descriptive, and so the goal of these interviews was to provide a basis upon which to develop a deeper discussion about drivers of land management in exurban settings.

Given 25 interviews in each site, this number was sub-divided amongst different populations as follows. I planned to conduct about 5 interviews with representatives of regulators and agency representatives in each site, with about two or more of these with regulators and the rest with representatives of homeowner's associations and various other land management agencies. This left 20 landowner interviews in each site, allowing for a deeper and richer investigation of the information garnered from the survey as well as an understanding of the causal mechanisms at work in the social-ecological system that creates the context in which land-use decisions are made.

The sampling strategy varied for each group. For the regulators and agency representatives, a purposive sampling strategy was employed. This was the most direct approach since regulators and agency representatives are easily identifiable based on public records, and often there are only a few people fulfilling this role on a county or community level. In terms of finding landowners to interview, I sampled for heterogeneity based on residence in a given subdivision. The goal was to ensure that subjects living in the various communities within the study sites were broadly represented. There were less than ten subdivisions in each site; every attempt was made to ensure the interviewee pool came approximately equally from each of the subdivisions so that one housing development was not overrepresented.

Data Analysis and Validity Procedures

Qualitative interview data was recorded by a digital recording device, transcribed, and finally analyzed via standard coding procedures using the qualitative data analysis software package Atlas.ti. Seidel's (1998) recommendation to thoroughly analyze one's data through the lens of prior studies (detailed in Chapter 3) provided the framework for coding the interview transcripts. Coding themes in the data based on concepts in the literature reviewed above and in subsequent chapters, such as influences and constraints on land management, landowner meanings, and land-use and land management activities, provided the basis for coding.

The framework for writing up the results of the interviews was organized thematically, by drivers of land management; for example, themes were goals, mechanisms, and impacts of regulation (Weiss 1994). Given this, the development of the interview guide was informed by the need to understand the processes by which landowners develop land management strategies, which in this case were the mechanisms by which landowners could be constrained or influenced in their land management strategies by external forces. The standard of validity that data was held to is that of thick description in which ideas, themes, and concepts are expounded upon and placed in context (Taskakori and Teddlie 1998), and the goal was to reach theoretical saturation, or convergence, wherein subsequent interviewees began to independently confirm the findings of prior interviewees and no new information was uncovered. Thick description provided evidence of transferability of interpretations and conclusions from the landowners and regulators that were interviewed to similar people in similar circumstances. Detailed description provided the fullest possible explanation of the phenomena under investigation.

Thesis Outline

The thesis consists of this introduction, two substantive chapters, and a concluding chapter that synthesizes findings from both chapters. In chapter two, the survey data was examined through descriptive and inferential (regression analysis) statistics to investigate environmental ethics and land-use in the Adirondacks and the Greater Yellowstone Ecosystem. The Reasoned Action Approach was used as a basis for building a model to measure the

influence of attitudes, norms, and behavioral controls on behavioral intent to engage in wildlife-friendly practices. The third chapter examined the interview data in conjunction with some of the descriptive aspects of the survey data. The goal was to understand what aspects of their private property that exurban landowners ascribe meaning to, to characterize the day-to-day activities that exurban landowners engage in, and to examine how landowners perceive external entities influence their land-use and land management in the exurban context. The regional land-use regulatory context of both sites was investigated in detail as part of this chapter. The final chapter addressed broad-level conclusions from the study, policy implications of this research, future research needs, and limitations of this study.

Broader Context of this Study

This research is taking place under a broader study funded by the National Science Foundation (NSF), entitled “Identifying Common Patterns in Diverse Systems: A Socio-Ecological Approach to Evaluating the Effects of Exurban Development on Avian Communities,” that seeks to understand how exurban development is changing landscapes, both socially and ecologically. Along with the social science inquiry presented here, researchers from the Wildlife Conservation Society have been working on the properties of a subset of exurban landowners in the two study sites to examine the impacts of exurban development on songbird and mammal communities on private parcels. Data related to noise and light disturbance has also been collected on these parcels. One of the goals of this larger NSF study will be to examine the ecological data collected on these parcels in light of the social science data that is discussed in this thesis.

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CHAPTER 2: EXAMINING THE EXURBAN ENVIRONMENTAL ETHIC OF LAND-USE DECISION-MAKING IN THE ADIRONDACK PARK AND THE GREATER YELLOWSTONE ECOSYSTEM

Abstract

Exurban development, defined as housing development occurring on tracts of land ranging from 5 to 40 acres, is changing amenity-rich landscapes, both ecologically and socially. While exurbanization impacts to forest resources and wildlife have been well-documented in the literature, research is still sparse with respect to exurban landowner decision-making and their actions that may lead to these impacts. Using the data from a mail survey of exurban landowners in two study sites, I investigated the relationship of environmental ethics to social psychological dimensions of norms, behavioral controls, and attitudes using the Reasoned Action Approach, in addition to examining the relationship between these constructs and intent to undertake wildlife-friendly behaviors. Results show that exurban landowners feel a responsibility for land stewardship and also feel an affinity for the natural environment, but their environmental ethics are not a direct predictor of their land-use and land management behaviors. Consistent with other social psychology research investigating rural landowner decision-making, results show that attitudes are the main driver of intent to engage in wildlife-friendly practices, and to lesser extent social norms. Behavioral controls were not a significant predictor of intention to engage in behavior that benefits wildlife. The results of this study indicate exurban landowners' in the study areas intent to engage in wildlife-friendly behaviors was not heavily influenced by external entities such as regulatory bodies or homeowner associations. Landowners in this study perceive themselves to be in primary control of their land management, pointing to a non-regulatory approach for wildlife conservation and management.

Introduction

Exurban development occurs on a continuum, from within proximity to urban centers directly adjacent to the suburban fringe to areas that exist in deep isolation of development. This

type of rural sprawl is often characterized by detached single residential homes on 5-40 acre tracts of land located outside of the urban and suburban fringe (Theobald 2001). Others have characterized exurban development as rural in-migration causing major changes in land-use; these rural subdivisions consist of low density housing within a landscape that retains native vegetation (Brown et al. 2005). Land previously used for forestry and ranching is converted to home sites in exurban regions (Hansen et al. 2005).

While exurban development is less dense than suburban or urban development and might appear to result in fewer disturbances to the landscape, researchers have documented negative effects on wildlife in exurbanizing regions, particularly birds and mammals (Odell and Knight 2001). Birds sensitive to habitat fragmentation and degradation, such as ground nesters (those that require large areas for breeding), and those limited by small clutch sizes or single clutches per season are particularly impacted by exurban development because when their primary habitat is brought into the proximity of roads, it exposes them to new predators such as housecats and dogs, as well as intensive landscaping techniques (Merenlender et al. 2009), leading to biotic homogenization of landscapes which favors human-adapted species over species sensitive to the presence of land-uses associated with human development (McKinney 2006). Also, presence and absence studies of mammals in proximity to rural housing developments find that coyotes and foxes are less likely to be present in exurban areas (Odell and Knight 2001). Given that exurban development consumes more than ten times the amount of land area compared to suburban and urban development combined (Heimlich and Anderson 2001), the overall effects of exurbanization on wildlife habitat are not trivial. Even expansive natural areas can become altered through landscape changes associated with exurban development (Hansen et al. 2005).

Some studies have investigated the negative ecological impacts of this form of rural land-use, such as decreased biodiversity, forest parcelization, and habitat fragmentation and discontinuities in various organisms preferred environments (Hansen et al 2005). Exurbanization also results in more landowners with smaller tracts of wooded land (Egan and Luloff 2000).

While the macro-level drivers of amenity migration and exurban development, such as the draw

of natural, cultural, and recreational resources as well as the advent of modern technologies that facilitate migration to these regions, have been investigated (Price et al 1997; Gosnell and Abrams 2011), little attention has been paid to the attitudes and values that exurban landowners have towards wildlife-related conservation.

Additionally, exurban landowner decision-making may be rooted in their environmental ethics. An environmental ethic can be understood at the most basic level as how one understands his or her relationship with the natural environment (de Groot et al 2011). This ethical relationship that private landowners have with their land has been investigated in some contexts (among farmers, for example in Busck 2002 and Schneider and Francis 2006), but never explicitly with an exurban population. Learning more about relationships between exurban landowners and their environment could help uncover how this population understands their relationship with the landscape.

As landowners are drawn to amenity-rich regions, natural resources in these areas are impacted by their decisions. I use a Reasoned Action Approach social-psychological framework to determine the role of both internal (environmental ethics, attitudes, norms, and perceived behavioral control) and external (town and county planning boards, code enforcement officers, state regulatory agencies, homeowner's associations, etc.) factors in exurban landowner decision-making about wildlife. By investigating exurban landowner environmental ethics in addition to understanding what activities they actually perform or intend to perform on their land, we can begin to understand the relationship between the two (decision-making and ethics).

This study was conducted in exurbanizing regions in the Greater Yellowstone Ecosystem of southwest Montana and the Adirondack Park region of upstate New York. These sites provide an opportunity to investigate the processes and consequences of exurbanization landowner decision-making yet differ enough in social and ecological composition to offer new and varying perspectives on this issue. By examining two distinct ecoregions, I draw conclusions that are common across these different ecosystems, while offering new and broader insights into

environmental ethics and models of landowner decision-making, given the unique social and regulatory contexts of study sites in New York and Montana.

Since exurban landscapes are vulnerable to exurban landowner decision-making, this study will reveal how this population of people is navigating internal and external constraints to make decisions about land-use. Understanding the landowners and the role that institutions that constrain and facilitate their behavior play is of interest to natural resource professionals, particularly foresters and wildlife biologists as well as land-use planners, because this knowledge will show them how to work within the new social realities of these increasingly exurban regions.

Literature

a. Exurban Development

The footprint of exurban developments leads to conditions that are suboptimal for many species and for the habitat that supports them (Hansen et al. 2005). For example, exurban development leads to parcelized forests (Egan and Luloff 2000), fenced rangelands, reduced biodiversity (Hansen et al. 2005), and shifts in species composition (Glennon and Kretser 2013) due to the changing land-use that it entails (Gude et al. 2006). Bird and mammal communities tend to shift in proximity to these housing developments, even at the low densities seen in exurbia (Odell and Knight 2001). The zone of impact in terms of how homes in exurban areas are affecting the biota, flora, and fauna around them, has been found to be about 200 yards in radius. Biotic homogenization typically occurs as the species that are adapted to human development thrive while specialists with particular habitat requirements may be outcompeted (McKinney 2006). Another set of key factors in exurban development are the land-use behaviors associated with owners of properties in these regions, such as landscaping, small-scale silviculture, and the introduction of house pets, which have been found in previous research to exacerbate problems described above (Daniels and Kirkpatrick 2011).

b. Exurban Landowners

Scholarly research on exurban landowners profiles them as a distinct population with different motivations from traditional landowners in rural regions (Cadieux and Hurley 2011; Meador et al. 2011; Knoot et al. 2009). Exurban housing developments often occur as a result of seasonal and part-time residents or retirees moving to areas rich in natural amenities facilitated by the modern convenience of telecommuting, or working remotely rather than in an office (Cadieux and Hurley 2011). Meador et al. (2011) noted in their Wyoming study that exurban landowners live in exurbia for the aesthetic values and lifestyle but did not expect to make economic gains from their lands. Respondents to their survey had knowledge about and an interest in gaining more information about various natural resource related issues, such as water quality, landscaping, and invasive species. Exurban landowners were shown to be interested in cooperative management of their lands by Erickson et al. 2011, in this case for cooperative farming arrangements.

Knoot et al. (2009) conducted a series of 32 interviews with natural resource professionals in the Midwest Driftless Area of Minnesota, Iowa, Wisconsin, and Illinois to determine how they view landowner decisions about oak management. They noted that land management practices shown to regenerate stands of oak, such as clear-cutting, were disconnected with how the exurban landowners they worked with felt their land should be managed. Interviewees indicated the exurban population in this region was not interested in using timber harvesting as a management tool; half felt the people in this region were absentee landowners not interested in active management activities of any sort, and a majority of interviewees stated that the landowners had no interest in forest management activities that would change how the stands of timber on their parcel looked.

Bastian et al. (2014) noted that exurban landowners in Wyoming seemed to be unaware of the collective impacts of their individual land-use decision-making, such as land management activities like pesticide use and livestock grazing, on the natural environment. Landowners did however indicate they were interested in landscape-level conservation-related issues such as

wildlife habitat preservation and water quality. Researchers show found that incorporating information related to landscape level changes such as habitat degradation and parcelization occurring due to exurban development could be an effective way to frame educational interventions for an exurban population because landowners indicated these were major concerns for them that warranted action.

Finally, in Australia, Daniels and Kirkpatrick (2011) showed that attitudes with respect to the natural environment had no impact on the land-uses (e.g. gardening, domestic pets) in which exurban landowners engaged. Working with a sample of 89 landowners, they found that their attitudes towards the environment, which were mostly biophilic (oriented towards an appreciation of nature), did not correlate with whether or not wildlife frequented an individual's property, indicating that one's environmental attitudes do not predict behavior and thus presence or absence of wildlife. While exurban landowners stated they wanted to appropriately manage the natural resources they were stewarding, they all performed similar activities with respect to landscaping, gardening, and domestic pet management that resulted in the same presence and frequency of mammals seen across private parcels. The study was limited insofar as the activities exurban residents were queried about related specifically to gardening and livestock and did not focus on the broad suite of activities that exurban landowners could engage in on their private property.

Given this research, scholars have not characterized the attitudes of a broad cross-section of exurban landowners for comparison specifically with respect to wildlife and similarly have not investigated some of the specific behaviors that they engage in on a day-to-day basis by virtue of them simply inhabiting the land, such as grilling, trash storage, light and sound disturbance. Previous work on exurban landowners has focused on more management level activities, such as landscaping, pesticide use, grazing, and silviculture, but day-to-day human activities may be important for understanding changes to the ecology of exurban regions (Glennon and Kretser 2014). As early as 2000, Egan and Luloff (2000) called for more social science research to characterize exurban development from the perspective of individual private

landowners. This research fills several gaps with respect to these deficiencies in the literature, including incorporating data from two distinct sites in order to make cross-cutting comparisons, characterizing specific land-use and land management activities in exurban regions, and developing a more nuanced understanding of the social drivers of exurban land management, be they internal (i.e. values towards stewardship) or external (i.e. regulatory).

c. Environmental Ethics

There have been a multitude of past studies that explain the evolution and understanding of the relationship between humans and nature (Dunlap and Van Liere 1978; Beus and Dunlap 1990; Mayer and Frantz 2004; Hunka et al. 2009; Buijs 2009; de Groot et al. 2012; Busck 2002). Dunlap and Van Liere's New Environmental Paradigm (1978) is one of the earlier efforts at developing a picture of how people think about the environment, specifically attempting to understand if the roots of our current day environmental problems stem from traditional attitudes, beliefs, and values prevalent within society. They ask whether a New Environmental Paradigm (NEP) is taking hold focused on balance with nature and a less anthropocentric world view, through a survey of residents of Washington State. The survey asked respondents their opinions about specific and general environmental issues; results showed a greater prevalence of the NEP than was previously anticipated.

Another way of understanding the human-nature relationship is through the Connectedness to Nature Scale (CNS) articulated by Mayer and Frantz (2004). In this framework, the authors designed a survey to test participants' affective, experiential relationship to the natural world. Their guiding principle is Leopold's contention that, in order for humanity to effectively address environmental problems, people themselves must feel a connection to the broader world, or biotic and abiotic community. Indeed, results showed that connection to nature is an important predictor of both ecological behavior and subjective measures of well-being. The CNS framework is distinct from the NEP by virtue of the fact that it focuses on participants' personal relationship with the environment rather than their opinions and beliefs about the environment in general. Buijs qualitatively examined the role of beliefs and values

with respect to the environment which led to future efforts in characterizing the human relationship with the natural world (Buijs 2009).

The Human and Nature Scale (HaN) attempts to capture the full range of human-nature relationships, dividing these relationships into categories such as master over nature, stewardship of nature, partnership with nature, and participation in nature. A variety of studies (Hunka et al. 2009; de Groot et al. 2011) have used this framework with the goal to understand which ethical dimensions are most prevalently held by the general public. Hunka et al. (2009) and de Groot et al. (2011), through survey research, both showed in Europe that perhaps the dominion or master over nature category of the human-nature relationship is outmoded and not reflective of the beliefs espoused by the participants in their studies. Stewardship of nature or partnership with nature, in other words more ecocentric-oriented ethics, were shown to be held by more participants. The Human and Nature Scale provides four broad, yet distinct, categories that cover a wide range of visions of a human relationship with the natural world.

The battery of questions utilized by de Groot et al. (2011) to understand how and the extent to which respondents understood their relationship with nature formed the basis of our battery of questions pertaining to environmental ethics. While there are several options in terms of characterizing human/nature relationships, the Human and Nature Scale, particularly as put forth by de Groot et al. (2011) provides a means that is appropriate for our study population and the types of quantitative analysis that were performed in this study. By asking these questions of a study population, one could understand how different environmental ethics resonate with respondents and thus characterize their environmental ethics. de Groot et al. (2011) studied the environmental ethics of the general population in western Europe using this battery of questions, and they found that a more ecocentric environmental ethic was espoused by respondents. Specifically, ethics related to mastery or dominance over nature were rejected, while ethics related to stewardship of, partnership with, and participation in nature resonated more with the study population. Using a similar battery of questions to the de Groot et al. (2011) study allows for comparison of environmental ethics across populations as well as a characterization of the

extent to which landowners identify with a variety of environmental ethics across the dominance to pro-environmental spectrum.

Explicit research needs to be done in exurban areas to understand the unique exurban environmental ethic since the population of people who inhabit these landscapes is changing. Further, the concept of the environmental ethic has not been taken to the next step of analysis, that is, attempting to investigate if it is acted upon by landowners. This missing aspect of the literature on environmental ethics in exurban regions drove my desire to more clearly understand the relationship between their environmental ethics, as a driver of behavioral intent, and their land stewardship. Characterizing how exurban landowners understand their relationship with the environment is a critical component of this gap in research.

d. Reasoned Action Approach

The Reasoned Action Approach (RAA) (and prior iterations beginning in 1980 of the Theory of Reasoned Action and the Theory of Planned Behavior) is a conceptual framework from social-psychology that allows us to understand how attitudes, norms, and perceived behavioral control influence behavioral intent (Fishbein and Azjen 2010). While characterizing environmental ethics can tell us more about the general values that exurban landowners have towards environmental stewardship and conservation, understanding more clearly the links between behavioral intent and (1) attitudes towards pro-environmental behavior, (2) social norms, and (3) behavioral controls can tell us how these factors predict behavior. Since I seek to understand what drives land management in exurban regions, the Reasoned Action Approach presents a coherent way to understand this social phenomenon in its component parts.

The Reasoned Action Approach (formerly Theory of Planned Behavior) has been used to understand drivers of landowner behavior. A review of all extant studies applying RAA to landowner behavior (Dayer et al. in review) found that, most notably, attitudes were the strongest and most consistent positive predictor of behavioral intent, followed by norms. While these studies investigated a many rural landowners with respect to their land-use and land management behaviors, a critical missing aspect in this social psychological research on landowner behavior

is exurban private landowners. Applying this framework to the study populations in the Adirondacks and Greater Yellowstone Ecosystem allows for a comparison to past research while presenting a more definitive picture of land-use decision making in exurban settings.

Research Questions

1. What type(s) of environmental ethics do exurban residents identify with most strongly?
2. Is there a relationship between environmental ethics and the extent of land-use activities and land management on private lands in exurban areas?
3. How do attitudes, norms, and perceived behavioral controls influence exurban landowner intention to engage in wildlife-friendly behaviors?

Methods

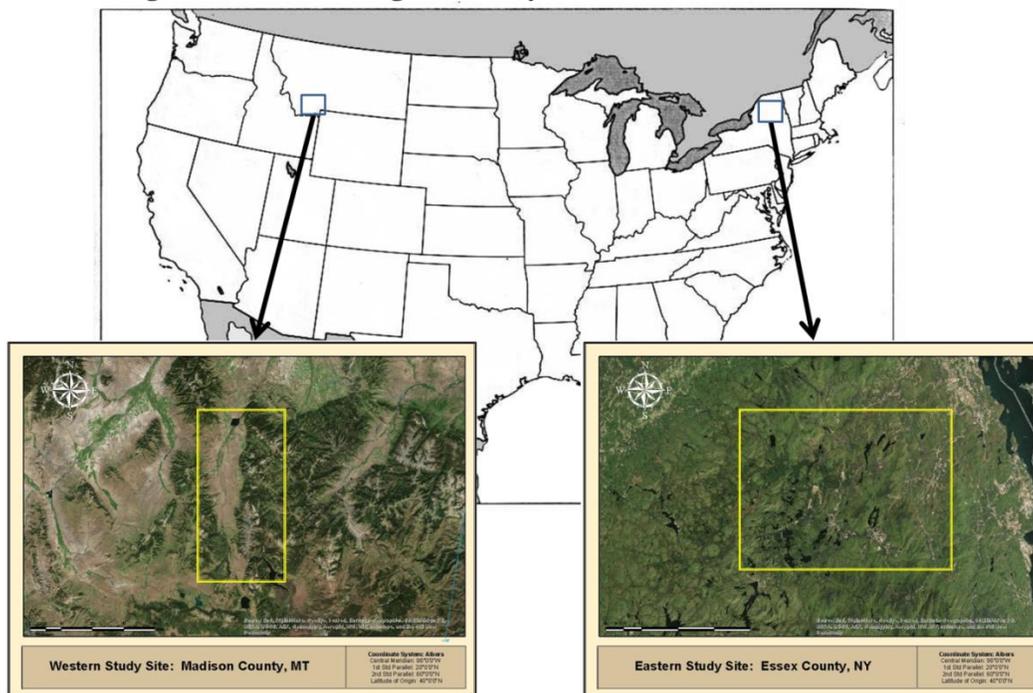
a. Study Areas

The Adirondack Park region (ADK) in the northeastern United States, an area famous throughout the world for its natural amenities, is comprised of approximately six million acres and is a mosaic of public and private lands in upstate New York. The region is characterized by various types of northern boreal forest cover that is relatively homogeneous in nature (Egan and Luloff 2000). Approximately 135,000 people live in the Adirondack Park, and millions more are within one day's drive of the park (U.S. Census Bureau 2012). The regulatory context that governs land-use in the park consists primarily town level regulations and the Adirondack Park Agency (with respect to environmental regulations), and, where applicable, rules implemented by homeowner's associations. Since development is occurring on an appreciable scale in the Adirondacks (Glennon and Kretser 2013), it is worthwhile to consider the impacts of exurban development on this region. The population of Essex County is 39,300 (US Census Bureau 2012). Elevation ranges from about 1500 feet to 4600 feet.

The Greater Yellowstone Ecosystem (GYE) is an internationally known area of natural beauty in the western United States. It is comprised of the Yellowstone National Park, Grand Teton National Park, and surrounding areas in southwestern Montana. Contrasted with the

Adirondack Park, this region is quite heterogeneous in land cover and displays greater change in elevation, with land cover changing from sagebrush and grassland to forest with rising elevation (Lesica et al. 2007). Elevations in the valley bottom begin around 4000 feet, and the peaks of the enclosing Gallatin and Gravelly mountain ranges can reach heights of nearly 11,000 feet. Again, thousands live in the environs of the park, and many tens of thousands of visitors frequent the region on an annual basis (National Parks Service 2012). Land-use is governed mostly by county-level regulations, and in contrast with the Adirondack Park, homeowner's associations play a larger role in constraining and facilitating land-use due to the prevalence of subdivisions in the Madison Valley of southwestern Montana.

Figure 2.1: Situating the Study Areas in the Continental US



These study sites were chosen for a number of reasons, most notably because both are amenity-rich regions undergoing rapid exurbanization. In the Adirondacks, rural housing developments have long been a part of the landscape, but only recently has research shown the impacts that exurban communities can have on ecological communities. Glennon and Kretser (2013) showed that avian communities were disrupted over 200 yards away from an exurban house and that the impact of a single exurban home can extend up to 31 acres beyond the

footprint of the building. Further, human-wildlife interactions have been shown to be correlated to housing developments of exurban densities in the Adirondacks, as opposed to urban or wilderness areas, indicating that this type of development has placed humans into sensitive wildlife areas (Kretser et al. 2008). In the Greater Yellowstone Ecosystem, exurban development is a more recent phenomenon. From 1970 to 1999, the GYE experienced a 58% increase in population and a 350% increase in the area of rural lands used for exurban housing developments (Gude et al. 2006). As former ranchlands are converted to second homes for absentee owners (Gosnell et al. 2006), biodiversity, a main reason people move to the region, is on the decline (Hansen et al. 2005; Gude et al. 2007). At present, Madison County has a population of 7,700 (US Census Bureau 2012). Both the Adirondack region and the GYE are quintessential amenity-rich areas currently undergoing the pressures of exurban development, both socially and ecologically. Developing a nuanced understanding of the environmental ethics and land-use behaviors of the people who now live in these rural areas could provide the basis for targeted interventions to minimize some of the negative impacts of this type of development, particularly because the decisions these people are making with respect to private land management are the driving force behind the changes in ecology that we see.

b. Mail Survey and Sample

I implemented a four-wave mail survey (Dillman et al. 2014) to collect data from landowners in each study area beginning in September and ending in November of 2013. Mailings consisted of a cover letter and questionnaire, a reminder letter, a second letter and copy of the questionnaire, followed by one last reminder letter, each spaced two weeks apart. I designed the survey instrument as an 8.5 x 11 inch booklet that asked private exurban landowners with parcels in either of the two study areas questions about their environmental ethics, their land management practices, and the factors that influence land-use decision-making, as well as some basic socio-demographic information.

I obtained the sampling frame from property tax databases in Essex County, NY, and Madison County, MT; counties maintain records on all landowners within their jurisdiction so

addresses were publicly available for the mailing of surveys. Our study population in Essex County resides exclusively in the towns of North Elba, Wilmington, and Keene. In Montana, the population resides in unincorporated areas of the county. Thus, I sought to populate this study with an equal sample of residents from both sites who met the appropriate tract size (5 acres or greater) to qualify as exurban landowners. An analysis of county tax roll data provided 248 landowners in Essex County, NY, and 260 landowners in Madison County, MT, who met the criteria of exurban land ownership. This survey was conducted under a university-approved Human Subjects protocol.

c. Design of Survey Instrument

Environmental Ethics. The concept of the environmental ethic is operationalized using the model of de Groot et al. (2011). de Groot’s original scale contained 21 statements, which was narrowed down to 11 items for the purposes of this study (See Table 2.1). Respondents were asked to indicate their level of agreement or disagreement on a 7-point Likert scale to a battery of statements relating to the human relationship with nature. The author used Cronbach’s Alphas to determine how reliably the items measured the dimensions of environmental ethics: mastery over nature, stewardship of nature, partnership with nature, or participation in nature. These four ethics represent a spectrum, from a person possessing a ‘mastery’ environmental ethic believing in human dominance over the natural environment to a person possessing a ‘participation’ environmental ethic believing that humans and nature are more or less of equal value. The Cronbach’s Alphas were as follows: mastery – 0.67 (ADK and GYE); stewardship – 0.62 (ADK), 0.84 (GYE); partnership – 0.69 (ADK), 0.73 (GYE); participation – 0.63 (ADK), 0.60 (GYE).

Table 2.2: Four Dimensions of Environmental Ethics from Survey Instrument

Environmental Ethic	Battery of Statements
Mastery	a. Human beings have more value than nature b. Human beings have the right to alter nature radically
Stewardship	a. Human beings have a responsibility to conserve the natural environment b. Human beings are part of nature and are also responsible for it c. We have to ensure that we leave enough nature intact for

	future generations
Partnership	a. People and nature are of equal value b. We must not set ourselves above nature, but must work together with it c. Nature wants to grow, prosper, and develop, just like humans do
Participation	a. Human beings are part of nature b. I often feel an intense connection with nature c. Natural sites are important, even if they are not useful to us human beings

Note:

(1) Adapted from de Groot et al 2011.

(2) The scale means are taken on a 7-point scale, with 1=agree and 7=disagree

Behaviors (Land-Use Activities, Land Management Activities): Land-use activities were characterized by asking landowners to indicate the frequency with which they engaged in certain land-use practices on a scale from never to daily. Respondents were queried on a wide variety of behaviors such as wildlife feeding, lawn mowing, dining practices, and use of yard space, among other things. Answers could range from 1 to 5, with 1 indicating that the respondent never engages in the activity and 5 indicating that the respondent engages in the activity on a daily basis. The entire battery is reproduced in Table 2.2, below.

Table 3.2: Land-Use Activities: “Please indicate how frequently you or someone else has engaged in each behavior on your property during the past year, in the season in which this behavior is appropriate. (Please check one box for each activity.)”

a. Fed the birds
b. Fed wildlife other than the birds
c. Used fertilizers, herbicides, and /or pesticides
d. Mowed the lawn with a gas or electric lawnmower
e. Mowed the lawn with a manual lawnmower
f. Used a grill outside
g. Ate meals outside my house (e.g. on a porch, by a fire pit, etc.)
h. Listened to music outside my house
i. Had kids playing in my yard
j. Worked on a small construction project around my house
k. Used power tools (e.g. chainsaw, leaf blower)
l. Engaged in non-motorized winter recreation on my property
m. Walked dogs on my property
n. Hiked trails
o. Mountain biked
p. Went horseback riding
q. Went off-roading (i.e. with a ATV, dirt bike, snowmobile)

Landowners were asked to report on their more intensive land management activities. This battery of questions focused on management techniques such as road maintenance, silviculture, and broad-scale landscaping (see Table 2.3). Respondents were asked to answer the questions on a Yes/No basis to indicate whether or not they engaged in the behavior at all over the past year.

Table 2.4: Land-Management Activities: “Please indicate whether or not the following activities occurred on your property during the past year or in the season where this activity is appropriate. (Please check one box for each activity.)”

a. Maintained recreational trails or unimproved roads
b. Conducted forestry activities (e.g. cut trees, planted trees, thinned trees, etc.)
c. Maintained a flower or vegetable garden
d. Worked on a large construction project around my house
e. Maintained an artificial water source
f. Planted or maintained fruit trees

For the purposes of analysis and modeling, the land-use and land-management variables were calculated into two scales measuring intensity of use. The first summative index focused on the land-use activities in Table 2.2. The summative index was calculated by summing all responses to the land-use questions for each respondent and then dividing by 5 (the number of points in the Likert scale). I then took a mean score on the summative index across all respondents to generate an index on a 1 to 5 scale. A number closer to 1 indicates lighter or infrequent land-use (approximately yearly), while a number closer to 5 indicating more intense, perhaps daily land-use. The second summative index focused on the land management activities listed in Table 2.3 such as hunting, road maintenance, and trash storage. I asked landowners whether or not they engaged in these activities at all, so these questions were answered Yes/No, and results are thus reported on a 0 to 1 scale in the summative index. Again, the summative index was constructed by summing all results and the placing them on a 0 to 1 scale in this case after taking a mean score on the summative index across all respondents.

Attitudes, Norms, Behavioral Control, and Behavioral Intention: Behavioral intention was measured by asking about their intent to engage in activities that benefit wildlife (“Do you

intend to conduct activities on your land to benefit wildlife in the next 12 months?”). The results of this question were measured on 7-point Likert scale, with 1=disagree and 7=agree. This question was used as the dependent variable in the RAA model framework. Attitudes towards conducting wildlife-friendly behaviors were also queried (“How do you feel about conducting activities on your land that benefit wildlife?”); responses could be from 1=negative to 7=positive. Norms were measured by asking landowners to indicate the extent to which certain actors influenced their decision making (“How important is it to the following groups of people that you manage your land to benefit wildlife?”). The groups were family, spouse or partner, neighbor or other landowners, friends, wildlife professionals, and local community leaders. Responses could be from 1=not important and 7=very important. Similar to the indices constructed for land-use and land management activities, a summative index of norms was developed, and a Cronbach’s Alpha was calculated to measure the internal consistency of these measures; the Cronbach’s Alpha for the norms summative index was 0.88 in the ADK and 0.82 in the GYE. Behavioral controls were measured by using a summative index of limiting and influencing factors, again constructed in the same manner as detailed previously, to account for ways that controls could either prevent landowners from doing what they would normally do or encourage them to do things they might not normally (Limits: “Please indicate to what extent the following limit you doing activities on your land that you would normally do.” Influences: “Please indicate to what extent the following influence you to engage in activities on your land that you would not normally do”). Landowners were asked to what extent the following behavioral controls limited or influenced them: their own desire to benefit wildlife, opinions and actions of neighbors, ordinances of homeowner associations, town land-use regulations, the Adirondack Park Agency (ADK landscape only), recommendations from conservation groups, and state agency regulations. Responses could be from 1=does not limit/influence my activities to 7=limits/influences my activities. Cronbach’s Alphas were calculated to measure the internal consistency of these measures. The Cronbach’s Alpha for the limiting factors summative index was 0.83 in the ADK and 0.86 in the GYE. The Cronbach’s Alpha for the influencing factors

summative index was 0.89 in the ADK and 0.82 in the GYE. Landowners were asked to indicate the extent to which external influences on land-use decision making impact the activities in which they were able to partake in upon their private lands. Again, a Likert scale was used: landowners were asked to indicate on a 7-point scale, homeowner's associations, town or county land-use agencies, state agencies, family, friends, neighbors, wildlife professionals, and non-governmental organizations influenced or limited landowners' ability to manage their land. In addition to regulatory bodies and agencies, landowners were asked to comment on how their desire to benefit wildlife limited or influenced their behavior with respect to land-use ("Do you intend to conduct activities on your land to benefit wildlife in the next 12 months?"). Data from these questions was incorporated into regression analysis.

Demographic. Respondents were asked to indicate their level of education, primary place of residence prior to age 18, land tenure, percentage of time spent outdoors for work and leisure, and whether the respondent was a seasonal or permanent resident. This data was used to characterize this population of exurban landowners in greater detail.

Analysis

Research Question 1: What type(s) of environmental ethics do exurban residents identify with most strongly? Scale means and standard deviations for each of the previously determined environmental ethics (mastery, stewardship, partnership, participation) were calculated to understand the extent to which landowners identified with each environmental ethic. Additionally t-tests were conducted to see if there was a significant difference in the mean scores on the four environmental ethic scales between study sites.

Research Question 2: Is there a relationship between environmental ethics and the extent of land-use activities and land management on private lands in exurban areas? I answered the second research question by running a linear regression analysis with each of the four environmental ethics as independent variables with the summative land-use indices as the dependent variable.

Research Question 3: How do attitudes, norms, and perceived behavioral controls influence exurban landowner intention to engage in wildlife-friendly behaviors? I

conceptualized the third research question based upon the RAA; this approach required a model that examined the relationship between attitudes, norms, and behavioral controls (the independent variables) and behavioral intent (dependent variable) to test their collective predictive power of behavioral intent.

Results

The mail survey was sent to 508 residents across the two study sites. The response rate was 54% in the Adirondacks and 42% in the Greater Yellowstone Ecosystem. The survey population was 63% male in the ADK and 75% male in the GYE, on average was about 66 years old in the ADK and 65 years old in the GYE, and the vast majority had achieved high levels of education, with 88% in the ADK and 70% in the GYE possessing at least a bachelor's degree. While 39% of respondents in the ADK were raised in a suburban environment versus 24% in the GYE, 63% of respondents in the GYE were raised in a residential or agricultural rural area or small-town versus 37% in the ADK. Those from urban areas represented 24% of the ADK sample and 13% of the GYE sample. Residents in the sample from the ADK had owned their land for 23 years, while 16 years was the average land tenure for respondents from the GYE. 61% of respondents in the ADK were seasonal residents, and 69% were seasonal in the GYE. ADK respondents spent 49% of their time outdoors for leisure and 17% outdoors for work; in the GYE, respondents spent 56% of leisure time and 24% of work time outside.

Non-Response Error

Non-response was addressed through the second phase of data collection via semi-structured interviews with landowners (N=29). In the interviews, I targeted people in the study areas who did not respond to the survey. Asking an abridged subset of the questions on the survey, no differences were found in the meanings that landowners ascribed to their property, land-use and land management activities, and constraining and influencing factors on land-use in the sample of non-respondents, even when analyzed in light of gender and land tenure. It should

be noted however that mixing methods of inquiry can introduce other forms of bias, particularly given the fact that the interviews were open response while the survey provided answers from which respondents could choose.

Research Question 1: What type(s) of environmental ethics do exurban residents identify with most strongly? The results of the scale mean and standard deviation analysis used to investigate the first research question pertaining to the characterization of an exurban environmental ethic are listed in Table 2.4.

Table 2.5 : Scale Mean and Cronbach’s Alpha for the Four Dimensions of the Environmental Ethic

Environmental Ethic Dimension	Scale Mean		Standard Deviation	
	ADK	GYE	ADK	GYE
Mastery	2.52	2.90	1.39	1.56
Stewardship	6.62	6.49	0.61	0.76
Partnership	5.56	5.26	1.31	1.47
Participation	6.38	6.24	0.75	0.88

Note:

- (1) The scale means are taken on a 7-point scale, with 1=agree and 7=disagree.
- (2) t-tests were conducted to see if there was a significant difference in environmental ethics between study sites. No significant differences were found between sites.

The study population identified most strongly with the stewardship of nature ethic given the mean response was 6.6 (ADK) and 6.5 (GYE), followed closely by the participation in nature ethic (6.4 in the ADK and 6.2 in the GYE). Landowners identified with the partnership with nature ethic, but to a lesser degree (5.6 in the ADK and 5.3 in the GYE). The mastery over nature environmental ethic was not an ethic which landowners identified strongly with, given that the average response was 2.5 in the ADK and 2.9 in the GYE. T-tests did not reveal a significant difference between the means of the four environmental ethics between study sites, revealing perhaps the ethics may not be context dependent.

Research Question 2: Is there a relationship between environmental ethics and the extent of land-use activities and land management on private lands in exurban areas? Tables 2.5, 2.6, and 2.7 contain descriptive statistics for the summative indices of land-use activities and land management activities.

Table 2.5: Descriptive Statistics for Land-Use Activities Index

Study Site	Mean of Land-Use Activity Index	Scale Minimum	Scale Maximum	Standard Deviation
Adirondacks	2.12	1	5	0.59
Greater Yellowstone Ecosystem	2.22	1	5	0.51

Table 2.6: Descriptive Statistics for Land Management Activities Index

Study Site	Mean of Land Management Activity Index	Scale Minimum	Scale Maximum	Standard Deviation
Adirondacks	0.38	0	1	0.23
Greater Yellowstone Ecosystem	0.38	0	1	0.26

Table 2.7: Comparison of Seasonal and Permanent Resident Land-Use Indices

Landscape		Mean of Land-Use Activity Index	Standard Deviation	Mean of Land Management Activity Index	Standard Deviation
ADK	Permanent	2.3	0.39	0.45	0.21
	Seasonal	2.0	0.49	0.34	0.23
GYE	Permanent	2.4	0.53	0.55	0.22
	Seasonal	2.1	0.58	0.31	0.24

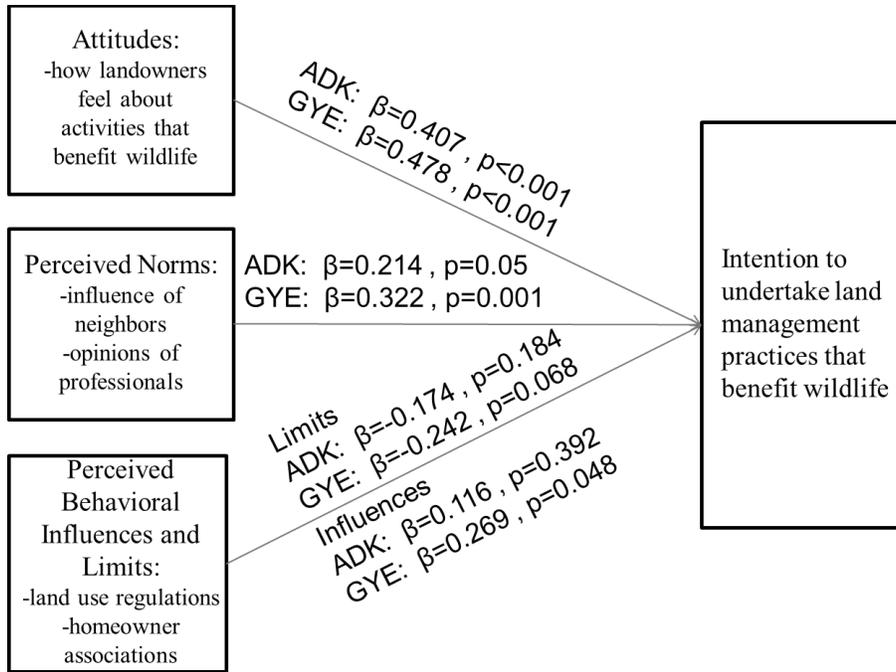
Based on the results, it appears exurban landowners do not intensively use their land when the activities are examined in aggregate using the summative index. The land-use activities are engaged in on a less than monthly basis on average as indicated by the means that range from 2.12 in the ADK to 2.22 in the GYE (Table 2.5). Landowners only engage in about 38% of the land management activities on average (Table 2.6). Results are similar when disaggregated for seasonal and permanent residents; however, permanent residents in the GYE do engage in over half of the land management activities (Table 2.7).

The results of the regression analysis used to understand the impact of the environmental ethic on land-use activities and land management activities showed that the environmental ethic is a very weak predictor of land-use activities and behaviors as well as larger scale land management in the study populations. None of the four environmental ethics predicted the intensity with which exurban landowners used their private parcels. Adjusted R^2 values were no

greater than 0.014 and p-values were no lower than 0.16 when analyzing the influence of the four environmental ethics and land-use and land-management activities in each study site.

Research Question 3: How do attitudes, norms, and perceived behavioral controls influence exurban landowner intention to engage in wildlife-friendly behaviors? The results of the regression analysis used to characterize the predictive power of attitudes, norms, and behavioral controls on behavioral intent are in Figure 2.2. Attitudes towards pro-wildlife activities were the most significant factor in predicting behavioral intent of exurban landowners with respect to undertaking pro-wildlife activities. Social norms played a weaker, but significant, role. There is a very weak prediction power between behavioral controls and behavioral intent in these landscapes.

Figure 2.2: Results of the Reasoned Action Approach Framework (Model)



Note: Adjusted R^2 values: 0.286 (ADK); 0.479 (GYE). F-statistic: 8.905 (ADK); 18.262 (GYE). p-value: <0.001 in both landscapes. n: 96 (ADK); 83 (GYE).

Discussion

The results of the analysis provide insight about exurban landowners and indicate the challenges of measuring an environmental ethic amongst exurban landowners. First, it is shown that an exurban landowner environmental ethic comprised of dominance or mastery over nature

is rejected by the landowners in this study through the results of the scale means (Table 2.4). This finding may have implications for conservation: exurban landowners feel that they have a responsibility in resource stewardship and possess more eco-centric or biophilic tendencies. The fact that the stewardship ethic was the one with which landowners most strongly identified is of particular interest. Of the four environmental ethic types, the stewardship ethic is the one that implies the greatest level of action or responsibility on the part of landowners, implying that landowners would be willing undertake efforts that would lead to conservation. This is consistent with studies of the general population (de Groot et al. 2011); the environmental ethics of European adults across the countries of France, the Netherlands, and Germany were similar to what was found in this study of landowners in exurban regions of the ADK and GYE regions – the stewardship ethic was strongest and the mastery one was weakest. It is also noteworthy that there was no significant difference in the environmental ethics of landowners in the ADK and GYE study sites. That these results hold true with the exurban populations surveyed here, even across the two landscapes in the study, implies that environmental ethics may transcend context.

The fact that none of the environmental ethics predict behavior indicates that landowners are performing the same activities on their lands regardless of how they view their relationship with the natural environment. This is interesting because it seems to indicate that there is a certain degree of homogenization with respect to extent of land-use and land management in exurban regions. The implication is that perhaps there is a typical land-use profile engaged in by exurban landowners that carries with it certain impacts. The only other study to examine exurban land-use in a comparable light, albeit by different means, found similar results insofar as management actions did not vary by conservation attitudes (Daniels and Kirkpatrick 2011).

In terms of the social psychological influences of landowner behavior, their attitudes, or how landowners felt about undertaking activities that benefit wildlife, were the most significant predictor of their intent to do so. It is noteworthy that perceived behavioral controls, such as regulations, homeowner's association covenants, the actions and opinions of neighbors, etc., largely did not have an impact on behavioral intent, except in the GYE. Though weak, norms do

exert a positive influence on behavioral intent, as friends, family members, community leaders, and wildlife professionals exert some influence on exurban landowners' intent to manage their land in a manner that benefits wildlife. The attitudes of landowners in this study towards wildlife-friendly behaviors are positive, and this is consistent with what other studies have found about exurban landowner attitudes towards the environment generally, i.e. forestry, aesthetics, nature (Knoot et al. 2009; Meador et al. 2011; Bastian et al. 2014).

Broadly speaking, exurban residents want to steward the environment and natural resources well based on the results of their environmental ethics. They feel positive about conducting activities to benefit wildlife, but they do not feel constrained by regulatory mechanisms or other behavioral controls that might require them to do so, pointing to the potential for failure of regulatory approaches.

Management and Policy Implications

Exurban residents' land very frequently adjoins state or federal lands, indicating that a collaborative approach could be warranted. This can take many forms, but based on the results of this study, educational interventions that show clear and concise means by which exurban residents can lessen their impacts on wildlife and minimize the pressures that parcelization places on forested and non-forested landscapes could perhaps be the most effective, particularly interventions that capitalize on these landowners' proclivity to be stewardship-minded. Given what could be construed as a mismatch between exurban landowners environmental ethics and the intensity of their land-use and land management activities on their land, convincingly demonstrating how conservation strategies related to land-use can serve to protect the aspects of the landscape that they value will make the issue salient for this population and cause them to be more likely to engage in behaviors that are friendly to wildlife and undeveloped land. Generally speaking, this research points to non-regulatory (given landowner interest in pro-wildlife behaviors and their lack of feeling constrained by regulatory mechanisms that already exist) and regionally specific (given the realities of land-use in specific exurban areas) interventions as a means for fostering pro-environmental behaviors with respect to wildlife and wilderness

conservation in exurban regions. Natural resource professionals looking to implement conservation interventions in these regions will find a willing constituency with whom to collaborate.

Limitations and Future Research

This study is limited in its ability to speak to the entire exurban population, since the study was conducted in two distinct research sites. Additionally, I opted to not conduct a standard telephone survey of non-respondents to the mail survey due the planned follow-up interviews. Given the semi-structured interviews that followed the mail survey, researchers affiliated with this project took care to avoid unduly burdening or confusing survey non-respondents to the mail survey with phone calls about both survey nonresponse and then follow-up interviews. The benefits of conducting semi-structured interviews outweighed the costs of not performing a standard telephone survey on non-respondents. However, the potential for non-response bias was addressed through the follow-up interviews of survey non-respondents; no major differences between mail survey respondents and non-respondents were found in the environmental ethics, land-use and land management activities, and constraining and influencing factors on land-use in the sample of non-respondents.

In terms of future research, one question that this study raises is whether or not measuring an environmental ethic is needed to understand landowner behavior. Analysis here and in other studies (Daniels and Kirkpatrick 2011) shows that ethics are weak predictors of the actions that landowners actually take on their private parcels. Perhaps future research could operationalize the concept of a land ethic in a more explicit way that measures the ideas that landowners have with respect to how their land should be managed rather than how they view their relationship with the natural environment generally. However, even though ethics have not been found to predict behavior directly, understanding the environmental ethics of exurban landowners is useful in its own right. Based on this study, we now know that landowners' environmental ethics demonstrate that they value their relationship with the natural environment and even feel themselves to be stewards of it. This can certainly inform the thinking of natural resource

professionals as they design future programming in exurban regions aimed at conserving open space and wildlife.

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CHAPTER 3: IMPACTS OF REGULATION LIMITED FOR INFLUENCING EXURBAN LAND-USE: THE ROLE OF EXTERNAL CONSTRAINTS IN EXURBAN PRIVATE LAND MANAGEMENT

Abstract

While the structure and function of ecosystems in amenity-rich regions may appear to remain intact in the face of residential development, exurbanization has been shown to change ecological communities in important ways. The ecological impacts of exurban development are well-characterized; missing from the literature is a discussion about the role that external constraints play in how exurban landowners manage their land. Using a mixed methods approach, this study examines the aspects of their private property that exurban residents ascribe value to, the specific land-use activities that exurban landowners engage in on their property, and the role that external influences such as regulatory bodies play in their land-use decision-making. Data from a mail survey and interviews conducted in two distinct settings, the Adirondack Park and the Greater Yellowstone Ecosystem, indicate that landowners ascribe meaning to the natural aspects of these landscapes in addition to the opportunities for peace and solitude that they afford. Exurban landowners engage in a suite of activities on their land that have implications for wildlife, including dog-walking, hiking, bird feeding, eating outside, silviculture, and gardening. Last, results indicate that landowners feel unburdened by regulatory institutions in their ability to manage their private land. This information is pertinent to any natural resource professional working in exurban landscapes.

Introduction

Exurban development is a recent phenomenon that is changing rural landscapes both socially and ecologically. Also known as rural sprawl, this type of residential development consumes ten times the amount of land area of urban and suburban development combined (Heimlich and Anderson 2001). Exurbanization, typically characterized as one detached single-family home on a 5-40 acre tract of land (Theobald 2001), has been shown to parcelize forests

(Egan and Morin 2010), fence rangelands, reduce biodiversity (Hansen et al. 2005), and change species composition (Glennon and Kretser 2013). While urban and suburban development occur within proximity to previous development, exurban development can occur in isolation of more urban areas and is parcelizing rural landscapes at a much faster rate than other types of development (Gude et al. 2006). Since the natural characteristics of exurban regions are vulnerable to the consequences of exurban landowner decision-making, it is necessary to know more about the new population of landowners that inhabits these regions (Cadieux and Hurley 2011). Specifically, little is known about the means by which exurban residents make decisions about their land based on internal and external influences and barriers to land management. This process warrants further investigation because it guides the types of land-use and land management activities in which exurban landowners engage. While scholarly research has documented the impacts of exurbanization to wildlife and natural resources (reviewed below), little attention has been paid to the meaning that exurban landowners ascribe to their land and the land management context that they operate under in exurban regions, which forms the basis of decisions they make about their land.

In this study, I explore the meaning exurban landowner's ascribe to their private property, characterize specific activities that exurban landowners engage in on a day-to-day basis, and investigate external constraints on land management such as regulatory bodies. Results of this study provide insights to those that work in exurban regions, such as non-governmental agencies and natural resource professionals who have a stake in conserving the biophysical amenities of exurban areas that serve as a draw for people desiring these characteristics where they live. Learning what meanings exurban landowners associate with their private property and examining this in the regional land-use regulatory setting allows conservation interventions to be tailored to the realities of exurban land-use. Informing those that work with exurban landowners, through the channels of government and private enterprise, about these internal and external impacts on land-use and land management could allow landowners and agency officials to work

in concert towards goals related to wildlife and open space conservation by highlighting grounds for collaboration and areas of common interest.

Literature

a. Impacts of Exurbanization

The body of exurban literature is burgeoning; in particular, studies regarding exurban development are extensive in terms of their focus on the ecological impacts of this type of land-use in the three broad categories of forests, wildlife, and indicators of environmental quality. In the area of forest parcelization and management, researchers (Egan and Luloff 2000; Rickenbach and Reed 2002) have shown negative impacts to old-growth forests as landownership patterns devolve from large-scale landholdings to individuals owning smaller tracts. Changing patterns of distribution of endemic and specialist species of fauna have been shown in exurban regions as well (Odell and Knight 2001; Glennon and Porter 2007); while biodiversity has not necessarily decreased, scholars have shown changes in the makeup of biotic communities in proximity to exurban development with generalist species outcompeting specialists in bird and mammal communities. Lastly, detrimental impacts to natural resources broadly like water quality have been demonstrated in the literature, with metrics such as dissolved oxygen content and the structure of macro-invertebrate communities indicating that water quality is in decline (Hansen et al. 2005; Bock and Bock 2009; Marcouiller and Tremble 2009).

While exurban development is less dense than suburban or urban development and might appear to leave the general structure and function of the landscape intact, researchers have documented negative effects on wildlife in exurbanizing regions, such as changing species composition (Glennon and Kretser 2013). These impacts can disproportionately impact specialist songbird species native to specific regions, leading to changes in community composition and abundance along edge habitat (Glennon et al. 2015). Similar results in terms of changes to species composition hold true for medium-sized mammals (Odell and Knight 2001). Since exurban development is highly land-intensive with respect to area (Heimlich and Anderson 2001), the overall effects of changes to bird and mammal habitat can be compounded over large

areas, making the impacts of exurbanization cumulative. Thus, exurban development can result in formerly vast and intact landscapes being divided by roads and houses (Egan and Morin 2010).

The overarching point is that exurban development has been shown to impact the ecology of the regions in which it occurs. Since this type of residential development places private landowners in charge of the land-use decision-making that occurs on these parcels, further investigation into this population of people and their land-use and land management activities is warranted to understand their choices and what they might potentially mean for the landscape. Glennon et al. (2015) suggest that the land-use decisions of private landowners may be an important driver of change in exurban regions. By noting that changes in bird species composition in regions marked by exurban development was similar across diverse ecosystems, the authors argue that other elements, such as humans and their associated behaviors and activities, may be shaping bird communities in regions undergoing exurbanization. Given that prior research in exurban areas (as reviewed below) has not characterized many of the land-use behaviors of private property owners, this study will contribute to this gap in the literature by specifying the day-to-day land-use and land management of exurban residents.

b. Exurban Landowner Decision-Making and Barriers to Action

Exurbanization often occurs as a result of seasonal and part-time residents or retirees seeking to move to areas rich in natural amenities facilitated by the modern convenience of telecommuting, or working remotely rather than in an office (Cadieux and Hurley 2011). Exurban landowners tend to value aesthetics and wildlife (Mealor et al. 2011), see benefits in cooperative management (Erickson et al. 2011), have a specific vision for what their land should look like (Knoot et al. 2009), and may not think at a regional or landscape scale (Bastian et al. 2014). Exurban landowners rarely value the landscape for economically productive land-use such as farming or grazing (Beus and Dunlap 1990; Gude et al. 2006; Kabii and Horowitz 2006).

While past research has shown that exurban landowners may not intend to degrade habitat (Bastian et al. 2014), little is known about the land-use decision-making of this

population. Meador et al. (2011) noted in their Wyoming study that exurban landowners live in exurbia for the aesthetic values and lifestyle but did not expect to make economic gains from their lands. Respondents to their survey had knowledge about and an interest in gaining more information about various natural resource related issues, such as water quality, landscaping, and invasive species. Knoot et al. (2009) also note the importance of aesthetics for exurban landowners in the Midwest. They found that timber management practices to regenerate stands of oak, such as clear-cutting, were not in concert with how exurban landowners felt their land should be managed. Knoot et al. (2009) conducted a series of interviews with natural resource professionals in the Driftless Area of the Midwest. These natural resource professionals explained that their impression of exurban landowners led them to believe that exurbanites were motivated to leave their forested lands intact because they purchased the lands for non-timber reasons, such as aesthetics and relaxation, and because they valued the views afforded by a forested parcel. This prevented them from engaging in timber management strategies that have been shown to be beneficial to certain tree species.

Bastian et al. (2014) noted that, while exurban residents in Wyoming were concerned about impacts of development to the environment, they did not consider the collective impacts of their individual land-use decisions, such as using pesticides that could damage wildlife or increases in residential development that could lead to a degradation of a general sense of place. Yet, this study showed that exurban landowners *were* concerned about transboundary effects, such as fencing, on neighbors. Erickson et al. (2011) found that exurban landowners in Vermont were interested in pursuing cooperative management of their lands, in this case for cooperative farming arrangements, across property boundaries. Bastian et al. (2014) found that an effective way to frame educational interventions for an exurban population would be to provide information related to landscape-level changes due to exurban development.

Bastian et al. (2014) also found that, in their survey population, financial concerns played a large role in the decision-making of the landowners; these residents ranked financial concerns highly on the survey along with other issues such as the natural environment. Thus, the authors

argue that correlating negative impacts to the environment due to land-use decisions with punitive financial penalties through fines for non-compliance or development fees could be an effective policy intervention that would speak to exurban residents' financial concerns. This result is surprising in some ways and incongruent with past studies since much research into exurban landowners has shown that they do not own land in these regions for economic benefit (Cadieux and Hurley 2011; Meador et al. 2011) but does stand to reason given these landowners would not want to suffer economic loss in their land holdings either.

Daniels and Kirkpatrick (2011) showed that the attitudes of Australian exurban landowners, with respect to the natural environment, had no impact on specific management strategies and presence of wildlife. This provides some confirmation of the Bastian et al. (2014) study where it was shown that, while landowners did have positive attitudes about the natural environment, these attitudes did not impact what actions they performed on their lands. While exurban landowners indicated they wanted to conserve natural resources, particularly wildlife, they all performed similar activities that had the same negative impacts on wildlife of degrading habitat and driving mammals away from their home sites (Daniels and Kirkpatrick 2011). The study conducted by Daniels and Kirkpatrick (2011) was limited insofar as the activities exurban residents were queried about limited to gardening and livestock and did not consider the broad range of land-use activities that exurban landowners might engage in on a more frequent basis that could perturb wildlife, such as improper trash storage and domestic animal activity. While it provides a useful basis for understanding the ecological impacts of attitudes and land-use on exurban landscapes, their study could have gone further to investigate some of the daily land-use activities in which exurban landowners engage. This is an understudied aspect of the literature and one that I begin to investigate by querying landowners about these seemingly benign, more daily aspects of exurban land-use.

c. External Factors in Exurban Landowner Decision-Making

Land-use regulations, such as government regulations and covenants in homeowner associations (HOA's), can impact the density and form of development patterns seen on the

landscape (Zellner et al. 2010). However, how these types of regulations, factor into exurban landowner decision-making is an aspect of exurban development that has been understudied (Cheung and Meltzer 2013). In addition to the well-documented land-use restrictions that may exist in exurban regions coming from local, county, state, and even federal regulatory bodies (Polasky and Doremus 1998; Benson 2001), HOA's provide an additional level of scrutiny and must be examined (Cheung and Meltzer 2014). HOA's can be thought of as a private mechanism of self-governance that act in a similar way to restrict or guide land-use and land management activities; these regulations, which landowners pay for the privilege of partaking in, often go above and beyond the regulatory burden of any local land-use planning agencies (Cheung and Meltzer 2013).

In their review of extant research on HOA's, Cheung and Meltzer (2013) found that no empirical study has ever been done to investigate the relationship between HOA's and local land-use. They used an ordinary least squares statistical analysis with data on HOA's in Florida and found that the prevalence of HOA's is positively associated with a propensity for land-use regulation and that HOA's are positively associated with incentive-based (rather than mandate-based) land-use techniques that direct development. In their 2014 study, Cheung and Meltzer (2014) found that predominantly white, higher income census tracts, and proximity to the city center are all factors that predict the arrival of HOA's. They also showed that census tracts in cities where spending on public services was low were more likely to have an HOA; they suggest that public spending and HOA services could be substitutable. Legal scholars believe that HOA's provide an optimal means for implementing conservation and sustainability-oriented regulations and covenants because they have the freedom to change with the times (Prum and Aalberts 2013).

Missing from this literature is an analysis of how landowners perceive their land-use options in the context of HOA's and local land-use regulations. While HOA's do provide a level of regulatory scrutiny for private landowners, it is important to know how landowners consider HOA's, in addition to county and state-level governmental planning agencies, in their land-use

decision-making. Additionally, the perspective of agencies and HOA's that govern land-use are missing from this conversation in the exurban literature. This study will investigate agency, HOA, and landowner perspectives on the extent to which these external entities influence exurban landowner decision-making with respect to land-use and land management.

Although research has documented the impacts of exurban development on wildlife and demonstrated that exurban landowners favor stewardship of nature, scholars have yet to characterize the broader social context in which exurban landowners make decisions about land management. Put another way, the regional land-use context has yet to be considered when examining exurban landowner attitudes and decision-making with respect to land management, and its subsequent impacts on wildlife. Researchers have not investigated the full spectrum of specific behaviors that these private landowners engage in on a day-to-day basis, which could affect wildlife. Further, much prior research has been limited to a single study site, so one cannot generalize findings across different contexts. As early as 2000, Egan and Luloff (2000) called for more social science research to characterize exurban development from the perspective of individual private landowners. Our research fills several gaps, including (1) incorporating data from two distinct sites in order facilitate broader understanding of exurban environments, (2) characterizing specific individual landowner land-use and land management activities in exurban regions, and (3) developing an explicit understanding of the regulatory drivers of exurban land management to understand the role of external factors in exurban land management.

Research Questions

1. How do exurban landowners describe what their land means to them?
2. What are the land-use and land management activities that exurban landowners conduct on their properties?
3. How do regulatory institutions impact the land-use and land management activities practiced by exurban landowners?

Methods

a. Study Sites

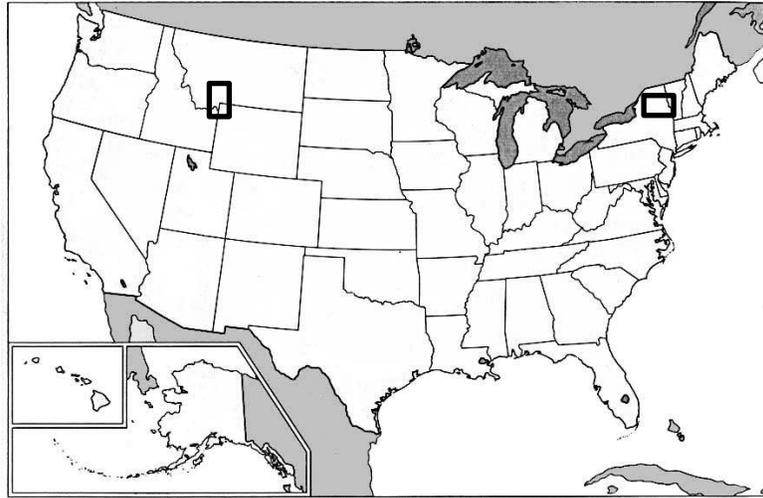
The research took place in two study sites in proximity to nationally and internationally renowned natural amenities: the Adirondack Park (ADK) region of upstate New York and the Greater Yellowstone Ecosystem (GYE) in Montana (See Figure 1). The ADK is comprised of approximately six million acres and is a mosaic of public and private lands. The region is characterized by various types of northern mixed forest cover (Jenkins and Keal 2004).

Approximately 134,000 people live in the Adirondack Park, and millions more are within one day's drive of the park (U.S. Census Bureau 2012). Data from ADK were collected from landowners in the towns of Keene, North Elba, and Wilmington in Essex County, NY.

The Greater Yellowstone Ecosystem (GYE) is comprised of Yellowstone National Park, Grand Teton National Park, and surrounding areas in southwestern Montana. Contrasted with the Adirondack Park, this region is quite heterogeneous in land cover and elevation, with land cover changing from sagebrush and grassland at lower elevations (4000 feet) to forest (11,000 feet) at higher elevations (Lesica et al. 2007). Thousands live in the environs of Yellowstone National Park, and millions of visitors frequent the region on an annual basis (National Parks Service 2012).

A two-phase, sequential mixed methods study design (Creswell 2013) was chosen to triangulate findings from survey and interview data. The mail survey was deployed first in the Fall of 2013, followed by semi-structured interviews in the Summer of 2014. Since few prior studies have investigated internal and external constraints on private land management, the survey could broadly tell us more about these influences on exurban land management; interviews could then get into the specifics of the mechanisms of these relationships. Then, by conducting the interviews after the survey, I was in a position to utilize the interviews to investigate themes uncovered in the survey, particularly around external influences on private land management in exurban regions.

Figure 3.1: Situating the Study Areas (Adirondack Park and Greater Yellowstone Ecosystem) in the US



These study sites were chosen for a number of reasons, most notably because both are amenity-rich regions undergoing rapid exurbanization (Glennon and Kretser 2013; Gude et al. 2006). While not located in proximity to a metropolitan area, the study areas are still experiencing the signature of exurban development, approximately one detached, single-family home per 5-40 acres. Further, though the study sites are in isolation of other more concentrated types of land-uses, their form and function is characteristic of typical suburban or peri-urban development but on tracts of land much larger in size, making the necessity of understanding the values of exurban residents critical since large acreages of land are vulnerable to their decision-making.

In the Adirondacks, rural housing developments have been a part of the landscape (Jenkins and Keal 2004), but only recently has research shown the impacts that exurban communities can have on ecological communities. For example, Glennon and Kretser (2013) showed that, compared to control sites, avian community structure differed from what one might typically expect in this ecosystem over 200 yards away from an exurban house due to altered habitat. With respect to land area, this equates to an ecological effect zone characterized by habitat degradation of up to 31 acres beyond the footprint of the building. Further, human-

wildlife interactions, reported as nuisance complaints to the state Department of Environmental Conservation, correlate to the presence of housing developments at exurban densities in the Adirondacks, as compared to urban or wilderness areas. This indicates that exurban development has placed humans into areas that increase the occurrence of human-wildlife interactions and impacts (Kretser et al. 2008).

From 1970 to 1999, the Greater Yellowstone Ecosystem experienced a 58% increase in population and a 350% increase in the area of rural lands used for exurban housing developments (Gude et al. 2006). As former ranchlands are converted to second homes for absentee owners (Gosnell et al. 2006), biodiversity is on the decline (Hansen et al. 2005; Gude, Hansen, and Jones 2007) and habitat for charismatic megafauna like grizzly bears (*Ursus arctos horribilis*) will dwindle (Schwartz et al. 2012), which is ironic given the draw of natural amenities for exurban residents. Both the ADK and GYE regions are amenity-rich areas currently experiencing the pressures of exurban development, both socially and ecologically. Developing an understanding of exurban landowner meanings and land-use behaviors could provide the basis for targeted interventions to minimize some of the negative impacts of this type of development, particularly because the decisions these people are making with respect to private land management could be the driving force behind the changes in ecology that we see.

b. Mail Survey and Sample

A four-wave mail survey (Dillman et al. 2014) was implemented to collect data from landowners in each study site beginning in September and ending in November of 2013. Mailings consisted of a cover letter and questionnaire, a reminder letter, another letter and questionnaire, followed by one last reminder letter, each spaced two weeks apart. The survey instrument (Appendix A) was designed as an 8.5 x 11 inch booklet that asked private exurban landowners with parcels in either of the two study areas questions about their environmental ethics, their land management practices, and the social and regional regulatory context that influence land-use decision-making, as well as some basic socio-demographic information.

County property tax databases from Essex County, New York, and Madison County, Montana, provided the sampling frame for the mail survey; counties maintain records on all landowners within their jurisdiction so addresses were publicly available for the mailing of surveys. Our study population in Essex County resides exclusively in the towns of North Elba, Wilmington, and Keene. In Montana, our population resides in unincorporated areas of Madison County. Thus, I sought to populate our study with an equal sample of residents from both sites who meet the appropriate tract size (5 acres or greater) to qualify as exurban landowners and further live in regions that are currently experiencing exurban development. An analysis of county tax roll data provided 248 landowners in Essex County, NY, and 260 landowners in Madison County, MT, who met the criteria of exurban land ownership across the two study sites.

c. Semi-Structured Interviews

Semi-structured interviews were used to gain a comprehensive understanding of the aspects of amenity-rich regions that landowners ascribe meaning to, the regulatory and non-regulatory constraints on their land management, and their attitudes and actions with respect to wildlife-friendly behavior. Given that little is known about these topics, qualitative inquiry is an excellent means of developing knowledge about the processes and mechanisms of these relationships (Patton 2002). The interviewees included both landowners and representatives of land-use organizations and agencies, with the assumption that representatives of agencies governing or guiding land-use could provide a clearer and perhaps unbiased understanding of the regional land-use context and its influencing and constraining factors. A subset of landowners participating in a connected ecological study who lived in the ADK and GYE were selected at random and contacted by telephone, email, or home visits and were asked to participate in an interview. Care was taken to ensure that the subset of landowners interviewed were taken from across the study areas and not concentrated in one or a few housing developments but rather represented the geographic breadth of both landscapes. This was done by limiting the number of interviewees from a given subdivision. For agency interviews, a list was compiled of government positions that have regulatory land-use authority along with lists of Homeowner

Associations (HOA) as these can also influence what activities can take place on exurban lands. Individuals in these government positions and HOA's were contacted by email, telephone, or office visits and asked to participate in an interview. The lists were developed based on the land-use regulatory context in each state, and I attempted to census those in the study area who were in positions to influence landowner decision-making.

A total of 29 landowners were interviewed across the two sites (15 in ADK and 14 in GYE), and 16 representatives of various land-use regulatory and non-regulatory bodies were interviewed (9 in ADK and 7 in GYE). The positions of the agency representative interviewees are included in Table 3.1. Interviews in the GYE were conducted from May to August of 2014; interviews were conducted in the ADK in August 2014. Interview guides for both groups are included in Tables 1 and 2 in Appendix B. Most interviews were conducted in person, either at the home of the landowner or the place of work of the agency representative; 10 of the 45 total interviews were conducted on the telephone due to the fact that many landowners in both landscapes are second homeowners and were not in the region when interviews were conducted. Interviews averaged 29 minutes in length.

Table 3.1: Positions of Agency Representative Interviewees

Interviewee Title	Number of Interviewees
County Planner	2 ADK, 1 GYE
State Planner	1 ADK, 1 GYE
County Planning Board Member	1 GYE
Ranch Manager	1 GYE
County Commissioner	1 GYE
HOA Board President	2 GYE
Regional Planner	1 ADK
Town Code Enforcement	2 ADK
Town Elected Official	2 ADK
Town Planning Board	1 ADK

Landowner interviews covered issues related to the meanings they ascribe to the land, daily land use activities, and the constraints and influences on their land management strategies. For agency representatives, the focus of the interviews centered on daily activities in their given role, mechanisms by which they can constrain and facilitate land-use, interest and concern in wildlife and conservation, and the relationship they have with those under their purview.

Interviews were audio recorded, transcribed, and thematically coded based on the relevant variables, such as landowner meanings, constraints and influences on decision-making, and concern for wildlife, identified in the literature. The coding framework is provided in Appendix C. Coding was done in the software program Atlas.ti. This study, including both the mail survey and the semi-structured interviews, was conducted under a university-approved Human Subjects protocol.

Data Analysis

Research Question 1: How do exurban landowners describe what their land means to them? Research Question 1 was answered using survey data and interview data. In the mail survey, I asked respondents to “please write three words that best describe what your land means to you.” I compiled a full list of words and determined the frequencies of words provided in response to this question. Prior to computing frequencies for the bar graph, the raw survey data was modified so that words similar or identical in meaning were streamlined; for example, if the root words were the same but the parts of speech were different, all words with the same meaning would be changed to the same part of speech, typically the noun form, so that in this case any instances of ‘natural’ would be coded as ‘nature.’ Research Question 1 was also addressed through an analysis of the interview data. Landowner interview transcripts were coded thematically based on important themes found in the literature a priori (Boyatzis 1998); the codebook contained codes related to landowner meanings, concern and interest in wildlife, and constraints and influences on land management (See ‘Coding Framework’ in Appendix C). Text assigned the ‘Landowner Meaning’ code in the transcribed interviews were reproduced below to demonstrate the aspects of the landscape to which exurban residents ascribe meaning.

Research Question 2: What are the land-use and land management activities that exurban landowners conduct? I examined survey data related to the activities in which landowners engaged upon their lands. The frequencies in which they engage in these activities, such as hiking, biking, grilling, and dog walking, are included in the results. I also asked

landowners whether or not they engaged in land management activities, such as large-scale construction, silviculture, landscaping, and road or trail maintenance.

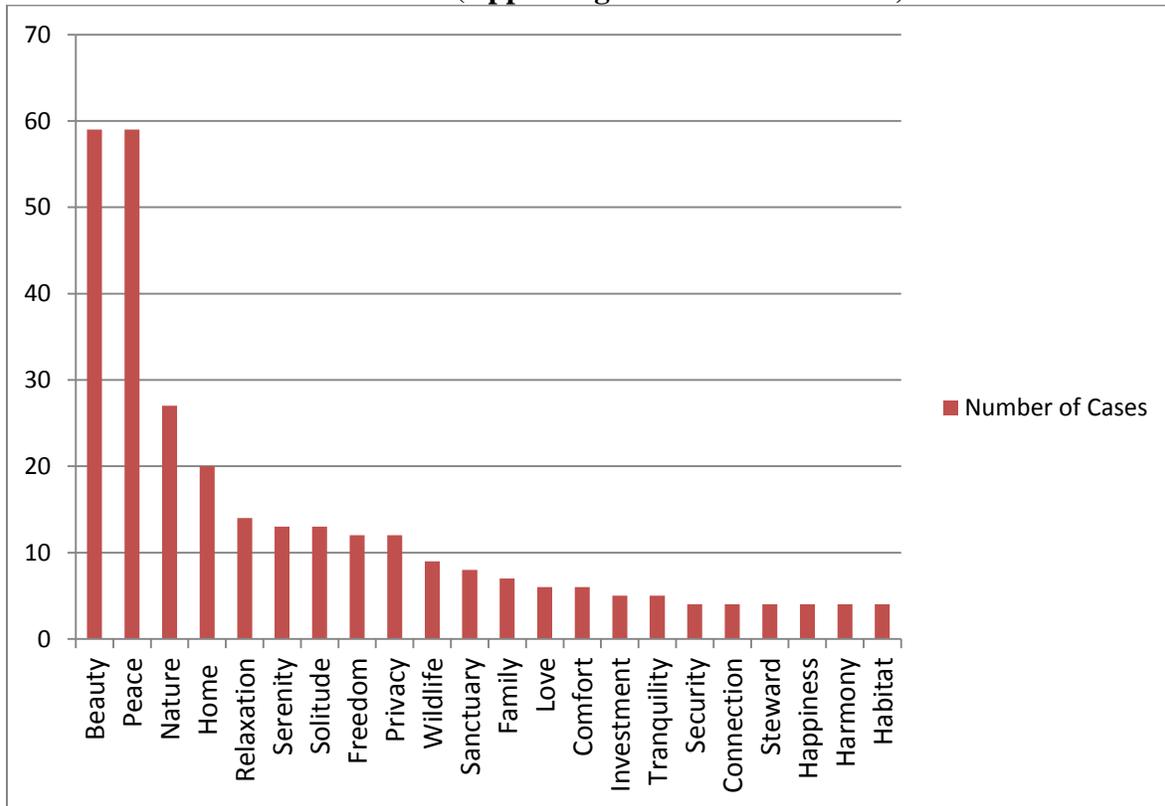
Research Question 3: How do regulatory institutions impact the land-use and land management activities practiced by exurban landowners? The regulatory and non-regulatory constraints on exurban land management are represented in diagrammatic form in the results based on the content of the interviews with representatives of agencies and organizations that impact land-use as well as document analysis. Based on the interview results, I group the data into several categories and propose a graphic representation of the relationships between different entities and the influence these external factors have on landowner management. An inductive approach was taken with respect to the agency interviews because it was unclear prior to the data collection phase what the de facto situation was with respect to how regulation impacts landowners and how landowners perceive these impacts of regulation. Qualitative work can be used to characterize social-ecological systems and the mechanisms of given relationships when little is known about their workings (Patton 2002). Primary sources for document analysis including planning documents and these also provide a basis for the diagrammatic representation of how landowners interact and are influenced by hierarchical forms of regulatory governance and are quoted where pertinent. I included landowner quotes that were coded (Boyatzis 1998) as indicative of constraints or influences on land management.

Results

The response rate was 54% (n=125) in the Adirondacks and 42% (n=98) in the Greater Yellowstone Ecosystem. The survey population was 68% male, on average was about 65 years age in age, and the majority had achieved high levels of education, with over 80% possessing at least a bachelor's degree. While 32% of respondents were raised in a suburban environment, nearly half (48%) were raised in a residential or agricultural rural area or small-town. Landowners in the study sites had owned their parcels for an average of 20 years and 64% were seasonal residents.

Research Question 1: How do exurban landowners describe what their land means to them? A total of 400 words were analyzed from the survey responses. The results are contained in Figure 3.2, where their relative frequencies are noted in bar graph format. When asked what their land means to them, exurban landowners most frequently replied ‘beauty’ (59 cases), ‘peace’ (59 cases), ‘nature’ (27 cases), and ‘home’ (20 cases). Some of the notable infrequent cases due to their divergence from the more typical responses were ‘investment’ (5 cases), ‘security’ (4 cases), ‘ownership’ (3 cases), and ‘off-grid’ (1 case).

Figure 3.2: Most Frequently Occurring Words Regarding What Land Means to Landowners (Appearing Four Times or More)



Similarly, in the interviews, many of the same characterizations of property reappeared consistently. Meanings that were coded as such when themes pertaining to ‘beauty,’ ‘peace,’ ‘nature,’ and ‘home’ were mentioned in the interviews a total of 91 times over the course of 29 interviews. It is important to note that landowner meanings came up even in instances in which they were not directly asked about, particularly in sections related to landowner motivations

regarding their original land purchase. When asked about why landowners originally purchased land in the region, they would describe aspects of the landscape that they ascribe value to, and these would then come up a second time when landowners were asked to describe what their land means to them. Below (Table 3.2) are quotes from the interviews that demonstrate some of the landowner meanings that appeared most frequently in Figure 3.2.

Table 3.2: Quotes Illustrating Landowner Meanings

Landowner Meaning	Illustrative Quote
Beauty:	<p>(1) Fly fishing and the beauty and hiking in the mountains. (GYE)</p> <p>(2) Probably more often it's just appreciating the beauty. (ADK)</p>
Peace:	<p>(1) This is where I want to die. Put it that way. Live and die. (GYE)</p> <p>(2) I mean it was work-related to be specifically here but having a rural lifestyle is important to us, privacy and peace and quiet and, and feeling like you were in what you value, living where you value. (GYE)</p>
Nature:	<p>(1) I mean living in the woods is the number one appeal of the whole thing is just the fact that we're in the woods, surrounded by trees and just no one else but animals. (ADK)</p> <p>(2) I tried to make it, the outside be as close to Nature as possible. (ADK)</p> <p>(3) I think first of all loving nature and being a naturalist and, and being trained as a biologist I enjoy it just because it's kind of like going to a zoo in your own land, on your own place you know so that we enjoy about it. We love the beauty of it, the beauty of nature. We also enjoy the, the peacefulness and the serene. (ADK)</p> <p>(4) Yeah, I don't want to hurt nothing. I just enjoy watching them. So, that's just my love for Mother Nature. (GYE)</p>
Home:	<p>(1) I'm sure that we'll develop a sense of place, you know a place where we're very connected to, to not just living here in the house but connected to the, to the house, the land that surrounds the house, the land that's beyond the house so a sense of place for me is, is my immediate environment sitting at this table, living in this house, living on this hill next to the oasis here next to the wild land that surrounds the oasis and then the valley beyond. (GYE)</p> <p>(2) You know I guess it's just home. (ADK)</p>

(3) My spiritual home, I love it more than anything. And I would be quite happy to spend every, every waking hour looking at the clouds over the mountains. That's what, what my land means. (ADK)

Research Question 2: What are the land-use and land management activities that exurban landowners conduct? The second research question is addressed by examining the day-to-day activities that landowners may engage in on their private lands. On the mail survey, I asked landowners about two distinct sets of activities, land-use activities and land management activities. Land-use activities are reported as frequency percentages in Tables 3.3 and 3.4.

Table 3.3: Frequency of Land-Use Activities in the Adirondacks

Frequency (by percentage) with which landowners engaged in the following behaviors in the ADK	Daily (%)	Weekly (%)	Monthly (%)	Yearly (%)	Never (%)	n
Walked dogs on my property	31	9	10	7	43	108
Hiked trails	19	21	27	14	19	108
Fed the birds	18	13	18	10	42	108
Ate meals outside my house (e.g. on a porch, by a fire pit, etc.)	13	25	34	9	19	109
Had kids playing in my yard	9	7	25	22	36	108
Engaged in non-motorized winter recreation on my property	7	16	20	25	32	111
Fed wildlife other than the birds	3	2	4	3	89	109
Listened to music outside my house	2	13	18	6	61	110
Worked on a small construction project around my house	2	14	31	38	16	110
Went off-roading (i.e. with a ATV, dirt bike, snowmobile)	2	2	5	0	94	111
Used a grill outside	1	34	32	14	19	109
Used power tools (e.g. chainsaw, leaf blower)	1	14	44	27	14	104
Used fertilizers, herbicides, and /or pesticides	0	1	10	34	55	108
Mowed the lawn with a gas or electric lawnmower	0	25	35	14	27	109
Mowed the lawn with a manual lawnmower	0	4	1	3	93	109
Mountain biked	0	7	11	5	78	111
Went horseback riding	0	1	1	0	98	112

Table 3.4: Frequency of Land-Use Activities in the Greater Yellowstone Ecosystem

Frequency (by percentage) with which landowners engaged in the following land-use activities in the GYE	Daily (%)	Weekly (%)	Monthly (%)	Yearly (%)	Never (%)	n
Walked dogs on my property	44	8	9	12	28	87
Hiked trails	33	17	9	15	26	86
Had kids playing in my yard	15	11	17	22	35	86
Ate meals outside my house (e.g. on a porch, by a fire pit, etc.)	14	31	25	14	17	88
Fed the birds	13	8	14	9	56	86
Used a grill outside	11	34	23	13	17	88
Worked on a small construction project around my house	9	12	26	45	8	87
Listened to music outside my house	8	9	15	13	53	85
Mountain biked	6	8	5	12	70	87
Engaged in non-motorized winter recreation on my property	5	9	9	22	55	87
Went horseback riding	5	10	6	8	71	87
Used power tools (e.g. chainsaw, leaf blower)	4	8	24	45	20	85
Fed wildlife other than the birds	1	4	1	5	89	85
Used fertilizers, herbicides, and /or pesticides	1	0	2	53	44	85
Mowed the lawn with a gas or electric lawnmower	0	21	33	33	13	87
Mowed the lawn with a manual lawnmower	0	1	4	4	92	86
Went off-roading (i.e. with a ATV, dirt bike, snowmobile)	0	9	10	18	62	87

Walking dogs, hiking trails, using a grill, and eating meals outside were the most frequently engaged in land-use activities by landowners in both sites. For land management activities (Tables 3.5 and 3.6), I again used survey data to investigate whether or not landowners were performing any large-scale management of their land. In the ADK, more than half of the landowners in the sample engaged in silviculture (due to the forested nature of that landscape) and flower or vegetable garden maintenance. In the GYE, no more than half of the landowners engaged in any land management activity.

Table 3.5: Frequency of Land Management Activities in the Adirondacks

Percentage of landowners who engaged in the following land management activities in ADK	Yes (%)	No (%)	n
Conducted forestry activities	72	28	117
Maintained a flower or vegetable garden	63	37	117
Maintained recreational trails or unimproved roads	49	51	117
Worked on a large construction project around my house	18	82	117
Maintained an artificial water source	15	85	118
Planted or maintained fruit trees	13	87	116

Table 3.6: Frequency of Land Management Activities in the Greater Yellowstone Ecosystem

Percentage of landowners who engaged in the following land management activities in GYE	Yes (%)	No (%)	n
Maintained a flower or vegetable garden	50	50	97
Conducted forestry activities	47	53	96
Maintained an artificial water source	44	56	96
Maintained recreational trails or unimproved roads	42	58	96
Worked on a large construction project around my house	27	73	96
Planted or maintained fruit trees	23	77	96

Research Question 3: How do regulatory institutions impact the land-use and land management activities practiced by exurban landowners? Interview data show that the regulatory structures of the ADK and GYE regions do not significantly impact what landowners can and cannot do on their land with respect to private land management. See Figures 3.3 and 3.4 below for a graphic representation of the agency representative interview data and document analysis results. These figures show the relationships between agencies and HOA's and the process by which regulatory requirements impact the landowner and his or her land-use and land

management; more specifically, in representing the results of the interviews, they show that the means by which external forces can influence private land management are minimal. While the landowner interviews did uncover some constraints on land management, such as homeowners associations and the county weed board in the GYE and town planning boards in the Adirondacks, the impacts of these factors were all minor in comparison with the ability of landowners themselves to manage their land.

Figure 3.3 presents a diagram showing the regulatory framework in the ADK. It was developed based on interviews with landowners, regulators, and documentation provided by regulators. The Adirondack Park Agency (APA), a state-level agency tasked with managing development within the Adirondack Park, has control over the distribution and density of development, but after the building phase of housing projects, particularly with respect to house siting near wetlands and other protected areas and well-digging, the APA plays little role in how landowners manage their land. In fact, document analysis shows that APA's land-use regulatory authority can often be devolved to the lowest level of jurisdiction: "local land use programming provides local government the administration and enforcement of certain Agency authority over land use and development in their town" (APA Approved Local Land Use Programs – Information Sheet 2011). Allowing lower levels of governance to be in charge of the APA's land-use regulatory authority provides towns with the benefits of coordinated permit systems, local jurisdiction, and authority over subdivision planning that does not involve wetlands, local participation in Agency reviews, local authority over shoreline restrictions, and refinement of density patterns. Through this process, the APA is demonstrating its ability to work through lower channels of government like the town but also its ability to impact landowners directly (in wetland management, for example).

County-level land-use planning exists in the Essex County in an advisory and fiduciary role, essentially providing towns and hamlets with the funds to implement comprehensive plans, but not impacting what landowners actually do on their lands. This was demonstrated in a series of publications that describe the role of counties as sponsoring research that towns and hamlets

can then use to develop comprehensive plans. The publications were titled “Hamlets of the Adirondacks,” “Hamlets of the Adirondacks: Development Strategies,” and “Hamlets: 3” published in 1983, 1985, and 2010, respectively. The first publication begins with strategies for pursuing economic development through means like waterfront development (Trancik 1983) and the most recent publication fully advocates for smart growth policies to be implemented into the comprehensive plans that towns may develop (Trancik 2010). Counties play an advisory role with respect to comprehensive planning to support towns located within the county (Trancik 2010). In the ADK, there is more regulatory structure at the town than county level. For example, there are town code enforcement officers as well as town planning boards that have some power to impact land management strategies. However, interview data with landowners, demonstrated through quotes, indicate that these institutions have little impact on what landowners are doing on their land: “We have had no big concerns, gripes about the amount of regulation in the way of construction and zoning,” “Nothing has felt heavy-handed so we’re fine with it all,” and “On the local level, just from the building inspecting, were you know the setbacks of your house, but we didn’t really have an issue with any kind of setback.” Further, the comprehensive plans developed by the towns demonstrate that the towns themselves are in direct control of how land-use plays out in their purview (Town of Newcomb Comprehensive Plan 2010). “The comprehensive plan is a policy guide that sets forth directions for the future of a community”; it is not law but rather a guide to direct future planning and decision-making (p.1). The comprehensive plan, however, portrayed potential regulatory abilities at the town level, such as decisions about housing density and location of development, to achieve the vision laid out in the comprehensive plan. It is important to emphasize that the town is not required to adopt any actions laid out in the plan.

HOA’s do operate loosely in subdivisions in the ADK study site; however, they are self-governing organizations that focus on road maintenance and water access, generally lacking covenants by which land-use is restricted or influenced, as indicated by the landowner interviews. While interactions within these HOA’s were documented to take place with respect

to payment for services such as water, they did not seem to impact landowners beyond the building phase, demonstrated through landowner quotes, such as “I mean we manage it the way we think it ought to be managed. Nobody’s telling us what to do.” While state, town, and HOA regulatory policy could all directly impact landowners (and the county indirectly), the individual landowner felt solely responsible for land management (Figure 3.3).

Figure 3.3: Process for Potential Regulatory Constraints on Land-Use in the Adirondacks

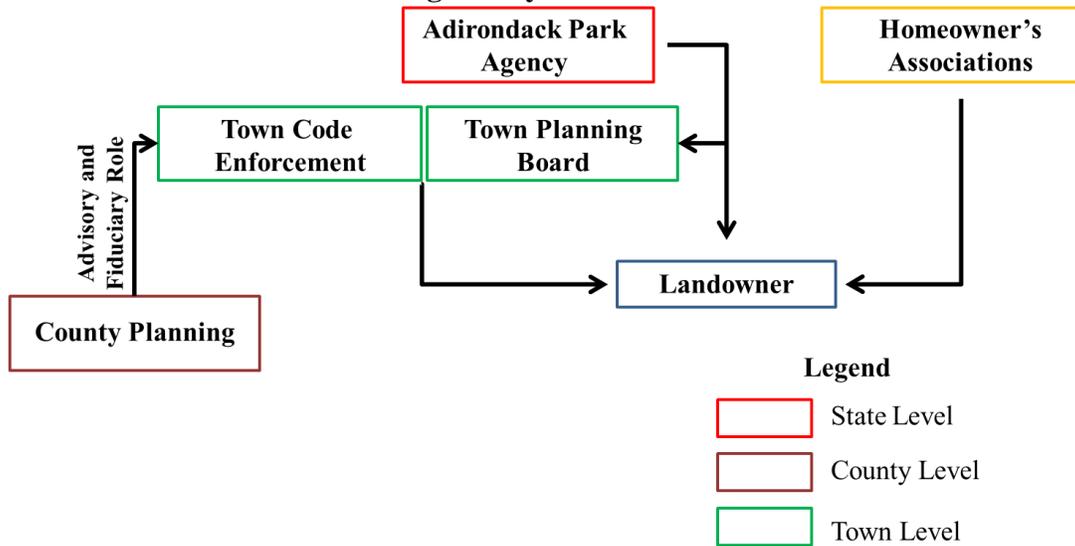


Figure 3.4 shows the regulatory framework in the GYE. The noteworthy aspect is that there is significantly less regulatory structure in this study site. In the diagrams, it can be seen that each box represents an entity that might exert management authority; when comparing the diagrams for the ADK and GYE study sites, there are fewer boxes in the GYE, meaning less regulatory structure. The state level wildlife management agency, Montana Fish, Wildlife, and Parks, has little power over land-use in Montana, and what control it does have is directed at the subdivision-level with respect to siting and permitting, as well as river setbacks, as shown in an interview with a state land-use planner from Montana Fish, Wildlife, and Parks and in a planning document (Forwand 2004). The state land-use planner noted: “What, what I could impact, I was strictly and this is where it’s important that you realize I was not a land manager making any decisions about land-use myself; I was strictly advisory.” With respect to regulatory powers, the

planner also noted, “As land use planners for Montana Fish, Wildlife and Parks, I would say the majority of my work was spent with or my time was spent with my biologist colleagues and county planners on ways to improve the consideration given to fish and wildlife in subdivision development.” The planning document, ‘Building with Wildlife,’ makes it clear that most guidelines at the state or county level are considered voluntary, particularly with respect to private landowners (Forwand 2004).

Conservation-oriented development, termed “conservation subdivisions” in the guidelines, is couched as a recommendation. This sentiment is echoed in a publication from the Madison County Planning Board called ‘Code of the New West’ (Madison County Planning Board 2005). The state agency does its land-use regulatory work through county planning in the GYE, and the county-level of governance does have more direct control over development and land-use than in ADK, but it is minimal and focuses on permitting subdivisions. In the GYE, a county planning board is responsible for recommending an approval or rejection of an application for development, on which county commissioners will then vote, as documented in an interview with a county planning board member in the GYE. The county planning board member said, “When the workload was lots of development to review, right, right so we recommend, the board recommends to the commissioners, and the commissioners make the decisions” about whether to accept or reject a plan for a subdivision. The planning board member also demonstrated what some of the board’s considerations were “river setbacks, stream setbacks we do have setbacks for subdivisions” and “locating development close to existing development so that you don’t cost the county more money to provide new services.” The design guidelines in the ‘Code of the New West’ (a publication of the Madison County Planning Board) are voluntary and appeal to residents encouraging them to be good neighbors and citizens of rural Montana. Design guidelines are just that – the Madison County Comprehensive Plan encourages “conservation subdivisions” but does not require them (Madison County Planning Board 2005). Resources are provided to developers for incorporating this type of thinking into the planning process. The Madison County Comprehensive Plan acknowledges that the region is

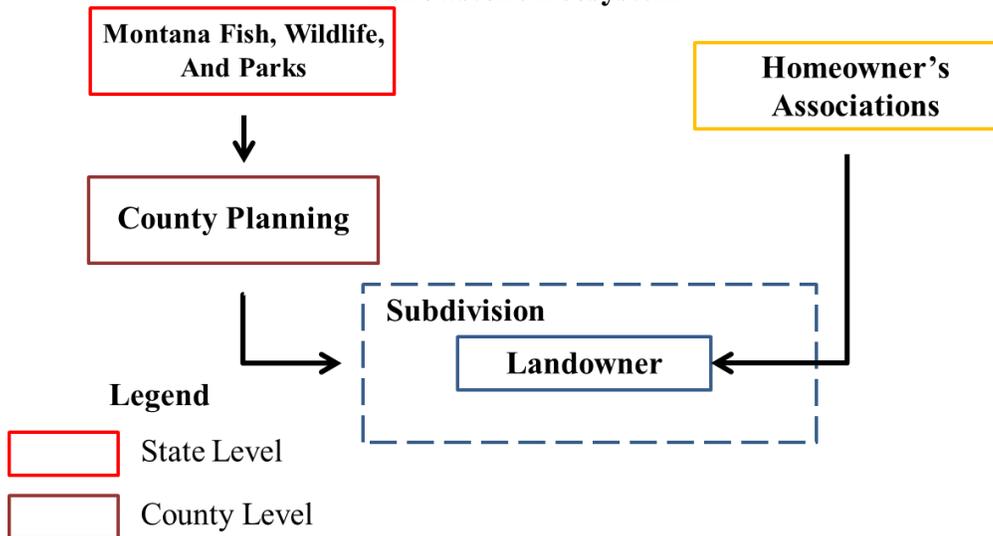
undergoing development marked by a decade of “growth and change” (p. 14), and in response to this, voluntary design guidelines are offered in the plan that focus on signage and billboards, architectural compatibility with the rural landscape, ridgeline and view shed preservation, fire protection in the wildland-residential interface, and dark skies preservation. The document goes on to note that the county-level Planning Board is not able to provide the same level of service as larger city governments and encourages landowners to be self-sufficient (p. 3). All of this is further demonstrated through an interview with the county’s sole land-use planner. It is important to note that county planning is limited in their ability to reach landowners on the level of private land management. The GYE county planner I interviewed said the planner’s role was “more to guide not dictate,” implying the burden was on landowners to make decisions about land-use and land management as opposed to this being the duty of the county. The county was limited in its abilities to provide even basic services: “you understand that there are certain things that, as a landowner, you’re going to have to take care of yourself,” according to the county land-use planner. Their level of involvement essentially ends at the subdivision level, the land-use planner indicated, where the county is involved in a three step process “it’s reviewed, pretty intense review at the, the preliminary plot phase, then it’s ‘okay, yeah you can go do it but you have to do these other things’ and then you see if they did those other things and if they meet all the requirements, they’re, they’re good to go and the commissioners will approve it.”

Interview data suggest that HOA’s can impact private landowner land management in the GYE. In some cases the impact of HOA’s is limited due to the ability to opt out of covenants that were created before a certain date due to a ruling of the Montana Supreme Court (Windemere Homeowners Association Inc. vs. McCue, 1999). Both representatives of HOAs that I interviewed in the GYE indicated their role was more advisory than regulatory: “There should be guidelines rather than rules, that’s kind of my, my theory on it” and “the only guidelines we can provide is, there’s a certain section in the CCRs that says things like you know ‘your buildings can’t be this color, they can’t be that color’.” Both HOA representatives described their HOAs as “running smoothly” and “well-oiled machines” indicating there was not

a large amount of contention amongst landowners involved in these self-governing arrangements, although admittedly this could potentially vary across subdivisions. Also of note is that, of the two HOAs interviewed only one had a mandated design review process or a homestead siting process. The power of the HOA's to limit and influence land-use and land management, however, was limited, with landowners indicating through the interviews the following sentiments when asked who had the final say in their land-use decision-making: "Me. I control it all" and "As far as land management of my personal land here, yeah, I'm the one" (two landowners from the GYE study site). With respect to the HOA's and their role in conservation, through the interviews there seemed to be an interest in considering resource-related issues on a subdivision level but little in the way of actual regulation.

County code enforcement does not exist in Madison County, with the exception of the weed board, which controls for invasive weeds (Madison County Planning Board 2005); indeed, this is one of the few things that the guidelines in 'Code of the New West' are direct about, indicating that landowners have a legal responsibility to manage for invasive knapweed. Town code enforcement does not apply to housing developments in this study area because they are located in unincorporated Madison County.

Figure 3.4: Process for Potential Regulatory Constraints on Land-Use in the Greater Yellowstone Ecosystem



Discussion

Exurban residents in this study ascribe meaning to beauty, peace, and nature, among other things in their private land holdings. We can see through these aspects of their property meanings that they have an appreciation for the natural environment and the peace that development at exurban densities can provide. Findings in this study suggest that, given the meaning landowners ascribe to the natural environment and the solitude it affords, they do not intend to change the natural environment in which they have chosen to live in a way that would be detrimental to the things they enjoy. Results show that landowner motivations for purchasing land in these exurban regions indicate they do not own their land for economic gain. This finding is interesting in light of the results of the Bastian et al. (2014) study (in which financial penalties were shown to be a motivator for exurban landowners) and implies that perhaps financial penalties may not be effective in these study areas. The results of this study show that the aspects of exurban landscapes that landowners value are correlated to opportunities for the enjoyment of the natural environment as well as the ability of landowners to escape the pressures of their daily lives. These findings are consistent with many past studies on exurban and other non-industrial private forest owners (Daniels and Kirkpatrick 2011; Quartuch and Beckley 2013) and amenity migrants (Cadieux and Hurley 2011). These characterizations of beauty, peace, and nature reflect the desires that landowners may have for exurban landscapes; land-use regulatory agencies were also shown to be interested in conserving some of these aspects of the landscape through regulations and guidance focused on these ends. Indeed, when such goals for landscape conservation align with each other, the contentiousness of implementing interventions can be minimized or avoided. Working together towards common goals, particularly when incorporating multiple parties and stakeholders, can contribute to success in community-based resource management (Pollnac et al. 2001; Quartuch and Beckley 2013).

Exurban landowners have demonstrated that they perceive that they ultimately possess the greatest amount of control over their land. Therefore, I believe that they would be open to

adopting behaviors that are neutral or even beneficial to the wildlife and open spaces of these regions based on their descriptions and characteristics of their land that are important to them. Aside from nuisance laws and public trust resource stewardship (such as wetland regulations), landowners possess explicit and ultimate control over their properties after lot development has occurred; therefore, working at the individual or perhaps subdivision level of land management could be the most promising avenue for implementing conservation interventions.

HOA's could provide a venue in which to pursue conservation-oriented interventions aimed at modifying private exurban landowner behaviors. Both of the representatives of HOA's that I interviewed in the GYE indicated that they saw resource or wildlife conservation as a part of their duty, even if they did not have a mandate from landowners within the subdivision to act on this aspect of their duty. Prum and Aalberts (2013) argued that HOA's are an optimal legal avenue for implementing conservation and sustainability-oriented regulations and covenants, mostly due to their more flexible nature. Since results of this study indicate that HOA representatives feel conservation is a part of their duty, perhaps the non-governmental community or natural resource professionals could work with HOA's to achieve these ends. Proceedings at recent forest products industry meetings indicate that this may already be occurring in practice but has not yet been examined empirically in the literature (Keegan 2014). The results of this study indicate that there are few or no constraints on the actual activities that landowners engage in on their property within the subdivision in which this research took place. Since landowners engage in day-to-day activities that they may not even realize could negatively impact the ecology of the exurban landscape, further ecological research will be necessary to assist HOA's in determining which of their behaviors are most impactful to wildlife and could thus be controlled by new covenants, conditions, and restrictions (CC&R's).

It should be noted that a non-regulatory approach (from a municipal, county, or state level) for landowners does not preclude a regulatory approach for land developers. Since landowners in this study have already built structures on their property, much of the impact of parcelization with respect to the introduction of houses and roads may have already been

realized. To prevent or reduce these impacts in places that do not have housing developments currently but may in the future, placing restrictions on land developers through the county- or town-level of governance could create benefits for conservation, while taking into account the economic realities of these rural regions. Utilizing the results of ecological studies in exurban areas (Egan and Morin 2010; Glennon and Kretser 2013; Glennon et al. 2014) that show the impacts these types of developments have been shown to have on natural processes could inform the planning of subdivisions, especially the size and placement of lots, in order to minimize the impacts to the ecology of these regions, particularly on the wildlife that are so valued in exurban areas. If conservation planning strategies are done in service of the aspects of the landscape that exurban landowners value, this could be a basis for garnering broad scale support for such initiatives, even if implemented through regulatory mechanisms.

If a regulatory approach were to be pursued, the differences in the two sites with respect to regulatory mechanisms show that conservation interventions in exurban areas must adhere to the local realities of the region. While an intervention related to conservation development in exurban subdivisions might work at the town-level in the ADK, the county would have absolutely no jurisdiction in such matters. Conversely, in the GYE, towns would have no regulatory mechanisms to implement conservation planning techniques for exurban development; any guidance would necessarily have to come from the county or even state level. Conservation strategies must take these realities into account and plan explicitly for them. Acknowledging the range of policy tools available for conservation, both regulatory and non-regulatory, provides the greatest possibility for success in interventions aimed at conservation in exurban regions. According to the results of other studies (Bastian et al. 2014), a regulatory approach could find success if it appeals to the fact that exurban residents inhabit regions known as national, or even international, treasures and as such residence in these regions carries a responsibility to conserve the amenities found in them.

Natural resource professionals interested in landscape conservation will have to continually address parcelization and changing landownership (Germain et al. 2007). There is

often no regulatory recourse for preventing parcelization. Therefore, non-governmental organizations need to facilitate landscape level conservation, either through outright purchase of sensitive lands or through working with the landowners who are living in these newly subdivided exurban landscapes. In areas where exurban development is prominent, implementing conservation strategies could be facilitated when more is known about the new landholders and when these strategies are suited to the specific environmental challenges their activities and behaviors pose for the landscape. On average, landowners across the two study sites owned their land for less than 20 years, nearly two-thirds were seasonal residents, and they used their property primarily for recreation. In this study, non-regulatory approaches aimed at addressing implementation gaps amongst exurban landowners could also be a promising means for achieving conservation goals.

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CHAPTER 4: CONCLUSION

Concluding Remarks

a. Exurban Landowners

From this study, which takes into account two distinct field sites, we can conclude that exurban landowners generally have a strong desire to conserve and steward the natural resources that constitute the regions in which they have chosen to live. While acting on these desires is another matter altogether, the evidence points to the fact that these landowners do have environmental ethics that might lead them to want to conserve the ecological integrity of exurban landscapes, even if they do not act on these ethics. Given this, these exurban landowners should be open to the process of developing interventions aimed at their land-uses to minimize the impacts of parcelization. The landowners in this study, through the mail survey and semi-structured interviews, consistently showed an interest in wildlife, a desire to benefit wildlife, and meanings related to the natural aspects of the landscape. The question going forward is how to empower landowners to implement strategies that conserve these aspects of the landscape to which they ascribe meaning. Perhaps more social science research could illuminate means by which this process could take place.

Perhaps unsurprisingly, exurban landowners also demonstrated that they are more or less unburdened in their ability to implement the land management strategies seen as the best fit for their lands. The role of town, county and state land-use regulatory bodies is minimal with respect to their influences on landowners, but they do play a larger role in overall land-use decision-making in the region. Indeed, these agencies do decide how land is used in their jurisdiction, by approving subdivisions in rural areas and performing environmental reviews, among other things, so their role is central earlier in the process of land development. Non-governmental organizations, such as non-profits and homeowners associations, similarly do not play a major role in how exurban landowners manage their land as investigated in this study. This may be a function of the rural landscapes in which exurban development is taking place. In the western study site, this limited amount of regulatory oversight was certainly a driver for why

people moved to the region in the first place, though less important than other drivers such as natural amenities. One might expect that most exurban landowners are similarly unburdened in terms of their land management regardless of geographic location and that this could be a signifier of social context in exurbia and rural regions generally; however, further research would be necessary to confirm this.

b. Role of Regulatory Mechanisms

Further regulation of land-use, through legal channels such as the town or county, carries with it opportunities and pitfalls for exurban land management. There is evidence from the interviews that further regulation in these areas could be contentious amongst landowners. Limiting what landowners are able to do on their private land, if politically or legally feasible, could be quite unpopular because an important reason many exurban landowners live in exurban regions is to be unburdened by these constraints, as demonstrated in the interviews. However, framing regulation in the context of the self-professed desires that exurban landowners possess by designing it to speak to the aspects of the landscape these landowners hold dear could be a means by which a greater regulatory burden could be accepted. This was demonstrated by Bastien et al (2014) when they showed that exurban residents would respond to punitive financial mechanisms towards conservation ends since the respondents to the survey had indicated that financial concerns were very important to them.

Perhaps a more efficient path would be to avoid placing greater town, county, or state regulation on these rural landowners and instead working through non-regulatory venues and incentives to achieve conservation goals. This is already happening to a certain extent with the use of conservation easements to protect private lands from future development and conservation-related non-governmental organizations pursuing strategies aligned with their organizations' missions. While exurban development is parcelizing the landscape and exurban landowners are complicit in this, their desire to maintain the ecology of these amenity-rich regions could lead them to participate more broadly in non-regulatory schemes such as conservation easements or non-governmental agency programming to conserve wildlife and open space. These could be

improved by speaking more directly to the needs and desires of the new population of homeowners who live in these exurban regions. The question then becomes, ‘how do we work in partnership with private exurban landowners to help them implement strategies that conserve the aspects of the landscape to which they ascribe meaning?’ This exurban population has, at the very least, an interest in these areas that has led them to purchase and develop land in regions that contain natural resources. The desire and abilities of these landowners could potentially replace the need for regulatory mechanisms in favor of self-government, either through homeowners associations or community-based educational outreach.

c. Future Development in Exurbia

While regulation may not be the most direct route for achieving conservation goals amongst landowners who have already built houses in exurban areas, it could almost certainly have demonstrable beneficial impacts for the ecological integrity of these regions were it to stem or alter the patterns of future development in these regions. Placing constraints on future housing developments that benefit wildlife and preserve the acreage of open space are in line with the viewpoints of the population of people already living in these regions. The goal of such constraints would be to influence the land-use planning process in addition to the actions of individual landowners who are already living in exurban developments. There is a regulatory structure in place for implementing these types of interventions. Town, county, and state regulatory bodies have the authority and jurisdiction to guide this type of development as well as a variety of conservation planning tools at their disposal, such as conditional zoning, transfer of development rights, and conservation easements, and these tools may find success where conventional land-use zoning and regulation have failed in exurban settings (Esparza and Carruthers 2000). Comprehensive planning in the municipalities in the Adirondacks could be an excellent means of guiding future development according to interviews with county and municipal agency representatives. Missing is ecological field data to demonstrate what types of interventions, specifically what kinds of restraints on development, that could have the greatest positive impact for wildlife and the general ecology of these regions.

Potential Policy Implications for Exurban Land Management

Since rural areas are becoming increasingly parcelized landscapes due to devolving patterns of landownership, it seems that natural resource professionals working in these settings would be well-served to consider reaching out to the landowners who now appear to wield the most control over exurban lands as shown in the interviews. In many cases, this group will be the exurban landowners themselves. While homeowners associations and various levels of regional government might seem to possess the power to effect broader change, the fact remains that exurban landscapes are most vulnerable to the decision-making of the new population of people who inhabit these areas. By investigating the internal and external constraints that they must navigate in order to make decisions about land-use, we have learned that exurban landowners possess both the will and the ability to manage their lands in a manner that benefits wildlife and promotes the ecological function of the landscape. The challenge for natural resource professionals, working through the private sector, government, and non-governmental organizations, will be to assist and support landowners in their endeavors to preserve the ecological integrity of these landscapes to which they ascribe so much meaning. The semi-structured interviews pointed especially to the role that non-governmental agencies can play in guiding the land management philosophies that landowners adopt. In the GYE, institutions such as the Rocky Mountain Elk Foundation and Trout Unlimited provided guidance to landowners with respect to their general land ethics and environmental paradigms. In the ADK, landowners mentioned the influence that the Wildlife Conservation Society and the Adirondack Mountain Club had on their understanding of their impacts on the landscape.

As shown by data not presented in this thesis, foresters, in particular, seem to have the appropriate skill set to guide aspects of land management related to timber health. In the interviews, both HOAs representatives that were interviewed in the GYE indicated that the board of the HOA saw fit to bring a consulting or state forester to the subdivision for consulting purposes with respect to invasive pest management and fire safety. Several landowners in both landscapes indicated that they had, in the past, requested that foresters help them to make

decisions about the health of their stands of trees with respect to a number of issues, particularly fire and pests. In the ADK, landowners were concerned about the spread of the invasive pests hemlock woolly adelgid (*Adelges tsugae*) and the emerald ash borer (*Agrilus planipennis*) and their impacts on native species of trees. Landowners in the GYE were also concerned about pests, including the mountain pine beetle (*Dendroctonus ponderosae*) and the western spruce budworm (*Choristoneura occidentalis*). Further, GYE landowners indicated concern about managing timber and range lands to be as resistant as possible to fire encroachment. If foresters can provide a service to landowners in terms of managing their property with respect to pests and fire, perhaps, embedded in these interactions, there are opportunities for imparting other wildlife-friendly behaviors through natural resource consulting firms, state agencies, or cooperative extension.

Future Research

a. Need for Longitudinal Studies

Future investigations on the topic of exurban landowner land ethics could be informed by the research performed in this study. Of particular interest to researchers could be changes in land ethic brought on by changing economic circumstances, educational interventions, or broad-scale environmental change. As the influx of amenity migrants continues, it will be important to continue to do social science research on this population to understand their changing demographics and attitudes.

Further research into the governance schemes of exurban regions could be fruitful as well. While the research detailed here was mostly exploratory given the dearth of prior work on the topic, later investigations of constraints and influences on exurban land management could perhaps provide more information about the changing and evolving mechanisms that regulatory and non-regulatory agencies interested in land management utilize to achieve goals for conservation.

b. Experimental Methods

An experiment approach to educational interventions could be an illuminating means of understanding if there truly is a knowledge gap amongst exurban landowners. The results of the study show suggest that landowners may not realize the impacts of some of their actions on wildlife given their pro-environmental ethics yet similar land-use and land management behaviors. Other authors (Daniels and Kirkpatrick 2011) argue that changing attitudes by educational interventions would be useless because attitude does not predict behavior in their study. Therefore, it would be useful to know if supplementing knowledge gaps is the means by which landowners can take up more conservation-oriented behaviors, particularly in instances where landowners do not even realize the environmentally detrimental consequences of their actions. If educational interventions related to ecologically-detrimental land-uses could be targeted to subsets of the population, then the results of those interventions, specifically whether conservation-oriented behaviors are adopted, could then be compared to landowners who did not participate in these interventions. Thus, the role of the knowledge gap, and whether it is a barrier to action, could be understood.

c. Collective Action for Conservation

Exurban regions present an interesting case in which to investigate the plausibility of landowners taking collective action for conservation. Since these landscapes are vulnerable to the individual decision-making of exurban landowners, tailoring policy or educational interventions towards the actions of the entire population could have the greatest impact. Given that the population is like-minded with respect to their land ethics, it would be interesting to see if this fact could be utilized in designing participatory mechanisms for collective management of natural resources held in common. Exurban landowners effectively participate in these types of organizations given the prevalence of homeowner's associations in the GYE study site and road and water associations in the ADK study site; however, tailoring the actions of these organizations to conservation-focused activities explicitly could yield benefits for the natural environment. Erickson et al (2011) provided evidence of the plausibility of such schemes related

to small-scale agricultural production on common lands in exurban areas in Vermont. Given the broad scale appreciation for natural resources and wildlife in both study sites as evidenced by the results of the survey, it seems entirely feasible to design interventions, perhaps under the stewardship of pre-existing channels such as the homeowner's associations or non-governmental organizations prominent in the regions, that could aim at collective action for wildlife and open space conservation.

Retrospective Analysis of the Study

a. Control Group

The inclusion of a control group in the study would be an essential addition. Characterizing the land ethic of exurban landowners, while informative for this understudied population, by gives us little with which to compare. Ideally, a study would compare land ethics across the urban to rural gradient. By doing so, researchers could place the exurban land ethic in its context amongst land ethics of the population at large. Given the large amount of land that exurban landowners have access to as a group, understanding where their land ethics fall on a scale could inform targeted interventions based on success and failure in other populations. A control population would set sidebars on the results and policy implications of this study instead of placing those results necessarily being interpreted in somewhat of a vacuum.

b. Improvements to the Survey Instrument

Based on various discussions with landowners during the interview phase of the project, there seemed to be some consensus that the survey instrument was quite long; indeed, it could likely have been considerably shorter and more pointed in terms of questions the land ethic and activities in which exurban landowners engage in upon their land. For example, questions 2 and 3 pertained to the land ethic; for analysis, only question 3 was used and so it is possible that question 2 could have been left out altogether thus shortening the time commitment of landowners in filling out the survey. One landowner also noted that the survey responses provided did not give enough detail to capture some of their activities; for example, it was noted that sometimes land-use activities change over time and that pets can come and go based on who

is staying at the property, but the survey did not provide response options to capture this level of detail. For subsequent analysis, it would have been useful to require only one response to question 17, regarding permanent or seasonal residence, of allowing landowners to select all that apply. Some of the questions regarding whether landowners leave their lights on at night and whether they close their blinds were probably, in retrospect, invasive and may have had an impact on the response rate. Again, landowners, during the interview phase of the study, voiced their concern about the intrusive nature of these questions.

c. Improvements to the Interview Guide

The interview guide could easily have been streamlined. Many of the questions were redundant. Wording of questions was often confusing to landowners particularly, especially those that focused on more esoteric concepts such as environmental ethics; this was corrected to the extent possible during the interview phase. In addition, the fact that half of the landowner interview guide focused on interactions with regulatory and non-regulatory bodies that may not have been taking place was an oversight in the interview guide design. Additional questions about personal visions of land management could have been included in cases where landowners indicated they were not constrained by external influences in order to develop a clearer picture of how the environmental ethic translated into action where external influences were minimal. Lastly, the agency interview guide was tailored to regulators. Many of the agency representatives interviewed had little regulatory power over private landowners, and so it would be beneficial in future studies to investigate in greater detail to what extent the land-use decisions of state, county, and municipal planners leads to exurban development of the landscape in the first place. Further, the agency representative interview guide did not take into account the fact that most agency representatives were not primarily focused on natural resource conservation or even on working with landowners themselves. That said, it would have been useful to ask agency representatives more questions about the various ways in which they can direct landowner behavior, as well as their perceptions about the effectiveness of their efforts to direct behavior.

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APPENDICES

APPENDIX A: SURVEY INSTRUMENTS

YOU AND YOUR LAND

A SURVEY OF PRIVATE LANDOWNERS IN THE ADIRONDACKS



This survey was conducted in Essex County in the Adirondack Park of upstate New York during the months of October through December of 2013. The response rate was 54.1%, giving an overall sample size of 125. Averages were calculated by taking the mean of all usable numerical responses; percentages were calculated by dividing the number of a given response (i.e. Yes/No, level of education, etc.) over the whole.



Cornell University
Human Dimensions Research Unit



You and Your Land

This questionnaire asks about how you use the land you own in the Adirondacks. You were selected for this survey because you own land in a neighborhood where Drs. Heidi Kretser and Michale Glennon of the Wildlife Conservation Society have been collecting data on wildlife.

This survey will help us to understand how activities on private land influence the wildlife found there. Your identity will be kept confidential and information you give us will never be associated with your name.

Please have the adult in your household who is most familiar with your land in Madison County complete this questionnaire at the earliest convenience, seal it with the white removable seal included, and drop it in any mailbox (no envelope needed); return postage has been provided. Your participation is voluntary, but your responses are extremely important to the success of this survey. We want our results to reflect the opinions of all landowners who receive this questionnaire, not just those with strong opinions. Further, your participation will help us to better understand the interests of all landowners and will allow us to design programs that can help to meet those interests.

This questionnaire has an identification number on the back so that we can remove your household from the list when you return the questionnaire and not bother you with unnecessary reminders. Again, we emphasize that your identity will be kept completely confidential.

This research is being conducted by Cornell University and the Wildlife Conservation Society with funding from the National Science Foundation.

If you have any questions regarding this survey please contact John Vogel, Fernow Hall 111A, Cornell University, Department of Natural Resources, Ithaca, NY 14850. You can also email John Vogel at jtv27@cornell.edu or Dr. Heidi Kretser at hkretser@wcs.org.

THANK YOU FOR YOUR ASSISTANCE!



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I. The first section of this questionnaire will ask you about your attitudes towards your private land in the Adirondacks as well as provide us with some background information.

1. How long have you owned property in this area? 22.73 years (n=114)

2. For each statement below, circle the number that indicates how strongly you agree or disagree with the following statements.

(Please circle one number for each item, where 1 indicates total disagreement and 7 indicates that total agreement.)

a. I keep my property in as natural state as possible with very little manipulation.	Disagree	1	2	3	4	5	6	7	Agree	5.76	n=119
b. I use my land to produce products that are important to me, such as timber, a garden, livestock, etc.	Disagree	1	2	3	4	5	6	7	Agree	2.87	n=120
c. I manage my land to maintain scenic views.	Disagree	1	2	3	4	5	6	7	Agree	5.22	n=121
d. I use my land for recreation.	Disagree	1	2	3	4	5	6	7	Agree	5.07	n=117
e. I have multiple uses and activities on my property but like to maintain a natural area.	Disagree	1	2	3	4	5	6	7	Agree	5.24	n=116
f. I use my property as an extension of my living space with items such as decks, porches, and trees to block wind.	Disagree	1	2	3	4	5	6	7	Agree	5.57	n=119
g. I feel responsible for creating the habitat that wildlife need.	Disagree	1	2	3	4	5	6	7	Agree	5.28	n=122
h. I bought this land to relax and escape the pressures of daily life.	Disagree	1	2	3	4	5	6	7	Agree	5.90	n=117
i. I bought this land to manage it how I see fit (e.g. for profit, for wildlife, etc.)	Disagree	1	2	3	4	5	6	7	Agree	4.12	n=120
j. Taking an active role in managing my land is important to me.	Disagree	1	2	3	4	5	6	7	Agree	5.76	n=121
k. I own land here in order to live off the grid as much as possible (i.e. generate my own power, etc.)	Disagree	1	2	3	4	5	6	7	Agree	1.88	n=122
l. I have a clear vision of how my land should be managed and what it should look like.	Disagree	1	2	3	4	5	6	7	Agree	5.65	n=122
m. I take steps to achieve my vision for my land.	Disagree	1	2	3	4	5	6	7	Agree	5.56	n=122

3. For each statement below, circle the number that best reflects your opinion. (Please circle one number for each item, where 1 indicates total disagreement and 7 indicates total agreement.)

a. Technological progress will enable us to solve environmental problems in the future.	Disagree	1	2	3	4	5	6	7	Agree	4.55	n=111
b. Human beings have more value than nature.	Disagree	1	2	3	4	5	6	7	Agree	3.04	n=112
c. Human beings have the right to alter nature radically.	Disagree	1	2	3	4	5	6	7	Agree	1.99	n=112
d. Human beings have a responsibility to conserve the natural environment.	Disagree	1	2	3	4	5	6	7	Agree	6.50	n=110
e. Human beings are part of nature and are also responsible for it.	Disagree	1	2	3	4	5	6	7	Agree	6.55	n=112
f. We have to ensure that we leave enough nature intact for future generations.	Disagree	1	2	3	4	5	6	7	Agree	6.79	n=112
g. People and nature are of equal value.	Disagree	1	2	3	4	5	6	7	Agree	4.85	n=110
h. We must not set ourselves above nature, but must work together with it.	Disagree	1	2	3	4	5	6	7	Agree	6.29	n=111
i. Nature wants to grow, prosper, and develop, just like humans do.	Disagree	1	2	3	4	5	6	7	Agree	5.42	n=107
j. Human beings are part of nature.	Disagree	1	2	3	4	5	6	7	Agree	6.44	n=112
k. I often feel an intense connection with nature.	Disagree	1	2	3	4	5	6	7	Agree	6.06	n=111
l. Natural sites are important, even if they are not useful to us human beings.	Disagree	1	2	3	4	5	6	7	Agree	6.63	n=112

4. Please write three words that best describe what your land means to you:

Beauty
Home
Nature
Peace
Wilderness
Tranquil, etc.

n=90.

Please see aggregate data for full listing.

5. We are interested in how levels of activity on private lands influence wildlife. Please indicate the number of weeks per season (a season is 13 weeks) that your property is occupied by both guests and owners.

(Summer: n=95, n=51; Fall: n=95, n=49; Winter: n=89, n=45; Spring: n=90, n=42)

	Summer (June-Aug)	Fall (Sept-Nov)	Winter (Dec-Feb)	Spring (Mar-May)
Owner Occupied	8.12 weeks	6.28 weeks	5.52 weeks	5.59 weeks
Guest Occupied	1.43 weeks	0.80 weeks	0.71 weeks	0.36 weeks

II. This section of the questionnaire aims to understand the various activities that you undertake on your private land.

6. Please indicate how frequently you or someone else has engaged in each behavior on your property during the past year, in the season in which this behavior is appropriate. (Please check one box for each activity.)	Never	Yearly	Monthly	Weekly	Daily		
a. Fed the birds (How many birdfeeders? 2.37 birdfeeders, n=51)	<input type="checkbox"/>	2.55	n=108				
b. Fed wildlife other than the birds (which species? Squirrel, Deer, Turkey, Marten, etc. Please see aggregate data, n=9)	<input type="checkbox"/>	1.27	n=109				
c. Used fertilizers, herbicides, and /or pesticides	<input type="checkbox"/>	1.57	n=108				
d. Mowed the lawn with a gas or electric lawnmower	<input type="checkbox"/>	2.58	n=109				
e. Mowed the lawn with a manual lawnmower	<input type="checkbox"/>	1.16	n=109				
f. Used a grill outside	<input type="checkbox"/>	2.83	n=109				
g. Ate meals outside my house (e.g. on a porch, by a fire pit, etc.)	<input type="checkbox"/>	3.03	n=109				
h. Listened to music outside my house	<input type="checkbox"/>	1.88	n=110				
i. Had kids playing in my yard	<input type="checkbox"/>	2.31	n=108				
j. Worked on a small construction project around my house (painting, installing new windows, etc.)	<input type="checkbox"/>	2.48	n=110				
k. Used power tools (e.g. chainsaw, leaf blower)	<input type="checkbox"/>	2.63	n=104				
l. Engaged in non-motorized winter recreation on my property (e.g. skiing, snowshoeing)	<input type="checkbox"/>	2.42	n=111				
m. Walked dogs on my property	<input type="checkbox"/>	2.78	n=108				
n. Hiked trails	<input type="checkbox"/>	3.06	n=108				
o. Mountain biked	<input type="checkbox"/>	1.48	n=111				
p. Went horseback riding	<input type="checkbox"/>	1.05	n=112				
q. Went off-roading (i.e. with a ATV, dirt bike, snowmobile)	<input type="checkbox"/>	1.15	n=111				

7. Please tell us about the domestic animals that live on your property. (Check the box if the animal listed lives on your land and indicate the how many of this animal you have.)

Species	Number	Species	Number
48.2% Own No Other Animals, n=114	5, n=1 n=0 n=0	20.3% Own Cats, n=59	1.25, n=12
5.08% Own Horses, n=59		84.7% Own Dogs, n=59	1.80, n=49
3.34% Own Sheep, n=59		0% Own Cattle, n=59	n=0
3.39% Own Chickens, n=59		5.08% Own Other, n=59	3.00, n=3

If you selected other, please indicate what kind:
COCKATIEL, GOLDFISH (n=2)

8. Please indicate whether or not the following activities occurred on your property during the past year or in the season where this activity is appropriate. (Please check one box for each activity.)	Yes	No		
a. Maintained recreational trails or unimproved roads	<input type="checkbox"/>	<input type="checkbox"/>	48.7% Yes	n=117
b. Stocked a fish pond.	<input type="checkbox"/>	<input type="checkbox"/>	0.85% Yes	n=117
c. Hunted big or small game	<input type="checkbox"/>	<input type="checkbox"/>	5.98% Yes	n=117
d. Trapped animals	<input type="checkbox"/>	<input type="checkbox"/>	4.27% Yes	n=117
e. Conducted forestry activities (e.g. cut trees, planted trees, thinned trees, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	71.8% Yes	n=117
h. Used a trail camera or wildlife camera	<input type="checkbox"/>	<input type="checkbox"/>	20.7% Yes	n=116
j. Went bird watching	<input type="checkbox"/>	<input type="checkbox"/>	48.7% Yes	n=117
l. Stored garbage/trash/dumpster outside	<input type="checkbox"/>	<input type="checkbox"/>	15.4% Yes	n=117
m. Stored compost outside	<input type="checkbox"/>	<input type="checkbox"/>	30.8% Yes	n=117
n. Used an animal-proof container for trash storage	<input type="checkbox"/>	<input type="checkbox"/>	30.4% Yes	n=115
n. Used an animal-proof container for compost storage	<input type="checkbox"/>	<input type="checkbox"/>	9.48% Yes	n=116
p. Maintained a flower or vegetable garden	<input type="checkbox"/>	<input type="checkbox"/>	63.2% Yes	n=117
q. Worked on a large construction project around my house (room addition, constructed outbuilding, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	17.9% Yes	n=117
r. Maintained an artificial water source (e.g. pool, birdfeeder, decorative fountain, stock tank, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	15.4% Yes	n=118
s. Had or installed bird boxes (How many? 2.78 bird boxes, n=18)	<input type="checkbox"/>	<input type="checkbox"/>	18.3% Yes	n=115
t. Planted or maintained fruit trees	<input type="checkbox"/>	<input type="checkbox"/>	12.9% Yes	n=116
u. Stored a grill outside	<input type="checkbox"/>	<input type="checkbox"/>	54.7% Yes	n=117

9. We are interested in how artificial night light influences wildlife.

a. About how many outdoor lights do you have affixed to various places outside of your house or other buildings on your property? **4.67** lights (n=115)

b. At what times do you have these lights on? (Check all that apply.) (n=120)
75.0% Evening (after sundown) **2.5%** Overnight **3.33%** Morning (before sunrise)

c. How frequently are these outdoor lights on? (Check one.) (n=106)
11.3% Never **78.3%** Sometimes **10.4%** Nightly

d. About how many indoor lights do you have on at night that shine through your windows without curtains? **5.10** lights (n=105)

e. At what times do you have these lights on? (Check all that apply.) (n=120)
83.3% Evening (after sundown) **4.17%** Overnight **11.7%** Morning (before sunrise)

f. Do you close all your curtains at night? (n=104)
16.3% Yes **83.7%** No

10. Please indicate how frequently each of the following activities took place at your house in the past year when it was occupied. (Please check one box for each activity.)	Never	Yearly	Monthly	Weekly	Daily		
a. A dog went outside during the day.	<input type="checkbox"/>	2.89	n=114				
b. A dog went outside during the night.	<input type="checkbox"/>	2.49	n=114				
c. A dog chased or killed wildlife.	<input type="checkbox"/>	1.15	n=114				
d. A cat went outside during the day.	<input type="checkbox"/>	1.26	n=111				
e. A cat went outside during the night.	<input type="checkbox"/>	1.15	n=111				
f. A cat chased or killed wildlife.	<input type="checkbox"/>	1.14	n=112				

11. Please circle all that apply to best describe how you and others use your outside property. When outside, people mostly...

- | | |
|---|----------------------|
| a. stay in the immediate vicinity of my house and other outbuildings. | 62.5% (n=120) |
| b. use the lawn area extensively. | 25.0% (n=120) |
| c. walk on trails or walking paths around my property. | 47.5% (n=120) |
| d. use <u>all</u> of my property about equally. | 21.7% (n=120) |

12. For each statement below, please check the box that best reflects the extent you engage in the following activities. (Please check one box for each activity.)	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree		
a. I try to learn as much as I can about wildlife.	<input type="checkbox"/>	4.08	n=114				
b. I take active measures to reduce opportunities for wildlife to damage my property and belongings.	<input type="checkbox"/>	3.29	n=113				
c. I manage my property to protect wildlife.	<input type="checkbox"/>	3.58	n=114				
d. I discourage certain types of wildlife from coming to my property.	<input type="checkbox"/>	2.59	n=113				
e. I actively try to attract wildlife to my property.	<input type="checkbox"/>	2.72	n=113				
f. I actively avoid all contact with wildlife.	<input type="checkbox"/>	2.10	n=112				
g. I manage wildlife in order to protect my property	<input type="checkbox"/>	2.64	n=112				

III. This section of the survey will ask about what influences the choices you make about using and managing your private land in the Adirondacks and how interpersonal relationships influence your decision-making. Please think about the activities mentioned in the previous section as you complete this section.

13a. Please indicate to what extent the following limit you doing activities on your land that you would normally do. *(Please circle one number for each item indicating the extent of limitation.)*

a. My desire to benefit wildlife	Does not limit my activities	1	2	3	4	5	6	7	Limits my activities	2.37	n=113
b. The opinions and actions of my neighbors	Does not limit my activities	1	2	3	4	5	6	7	Limits my activities	2.21	n=114
c. The ordinances of my homeowner's association	Does not limit my activities	1	2	3	4	5	6	7	Limits my activities	1.98	n=105
d. County land-use regulations	Does not limit my activities	1	2	3	4	5	6	7	Limits my activities	2.49	n=113
e. The Adirondack Park Agency (Adirondacks only)	Does not limit my activities	1	2	3	4	5	6	7	Limits my activities	2.96	n=113
f. Recommendations from other groups (i.e. conservation)	Does not limit my activities	1	2	3	4	5	6	7	Limits my activities	2.67	n=113
g. State agency regulations (i.e. FWP, DEC)	Does not limit my activities	1	2	3	4	5	6	7	Limits my activities	2.87	n=113

13b. Please indicate to what extent the following influence you to engage in activities on your land that you would not normally do.

(Please circle one number for each item indicating the extent of influence.)

a. My desire to benefit wildlife	Does not influence my activities	1	2	3	4	5	6	7	Influences my activities	4.09	n=107
b. The opinions and actions of my neighbors	Does not influence my activities	1	2	3	4	5	6	7	Influences my activities	2.58	n=108
c. The ordinances of my homeowner's association	Does not influence my activities	1	2	3	4	5	6	7	Influences my activities	2.22	n=101
d. County land-use regulations	Does not influence my activities	1	2	3	4	5	6	7	Influences my activities	2.84	n=107
e. The Adirondack Park Agency (Adirondacks only)	Does not influence my activities	1	2	3	4	5	6	7	Influences my activities	3.11	n=107
f. Recommendations from other groups (i.e. conservation)	Does not influence my activities	1	2	3	4	5	6	7	Influences my activities	2.85	n=108
g. State agency regulations (i.e. FWP, DEC)	Does not influence my activities	1	2	3	4	5	6	7	Influences my activities	2.94	n=108

14. How do you feel about conducting activities on your land that benefit wildlife? By benefiting wildlife, we mean steps taken to minimize the potential influence that homes and related activities or uses can have on wildlife. *(Circle one number, where 1 is very negative and 7 is very positive.)*

Negative	1	2	3	4	5	6	7	Positive	5.53	n=115
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15. Do you intend to conduct activities on your land to benefit wildlife in the next 12 months? (Circle one number, where 1 indicates total disagreement and 7 indicates that total agreement.)

Disagree	1	2	3	4	5	6	7	Agree	4.53	n=113
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16. We are interested in how interpersonal relationships influence landowner decision-making. How important is it to the following groups of people that you manage your land to benefit wildlife?

(Please circle one number for each item, where 1 indicates not at all important and 7 indicates very important. If you do not know, do not circle a number.)

a. Family	Not important	1	2	3	4	5	6	7	Very important	4.83	n=115
b. Spouse or partner	Not important	1	2	3	4	5	6	7	Very important	5.25	n=109
c. Neighbors or other landowners	Not important	1	2	3	4	5	6	7	Very important	3.86	n=112
d. Friends	Not important	1	2	3	4	5	6	7	Very important	4.01	n=109
e. Wildlife professionals	Not important	1	2	3	4	5	6	7	Very important	4.96	n=109
f. Local community leaders	Not important	1	2	3	4	5	6	7	Very important	3.64	n=106

IV. The last section of this survey will ask you some background information.

17. Are you currently a permanent or seasonal resident of the Adirondacks? Please indicate for how long.

41.7% Permanent (n=120) For how many years? **17.8** (n=45)

60.8% Seasonal (n=120) For how many years? **29.9** (n=73)

18. In what year were you born? 1948 (Average age is about 66, n=116)

19. What is your gender? (Check one.) (n=121)

62.8% Male **37.2%** Female

20. Which category from the list below best describes the area you lived in most of the time before your 18th birthday?

(Please check one.) (n=119)

10.1% Rural – mostly agricultural **38.7%** Suburban **24.3%** Urban

10.1% Rural – mostly residential **16.8%** Small town

21. How much school have you completed? (Check the highest level.) (n=122)

0.8% Some high school **29.5%** Bachelor's degree

1.6% High school or GED **58.2%** Graduate or professional degree

9.9% Some college (including A.A.)

22. Approximately what percent of your total leisure time do you spend outdoors?

48.7% of leisure time (n=119)

23. Approximately what percent of your total work time do you spend outdoors?

16.8% of work time (n=104)

YOU AND YOUR LAND

A SURVEY OF PRIVATE LANDOWNERS
IN THE MADISON COUNTY



This survey was conducted with landowners who own parcels in Madison County, Montana, in the Greater Yellowstone Ecosystem during the months of October through December of 2013. The response rate was 42.1%, giving an overall sample size of 98. Averages were calculated by taking the mean of all usable numerical responses; percentages were calculated by dividing the number of a given response (i.e. Yes/No, level of education, etc.) over the whole.



Cornell University
Human Dimensions Research Unit



You and Your Land

This questionnaire asks about how you use the land you own in Madison County. You were selected for this survey because you own land in a neighborhood where Drs. Heidi Kretser and Michale Glennon of the Wildlife Conservation Society have been collecting data on wildlife.

This survey will help us to understand how activities on private land influence the wildlife found there. Your identity will be kept confidential and information you give us will never be associated with your name.

Please have the adult in your household who is most familiar with your land in Madison County complete this questionnaire at the earliest convenience, seal it with the white removable seal included, and drop it in any mailbox (no envelope needed); return postage has been provided. Your participation is voluntary, but your responses are extremely important to the success of this survey. We want our results to reflect the opinions of all landowners who receive this questionnaire, not just those with strong opinions. Further, your participation will help us to better understand the interests of all landowners and will allow us to design programs that can help to meet those interests.

This questionnaire has an identification number on the back so that we can remove your household from the list when you return the questionnaire and not bother you with unnecessary reminders. Again, we emphasize that your identity will be kept completely confidential.

This research is being conducted by Cornell University and the Wildlife Conservation Society with funding from the National Science Foundation.

If you have any questions regarding this survey please contact John Vogel, Fernow Hall 111A, Cornell University, Department of Natural Resources, Ithaca, NY 14850. You can also email John Vogel at jtv27@cornell.edu or Dr. Heidi Kretser at hkretser@wcs.org.

THANK YOU FOR YOUR ASSISTANCE!



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I. The first section of this questionnaire will ask you about your attitudes towards your private land in Madison County as well as provide us with some background information.

1. How long have you owned property in this area? 16.15 years (n=88)

2. For each statement below, circle the number that indicates how strongly you agree or disagree with the following statements.

(Please circle one number for each item, where 1 indicates total disagreement and 7 indicates that total agreement.)

n. I keep my property in as natural state as possible with very little manipulation.	Disagree	1	2	3	4	5	6	7	Agree	5.75	n=94
o. I use my land to produce products that are important to me, such as timber, a garden, livestock, etc.	Disagree	1	2	3	4	5	6	7	Agree	2.68	n=96
p. I manage my land to maintain scenic views.	Disagree	1	2	3	4	5	6	7	Agree	5.64	n=97
q. I use my land for recreation.	Disagree	1	2	3	4	5	6	7	Agree	5.54	n=97
r. I have multiple uses and activities on my property but like to maintain a natural area.	Disagree	1	2	3	4	5	6	7	Agree	4.73	n=94
s. I use my property as an extension of my living space with items such as decks, porches, and trees to block wind.	Disagree	1	2	3	4	5	6	7	Agree	5.60	n=95
t. I feel responsible for creating the habitat that wildlife need.	Disagree	1	2	3	4	5	6	7	Agree	5.63	n=94
u. I bought this land to relax and escape the pressures of daily life.	Disagree	1	2	3	4	5	6	7	Agree	6.07	n=96
v. I bought this land to manage it how I see fit (e.g. for profit, for wildlife, etc.)	Disagree	1	2	3	4	5	6	7	Agree	4.83	n=95
w. Taking an active role in managing my land is important to me.	Disagree	1	2	3	4	5	6	7	Agree	5.96	n=94
x. I own land here in order to live off the grid as much as possible (i.e. generate my own power, etc.)	Disagree	1	2	3	4	5	6	7	Agree	2.72	n=96
y. I have a clear vision of how my land should be managed and what it should look like.	Disagree	1	2	3	4	5	6	7	Agree	5.76	n=95
z. I take steps to achieve my vision for my land.	Disagree	1	2	3	4	5	6	7	Agree	5.75	n=95

3. For each statement below, circle the number that best reflects your opinion. (Please circle one number for each item, where 1 indicates total disagreement and 7 indicates total agreement.)

o. Technological progress will enable us to solve environmental problems in the future.	Disagree	1	2	3	4	5	6	7	Agree	4.64	n=86
p. Human beings have more value than nature.	Disagree	1	2	3	4	5	6	7	Agree	3.65	n=86
q. Human beings have the right to alter nature radically.	Disagree	1	2	3	4	5	6	7	Agree	2.13	n=85
r. Human beings have a responsibility to conserve the natural environment.	Disagree	1	2	3	4	5	6	7	Agree	6.44	n=87
s. Human beings are part of nature and are also responsible for it.	Disagree	1	2	3	4	5	6	7	Agree	6.49	n=87
t. We have to ensure that we leave enough nature intact for future generations.	Disagree	1	2	3	4	5	6	7	Agree	6.55	n=87
u. People and nature are of equal value.	Disagree	1	2	3	4	5	6	7	Agree	4.69	n=84
v. We must not set ourselves above nature, but must work together with it.	Disagree	1	2	3	4	5	6	7	Agree	5.92	n=86
w. Nature wants to grow, prosper, and develop, just like humans do.	Disagree	1	2	3	4	5	6	7	Agree	5.19	n=83
x. Human beings are part of nature.	Disagree	1	2	3	4	5	6	7	Agree	6.22	n=86
y. I often feel an intense connection with nature.	Disagree	1	2	3	4	5	6	7	Agree	6.09	n=87
z. Natural sites are important, even if they are not useful to us human beings.	Disagree	1	2	3	4	5	6	7	Agree	6.42	n=85

4. Please write three words that best describe what your land means to you:

Beauty
Home
Nature
Peace
Important,
Steward
Tranquil, etc.

n=65.

Please see aggregate data for full listing.

5. We are interested in how levels of activity on private lands influence wildlife. Please indicate the number of weeks per season (a season is 13 weeks) that your property is occupied by both guests and owners.

(Summer: n=68, n=28; Fall: n=63, n=21; Winter: n=54, n=19; Spring: n=60, n=18)

	Summer (June-Aug)	Fall (Sept-Nov)	Winter (Dec-Feb)	Spring (Mar-May)
Owner Occupied	8.88 weeks	6.73 weeks	5.80 weeks	5.90 weeks
Guest Occupied	3.50 weeks	2.00 weeks	1.05 weeks	1.33 weeks

II. This section of the questionnaire aims to understand the various activities that you undertake on your private land.

6. Please indicate how frequently you or someone else has engaged in each behavior on your property during the past year, in the season in which this behavior is appropriate. (Please check one box for each activity.)	Never	Yearly	Monthly	Weekly	Daily		
a. Fed the birds (How many birdfeeders? 3.26 birdfeeders, n=27)	<input type="checkbox"/>	2.13	n=86				
b. Fed wildlife other than the birds (which species? Fish, Elk, Deer, Squirrels, Antelope, etc. Please see aggregate data, n=8)	<input type="checkbox"/>	1.22	n=85				
c. Used fertilizers, herbicides, and /or pesticides	<input type="checkbox"/>	1.62	n=85				
d. Mowed the lawn with a gas or electric lawnmower	<input type="checkbox"/>	2.62	n=87				
e. Mowed the lawn with a manual lawnmower	<input type="checkbox"/>	1.14	n=86				
f. Used a grill outside	<input type="checkbox"/>	3.13	n=88				
g. Ate meals outside my house (e.g. on a porch, by a fire pit, etc.)	<input type="checkbox"/>	3.10	n=88				
h. Listened to music outside my house	<input type="checkbox"/>	2.05	n=85				
i. Had kids playing in my yard	<input type="checkbox"/>	2.49	n=86				
j. Worked on a small construction project around my house (painting, installing new windows, etc.)	<input type="checkbox"/>	2.69	n=87				
k. Used power tools (e.g. chainsaw, leaf blower)	<input type="checkbox"/>	2.31	n=85				
l. Engaged in non-motorized winter recreation on my property (e.g. skiing, snowshoeing)	<input type="checkbox"/>	1.86	n=87				
m. Walked dogs on my property	<input type="checkbox"/>	3.29	n=87				
n. Hiked trails	<input type="checkbox"/>	3.16	n=86				
o. Mountain biked	<input type="checkbox"/>	1.68	n=87				
p. Went horseback riding	<input type="checkbox"/>	1.69	n=87				
q. Went off-roading (i.e. with a ATV, dirt bike, snowmobile)	<input type="checkbox"/>	1.67	n=87				

7. Please tell us about the domestic animals that live on your property. (Check the box if the animal listed lives on your land and indicate the how many of this animal you have.)

Species	Number	Species	Number
30.8% Own No Other Animals, n=92		28.6% Own Cats, n=63	1.41, n=17
22.2% Own Horses, n=63	6.00, n=11	88.9% Own Dogs, n=63	1.80, n=54
4.76% Own Sheep, n=63	4.00, n=1	1.59% Own Cattle, n=63	None, n=0
11.1% Own Chickens, n=63	10.2, n=6	6.35% Own Other, n=63	1.00, n=1

If you selected other, please indicate what kind:
COYOTE and RABBIT, BUNNY (n=2)

8. Please indicate whether or not the following activities occurred on your property during the past year or in the season where this activity is appropriate. (Please check one box for each activity.)	Yes	No		
a. Maintained recreational trails or unimproved roads	<input type="checkbox"/>	<input type="checkbox"/>	41.7% Yes	n=96
b. Stocked a fish pond.	<input type="checkbox"/>	<input type="checkbox"/>	7.37% Yes	n=95
c. Hunted big or small game	<input type="checkbox"/>	<input type="checkbox"/>	9.38% Yes	n=96
d. Trapped animals	<input type="checkbox"/>	<input type="checkbox"/>	4.17% Yes	n=96
e. Conducted forestry activities (e.g. cut trees, planted trees, thinned trees, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	46.9% Yes	n=96
h. Used a trail camera or wildlife camera	<input type="checkbox"/>	<input type="checkbox"/>	20.8% Yes	n=96
j. Went bird watching	<input type="checkbox"/>	<input type="checkbox"/>	68.8% Yes	n=96
l. Stored garbage/trash/dumpster outside	<input type="checkbox"/>	<input type="checkbox"/>	12.5% Yes	n=96
aa. Stored compost outside	<input type="checkbox"/>	<input type="checkbox"/>	16.7% Yes	n=96
n. Used an animal-proof container for trash storage	<input type="checkbox"/>	<input type="checkbox"/>	36.2% Yes	n=94
bb. Used an animal-proof container for compost storage	<input type="checkbox"/>	<input type="checkbox"/>	6.45% Yes	n=93
p. Maintained a flower or vegetable garden	<input type="checkbox"/>	<input type="checkbox"/>	49.5% Yes	n=97
q. Worked on a large construction project around my house (room addition, constructed outbuilding, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	27.1% Yes	n=96
r. Maintained an artificial water source (e.g. pool, birdbfeeder, decorative fountain, stock tank, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	43.8% Yes	n=96
s. Had or installed bird boxes (How many? 5.51 bird boxes, n=51)	<input type="checkbox"/>	<input type="checkbox"/>	54.6% Yes	n=97
t. Planted or maintained fruit trees	<input type="checkbox"/>	<input type="checkbox"/>	22.9% Yes	n=96
u. Stored a grill outside	<input type="checkbox"/>	<input type="checkbox"/>	54.2% Yes	n=96

9. We are interested in how artificial night light influences wildlife.

a. About how many outdoor lights do you have affixed to various places outside of your house or other buildings on your property? **4.73** lights (n=95)

b. At what times do you have these lights on? (Check all that apply.) (n=97)
69.1% Evening (after sundown) **12.4%** Overnight **12.4%** Morning (before sunrise)

c. How frequently are these outdoor lights on? (Check one.) (n=85)
10.6% Never **83.5%** Sometimes **5.88%** Nightly

d. About how many indoor lights do you have on at night that shine through your windows without curtains? **3.56** lights (n=89)

e. At what times do you have these lights on? (Check all that apply.) (n=97)
78.4% Evening (after sundown) **5.15%** Overnight **9.28%** Morning (before sunrise)

f. Do you close all your curtains at night? (n=94)
40.4% Yes **60.6%** No

10. Please indicate how frequently each of the following activities took place at your house in the past year when it was occupied. (Please check one box for each activity.)	Never	Yearly	Monthly	Weekly	Daily		
a. A dog went outside during the day.	<input type="checkbox"/>	3.53	n=94				
b. A dog went outside during the night.	<input type="checkbox"/>	2.76	n=93				
c. A dog chased or killed wildlife.	<input type="checkbox"/>	1.26	n=95				
d. A cat went outside during the day.	<input type="checkbox"/>	1.67	n=92				
e. A cat went outside during the night.	<input type="checkbox"/>	1.59	n=92				
f. A cat chased or killed wildlife.	<input type="checkbox"/>	1.28	n=89				

11. Please circle all that apply to best describe how you and others use your outside property. When outside, people mostly...

- | | |
|---|---------------------|
| a. stay in the immediate vicinity of my house and other outbuildings. | 72.9% (n=97) |
| b. use the lawn area extensively. | 30.2% (n=97) |
| c. walk on trails or walking paths around my property. | 36.5% (n=97) |
| d. use <u>all</u> of my property about equally. | 20.8% (n=97) |

12. For each statement below, please check the box that best reflects the extent you engage in the following activities. (Please check one box for each activity.)	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree		
a. I try to learn as much as I can about wildlife.	<input type="checkbox"/>	4.30	n=89				
b. I take active measures to reduce opportunities for wildlife to damage my property and belongings.	<input type="checkbox"/>	3.59	n=88				
c. I manage my property to protect wildlife.	<input type="checkbox"/>	4.14	n=88				
d. I discourage certain types of wildlife from coming to my property.	<input type="checkbox"/>	2.83	n=89				
e. I actively try to attract wildlife to my property.	<input type="checkbox"/>	3.17	n=89				
f. I actively avoid all contact with wildlife.	<input type="checkbox"/>	2.15	n=89				
g. I manage wildlife in order to protect my property	<input type="checkbox"/>	2.77	n=88				

III. This section of the survey will ask about what influences the choices you make about using and managing your private land in Madison County and how interpersonal relationships influence your decision-making. Please think about the activities mentioned in the previous section as you complete this section.

13a. Please indicate to what extent the following limit you doing activities on your land that you would normally do. (Please circle one number for each item indicating the extent of limitation.)

h. My desire to benefit wildlife	Does not limit my activities	1	2	3	4	5	6	7	Limits my activities	2.69	n=87
i. The opinions and actions of my neighbors	Does not limit my activities	1	2	3	4	5	6	7	Limits my activities	2.56	n=87
j. The ordinances of my homeowner's association	Does not limit my activities	1	2	3	4	5	6	7	Limits my activities	3.11	n=88
k. County land-use regulations	Does not limit my activities	1	2	3	4	5	6	7	Limits my activities	2.93	n=87
l. Recommendations from other groups (i.e. conservation)	Does not limit my activities	1	2	3	4	5	6	7	Limits my activities	2.85	n=87
m. State agency regulations (i.e. FWP, DEC)	Does not limit my activities	1	2	3	4	5	6	7	Limits my activities	3.06	n=87

13b. Please indicate to what extent the following influence you to engage in activities on your land that you would not normally do.

(Please circle one number for each item indicating the extent of influence.)

h. My desire to benefit wildlife	Does not influence my activities	1	2	3	4	5	6	7	Influences my activities	4.34	n=86
i. The opinions and actions of my neighbors	Does not influence my activities	1	2	3	4	5	6	7	Influences my activities	2.93	n=86
j. The ordinances of my homeowner's association	Does not influence my activities	1	2	3	4	5	6	7	Influences my activities	3.14	n=85
k. County land-use regulations	Does not influence my activities	1	2	3	4	5	6	7	Influences my activities	3.07	n=85
l. Recommendations from other groups (i.e. conservation)	Does not influence my activities	1	2	3	4	5	6	7	Influences my activities	3.21	n=85
m. State agency regulations (i.e. FWP, DEC)	Does not influence my activities	1	2	3	4	5	6	7	Influences my activities	3.35	n=85

14. How do you feel about conducting activities on your land that benefit wildlife? By benefiting wildlife, we mean steps taken to minimize the potential influence that homes and related activities or uses can have on wildlife. (Circle one number, where 1 is very negative and 7 is very positive.)

Negative	1	2	3	4	5	6	7	Positive	5.64	n=88
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15. Do you intend to conduct activities on your land to benefit wildlife in the next 12 months? (Circle one number, where 1 indicates total disagreement and 7 indicates that total agreement.)

Disagree	1	2	3	4	5	6	7	Agree	5.21	n=87
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16. We are interested in how interpersonal relationships influence landowner decision-making. How important is it to the following groups of people that you manage your land to benefit wildlife?

(Please circle one number for each item, where 1 indicates not at all important and 7 indicates very important. If you do not know, do not circle a number.)

g. Family	Not important	1	2	3	4	5	6	7	Very important	5.38	n=90
h. Spouse or partner	Not important	1	2	3	4	5	6	7	Very important	5.88	n=88
i. Neighbors or other landowners	Not important	1	2	3	4	5	6	7	Very important	4.37	n=90
j. Friends	Not important	1	2	3	4	5	6	7	Very important	4.35	n=91
k. Wildlife professionals	Not important	1	2	3	4	5	6	7	Very important	4.84	n=91
l. Local community leaders	Not important	1	2	3	4	5	6	7	Very important	3.89	n=90

IV. The last section of this survey will ask you some background information.

17. Are you currently a permanent or seasonal resident of Madison County? Please indicate for how long.

34.4% Permanent (n=96) For how many years? **14.6** (n=29)

68.8% Seasonal (n=96) For how many years? **15.0** (n=65)

18. In what year were you born? 1949 (Average age is about 65, n=94)

19. What is your gender? (Check one.) (n=94)

75% Male **25%** Female

20. Which category from the list below best describes the area you lived in most of the time before your 18th birthday?

(Please check one.) (n=94)

26.6% Rural – mostly agricultural **24.5%** Suburban **12.8%** Urban

9.6% Rural – mostly residential **26.6%** Small town

21. How much school have you completed? (Check the highest level.) (n=92)

0% Some high school **22.8%** Bachelor's degree

5.4% High school or GED **46.7%** Graduate or professional degree

25% Some college (including A.A.)

22. Approximately what percent of your total leisure time do you spend outdoors?

56.2% of leisure time (n=88)

23. Approximately what percent of your total work time do you spend outdoors?

23.7% of work time (n=81)

APPENDIX B: INTERVIEW GUIDES

Landowner Interview Guide

Q#	Question
1	What motivated you to buy land in this region?
2	Do you have any long-term goals for your land? What are those long-term goals?
3	What kinds of activities do you do on your land on a day-to-day basis?
4	In what ways do you take an active role in managing your land?
5	How does your concern or interest in wildlife play into how you use and manage your land? How about other environmental considerations?
6	How would you describe the value you place on your land? What does your land mean to you?
7	Which regulatory bodies do you interact with the most? County? State? Town? Homeowners' Association? Montana Fish, Wildlife, and Parks? New York Department of Environmental Conservation? Adirondack Park Agency?
8	How do you the land-use regulatory bodies in this region influence the ways in which you use and manage your land? Do they change your land-use in any way? Or do they constrain it? How do they do this?
9	How do you interact (if at all) with these agencies? What is the nature of your interactions
10	What drives you to do things on your land that you wouldn't normally do? What activities are you influenced to do? Who influences you to do them?
11	What constrains the ways you use and manage your land? What prevents you from doing what you want to do? What are the things you cannot do because of these constraints?
12	How do your inter-personal relationships influence your land management strategies? What is the role of your family members, friends, neighbors, etc., in your land management decisions?
13	Who plays the biggest role in influencing how you manage your land?

Agency Representative Interview Guide

Q#	Question
1	What constitutes the majority of what you do on a day to day basis?
2	How often to you work directly with landowners in this region?
3	As a regulator/board member of a homeowner's association, how do you understand your role or mandate with respect to land use and management?
4	What goals do you attempt to achieve in your role as a regulator/board member of a homeowner's association?
5	What land-use and land management activities are under your jurisdiction? In other words, what do you actually manage/regulate?
6	How do you achieve the goals you mentioned previously? What specific mechanisms allow you to achieve (list the goals they mentioned previously)?
7	How effective do you think the current methods you have been using are at achieving the aforementioned goals? Given these methods you currently use, do you see opportunities for new or different solutions for achieving the same goals?
8	What is the nature of your relationship with the private landowners in this region?
9	How receptive are landowners in this region to the laws or policies of your organization?
10	What impressions do private landowners in this region have of your agency?
11	How do people in this region feel about the amount of control you have over their land-use decisions and their ability to manage their private lands?
12	Do you attempt to facilitate certain behaviors? Which ones? And why? Do you attempt to constrain certain behaviors? Which ones? Why?
13	Do you see conservation of resources as an aspect of your job? Why or why not?
14	Is conserving wildlife a major or minor goal of what you do?
15	Is conserving open space a major or minor goal of what you do?
16	Do you feel it is necessary, as part of your organization's mission, to provide guidelines, rules, or regulations in addition to those that exist at (the local, state level) to achieve conservation goals?
17	How does the work you do as (regulator, HOA rep, etc) influence what landowners can and cannot do on their property?
18	How do you think landowners feel about your organization's influence over their land-use?
19	What are ways you that you personally have communicated with landowners about land-use management that have been successful?

APPENDIX C: CODING FRAMEWORK

Theme	Description	Code	Example Quotation
Landowner Meaning	Aspects of exurban landownership to which exurban landowners ascribe meaning; these codes came from the results of the mail survey question where landowners were asked to describe what their land means to them	<ul style="list-style-type: none"> -Beauty -Peace -Nature -Home -Relaxation -Serenity -Solitude -Freedom -Privacy -Wildlife -Family 	It's a non-measurable thing you know it gives you certain feelings and intrinsic, intrinsic positive feelings. To see this view, to walk on this land, to ride it, I mean just the whole thing is fabulous and I don't think of this place in terms of money. (GYE)
Influences on Land-Use and Land Management	Actors that cause exurban landowners to do something with respect to land use or management that they would not otherwise do; these codes came from the actors were queried landowners about in the mail survey	<ul style="list-style-type: none"> -Internal Influence: <ul style="list-style-type: none"> -Self -Spouse/Partner -Family -Friend -External Influence: <ul style="list-style-type: none"> -Town Regulation -County Reg. -State Regulation -Professional -NGO -Neighbor -APA (ADK only) 	<ul style="list-style-type: none"> -Yeah absolutely, I've always wanted to be a good steward, and I'm going to do the right thing as much as I can, let nature do its thing but yeah I think it's up, it's up to the individual really. (GYE) -I would say as far as I use my personal land I think my wife and I, it's my land so with that said, yeah I say 'us.' (ADK)
Constraints on Land-Use and Land Management	Actors that cause exurban landowners to not do something with respect to land use or management that they would normally do; these codes came from the actors were queried landowners about in the mail survey	<ul style="list-style-type: none"> -Internal Influence: <ul style="list-style-type: none"> -Self -Spouse/Partner -Family -Friend -External Influence: <ul style="list-style-type: none"> -Town Regulation -County Reg. -State Regulation -Professional -NGO -Neighbor -APA (ADK only) 	<ul style="list-style-type: none"> -We do nothing in order to let the wildlife thrive rather than managing specifically for wildlife. (ADK) -I would say the APA. (ADK) -There is a homeowner's association. (GYE)