

Socio-demographic drivers of land use change
on non-industrial private forestland

By
Celia J. Riechel
B.A., Princeton University, 2004

Thesis

Submitted in partial fulfillment of requirements for the degree of Master of Arts in the
Program in Environmental Studies at Brown University

PROVIDENCE, RHODE ISLAND

MAY 2009

This thesis by Celia Riechel is accepted in its present form
by the Center for Environmental Studies as satisfying the
thesis requirements for the degree of Master of Arts

Date _____

Steven Hamburg, Advisor

Date _____

John Logan, Reader

Date _____

Michael White, Reader

Approved by the Graduate Council

Date _____

Sheila Bonde, Dean of the Graduate School

AUTHORIZATION TO LEND AND REPRODUCE THE THESIS

As the sole author of this thesis, I authorize Brown University to lend it to other institutions or individuals for the purpose of scholarly research.

Date _____

Celia Riechel, Author

I further authorize Brown University to reproduce this thesis by photocopying or other means, in total or in part, at the request of other institutions or individuals for the purpose of scholarly research.

Date _____

Celia Riechel, Author

Vita

Celia Riechel was born in Oxford, Ohio in 1982. She earned her BA with high honors in Anthropology from Princeton University in 2004. She was the recipient of the 2004 Peter W. Stroh '51 Environmental Thesis Award. She has worked as a wildland firefighter for the US Forest Service and a Park Ranger for the National Park Service.

Acknowledgements

Thank you to my advisor Steven Hamburg, whose support and encouragement was indispensable, as well as to John Logan, Will Abbott, and Michael White. Thank you to Patti Caton and Betsy Barlow, who keep the Center for Environmental Studies running.

Thank you to Will Yandik, whose insights were always helpful, and to the wonderful ladies in the Campton Town Selectmen's Office. My wholehearted thanks to the many others who have helped me with this project.

Table of Contents

Abstract	1
Introduction	1
Data and methods	14
Results	18
Discussion	38
Conclusion	50
Works cited	57
Appendices	
Population projections	60
Landowner survey	71

List of figures and tables

Table 1. Change in private forestland and timberland coverage in New Hampshire	13
Table 2. Past trends in age composition	21
Table 3. Characteristics and survey responses by owner residence	30
Table 4. Characteristics and survey responses by owner age	35
Table 5. Children's interest and involvement in managing their parents property	37
Figure 1. Campton, NH real estate trends 1980-2007	19
Figure 2. Property size distribution in Campton, NH	20
Figure 3. Population change in Campton, 1790-2010	21
Figure 4. Population growth and growth rate under different migration scenarios, 2000-2040	23
Figure 5. Dependency and elderly dependency ratios under different migration scenarios, 2000-2040	23
Figure 6. Age structure under different migration scenarios, 2040	24
Figure 7. Occupancy of housing units, 1980-2005	27
Figure 8. Likelihood of selling in five years by owner residence	31
Figure 9. Acres owned by age of survey respondent	36

Socio-demographic drivers of land use change on non-industrial private forestland
Masters thesis, Environmental Studies
Celia Riechel

This research projected population growth for the period 2000 to 2040 in a rural New Hampshire town. It analyzed land use change on non-industrial private forest (NIPF) land from 1980 to 2007, surveyed and interviewed NIPF owners. Average NIPF parcel size decreased from 16ac in 1980 to seven acres in 2005. The housing stock increased by over 90 percent. Under three different scenarios of migration, the total population could be as high as 4,112 in 2040 (+51%) and elderly dependency ratio could be 30 with steady immigration with an even age distribution. With no migration, population would be 2,468 (-9%). The elderly dependency ratio could rise as high as 84 with retirement immigration and youth outmigration. Non-residents owned larger parcels and tended to be older than local owners. They were more likely to have sold or subdivided their land, more likely to sell in the near future, but also more likely to consider conservation easements. Owners over the age of 65 owned more land and more likely to plan on selling it in the near future than younger owners. 27% of owners over the age of 65 had children interested in managing their parents land, more than younger owners. Owners of all ages often changed land use due to reasons related to aging. NIPF land owned by non-residents or elderly owners is the most vulnerable to being developed, subdivided, or sold. These owners should be the target of conservation efforts.

I. Introduction

Landscapes are created and shaped by interactions between cultural and ecological systems. The most important aspect of the cultural influence on ecological system health is through land ownership patterns and their subsequent decisions about how that land is used (e.g. timber harvesting, placing houses, agriculture protection). Rapid landscape change due to changes in use is of central importance to ecologists, planners, and the public at large as it can have significant effects on ecosystem functioning and many of the services they provide, including biodiversity, timber and other natural resource production, public health, and economic stability. Throughout rural America, especially areas high in natural amenities and near cities, conversion of private forestlands to low-density residential development (exurbanization) is accelerating and projected to continue

for the next fifty years, with significant implications for the public and ecosystem health (Kline and Alig, 2005; Smith et al., 2004; USDA, 2000).

Over half of US forestland is privately owned. It has significant ecological (Millennium Ecosystem Assessment, 2003; Hansen et al., 2002; Kline and Alig, 2005; Groom et al., 1999; Kolipinski et al., 1975), economic (AFT, 2006; Smith et al., 2004; Butler and Leatherberry, 2004; Sampson and DeCoster, 2000), and cultural value (Kendra and Hull, 2005). Because legal boundaries do not follow ecological ones, many separate owners make separate decisions about land within the same watershed, migration corridor, or habitat, making land use on private property a public issue of great importance to civil society.

Private lands adjacent to public parks and forests are often ecologically important buffer zones between developed land and conservation land. They are the “key compliments to public lands” (Groom et al., 1999), the uses of which effect ecosystem and resource conditions, as well as biodiversity, far beyond their boundaries (Kolipinski et al., 1975). Public lands are created to protect many different public values ranging from the scenic to particular species to resources. The use of land beyond the boundaries of public land determines the success of these protective measures. From 1993 to 2003, the number of family forest owners in the lower 48 states rose from 9.3 million to 10.3 million, and accordingly the size of forest holdings declined (Butler and Leatherberry, 2004).

The nature and magnitude of the human impact on the landscape is largely due to the interaction of ecological conditions with three human factors: land use, technology, and demographics. Land use includes whether a landscape is used to produce goods of

economic value, and for what duration, the degree to which it is managed and natural processes able to continue, and size of management units. Technology consists of both those directly related to land use (e.g. feller-bunchers) as well as those that more broadly affect the way human society organizes itself (cars, high-speed internet). Demographics consists of total population size, age structure, and migration patterns. The first two have been the subject of separate study (Cronon, 1983); however, in the absence of the third piece, and without considering the synergisms among all three, our understanding of the cultural processes that drive land use change are incomplete. The focus of this research is on demographics, and in synthesis of multiple factors.

Conversion of open space and rural lands to developed uses has been the focus of considerable attention in both the natural and social sciences. The interdependency of natural and socioeconomic landscapes is now acknowledged to the point of truism; however, researchers and policymakers continue to struggle with the integration of quantitative and qualitative measures, terminology, and disciplinary tradition.

Fragmentation and development are commonly framed as either problems of management or suburbanization. Micro-level causation of land use change is interpolated from correlations between trends in macro-level outcomes. The environmental and ecology literature focus largely on land characteristics such as proximity to roads and major cities (Bancroft and Alkire, 2007; Gosnell et al. 2006; McDonald et al. 2006; Kline and Alig 2001), natural amenities and public lands (Hansen et al. 2002; Rudzitis 1999; McGranahan 1999), and feedbacks between population growth and the timber economy (Wear et al. 1999; Barlow et al. 1998). Sociological research focuses on new owners and immigrants—the demand side of the land use change equation—citing population growth,

increased disposable income, retirement, and lifestyle choices regarding valuation of the “rural,” household size, second home ownership, and increasing popularity of recreational activities (Kendra and Hull, 2005; Sampson and DeCoster, 2000).

Existing work skirts the central issue: forest owners are increasingly *choosing* to subdivide, develop, and sell their land to non-traditional owners who do not actively manage their land for timber production or other products. We know why new people move to rural areas and buy “hobby” farms and forests; comparatively little has been written to explain why established landowners accede to this transition. There are at least two potential reasons why there have not been systematic attempts to link owner characteristics to actual observed land use change: the difficulty in obtaining personal information on individuals, and in locating and contacting former owners. Despite these challenges, the maintenance of working forests into the future demands closer examination of generic trends of exurbanization and the growing popularity of second homes to which land-use change and transition is attributed.

Established “traditional” owners—those who earn their living from working the land, or who acquired it before highways and telecommunications networks reached the forest—are cast uneasily in the role of victims of industry decline, the increasing opportunity costs of maintaining working forestland in the face of the rapid growth in real estate values and growing competition from foreign timber sources (Stein et al. 2005; Hulse and Ribe 2000; McGranahan, 1999; Rudzitis, 1999). Aggregate measures of forest cover show that the area of NIPF and industrial lands do not always track together, suggesting they are governed by different influences (Table 1).

Eight years ago Sampson and DeCoster (2000) concluded that public open space conservation programs are “becoming outmoded” in their ability to meet the needs of new forest owners. Yet, programs aimed at promoting sustainable NIPF forests are still largely directed by assumptions about the primacy of economic motivations such as reduced current-use tax status and timber harvest assistance programs.

In New England and most of the eastern US, the realization that private owners do not always pursue management strategies in ways consistent with public interest came long after nearly all land was settled and privately owned. Thus efforts to improve the management behaviors of private owners have used non-coercive means.

Incentive programs that attempt to make good land use more economically appealing are the primary conservation tool, and have been adopted across the country. They are geared towards two general types of landowner: those who own land to work it in some productive capacity, e.g. farmers, ranchers, and woodlot owners; and those who own land as part of an accumulation of wealth. This reflects the historic shape of the landscape: predominantly working lands engaged in local economic production, and scattered large holdings held for their recreational or status values.

An example of the former is New Hampshire’s voluntary Current Use program (RSA 79-A), in which owners of ten or more undeveloped acres may enroll and receive benefits. Its strategy is one of “encouraging preservation of open space” through the “assessment of land value for property taxation on the basis of current use,” thus reducing the financial burden of keeping land undeveloped by taxing land on its income-producing capacity as forest, agricultural, or unproductive land rather than its real estate market value. (NH Current Use Criteria Booklet for April 1, 2007 to March 31, 2008)

Current use does not prohibit development; rather, it makes it less financially onerous to maintain open space and establishes a modest penalty for removal from the program in order to develop a property. An owner of property enrolled in current use may develop it whenever he or she wishes, at which time a land use change tax amounting to ten percent of the full value of the property is assessed (79-A:7). Thus, while it partially mitigates financial need due to daily operating costs as a cause of development, it does little to address profit-seeking or familial necessity; the reasons for which people develop or subdivide their land remain unaddressed.

Conservation easements are the primary incentive directed towards wealthy estates. Created in many states beginning in the 1980s to encourage charitable giving, easements consist of a set of restrictions (and sometimes obligations) on the uses of a property, in exchange for which the owner is entitled to tax savings based upon their previous year's Adjusted Gross Income. They are specifically targeted towards individuals interested in reducing the value of their land for estate tax purposes. Easements are not effective in promoting conservation by "land rich, cash poor" owners, for whom their property functions as a bank account, retirement plan, and insurance policy rolled into one. Affluent donors are better able to significantly reduce the value of their land without threatening their financial security, and they receive disproportionately greater tax savings due to their high marginal tax rates (Daniels 2000).

A third major non-coercive effort to preserve undeveloped lands has taken shape in the grassroots formation of land trusts and other non-profit organizations. Land trusts also emerged in the 1980s, in part as a response to population growth and rapid development. They typically focus on protecting a specific geographic area by getting

local owners to donate or sell the development rights to the trust. It is difficult, time consuming work, hashed out at countless kitchen tables, property by property. While many land trusts successfully preserve some open space properties, they are nevertheless generally limited in their geographic scope, financial assets, and political influence. Accordingly, their efforts have often been reactionary, piecemeal, and, consequently, largely inadequate to preserve the larger public interest in private lands ()

People are not atomized, purely rational economic actors. If profit were the sole motive, if landowners were exclusively rational economic actors, behaving in predictable ways to common pressures, NIPF owners would have long since sold out to development interests. The persistence of many people in forestry professions that are of increasingly marginal profitability, and on land that would be worth far more were it developed, contradicts the notion that the decline of the forest economy and general exurban migration are the sole forces of exurbanization.

People make decisions in a cluttered context of valuation and subjectivity. Very often individual choices are based on considerations entirely external to the market. Previous surveys of owners have shown that people own land for reasons other than to maximize economic profit, and in addition to income, landowners derive countless non-monetary benefits from their land (Gosnell and Travis 2005; Rowan 1994). There is no reason to assume that long-established owners behave differently than land owners in general. Although real estate is technically fully fungible, long-term landowners—especially those whose land has belonged to family members for several generations—may not typically consider the exchange value of their property to be the sole or primary reason for possession. They sell (exchange their land for its monetary value) because

extenuating circumstances force them to do so. Facing similar economic realities—the aggregate trends displayed in census, real estate and timber markets, and prospective buyers—specific family and land histories display greater variation than can be explained easily or solely by these external, mechanistic economic circumstances.

One source of insight relates to life course: Eddy and Smith (2001) found that of New Hampshire landowners whose property was enrolled in the current use tax program (by which lands are assessed based on their capacity as a working landscape rather than on their potential developed value), half were over the age of 65 and 76 percent over 55 in 2001, compared to only 21 and 42 percent, respectively, in 1993. It is commonly thought that the turnover rate of NIPF properties increases as owners age, but history shows that intergenerational transfer does not categorically lead to instability in ownership regimes (Donahue, 2004). We can say that owners are on the whole older than they were ten or twenty years ago, but not whether or by what mechanism this effects their land use decisions. Anecdotally, it is thought that aging landowners increasingly view their property as a source of retirement savings and medical insurance, with development a nearly inevitable alternative to the fading legacy of an intrafamilial transfer system.

What makes one owner develop his land and another keep it? This study will explicitly test the conventional assumption that economics are the sole or primary driver. It will seek to identify circumstances of the individual owner that make him more or less susceptible to aggregate pressures. These, I argue, form the underlying factors that play a significant role in determining landscape outcomes. After all, one does not attribute good health to the absence of germs, but rather to the robust functioning of the system to ward

off the effects of a ubiquitous exposure. Decisions to sell or develop may not solely or even primarily be driven by the real estate or timber market, but instead are simply functions of aging, shifts in family structure, and the nature of land ownership.

Planning requires imagining the future

Despite some cases of modest reversal in the fifty year trend of declining urban populations, most demographers predict the continued redistribution of the American population outward from dense population centers (Guest and Brown, 2005).

Accurate projection of the future of forestland requires understanding both demand and *supply* of forest properties, and the interaction between them. While pure economics may explain the development of forestland in immediate proximity to urban areas, it does not adequately account for exurban and rural forestland conversion. Urbanization is not an inscrutable black box; regional planning and management superficially alleviate symptoms of low-density, exurban residential development but do not address causation or prevention (Nowak and Walton, 2005).

Case study: New Hampshire

What causes a landscape dominated by working forest to become rural residential? What makes one owner develop his land and another keep it as a working landscape? Do trends observed on the aggregate level accurately represent specific communities? If working forests are to be preserved into the future, we must understand the processes that shape the present and will shape the future, know what can be generalized and what cannot; we must be able to imagine these different futures for

American forestland. Invariably, management on the large scale necessary to be relevant requires generalization; we need to know which *people* conservation efforts should target, not just what property.

The demand side of the land-transfer equation is large and its motivations well-studied. As such it will be examined in the aggregate: the implications for the landscape and community of total population size, migration and age characteristics. Because it is unforeseeable that even the largest national actors will have the capacity to change cultural phenomena (to say nothing of demographic certainties), the intent is to define the future conditions to which rural communities will have to adapt, or, the social dynamics to target to conserve NIPF land.

The supply side of the equation—consisting of current forest owners—is a potentially far more effective object of intervention for conservation. Projecting both the magnitude and kind of migration can further understanding of the nature and duration of their impact on rural landscapes, as well as something about future forest owners.

This paper examines the importance of population age, migration, residence and landowners' extended decisionmaking contexts for the shifts in land-use on private forestland in Campton, New Hampshire. It attempts to describe possible human futures and the landscapes that result, and the options for action to change that trajectory. The size, composition, and migration flows of a population have a substantial effect on the stability of a land use regime, the economic activity, and service needs of a community. This is especially true for small rural communities that typically offer fewer services than urban areas and lack the resources to quickly adapt.

Understanding the causes of development on NIPF land will, in combination with estimates of demand for forestland, enable planners, foresters, and conservationists to better shape their policies and programs. It can help direct the next generation of government conservation programs to more precisely address the human as well as economic and physical drivers of forest loss to exurban residential development. In the meantime it can provide conservation organizations such as land trusts with a means of directing their limited resources towards the most at-risk properties and owners.

Case study: Campton, New Hampshire

Campton, New Hampshire, is a historically timber- and agriculture-dependent rural community which has in recent decades seen a decline in the relative importance of timber and other natural-resource occupations for employment (US Census Bureau, 1990 and 2000) and as a component of state GNP (Bureau of Economic Analysis, 2006.). Campton has an area of 32,316 acres adjacent to and including a small part of the White Mountain National Forest. It is predominantly privately owned. It is bisected by the Pemigewasset River—historically a source of power, water, and transportation—and Interstate 93, whose construction in the late 1970s vastly increased its accessibility from major cities such as Concord, Manchester, and Boston. It is an average amenity-rich, rural forested community.

The landscape of New Hampshire, as anywhere, is the aggregated physical manifestation of human relationships on multiple scales. Exurban development is the cumulative result of many individual and local decisions to change land use. For most of the later half of the twentieth century, New Hampshire was dominated by forest cover,

with a large timber industry, providing employment for residents and generating profit for forestlands. It is second only to Maine in percent forest cover. Like the rest of the eastern US, it is overwhelmingly privately owned, and parcel sizes tend to be smaller than in western states. Seventy percent of New Hampshire forests are NIPF. It has the fastest-growing population in New England, but is average nationally. Land conversion rates are slightly below the national average.

New Hampshire has lost forestland since its peak in the late 1960s; just how much it has lost differs according to source. Smith et al. (2004) report that between 1953 and 2002, New Hampshire lost approximately 515,000 acres of private timberland to development, twelve percent of its total private timberland.¹ Most of this occurred from 1977 onwards: forestland decreased by less than one percent between 1953 and 1977. The losses were not evenly distributed among types of forestland. NIPF loss occurred at a much greater rate in the earlier period, followed by relative stability in net area in the latter; conversely, industrial forestland expanded in the first period, then lost over 50 percent after 1977. The USDA National Resources Inventory (NRI) reports a six percent decline in non-federal forestland² and a 68 percent increase in developed land between 1982 and 2003 (Table 1).

¹ Timberland is defined as “forest land that is producing or is capable of producing crops of industrial wood and not withdrawn from timber utilization by statute or...regulation...Currently inaccessible and inoperable areas are included” (Smith et al., 2004).

² Forest land is defined as “A Land cover/use category that is at least 10 percent stocked by...[trees]. Also included is land bearing evidence of natural regeneration of tree cover...and not currently developed for no forest use...The minimum area for classification as forest is 1 acre...”

Table 1. Change in private forestland and timberland coverage in New Hampshire (1,000s acres)

	Smith et al. 2004									National Resources Inventory					
	Forest industry			NIPF			All private timberland			Non-federal forestland			Developed land		
	Total	Change	% chg	Total	Change	% chg	Total	Change	% chg	Total	Change	% chg	Total	Change	% chg
1953	771			3,366			4,137								
1977	947	176	23%	3,165	-201	-6%	4,112	-25	-1%						
1982										4,128			379		
1987	662	-434	-46%	3,353	188	6%	4,015	-97	-2%	4,054	-75	-2%	469	90	24%
1992										3,979	-75	-2%	526	57	12%
1997	513	-149	-23%	3,246	-107	-3%	3,759	-256	-6%	3,932	-47	-1%	589	63	12%
2002	458	-55	-11%	3,164	-82	-3%	3,622	-137	-4%						
2003										3,899	-34	-1%	635	47	8%
1977-2002		-489	-52%		-1	0%		-490	-12%						
1982-2003											-230	-6%		256	68%

Source: Smith et al. (2004); US Department of Agriculture (2000; 2007)

The difference between the loss of industrial and NIPF land suggests that factors driving their change differ. The management priorities of industrial timberland are generally simpler than for family forests—lands are managed for profit from timber harvest, and decisions are influenced by economic and market trends. Thus the significant decline in the northern timber economy and increasing competition from foreign timber sources, coupled with the growing profitability of rural land development since 1977 could explain the loss of industrial land. The difference may also be due to transfers of some land between the two categories. However, that cannot account for all NIPF loss, as both Smith et al. and the NRI indicate a consistent decline in total private forestland.

There are several questions raised by the trends in NIPF and industrial lands. First, are the data accurate? Are NIPF lands actually enjoying a period of stability, or is this measure inaccurate or too coarse to usefully direct policy? Secondly, what caused NIPF loss from 1953 to 1977, and will those same drivers of change reemerge in the future? If NIPF land is tied more strongly to human social situations, then understanding

and predicting the occurrence of those conditions can substantially help in predicting the likelihood of NIPF loss in the future, and direct mitigation efforts.

II. Data and methods

This paper uses information from multiple administrative levels and perspectives, ranging from aggregate national measures to local public record to individual recollection, the compilation of which permits a kind of triangulation on the intersection of land and people. The period in question was 1980 to 2007. Combining information on multiple levels and from multiple disciplines permits refinement of the generalizable points from specific localities to be extracted for broader application.

Census

Data from the 1980, 1990, and 2000 Censuses were used to measure change in population and its characteristics, housing units, occupancy and ownership rates, value, and construction date in Campton, NH. American Community Survey information from intercensal years since 2000 were also used, however, these do not go to the town or block level. Life tables and other vital statistics from the National Center for Health Statistics were used to project population.

Projections of the future resident population were created for Campton extending to the year 2040 in order to extend beyond the peak of baby-boomer retirement (2025 to 2030) but remain within a reasonable long-term planning horizon. Migration was the variable altered using the cohort-component method. Limited availability of data at the

town level and for a single consistent year necessitated the use of national level data for life expectancy and state data for fertility (see Appendix).

The accuracy of projections is inverse to the size of the population, as stochastic events, whether of natural or human origin, are likely to affect a higher proportion of the population in small communities. Estimating in-migration is also subject to some inaccuracy because it originates from the population outside the subject population, thus it is somewhat nonsensical to describe it in terms of flows or rates relative to the subject population. As a result the Census Bureau does not normally make detailed population projections for small populations such as Campton. Nonetheless, data limitations should not deter making projections for small communities as, with disproportionately more land per person and fewer municipal resources to handle change than suburban counterparts, they are the ones that need to know the future the most.

The purpose of these projections is to describe the range of potential populations which will shape forest land use decisions and the host community. They are not intended to accurately predict the future population of Campton, but to provide the basis for considering how age and migration could shape Campton and similar rural towns in the future. Three scenarios are considered, in which the future of Campton's population is projected assuming different migration and age distribution for the period 2000 to 2040. The dependency ratio is a measure of the number of workforce-aged people to those of dependent ages, both children and the elderly. The old-age, or elderly dependency ratio is a measure of the number of elderly dependents to workforce aged people in a population. These are important measures of the economic productivity of a population, and the likely demand for public services. Scenarios included:

1. “Aggregate”/Macro to micro: Age distribution of immigrants was set as the average of the distribution of immigrants for New Hampshire in 2004 and 2005. Number of immigrants kept constant at 173 per year—the population growth in Campton from 2000 to 2005, minus natural increase (US Census Bureau, 2000).
2. “Retirement” migration: age distribution according to 1990 to 2000 change in Campton. Net immigration was kept at 173; outmigration was calculated using the percent of net loss in each age group in Campton from 1990-2000—primarily in younger ages.
3. No migration: used as a reference scenario; projection for the population of Campton, baseline year 2000, assuming the population to be closed to both in- and out-migration.

See Appendix 1 for detailed description of projections.

Records

A database of land use change for all private property in Campton was created from town-level records for the period 1980-2007; New Hampshire Real Estate Transfer Questionnaire (form PA-34), Application for Current Use Form A-10 (RSA 79-A), and subdivision/merger requests filed with the town. These data provide a comprehensive record of key land-use changes in Campton throughout the study period. However, only those individuals who have taken specific action requiring the filing of one of the three forms with which the record is concerned—property purchase or sale, current use application or withdrawal, or subdivision—are visible. Individuals who did none of these

things are not represented, nor are less dramatic actions or land-use changes short of tenurial or taxation changes.

Properties enrolled in current use were rated for their physical quality by the Campton tax assessor between 2003 and 2005. The Marlow Decision Matrix was used to assign each property a score of 0 (poor), 1 (average), or 2 (good) in each of three categories: grade, location (as proximity to a road), and site quality (terrain). The sum of these points is the total site quality: 0 – 2 is poor; 3 – 4 is average; 5 – 6 is good. These ratings were used when considering possible causes of land use decisions.

Landowner surveys

A survey was mailed to 227 individuals identified from the town records as current or former owners (1980-2007) of forested properties ten acres or larger—the absolute minimum acreage necessary for profitable harvesting of northern hardwood forest lands and the minimum acreage for participation in the current use program. Owners who had multiple parcels under ten acres, but that were contiguous and thus collectively ten or more acres, were included because such parcels can and often are managed as a single property. The survey was composed of 20 open-ended and Likert-type questions, eliciting information on property history, land use values, motivations for taking specific actions, and likely future actions. Questions about socioeconomic characteristics were included to determine owners' decisionmaking context. Sixty-four questionnaires were returned, sixty of which were used for the analysis. Questionnaires were excluded that were not completed or that arrived after responses had been compiled. Appendix 2 is the survey.

Interviews

Interviews were conducted with a subset of landowners who were willing and available. Potential interviewees were drawn from among those who were mailed the surveys, and every attempt was made to reach owners of different ages, total holdings, and residence. Real estate agents, a tax assessor, town staff, foresters, and developer were also interviewed. Interviews consisted of open-ended questions and lasted for about an hour and a half.

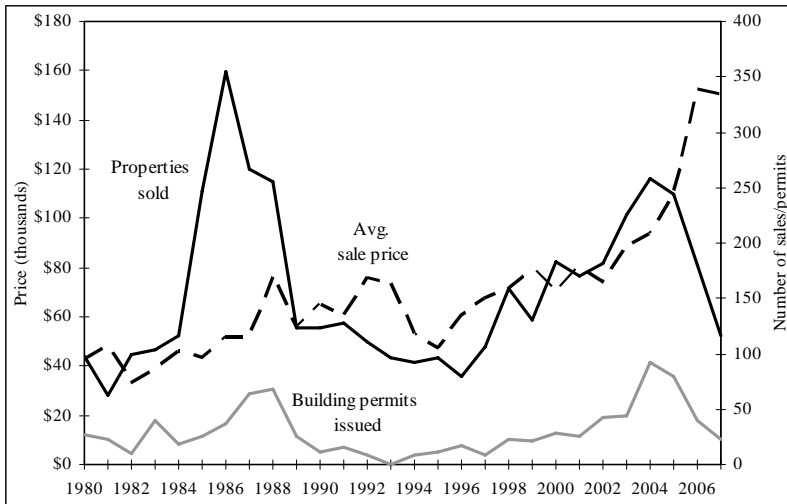
III. Results

Land use change

Roughly 4,500 different individuals have owned property in Campton in the past 27 years. The average parcel size of land sold in 1980 was 16 acres; in 2005 it was seven acres. There were 73 major subdivisions, involving over 8,000 acres—nearly a quarter of the town's land area. Among these was the subdivision of a very large tract in the northeast corner of the town into Waterville Estates, with around 600 residential lots. The number of privately-owned parcels in town went from approximately 1,785 in 1983 to 3,042 in 2007, even as the total acreage of privately owned land decreased slightly due to the addition of around 500 acres of public lands. One thousand and seven new housing units (to 2006) were built, an increase of over ninety percent since 1980 (Figure 1) (US Census Bureau, 2008; NH Housing Finance Authority, 2008). The size distribution of parcels has shifted, with smaller properties increasing and large properties decreasing as a percentage of all parcels ten or more acres (Figure 2).

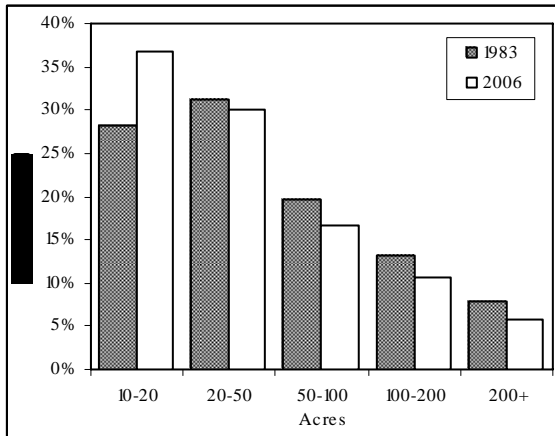
Comparing aggregate data from Table 1, high real estate sale price (a measure of demand for Campton property and the opportunity cost for landowners who kept their land in forest) in 1987 coincided with the largest loss of industrial land, as would be expected if its decisions were driven primarily by economic conditions. The total area of NIPF land *increased* from 1977 to 1987, however, in subsequent periods of spiking real estate prices, it declined, while developed land increased. The rate at which NIPF land was lost and developed land grew accelerated between 1997 and 2002., despite only modest, fluctuating gains in price. Loss of industrial land area remained at a relatively constant rate during the period.

Figure 1. Real estate trends, Campton, NH 1980-2007



Source: US Census Bureau; NH Housing Finance Authority; New Hampshire Form PA-3

Figure 2. Size distribution of properties 10 or more acres in Campton, NH, in 1983 and 2006.

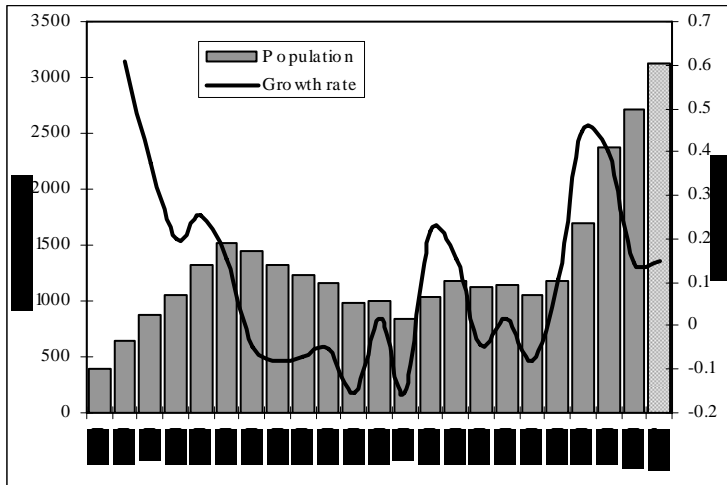


Source: Elson, 2006.

Population growth & projections

From 1980 to 2000, Campton's resident population increased by 61 percent (Figure 3). Campton grew by 14 percent between 1990 and 2000, but this growth was not evenly distributed across different ages. The greatest increase was in the 45 to 49 cohort (+136%), 50 to 54 (+99%), and 75 to 79 (+100%). Young children and young adults declined as a relative portion of the population: both zero to five and five to nine year olds declined 22 percent; 20 to 24 year olds declined twelve percent. The largest cohort of Campton's 2000 population was the 45 to 55 age range. The median age was 30 in 1980 and 32 in 1990, both in line with the national average. By 2000 it was four years older than the national average (Table 2). Smaller birth cohorts due to relatively fewer young adults suggest that children will likely continue to decline as a percentage of the total population, and median age continue to rise, even without migration.

Figure 3. Population change in Campton, NH, 1790-2010*



Source: US Census Bureau

Table 2. Past trends in age composition.

	1980			1990			2000		
	<5 years old (%)	65+ (%)	Median age	<5 years old (%)	65+ (%)	Median age	<5 years old (%)	65+ (%)	Median age
Campton, NH	8.0%	11%	30	8.4%	11%	32 ³	5.7%	12%	39
New Hampshire	6.8%	11.2%	30.1	7.6%	11.3%	32.8	6.1%	12.0%	37.1
United States	7.2%	11.3%	30.0	6.1%	12.6%	32.9	6.8%	12.4%	35.3

Source: US Census Bureau

Three population scenarios

Campton's private forestland could have very different futures depending on the kind of population change the town experiences over the next 30 to 40 years, irrespective of the age of the landowners themselves (discussed later). All three projections produced population growth in the near-term future, followed by decline in the retirement and closed scenarios. The rate and duration of growth differed substantially, as did dependency ratios. The total population would increase by as much as 50 percent under the New Hampshire distribution scenario, but would actually decrease by around five percent under the retirement scenario (Figures 4, 5 and 6).

³ Imputation. Median age not reported for 1990. Estimated from reported five year age categories, assuming mid-category (2.5 years) age for all except the last age category (85 years and over), which was assumed to be four years beyond.

1. New Hampshire age distribution

Population increased for the entire projection period, reaching 4,112 by 2040. The rate of increase declined, however, leveling off to below one percent from 2035 to 2040. This projection produced the lowest total and elderly dependency ratios, peaking in 2030 at 76 and 33, and subsequently declining to 71 and 30 by 2040, respectively (see Appendix 1). Such growth was due to a large number of people of childbearing age and resulting high crude birth rate.

Applying state-level migration ages from a baseline of the 2000 population, produced the closest match to the recently released 2005 population estimate (released as a total only), however, it does not reflect the outmigration of 15 to 24 year olds that was observed in the 1990 to 2000 period.

2. Retirement migration

This projection modeled a rural population with children and young adults exiting and older adults entering the population. Because the immigrants were largely beyond the child-bearing years, total population increased more slowly than the New Hampshire-wide projection, peaking in 2020 and then declining, dropping below the 2000 population by 2040. It produced the highest dependency ratios, peaking in 2035 at 113 for the total and 86 for the elderly dependency. It also produced the lowest crude birth rate, which declined throughout the projection period, to 29 in 2040.

3. No migration

Projecting the population assuming it to be closed to migration produced the least growth, peaking earliest, at 2,744 in 2010, and slowly declining. The total 2040 population is very near to that under the retirement migration scenario, but without having gone

through the same ‘bubble’ of growth, and with a younger, more even-aged population. This is a result of the uneven distribution of ages already present in 2000, and low fertility rates in New Hampshire. Such an age distribution continues to depress population growth decades after it is introduced—in this case, the 1990s—resulting in a doubling of the dependency ratio.

Figure 4. Population growth (a) and growth rate (b) under different scenarios, 2000-2040

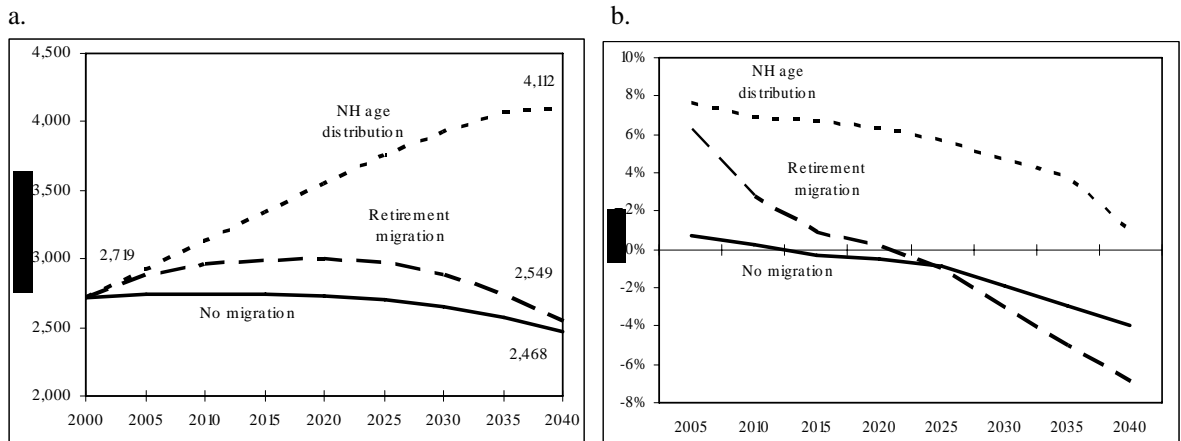


Figure 5. Dependency and elderly dependency ratios under three scenarios

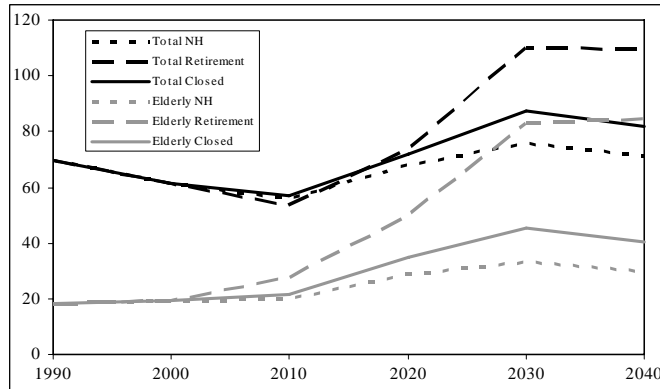
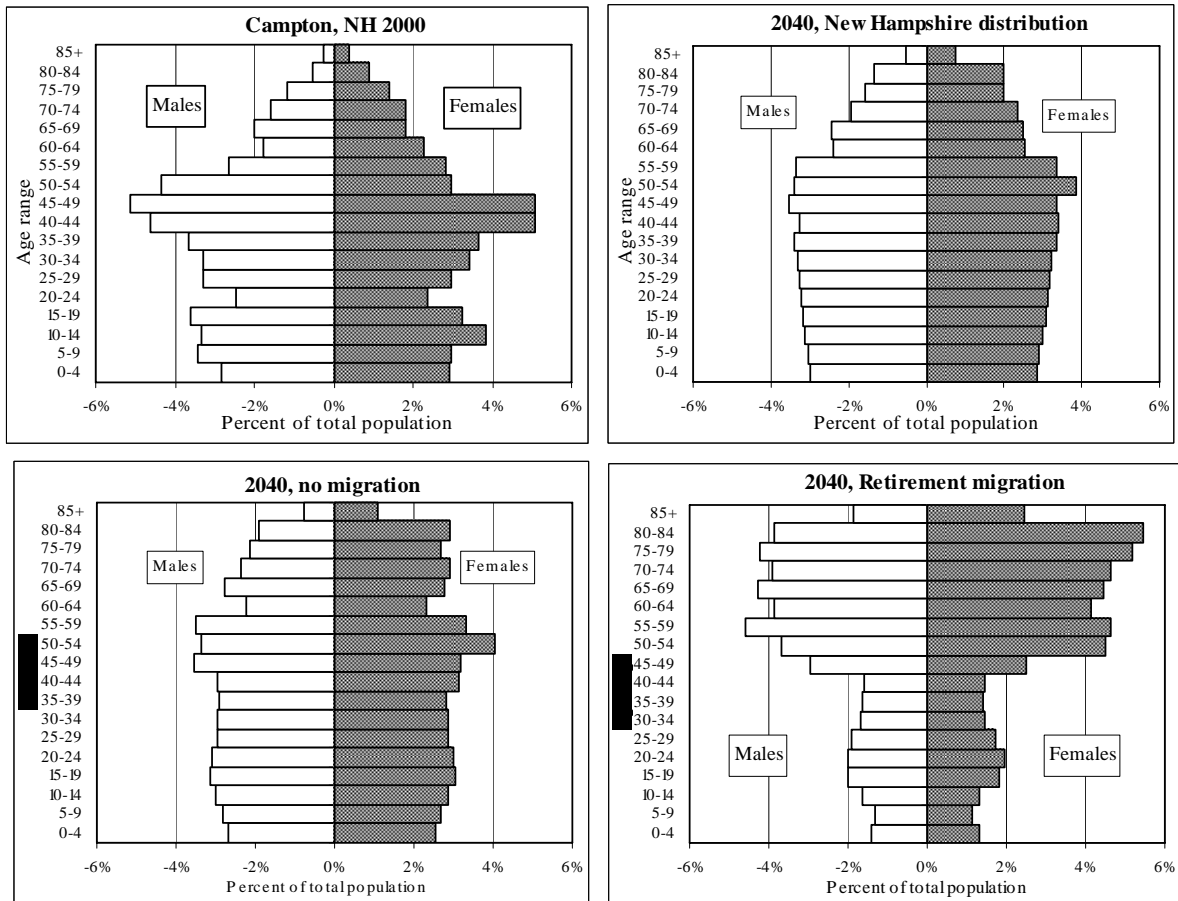


Figure 6. Age structure under three different scenarios



NIPF landowner surveys

The census of population does not identify who among a population owns land, nor does it cover people who own land in one place but live in another. Older and non-resident forest owners could (and may already have begun to) cause a transition in the NIPF landscape. Statewide, forest landowners have grown older, with minimal entrance of new, younger owners (Eddy and Smith, 2001). Since 1980, the ratio of non-resident to resident home ownership nearly doubled, such that the use of an increasing proportion of Campton's land is determined by people who do not live in town (Figure 6). The landowner survey sought to provide a more detailed picture of the people who shape Campton's forestland, identifying owner age and including non-resident owners.

Survey respondents collectively owned 119 parcels, totaling 5,054 acres, or around 15 percent of the total town acreage, and seventeen percent of the total privately-owned acreage. Their average parcel size was 42 acres, slightly smaller than the 60 acre average among all properties over ten acres in 2007. The average 2007 assessed building value for respondents was \$172,303, about 12 percent greater than that for all properties greater than ten acres, but it was not a significant difference (t-test, 1 tail, $df=75$, $p=0.12$).

It is commonly thought that economically productive land is less vulnerable to development. Relatively few owners surveyed managed their land for profit. Twenty - three percent of owners received some income from productive uses of their property but just seven percent earned ten percent or more of their annual income. Parcels from which the owner generated income were significantly larger than those that did not, averaging 113 acres and 70 acres, respectively (t-test, 1-tail, $df=23$, $p=0.078$). However, there was significant variability in the pattern, for instance, the owner of the largest property in the survey (539 acres) did not generate income from its management. Owners who received income from their land were less likely to have changed land use during their own tenure, but when they did, it was more likely to have been related to a life-course event (related to aging and different stages in one's life, such as childbirth, career change, and retirement). They were equally likely as non-productive owners to have changed land use from the previous owner. They were more likely to have sold or subdivided land than those who earned nothing from it, but less likely to have developed. Significantly, fewer economically productive owners anticipate selling in five years than those who

derive no income, but in ten years, more foresee selling or subdividing. They did not anticipate future development or construction of a house.

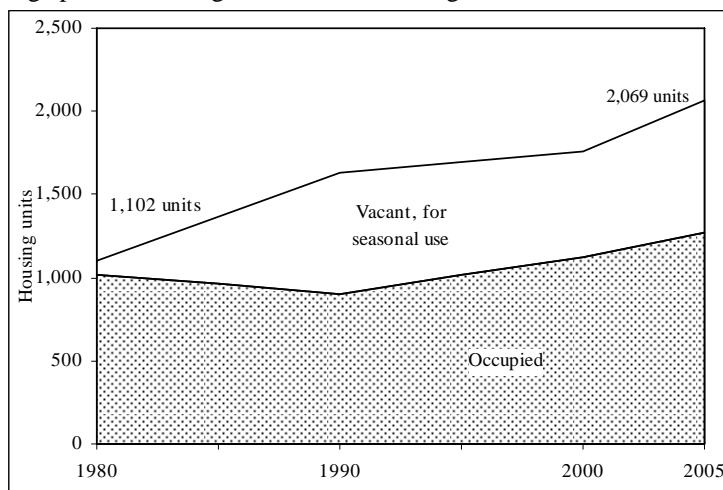
Owner income was also not strongly correlated with productive or non-productive uses. Generally it is thought that ownership of non-productive land is restricted to the wealthy. However, fully half of owners who received no income from their land had annual incomes below \$100,000—well within the income range considered middle class. Fourteen percent had an income below \$50,000. While profit may not play a key role, minimizing loss probably does—a forester-turned developer remarked that, “without current use, nobody could keep their land.” Current use enrollment likely enables the large portion of landowners with modest income to treat their land as a non-productive luxury good. Despite the evidence to suggest economics do matter, few surveyed owners indicated economic considerations as significant in their decision-making process—25 percent mentioned anything related to finances, broadly defined.

Residence

Non-resident landowners are equally if not more important to the future of the town’s landscape than resident owners, and their numbers are growing. Since 1980, the number of properties held by absentee and seasonal residents has increased substantially. Figure 2 displays the growth of Campton’s population over time, however, the number of people who make decisions about its land has increased far more than the resident population would indicate. In 1980, 60 percent of properties sold in Campton were bought by local residents; by 1985 it had dropped to just 40 percent, and has not been higher than 52 percent since. In 2007, non-residents owned about 40 percent of the forest acreage eligible for current use, up from 30 percent in the 1980s. One third of all houses in

Campton were vacant in 2000, 91 percent of which were seasonal second homes, despite coming at the end of a decade-long real estate slump. In 1980, just seven percent of housing units were vacant for seasonal use (Figure 7) (US Census Bureau 1980; 2000). The number of housing units increased at nearly twice the rate that the resident population did between 2000 and 2005, raising the seasonal home percentage to 38 percent of the total.

Figure 7. Occupancy of housing units, Campton, NH 1980-2005. Seasonal homes have contributed to a large portion of the growth in total housing stock.



Source: US Census Bureau

For forestland ten or more acres in size, local residents comprised 57 percent of owners, and 53 percent of respondents to the survey. Forty-six percent of surveyed properties were owned by non-residents, owning 48 percent of the acreage surveyed. The largest holding surveyed was owned by a non-resident.

Non-resident respondents typically owned more land—their average holding size was 89 acres, compared to 80 acres for residents, though this was not a significant difference (t-test, 1-tail, df=49, p=0.34), and their land tended to be of poorer quality. Residents’ assessed building value for the year 2007 averaged over \$60,000 more than for non-residents’ buildings.

Resident owners were younger than non-resident owners, with 12 percent and 7 percent of each, respectively, under the age of 44. Resident owners tended to have lower incomes, and were more likely to earn income from their property. Thirty percent of non-residents and 24 percent of residents acquired their land from a family member. Fifty-nine percent of non-residents and 36 percent of residents acquired their property due to death or aging of the previous owner. Death of the previous owner was twice as likely to have been the reason non-residents acquired it than residents, whereas residents were slightly more likely to have acquired it due to the previous owner being elderly.

Valuing land for timber or conservation and recreation are often considered mutually exclusive. Resident owners rated timber harvesting and investment as important more than twice as often as non-residents, but they also valued conservation and recreation—at roughly the same rate as non-residents. They considered privacy to be slightly less important, but passing on to their children more important. Residents also more commonly enrolled their land in current use and had a written management plan, however, more non-residents had conservation easements, and more indicated they were likely to place an easement on their land in the future.

Nearly 80 percent of residents indicated that they changed land use from the previous owners', compared to 67 percent of non-residents. Most commonly, they converted the property to a primary residence, however, nearly a quarter stopped timber harvest activities, and nearly 30 percent stopped farming. Non-residents most commonly changed a permanent residence to seasonal, and built or developed. Roughly equal percentages of residents and non-residents changed their own land use, however, residents' land use changes were more commonly attributed to life-course issues.

Similarly, residents were only slightly more likely to harvest timber on their property, and both developed at similar rates.

More non-residents had sold or subdivided their property, and more indicated they would to sell in the future. Over half of residents indicated that they would likely harvest timber in the future, compared to only 30 percent of non-residents. More children of non-residents were interested in managing their parents' land. No children of resident owners who acquired their land from a family member were more than neutral towards their parents' property (two owners in this group had children too young to have formed an opinion). Non-resident owners who purchased their land from an unrelated person had children that were most interested in managing their land, with one quarter interested or very interested. *None* of the children of resident owners who had acquired their property from a family member exhibited interest in their parents' land.

Table 3. Characteristics and survey responses from resident and non-resident NIPF landowners

	Resident (n=33)	Non-resident (n=27)	
Land			
Total land area owned (acres)	2,645	2,411	
Parcels	64	55	
Parcel size, mean (acres)	41	44	(t-test, 1-tail, df=117, p=0.35)
Parcel size, median (acres)	23	27	
Total holdings, mean (acres)	80	89	
Total holdings, median (acres)	49	62	(t-test, 1-tail, df=49 p=0.34)
std deviation	81	104	
max	380	539	
min	10	11	
Land quality: Good to Very Good^a	32%	24%	
Average building value, 2007^b	\$201,700	\$138,000	(t-test, 1-tail, df=31, p=0.015)
Average years owned^c	20	19	(t-test, 1-tail, df=115, p=0.21)
People (percentages out of total owners)			
Age: 25 to 44 years	12%	7%	
65 and over	36%	41%	
Previous owner's sale age-related^d	36%	59%	
Death	15%	33%	
Advanced age	18%	15%	
Acquired from family member	24%	30%	
In current use	79%	70%	
Written mgmt plan	24%	22%	
Conservation easement	3%	15%	
Work <30 miles away			
Annual income >\$100,000	29%	55%	
10% or more of income from property	13%	0%	
Children interested/involved	12%	23%	
Values: "very important" or "important" uses			
Timber harvest	45%	22%	
Investment	48%	19%	
Conservation	70%	67%	
Recreation/enjoyment	76%	78%	
Privacy	67%	74%	
Pass to children	55%	48%	
Land use change			
Change from previous owner	79%	67%	
Stop timber harvest	24%	7%	
Stop farming	27%	15%	
No longer permanent residence	6%	30%	
Develop/build	21%	30%	
Start timber harvesting	12%	15%	
Start farming	9%	0%	
Become primary residence	33%	0%	
Change (same owner)	18%	15%	
Age-related life change cause ^e	12%	7%	
Land use			
Timber harvest	45%	41%	
Developed/construction	27%	26%	
Sold	15%	30%	
Subdivided	12%	22%	
Future land use: "Very likely" or "likely"			
Sell in 5 years	6%	15%	
Subdivide	6%	4%	

Build	12%	19%
Timber harvest	52%	30%
Conservation easement	6%	11%

^a From the Marlowe Decision Matrix

^b Values from the FY 2007 tax assessment for buildings. No distinction was made between houses and other structures. Does not include land and current use value for the property.

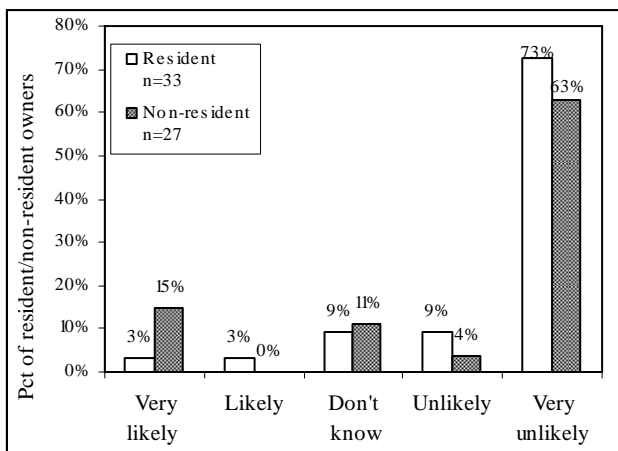
^c Taken from mean average year acquired for all parcels: resident: 1987; non-resident: 1988. The difference is inconclusive due to ambiguity surrounding when specific properties were actually acquired. The median year acquired for all parcels is: resident: 1989; non-resident: 1985. Combining parcels owned by the same individual yields: resident: mean 1988, median 1989; non-resident: mean 1989, median 1994.

^d Advanced age, death of owner, or death of spouse.

^e Causes included: Advanced age, death, childbirth, career change, retirement

Residents’ reported likelihood of selling in five years followed a relatively even, exponential trajectory, with very few considering it likely, only slightly more reporting it unlikely, and 73 percent indicating—often emphatically, with added exclamation points and variations on the words “Never sell!” written in—that they were very unlikely to sell. Non-residents clumped at the two poles, and fewer in the uncertain middle. Like residents, the greatest number indicated they were very unlikely to sell, however, the second most common response—15 percent—was very likely to sell (Figure 8).

Figure 8. Self-reported likelihood of selling in five years, by owner residence



Age

The age of a landowner provides an indication of when ownership transfer—and elevated risk of land use change—will occur. Ownership transfer tends to be precipitated by

landowner aging or death (DeCoster, 1998). Survey respondents' ages corroborated the state-level trend found by Eddy and Smith (2001). Ninety percent of respondents were over the age of 45; they owned 92 percent of the total acreage surveyed. Almost 40 percent were 65 or older, and owned half of surveyed acreage. The ages of owners who did not respond is not known, so it could not be established whether this is representative of the ages of all NIPF owners.

The total acres owned by respondents differed by age, however, there was considerable variance (Figure 9). Older owners (65 years and over) owned the most land, with a median holding of 68 acres. The middle-aged owners (45 to 64) owned on average 56 acres, while owners under 45 years old averaged just 25 acres (Table 4). Older landowners owned the greatest amount of land, were least likely to be resident, most likely to have acquired their land when the previous owner grew too old or died. Their conservation activities tended towards the passive—they were most likely to have a conservation easement or to have consolidated properties, but least likely to have a written management plan. Over three-quarters had changed land use from the previous owners' use; nearly half of these involved cessation of farming activities, and nearly a quarter stopped timber management. During their own tenure, nearly a quarter changed land use, of which 80 percent were due to an age-related cause. Thirty-two percent of old owners generated income from their property, more than younger owners; however, they identified enjoyment, conservation, passing to children, and privacy as all more important than timber harvesting. Fourteen percent indicated they were “very likely” to sell within five years; nearly a fifth said they would in ten years. The oldest owners exhibited the greatest interest in passing their land on to their children (but over a quarter were not),

and were most likely to have children interested or involved in their land, however, nearly three quarters of them did not.

Many respondents and interviewees said they intended to leave their land to their children. Few, however, had openly discussed with their children the future of the property, and most showed a reluctance to impose restrictions upon their children's decisions. One man said of his daughter: "we haven't really talked about it, but she knows we'd like her to keep it. I don't really know what she'll do with it, but we don't want to coerce her." Another man said that "when I'm gone, it's his [his son, who lives in another state]. I'd like to think he'll keep it, but the dead don't have any right to force things on the living...it'll be their world then..." "We hope to leave to our three sons," a survey respondent wrote.

No respondents were under the age of 25; only six were under 45, and they collectively owned 188 acres—just four percent of surveyed land. Half acquired their land from a family member, twice the rate of the other age groups. Nearly all were Campton residents; only one worked in Campton. None had an annual income over \$100,000, however, they also did not generate income from their property. Like owners over the age of 65, they valued their land primarily for its non-productive and amenity qualities, and valued timber harvesting and investment potential least. They were least likely to enroll their land in current use, but most likely to have a written management plan. All had changed land use from that of the previous owner, however, unlike the oldest owners who had largely stopped productive uses (mostly farming, some timber harvest), most of the youngest owners built on their land and half converted it into a primary residence. All of the properties on which the previous owner had harvested

timber were no longer managed for timber, however, they did indicate a strong likelihood of timber harvest in the future. Owners under 45 changed uses during their tenureship in greater proportion than older owners, of these, half were due to some life-course event such as having children. None foresaw selling or subdividing their property in the future.

The largest portion of respondents were middle-aged, 45 to 64 years old. They owned less land than the older respondents, however, they were most likely to engage in timber harvest. Significantly fewer middle-aged owners lived in Campton than younger owners, however, they more frequently enrolled their property in current use and had a written management plan nearly as often. They had the greatest percentage of owners earning \$100,000 or more in income, but still nearly three quarters earned nothing from their property. Nearly all considered recreation and enjoyment to be important, closely followed by conservation and privacy. They rated everything as an important aspect of their ownership more highly than owners younger and older, with the exception of passing on to their children. Fewer had changed use from that of the previous owners, however, nearly three quarters had changed uses. There was not as overwhelming a usage change as for the older and younger owners; roughly a quarter developed, and slightly more made their property a primary residence. Significantly, twenty-one percent of middle-aged owners harvested timber on land which previous owners had not (to their knowledge) harvested. They changed land use during their own tenure least frequently, and these were less frequently triggered by age or life change.

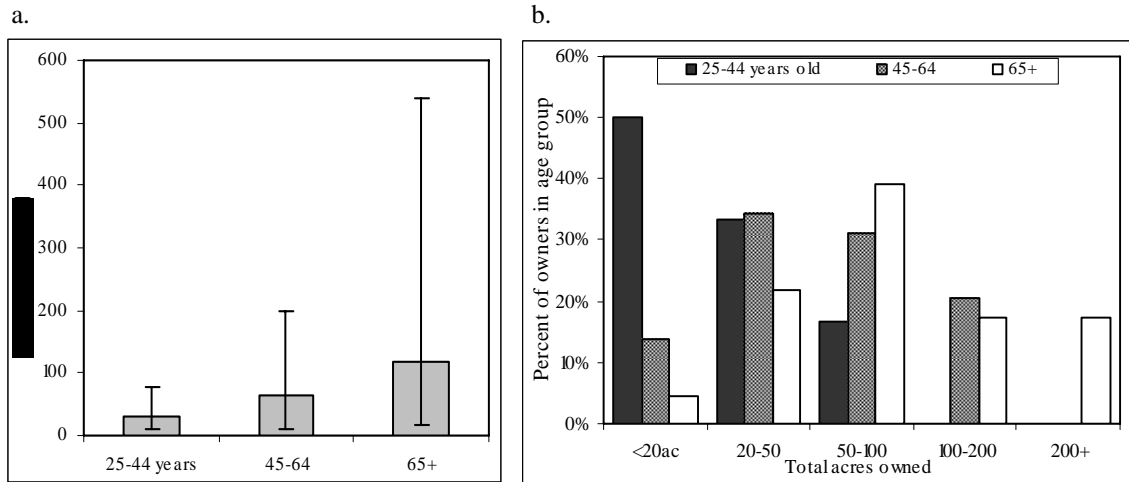
Table 4. Land and owner characteristics by age of survey respondents.

	25 to 44 years (n=6)	45 to 64 years (n=29)	65 years and over (n=22)	All respondents (n=60)
Land				
Parcels	12	58	44	119
Parcel size, mean (acres)	23	37	49	42
Parcel size, median (acres)	15	19	30	26
Total holdings, mean (acres)	31	66	120	84
Total holdings, median (acres)	25	56	68	59
std deviation	24	54	126	
max	76	199	539	539
min	11	10	16	10
Average primary residence value, 2007	\$190,400	\$206,200	\$204,800	\$201,700
People (percentages out of total owners)				
Previous owner's sale age-related	33%	41%	64%	47%
Death	17%	17%	36%	23%
Acquired from family member	50%	24%	27%	27%
Primary residence	67%	38%	36%	40%
In current use	67%	79%	77%	75%
Written mgmt plan	33%	28%	18%	23%
Conservation easement	0%	7%	14%	8%
Work <30 miles away	50%	24%	14% ^a	22%
Annual income >\$100,000	0%	41%	32%	32%
No income from property	100%	72%	68%	70%
Children interested/involved	0% ^b	10%	27%	15%
Values: "very important" or "important" uses				
Timber harvest	33%	45%	27%	35%
Investment	33%	45%	23%	35%
Conservation	50%	83%	64%	68%
Recreation/enjoyment	50%	97%	68%	77%
Privacy	83%	83%	59%	70%
Pass to children	50%	48%	64%	52%
Land use change				
Change from previous owner	100%	72%	77%	73%
Stop timber harvest	33%	10%	23%	17%
Stop farming	0%	14%	41%	22%
No longer primary residence	0%	21%	18%	17%
Develop/build	67%	24%	18%	25%
Start timber harvesting	0%	21%	9%	13%
Start farming	17%	3%	5%	5%
Become primary residence	50%	28%	0%	18%
Change (same owner)	33%	10%	23%	17%
Age-related life change cause ^d	50%	33%	80%	60%
Land use				
Timber harvest	33%	52%	41%	43%
Developed/construction	67%	24%	18%	27%
Consolidated	0%	0%	18%	7%
Future land use: "Very likely" or "likely"				
Sell in 5 years	0%	10%	14%	10%
Subdivide	0%	7%	5%	5%
Build	17%	17%	14%	15%
Timber harvest	67%	52%	27%	42%

^aMost respondents over 65 were retired and did not indicate work location

^bSome respondents in the 25 to 44 age range had children who were too young to display interest

Figure 9. Acres owned by survey respondents, by age. Total acres owned by age (a) and distribution of ownership size (b).



Forestland is most vulnerable to land use change at moments of human transition—either ownership transfer, or significant changes in the life condition of the owner(s). Just 17 percent of survey respondents indicated that they had changed their land use during their tenure. Of these, 60 percent were related to life changes—aging, death of spouse, or children (nearly all the rest cited surrounding development).

Advanced age or death of a spouse is as common a reason for people to sell or shift land use as is death of the land-owner. Nearly half of respondents acquired their land due to aging or death of the previous owner. Of these, half were due to death and just less than 40 percent due to advanced age. Several older respondents had recently “downsized” their own holdings because they did not want to manage it, selling all but a smaller residential parcel.

Women have slightly longer life expectancies, but own or manage land less frequently than men. Following a husband’s death, surviving widows tended to sell the property they jointly owned with their husbands. Many owners surveyed and interviewed

commented about how they acquired their property: “the husband died, and the wife was unable to take care of it,” or “Mr. X died, and then Mrs. X didn’t want to deal with it all.”

This may be less of an issue for younger generations, but men are still the more active managers of jointly-owned properties. Even where widows retain ownership, they do not often manage it. As a woman whose husband had recently died said: “I will stay here as long as I am physically able,” but she does not continue any of her husband’s management activities.

The life expectancy of a 60 year old male in 2000 was around twenty years (Arias, 2002). Land owned by men currently over the age of 65, if not sold in the next decade—as 18 percent of respondents said was very likely—will probably transfer ownership in the next two decades. Eighty-two percent of all respondents had children. Sixty-eight percent of the oldest respondents had children who are neutral to uninterested in managing their parents’ forestland, or had no children (Table 5).

Table 5. Children’s interest and involvement in managing their parents’ property, by age of landowner; acres and properties involved.

Landowner age	Very interested/ interested			Neutral to very disinterested or no children			n =
	Owners in age group (%)	Acres subject	Percent of total acreage	Owners in age group (%)	Acres subject	Percent of total acreage	
<25	-	-	-	-	-	-	0
25-44	0%	0	0%	100%	188	100%	6
45-64	10%	236	12%	90%	1,664	88%	29
65+	32%	1,064	41%	68%	1,529	59%	22
All	17%	1,300	26%	65%	3,598	71%	60

Acres/properties are percentages of all surveyed properties.

Previous owners’ use also influenced current owners’ activities. Land that was harvested by previous owners was somewhat less likely to have been subdivided or developed by current owners than land that was owned for non-productive purposes. Land that was harvested by the previous owners had six percent lower chance of being

subdivided, and eight percent lower chance of being developed than land that was not used for timber harvest.

Land use change occurs most often when ownership changes. An owner is most likely to change his or her land use during their tenure when some significant event in their own life occurs—typically when they are young or old. The owners most likely to sell are those who are older, and those who do not live in town. Sixty-five percent of surveyed owners belonged to one of these categories, collectively owning seventy eight percent of surveyed land. Seventeen percent of owners were both over 65 and non-resident, owning almost a quarter of surveyed land area. The land most secure for the near future is that owned by middle-aged resident landowners.

IV. Discussion

Aging, both of the general population and landowners, is and will continue to shape Campton's landscape in the future. Retirement migration is occurring and will likely continue, as baby boomers start to retire and look for places to go and things to do with their accumulated wealth. But the entire nation, like most of the industrialized world, is facing an aging population. The more compelling story is the loss of young adults. Young adults, especially those of the age immediately following completion of high school, left Campton between 1990 and 2000, and they continue to leave.

Aggregate indices calculated for larger geographies have a smoothing effect that obscures the idiosyncrasies of specific, subsumed locations. If Campton witnesses an even spread of ages of immigrants as at the state level, they would generate a higher birthrate than it currently has—something like a baby boom—and thus, higher overall

population. Given that Campton has in the past experienced a net loss of younger ages, it is unlikely that applying aggregate projections of population change provides an accurate picture of its future with which to plan.

The elderly dependency ratio calculated for the retirement migration projection is very high compared to existing conditions, even in the parts of the developed world where aging population is a concern. However, it may not be as unrealistic as aggregate numbers for the US, Japan, or Germany might seem to suggest. Populations naturally segregate themselves geographically, whether by race, income, or age, and increasing mobility coupled with the passage of time could result in the strengthening of this segregation. There are towns and even whole counties in the US which already have very different age profiles than the country as a whole, as with some locations in Florida, because they specifically attract certain ages. Furthermore, once a certain threshold of elderly people is reached, younger people may be repelled, increasing the imbalance.

Campton is not closed to migration and its future will inevitably include inflows and outflows of people. The projection assuming no migration illustrates that, even without any older people moving in or young people moving away, Campton's population will age considerably and its birthrate decline in the coming years. Its elderly dependency ratio will increase. This is purely a legacy of the uneven age structure it already has, particularly the loss of young people and influx of older people in the 1990s. Even if no baby boomers move to Campton, it will have to develop ways to meet the challenge of an aging resident and land-owning population.

Campton's future population will probably follow a less-extreme version of the "retirement" projection. Population will continue to increase in the short-term (15-25

years) driven largely by the in-migration of younger retirees, but somewhat muted by outmigration of young adults. In the 25 to 30 year horizon, total population growth will level off and then decline, as elderly immigrants die. Even if it continues to receive retirement migration, the cumulative effect of departing young adults will result in a crude birth rate too low to compensate for mortality levels in older cohorts. The migration patterns of different segments of the population are already established; the much-discussed retirement of baby boomers will be a difference only in magnitude. The largest segment in the US population (which loosely aligns with the population ‘at risk’ of moving to Campton) are those who were 40 to 50 years old in 2005, the younger baby-boomers. The pool of potential immigrants will continue to increase, reaching its maximum around 2030.

Do all retirees stay for good? By 2030, older baby boomers and those with medical conditions requiring regular or significant care may find Campton, with its harsh winters and necessary driving, incompatible with their needs. They may then move back to cities and suburbs. This does not alter the fundamental story. Land use change and ownership transfer have occurred in the past because the owner grew too old to manage it—in the future it may be not because they grew too old to walk their property or thin trees, but because they reached such an age where they cannot reside there without care. As with the elderly woman who said she would stay “as long as I am able,” some older owners may assume there will come a point when they will have to sell. Whether they sell because they cannot manage it in ten years, or their heirs sell after their death in 15 or 20,

is immaterial; older owners and buyers introduce a pattern of shorter tenure and lower-intensity management.

If anything, the vulnerability of NIPF land may be increased when aging owners moving back to cities to access better medical care, due to the high cost of such care. While it was not commonly mentioned by owners, the rising costs of healthcare are undeniable. One man described his land as part of his “long term plan for retirement income.” There were only five properties with conservation easements among those surveyed. In all other cases, the development or sale of land may be a source of funds.

The surveys provided clues to what this aging population—and their likely successors—will do with their land. Survey findings generally agreed with what others have found about amenity forest owners. If the composition of owners for all of Campton is similar to those surveyed, then substantial portions 78 percent—22,760 acres, or 2,085 parcels—of its NIPF land is vulnerable to land use change—78% of total NIPF land— in the near future. A large portion of forestland that will likely be in contention, and a growing population of older people with money and the desire to buy five acres parcels to put their retirement home on—these are things to take note of. Build-out analyses of Campton’s zoning regulations indicate that there is little in the way of regulation to forestall such a future (Elson, 2006).

Non-resident owners were older, probably reflecting that younger adults less frequently own or can afford second homes. The greater percentage of non-residents who acquired their land from a relative may be due to a general turnover in the population. As seen in the population change from 1990 to 2000, people who grew up in Campton move

away. The difference might simply reflect that fewer people who acquire family land still live in the area. It could be inferred as well that the outmigration of younger adults has been going on since at least the 1980s, which would coincide with the decline of timber jobs in the area.

There were some clear differences between owners of different ages and residence. Most owners were over 45, and a substantial number were over 65. Older owners had higher incomes, permitting them to pay more for land than it is worth as timberland. Not many young adults own land, either because they are unable to afford it, they left town after high school, or, if they stand to inherit land, their parents may still be holding it.

All owners shared a common interest in conservation, or not inconsistent values such as privacy, but, without written management plans, people lacked a means of connecting sentiment with desirable or coordinated behaviors. Thus, development activities were fairly common among all owners. Owners changed their land use or sold often because of personal age or life-course issues. Accordingly, management plans should consider and incorporate changes not just in the land but in the owner, and identify beforehand the way in which land use can adjust in ways consistent with conservation values.

The higher percentage of intrafamilial acquisition and lower incidence of death as a cause for acquisition by younger owners, suggests that perhaps the tide of children eschewing their rural family land has turned—not back to the working lands past, but rather, to recreation and amenity management (often realized as non-management). Coupled with

the indication by nearly one fifth of older owners that they would very likely sell their land within ten years, this suggests that at least some older owners do have options other than simply keeping it until they die, with no interested heir to take it.

The growth in the popularity of outdoor recreation, natural amenities, and privacy may be enticing some younger people away from the cities and suburbs, permitting older owners to pass it on sooner. Rural areas like Campton no longer represent the kind of isolation and narrow employment opportunities that may have contributed to driving previous generations out. Communications and transportation have vastly increased their connectedness to large cities.

Thirty-two percent of owners over age 65, owning 41 percent of the land in their age group, had children interested in managing their land. Their children, upon inheritance, may become younger owners like the ones surveyed. Most owners who intended to leave their land to their children did not have a good idea of what they might do with it. One owner said his daughter wanted to build on a corner of his land. Owners' reluctance to pursue the issue with their children is a vulnerability that could become an important opportunity to bring together current and future landowners to coordinate activities, plan for the future, and establish greater management continuity.

It is unclear how the greater interest in land management shown by children of people who neither live in Campton, nor have family ties to their land, will affect the future landscape, or what is its cause. It may be due to the cultural differences between the owners themselves—with absentee owners having stronger environmental- and amenity-oriented values (Gosnell et al. 2006; Kendra and Hull, 2005). In this case the distinction could be expected to diminish over time. It may also be related to the children

themselves, who, if they were raised in more urban areas, may be displaying the tendency of wealthier Americans to romanticize the “natural” and rural. Children who were raised in Campton may see the forest as a more quotidian landscape, with staying put to work in the woods a stifling and demeaning future compared to moving to the city. Regardless of the precise mechanism, it is important to pull these two groups together—older owners and potential future owners—so that the management of the land does not abruptly end with the transfer of ownership.

Local residents stopped timber management in more instances than non-locals, a difference that is not explained by the relatively fewer parcels that were managed for timber that non-residents owned. It may be that non-residents, because they more highly value recreation and conservation qualities of the land, and because they have higher earnings, preferentially choose to purchase properties that were not recently harvested. One would expect the reverse, that non-locals, with less need to generate income from their property, would more frequently discontinue timber harvest. This result may be a result of reporting omissions. Non-locals reported fewer overall land uses by the previous owners, possibly indicating that they are simply less familiar with their property and its past. If so, it merely underscores the need to connect current owners to new owners.

Residents are more likely to earn income from their property. Landowners who earn productive income from their property are less likely to sell or develop as a means of generating income in the future. Despite professed values of conservation, non-local owners developed at a rate equal to that of residents, and were actually more likely to sell or subdivide. The only significant conservation behavior that non-residents exhibited

more frequently was with conservation easements: four of out of the five owners of land under easement were non-resident. Sentiment does not necessarily translate into action, and the majority of those indicating conservation, privacy, or enjoyment as their chief values do not actually do anything with their land—they simply “leave it alone,” or “let nature take its course.” Non-residents’ strong favoring of privacy better describes them than conservation.

While the intricacies are still to be worked out, individual and family circumstances seem to have a much stronger impact on NIPF owners’ land use decisions than do economics. A cause of confusion may be the conflation of forest owners and timber workers. Even an owner who actively manages their land will have at least 10 to 15 years between harvests, unless they own substantial amounts of land. Such infrequent income is unlikely to be used for routine expenses. Interviews with self-employed professional loggers and foresters suggest that, because they are dependent upon a continuous forest-based revenue stream, they are more closely affected by timber and housing markets.

Accommodating the near-term future

The impact of an increase in population derives from increased fragmentation, housing development, roadbuilding, traffic, schools, non-point pollution, and invasive species introduction. Campton’s large unoccupied housing stock alone holds in it both a potential danger to the landscape, and also a possible protection.

If Campton does face an influx of people, accommodating them with existing housing stock would pose less of a threat to forest management and place less of an environmental burden on the area, requiring few or no new roads to be built, minimal

increases in impervious surfaces, and presumably less threat to larger contiguous blocks of forest where timber management could continue (Barlowe et al., 1998). The seasonal housing stock as it stood in 2000, if converted to permanent residences to equal New Hampshire's or the national seasonal housing rate, could immediately house 950 or 1,250 new residents, respectively.

Converting existing second homes to primary residences could allow Campton to transition beyond the most intense period of baby-boomer retirement migration with relatively less development of forestland, after which time demand would ease off. The limiting factor in this is probably not housing capacity, which Campton has, but rather the preference of the buyers. A real estate agent who works extensively with retirees commented that they generally do not want to purchase even new market homes. "They're buying *land*, and *views*. They've worked their whole lives and now they want to get out of the rat race and construct their own home in the mountains." Privacy is a premium, for which five acres will generally suffice. "They're looking for their final resting place," they have the money to do it, and it looks a lot like suburban density (Lorrey, 2007).

New development could have negative ecological, economic, and cultural effects. Watershed degradation would result from increased runoff from more roads and paved areas, more septic systems, and non-point sources of residential pollution. This would compromise the water quality for Campton itself; if similar developments occur throughout the area it will also harm downstream cities such as Concord and Manchester. Habitat fragmentation and loss would species that live in NIPF forests and those that live in the National Forest but depend on NIPF lands for feeding and breeding grounds or

migration routes. While these effects are inevitable with development, their magnitude is widely variable according to the kind of development. Low-density exurban development tends towards the greatest impact.

Such fragmentation would almost certainly put an end to timber harvesting in the area, both on parcels that are subdivided, and those adjacent to them. Even non-adjacent timber activities may ultimately fall to such development if insufficient harvesting activity remains to maintain necessary infrastructure (Egan et al, 2007). Municipal costs for providing services to new residential development (the most expensive kind of land use) would increase more than tax revenue, likely requiring increased tax rates (Brighton, 2005; American Farmland Trust, 2006).

Preventing this sort of cascade of events requires proactive intervention with older and non-resident owners, and effective town ordinances to guide growth and development in appropriate ways. Large-lot zoning does not protect forests or forest-based jobs. Towns should promote cluster development that maximizes contiguous blocks of forest and minimizes new road construction. They should severely limit construction of new roads.

Reaching non-resident owners is crucially important. Because they are less frequently on their property, efforts should be made to establish and increase contact with them during the time in which they are in residence. Simply establishing these contacts—with forest practitioners, other local owners, conservation organizations—could do much to start non-resident owners thinking about their land use and legacy, and establish the social contacts with those that can help them. These should focus on getting them involved in ways that require minimum commitment.

Despite their attempt to cover both the past and future, the surveys represent only one moment in time, and cannot tell us definitively whether the age groups represent behavioral stages through which each individual will pass, or whether younger owners comprise a new type of owner that will continue to behave differently as they age, and will in time predominate. In all likelihood it is some combination of the two. Human aging is inevitable, as is cultural change. What is nearly certain is that the future will be diverse, with more owners holding many different values, dependent upon various economic systems. While timber management has declined, it will not disappear, so long as the conditions—the infrastructure, contiguous forest, and economic support—that make it possible are maintained. Younger owners have not harvested timber, but they are interested in it. They may simply not have owned it long enough for stands to mature to marketable sizes. Some have begun farming or harvesting on land that was abandoned a century ago.

Owners often rated multiple values highly, indicating that productive uses such as timber production are not completely incompatible with such values as conservation, recreation, or privacy. Accommodating amenity uses and values in such a way that does not hinder productive use and that can perhaps foster new, low-intensity means of forest management, is broadest, best tent under which all owners can fit.

The future of intrafamilial property transfer

Implicit in this discussion is the assumption that intergenerational property transfer is the only tenurial system that can provide the relatively stable human relationship to land

necessary for forest conservation. It is worth asking whether it is realistic to expect these ties can be repaired or reestablished. The question, ‘How can young adults be encouraged to stay?’ must be tempered with ‘Does the system of intergenerational familial land ownership have a future?’ In the past, stable land use patterns have been closely tied to stable ownership transfer; while it certainly makes it easier, there is no indication that interfamilial transfer is a necessary condition for good management practices to be maintained. The goal of good land stewardship is separate from and should not be hindered by attempts to preserve family ownership.

A dearth of economic opportunity is not the only reason young adults leave rural forest communities. The ugly underside of the American Dream is the wholesale devaluing of manual labor and working landscapes, the destructive consequences of which have hit farming and forest communities alike. Americans like to keep their hands clean and their nature pure. This makes NIPF land vulnerable to the alternative paradigm brought by urban people into the rural areas—a non-productive vision of nature that cannot offer lasting protection. Most young people in the area are employed not in timber or agricultural areas, but in services and construction—driven largely by recreation and demand for second home construction.

Will we be faced with potential landscape disruption with the passing of each human generation? A progressive plan for maintaining forestland in the future should certainly foster intergenerational familial transfer where possible, but to focus exclusively on enticing adult children to “stay on the farm,” on trying to recreate a past, may miss fertile ground for enabling populations that want to work the land to acquire it. Connecting older owners who do not have interested or potential heirs with younger

people who would like to own and actively manage NIPF land is a crucial task that conservation organizations or foresters are well-positioned to take up.

V. Conclusion

Regardless of which projection of Campton's future population most closely predicts the future, the people who live there and the people who own property there will be getting older. If, as this research suggests, the difference in landowner behavior is due not only to different 'types' of forest owners, but also to a predictable progression of behaviors tied to age, then the landscape itself can be expected to undergo a transition as its owners do. The vulnerability of NIPF properties to land use change differs with owner age and residency status, thus, tactics of conservation organizations, local economic development organizations, and towns must change accordingly. Currently there is a roughly equal amount of NIPF land held by middle aged and elderly owners, with significantly less owned by younger people. In the future, vulnerable owner categories will probably grow: retirement-age owners may predominate; non-resident owners might not increase but are unlikely to decline.

Established conservation tools such as conservation easements and legacy planning assistance could be effective with older and non-resident owners, who as a group are more likely than others to adopt these, however, the landscape so preserved would be something of a museum piece, unnaturally frozen in a state of dis-use. An amenity landscape is not an inherently irreversible one, provided the building is done in a sensitive manner and road construction is minimized. After all, it is the "beautiful," "enchanted!" "great views of the mountains and open space"—characteristics of

undeveloped and working landscapes—that draws such owners. However, it is not self-supporting—it requires owners who have sufficient wealth to purchase and pay taxes on land that does not pay for itself. Conservation easements were created as a form of charitable giving for wealthy people, and it is primarily with them that easements are effective. Far more owners in Campton are interested in conservation than have, or can afford, easements. If they were the only means for NIPF preservation, younger would-be owners who lack the money to buy into an amenity landscape could be priced out of rural communities like Campton. Conservation for the future will require an intermingling of amenity and working forests, wealthy and middle-income owners.

Even owners who articulated strong conservation values tied them with notions of stasis. They imagine that by not managing their property, it will return to its “natural” state. One owner described how he is carefully tending to a grove of aging paper birch trees (an early-secessional species) that he does not want to die. Helping owners, especially new ones, or those who are unfamiliar with forests, to understand the role that change naturally plays in forests, could open them up to non-intensive forms of management that can prove an effective conservation tool for less wealthy owners.

Alternative policies that would support less financially-well-off younger people to own forestland could help them manage their land productively, but their values suggest that there is no going back to the timber-dominated past. Efforts to establish younger owners should identify multiple, low-intensity productive uses that do not compromise conservation and aesthetic values, however, they, like older owners, see the forest more as a thing to be passively consumed rather than a source of livelihood. Regional

coordination to establish conservation-compatible forest-based economies could generate the economic conditions to support younger ownership of NIPF land.

Nearly all owners expressed concern for conservation and enjoyment of the forested landscape—a fact that requires the recognition of the inherent limit to how many people, and housing units, a town like Campton can support without losing its forests, its rural character, or its amenities. Younger residents and landowners could raise the birth rate and sustain the population growth beyond this point of diminishing returns—if the children stay. While it is desirable for some to stay, Campton’s history is like that of many rural towns—a constant casting off of young people, sending them away, to the cities or suburbs. The exodus of youth will likely continue. The goal should be to make it possible for some to stay.

Targeting older owners and encouraging them to think long-term and large -scale should be a priority of conservation organizations and foresters. These owners know they will have to do something with their land in the near future. Helping them to think beyond the moment when it passes out of their hands can help establish greater continuity between owners. Traditional methods for promoting conservation can be effective for many older owners, who often are of sufficient financial standing for easement donation to be desirable. Many want to do the right thing, but are simply ignorant of their options, of the importance of their small piece of land, and of the forest itself. This will likely increase as more urban and suburban people move to and buy forestland in rural areas. Foresters and conservation organizations need to each extend into the other’s sphere, to provide education about forests and their management, and to encourage discussion between family members.

For those owners who will sell their land, guidance should be provided to them, as well as for the purchasers. Some regulation, as with zoning and cluster development, can alleviate some of the pressure on more remote parcels and prevent costs from excluding younger potential buyers.

This paper only touches on some of the variables affecting the future of rural forestland. Its purpose is to encourage broader thinking about how changes in the human population will change the landscape.

Residents and non-residents who report themselves unlikely to sell their land probably do not equally secure their land from development. Conservation values, like esoteric environmental values everywhere, are a luxury good, the consumption of which is elastic and can be quickly jettisoned in times of economic need. Children may be genuinely interested in keeping their parents' land, but property whose function is purely decorative is not secure. Death of a parent often leads to messy arguments among siblings over inheritance—in which case the easiest way to divide up land is to sell it and divide the proceeds.

People who move to rural communities and purchase forestland in their 40s or 50s may be active managers for conservation for decades, but NIPF preservation cannot rely solely on their good intentions, or their unvoiced desire that their children do not develop. The distribution of likelihood of selling in five years suggests that the non-resident owners fall roughly into two groups—those that own for investment purposes, and those that are interested in longer-term conservation. Conservation-driven owners should be targeted to establish a safety net for the land—an easement or other legally binding

restriction if they want nothing done with the land, or, if they are willing, some light management program that requires little effort and does not diminish aesthetics. Build-out analyses using current zoning regulations suggest that conservation cannot be left to coaxing or persuading owners to maintain forests; some strengthening of ordinances is crucial (Elson, 2006). Studies such as that by Carpenter et al. (2007) suggest that wealthier retirees are more supportive of development restrictions than local residents, such that restrictions that may not have generated support even a decade ago may soon fare better.

The task of projecting human population is confounded not only by unpredictable natural events, but by the vicissitudes of human cultural and technological evolution.

Transportation and communication advances have enabled the dispersal of population out from urban centers in the past. Together these could tear down the protection offered by distance that has heretofore limited residential development in distant rural areas. Rising gas prices might suggest that the era of expansion is over, and that people will return to compact cities. Given America's tradition of technological innovation, however, it seems premature to assume that another form of inexpensive personal transportation will not emerge. What influence it might have would fall largely on those who earn less or commute to work. The demand for amenity-rich land from retirees or wealthy second home buyers is probably less elastic. Geographic distance is a false protection.

Landscapes are preserved when they are economically productive. Those that are unproductive are not. The challenge of good management practice is one of education and regulation, and is eminently surmountable. It is impossible to preserve sufficient

amounts of land that is unproductive. Working forest is still the best way to secure the continued existence of private forests.

Greater land-use stability might be secured by ensuring there are real economic opportunities for young adults in the area. The massive loss of forestry jobs due to mechanization in the 1980s caused the supply of well-paid forest jobs to collapse; now the increased fragmentation of private parcels threatens the possibility of their resurgence.

Campton may already be too far down the track of fragmentation and exurban development to be recalled, as the profitability of timber harvest declines with declining parcel size. The interstate and river both bisect it, raising the amenity value and bringing people to the area, further increasing fragmentation and timber profitability. However, it could serve as a sort of buffer protecting the adjacent towns (the “real banjo country and woodlot towns”), by channeling housing development and population towards its center in de facto cluster development, along the roads, and away from the large contiguous blocks of forest.

Campton could affect this sort of soft buffer if it can retain or attract younger owners who will actively manage the land, but it would require a careful balancing of the demand for more school resources for their children—which could pressure development to increase the tax base. While younger immigrants might cause a more permanent growth in population, they would also bring with them the potential for rebuilding a local forest economy, and, possibly restoring intrafamilial transfer patterns.

The technological advances that have enabled the growth of population and second home-owners can also alleviate some of the hardships that compel young people to leave rural areas. People from urban and suburban areas may indeed romanticize about rural areas; when they find reality does not match their image, they may, like those owners who had begun farming and harvesting on land that had been in disuse before them, try to recreate their idealized landscape. This is already being seen anecdotally in the numbers of young, college-educated people starting organic farms. So long as the landscape created is beneficial and sustainable, it is immaterial whether family tradition or romantic ideology drives it. At the very least they would lengthen tenurial periods, allowing time to develop more effective conservation strategies.

The number of ecosystems that are free of direct human impacts are so few as to be largely irrelevant. This is a human dominated world; forests may have emerged independently of us, but they continue to exist only when and where they serve our diverse, decentralized, and often very short-term needs. Publically-owned lands, like the White Mountain National Forest, were established to institutionalize long-term planning, but alone they are not sufficient to provide all the natural resources, ecosystem services, and pleasing landscapes we need. It will not be by accident, nor by attending only to strictly land management concerns, that they will be maintained. There are as many reasons for keeping or destroying forestland as there are individuals. The preservation of private forestland as an integral part of the American landscape long into the future demands that we think about forests as the not inevitable outcome of human social relations.

The crucial moment of vulnerability for ecologically functional landscapes is the transition between stages of the human life course. Effectively preserving undeveloped NIPF land into the future requires fostering a diverse population of NIPF owners, with both amenity and productive uses. Conservation and regulatory efforts must be directed not just towards the land, but towards the right people—older and non-resident owners.

Works cited

- American Farmland Trust (AFT), Farmland Information Center. 2006. Fact Sheet: Cost of Community Services Studies.
- Arias, E. United States life tables, 2000. National vital statistics reports; vol 51 no 3. Hyattsville, MD: National Center for Health Statistics. 2002.
- Bancroft, G.T. and C. Alkire. 2007. An Ecological Perspective on the *National Report on Sustainable Forests-2003*. In: Perspectives on America's Forests. 2-11.
- Barlow SA, Munn IA, Cleaves DA, Evans DL. 1998. The effect of urban sprawl on timber harvesting. *Journal of Forestry* 96:10-14.
- Brighton, D. 2005. Managing Growth: The Impact of Conservation and Development on Property Taxes in New Hampshire. Trust for Public Lands.
- Butler BJ, Leatherberry EC. 2004. America's Family Forest Owners. *Journal of Forestry*, October/November: 4-14.
- Carpenter, S.R., Benson, B.J., Biggs, R., Chipman, J.W., Foley, J.A., Golding, S.A., Hammer, R.B., Hanson, P.C., Johnson, P.T.J., Kamarainen, A.M., Kratz, T.K., Lathrop, R.C., McMahon, K.D., Provencher, B., Rusak, J.A., Solomon, C.T., Stanley, E.H., Turner, M.G., Vander Zanden, M.J., Wu, C.H., and H. Yuan. 2007. Understanding Regional Change: A Comparison of Two Lake Districts. *BioScience* 57(4):323-335.
- Cronon, W. 1983. *Changes in the Land: Indians, Colonists, and the Ecology of New England*. Hill and Wang: New York, NY.
- DeCoster, L.A. 1998. The boom in forest owners—A bust for forestry? *Journal of Forestry* 96(5):25-28.
- Donahue B. 2004. *The Great Meadow: Farmers and the Land in Colonial Concord*. Yale University Press: New Haven, CT.
- Eddy K., and A. Smith. 2001. *Current Use Practices in New Hampshire*. Project report for New Hampshire Statewide Program of Action to Conserve our Environment. University of New Hampshire Survey Center. 44p.
- Egan, A., D. Taggart, and I. Annis. 2007. Effects of Population Pressures on Wood Procurement and Logging Opportunities in Northern New England. *Northern Journal of Applied Forestry* 24(2):85-90.
- Elson, S. 2006. *Exurban Sprawl in the Northern Forest: The Role of Local Planning in*

- Conserving Ecosystem Goods and Services. Unpublished Masters thesis. Brown University: Providence, RI.
- Gosnell H, Haggerty JH, Travis WR. 2006. Ranchland Ownership Change in the Greater Yellowstone Ecosystem, 1990-2001: Implications for Conservation. *Society and Natural Resources* (19):743-758.
- Gosnell H, Travis WR. 2005. Ranchland Ownership Dynamics in the Rocky Mountain West. *Rangeland Ecological Management* 58(2):191-198.
- Groom M, Jensen DB, Knight RL, Gatewood S, Mills L, Boyd-Heger D, Mills LS, Soule ME. 1999. Buffer zones: Benefits and dangers of compatible stewardship. P. 171-197 in *Continental conservation: Scientific foundations of regional reserve networks*. Soule MD, Terborgh J, (eds.). Island Press: Washington, DC.
- Guest, A.M. and S.K. Brown. 2005. Population distribution and suburbanization. P. 59-86 in *Handbook of Population*, Poston, D.L. and M. Micklin (eds.). Kluwer Academic/Plenum Publishers, New York, NY.
- Gustanski, J.A. 2000. Protecting the Land: Conservation Easements, Voluntary Actions, and Private Lands. P. 9-25 in *Protecting the Land: Conservation Easements Past, Present, and Future*. Gustanski, J.A., and R.H. Squires, (eds.). Island Press.
- Hansen AJ, Rasker R, Maxwell B, Rotella JJ, Johnson JD, Parmenter AW, Langner U, Cohen WB, Lawrence RL, Kraska MPV. 2002. Ecological Causes and Consequences of Demographic Change in the New West. *BioScience* 52(2):151-162.
- Kendra A, Hull RB. 2005. Motivations and Behaviors of new Forest Owners in Virginia. *Forest Science* 51(2):142-154.
- Kline JD and Alig RJ. 2005. Forestland development and private forestry with examples from Oregon (USA). *Forest Policy and Economics* 7:709-720.
- McDonald RI, Motzkin G, Bank MS, Kittredge DB, Burk J, Foster DR. 2006. Forest harvesting and land-use conversion over two decades in Massachusetts. *Forest Ecology and Management* 227: 31-41.
- McGranahan DA. 1999. *Natural Amenities Drive Population Change*. Washington (DC): Food and Rural Economics Division, Economic Research Service, US Department of Agriculture.
- McKee, S. 2000. Conservation Easements to Protect Historic Viewsheds: A Case Study of the Olana Viewshed in New York's Hudson River Valley. P. 102-116 in *Protecting the Land: Conservation Easements Past, Present, and Future*. Gustanski, J.A., and R.H. Squires, (eds.). Island Press.
- Millennium Ecosystem Assessment. 2003. Chapter 2: Current State and Trends: Ecosystems and Their Services around the Year 2000. Pp 15-39.
- New Hampshire Housing Finance Authority. 2007. *Housing Units Authorized by Permit*.
- Nowack, D.J., and J.T. Walton. 2005. Projected Urban Growth (2000-2005) and Its Estimated Impact on the US Forest Resource. *Journal of Forestry* 103(8):383-389.
- Poston, D.L. Jr. 2005. Age and Sex. P. 19-58 in *Handbook of Population*, Poston, D.L. and M. Micklin (eds.). Kluwer Academic/Plenum Publishers, New York, NY.
- Sampson, N. and L. DeCoster. 2000. Forest Fragmentation: Implications for Sustainable Private Forests. *Journal of Forestry* 98(3): 4-8.
- Smith WB, Miles PD, Vissage JS, Pugh SA. 2004. *Forest resources of the United States*,

2002. General Technical Report NC-241. St. Paul (MN): USDA Forest Service, North Central Research Station. 137 pp.
- Theobald DM. 2000. Fragmentation by inholdings and exurban development. In: Knight RL, Smith FW, Buskirk SW, Romme WH, Baker WL, eds. Forest Fragmentation in the Central Rocky Mountains. Boulder (CO): University Press of Colorado. Pp 155-174.
- Wear DN, Lui R, Foreman JM, Sheffield R. 1999. The effects of population growth on timber management and inventories in Virginia. Forest Ecology and Management 118: 107-115.
- US Census Bureau; 1990 Census of Population and Housing, Summary Tape Files 1 and 3; generated by Celia Riechel; using American FactFinder, <http://factfinder.census.gov>; 2007.
- US Census Bureau; Census 2000, Summary Files 1 and 3; generated by Celia Riechel; using American FactFinder; <http://factfinder.census.gov>; 2007.
- US Census Bureau. 2008. Annual New Privately-Owned Residential Building Permits.
- U.S. Department of Agriculture. 2000. Summary Report: 1997 National Resources Inventory (revised December 2000). Natural Resources Conservation Service, Washington, DC, and Statistical Laboratory, Iowa State University, Ames, IA, 89p.
- U.S. Department of Agriculture. 2007. Total Surface Area by Land Cover/Use: 2003 Annual Natural Resource Inventory. Natural Resources Conservation Service, Washington, DC, and Statistical Laboratory, Iowa State University, Ames, IA.

Appendix 1: Population projections

Calculations for female population under three scenarios.

Cohort-component population projection for females, Campton, NH																
1. New Hampshire age distribution (macro to micro)																
Age x	${}_5N_x(2000)$	${}_5N_x^F(2000)$	nD_x^F	nq_x	nPx	l_x	n^d_x	${}_5L_x^F$	T_x	e_x	${}_5F_x$	Immig age distrib NH 2004-05	${}_5I_x(2000, 2005)$	${}_5I_x^F(2000, 2005)$	${}_5B_x(2000, 2005)$	${}_5N_x^F(2005)$
0	156	79	0.5838	0.00739	0.99261	100,000	739	498,153	7,766,630	79.5		9.3%	16	8		82
5	174	81	0.0588	0.00073	0.99927	99,261	72	496,125	7,268,478	75.1		5.2%	9	5		85
10	196	105	0.0868	0.00083	0.99917	99,189	82	495,740	6,772,353	70.1		4.6%	8	4		85
15	186	88	0.1758	0.00200	0.99800	99,107	198	495,040	6,276,613	65.2	0.0234375	6.6%	11	6	11.7526	110
20	131	64	0.1540	0.00241	0.99759	98,909	238	493,950	5,781,573	60.3	0.078051899	16.0%	28	14	32.8800	98
25	171	81	0.2290	0.00283	0.99717	98,671	279	492,658	5,287,623	55.4	0.114228457	12.6%	22	11	46.4447	76
30	182	93	0.3507	0.00377	0.99623	98,392	371	491,033	4,794,965	50.6	0.094935576	12.4%	21	11	45.0745	92
35	200	100	0.5723	0.00572	0.99428	98,021	561	488,703	4,303,933	45.8	0.038522986	9.3%	16	8	19.8354	102
40	264	138	1.1852	0.00859	0.99141	97,460	837	485,208	3,815,230	41.0	0.007291555	3.9%	7	3	4.4594	105
45	277	138	1.7496	0.01268	0.98732	96,623	1,225	480,053	3,330,023	36.3	0.000467328	3.7%	6	3	0.3264	140
50	199	81	1.5597	0.01926	0.98074	95,398	1,837	472,398	2,849,970	31.8		5.1%	9	4		140
55	149	77	2.3414	0.03041	0.96959	93,561	2,845	460,693	2,377,573	27.4		2.5%	4	2		82
60	110	62	2.9881	0.04819	0.95181	90,716	4,372	442,650	1,916,880	23.1		2.7%	5	2		76
65	105	50	3.6835	0.07367	0.92633	86,344	6,361	415,818	1,474,230	19.2		1.2%	2	1		60
70	92	49	5.5137	0.11252	0.88748	79,983	9,000	377,415	1,058,413	15.5		1.7%	3	1		47
75	70	38	6.6489	0.17497	0.82503	70,983	12,420	323,865	680,998	12.1		0.9%	2	1		43
80	39	25	7.0087	0.28035	0.71965	58,563	16,418	251,770	357,133	9.1		1.2%	2	1		30
85+	18	11	11.0000	1.00000	0.00000	42,145	42,145	105,363	105,363	6.7		1.0%	2	1		11
Total	2,719	1,360											173	86	161	1,463

qx, lx = Life table for females, United States 2000

$Fx=2000$ NH rate (no. of births at age $5N_x/lx$)

$lx = (0.77*225 \text{ pop chng obs. Campton } 2000-2005) = 173$

Derived from net migration as pct of total pop change in Grafton Cty, 2000-2005. Kept constant.

Immigrant age distribution: average of age distrib. for NH immigrants 2004-2005

$B^F(2000, 2005)$

78

$B^M(2000, 2005)$

82

Source: US Census Bureau; Census 2000; American Community Survey 2002, 2003, 2005

US Department of Health and Human Services, National Vital Statistics System, NCHS, CDC. Demographic Characteristics of Mother by State/County - 2000.

${}_5N_x(2005)$	${}_5I_x(2005, 2010)$	${}_5I_x^F(2005, 2010)$	${}_5B_x(2005, 2010)$	${}_5N_x^F(2010)$	${}_5N_x(2010)$	${}_5I_x(2010, 2015)$	${}_5I_x^F(2010, 2015)$	${}_5B_x(2010, 2015)$	${}_5N_x^F(2015)$	${}_5N_x(2015)$	${}_5I_x(2015, 2020)$	${}_5I_x^F(2015, 2020)$	${}_5B_x(2015, 2020)$	${}_5N_x^F(2020)$	${}_5N_x(2020)$
168	16	8		86	177	16	8		95	193	16	8		105	215
168	9	5		88	180	9	5		92	189	9	5		100	205
182	8	4		89	176	8	4		92	188	8	4		96	197
205	11	6	12.3144	90	192	11	6	12.4240	94	186	11	6	11.4931	97	197
205	28	14	35.2574	119	224	28	14	46.0202	100	210	28	14	46.3825	103	204
155	22	11	49.4554	110	228	22	11	57.6513	131	248	22	11	73.3547	112	234
192	21	11	47.1946	87	176	21	11	45.7110	120	249	21	11	52.5018	142	268
199	16	8	20.3128	100	209	16	8	20.3579	96	193	16	8	19.7591	129	266
209	7	3	4.4923	107	209	7	3	3.9313	105	218	7	3	3.9397	101	203
267	6	3	0.3283	107	213	6	3	0.2922	109	212	6	3	0.2568	108	222
279	9	4		141	269	9	4		109	216	9	4		111	215
199	4	2		139	276	4	2		141	266	4	2		110	215
146	5	2		81	192	5	2		136	266	5	2		138	257
105	2	1		73	138	2	1		78	180	2	1		129	249
95	3	1		56	95	3	1		68	124	3	1		72	161
78	2	1		41	81	2	1		49	81	2	1		59	105
54	2	1		34	60	2	1		33	61	2	1		39	62
17	2	1		13	22	2	1		15	25	2	1		15	26
2,922	326	86	169	1,562	3,116			186	1,661	3,306			208	1,764	3,501
		$B^r(2005, 2010)$	83				$B^r(2010, 2015)$	91				$B^r(2015, 2020)$	101		
		$B^M(2005, 2010)$	87				$B^M(2010, 2015)$	95				$B^M(2015, 2020)$	106		

εI_x (2020, 2025)	εI_x^F (2020,2025)	εB_x (2020, 2025)	εN_x^F (2025)	εN_x (2025)	εI_x (2025, 2030)	εI_x^F (2025, 2030)	εB_x (2025, 2030)	εN_x^F (2030)	εN_x (2030)	εI_x (2030, 2035)	εI_x^F (2030, 2035)	εB_x (2030, 2035)	εN_x^F (2035)	εN_x (2035)	εI_x (2035, 2040)	εI_x^F (2035, 2040)
16	8		111	228	16	8		113	232	16	8		114	233	16	8
9	5		111	226	9	5		117	240	9	5		119	243	9	5
8	4		104	213	8	4		115	234	8	4		121	248	8	4
11	6	11.8973	101	206	11	6	12.3186	109	222	11	6	13.0429	119	244	11	6
28	14	43.2909	106	216	28	14	44.6338	111	225	28	14	46.0333	119	241	28	14
22	11	73.8794	115	228	22	11	69.3706	118	240	22	11	71.3299	123	249	22	11
21	11	65.4985	122	254	21	11	65.9258	126	248	21	11	62.1976	129	260	21	11
16	8	22.5027	150	285	16	8	27.7438	131	271	16	8	27.9114	135	265	16	8
7	3	3.8273	134	274	7	3	4.3432	155	293	7	3	5.3260	136	280	7	3
6	3	0.2573	103	206	6	3	0.2502	136	277	6	3	0.2830	157	296	6	3
9	4		110	224	9	4		105	209	9	4		137	278	9	4
4	2		112	215	4	2		110	223	4	2		106	209	4	2
5	2		108	209	5	2		109	208	5	2		108	216	5	2
2	1		131	241	2	1		103	196	2	1		104	195	2	1
3	1		119	223	3	1		120	216	3	1		94	176	3	1
2	1		63	135	2	1		103	187	2	1		104	181	2	1
2	1		47	80	2	1		50	101	2	1		81	140	2	1
2	1		16	27	2	1		19	32	2	1		21	40	2	1
			221	1,863	3,690			225	1,950	3,854			226	2,026	3,994	
	$B^+(2020, 2025)$		108			$B^+(2025, 2030)$		110			$B^+(2030, 2035)$		110			$B^+(2030, 2035)$
	$B^M(2020, 2025)$		113			$B^M(2025, 2030)$		115			$B^M(2030, 2035)$		116			$B^M(2030, 2035)$

$\text{B}_x(2035, 2040)$	$\text{N}_x^F(2040)$	$\text{N}_x(2040)$
	117	239
	120	245
	123	251
14.1266	126	257
48.4398	129	262
73.3721	131	265
63.8193	133	269
26.4103	138	277
5.3561	139	274
0.3451	137	282
	158	297
	137	276
	104	203
	103	203
	96	175
	82	148
	82	137
	31	53
232	2,085	4,112
113		
119		

	2000	2005	2010	2015	2020	2025	2030	2035	2040
Population	2,719	2,927	3,129	3,339	3,551	3,752	3,927	4,076	4,112
Change		208	202	210	212	201	175	149	36
Percent chg		7.6%	6.9%	6.7%	6.3%	5.7%	4.7%	3.8%	0.9%
Pct due to migration		0.8	0.9	0.8	0.8	0.9	1.0	1.2	4.8
Dependency rat	61.6	58.0	56.1	59.1	68.0	74.8	75.6	74.1	71.06
Old-age depend	19.3	18.9	19.8	22.7	29.0	33.4	33.3	31.9	29.77
CBR		57.0	54.4	58.0	61.0	61.5	59.5	57.6	57.2

Cohort-component population projection for females, Campton, NH

2. Retirement migration

Age x	${}_5N_x(2000)$	${}_5N_x^F(2000)$	${}_nD_x^F$	nq_x	nPx	l_x	${}_nd_x$	${}_5L_x^F$	T_x	e_x	${}_5F_x$	${}_5O_x$ age distribution	${}_5I_x$ age distribution
0	156	79	0.5838	0.00739	0.99261	100,000	739	498,153	7,766,630	79.5	-	-0.21608	-
5	174	81	0.0588	0.00073	0.99927	99,261	72	496,125	7,268,478	75.1	-	-0.22321	-
10	196	105	0.0868	0.00083	0.99917	99,189	82	495,740	6,772,353	70.1	-	-	0.032755 154
15	186	88	0.1758	0.00200	0.99800	99,107	198	495,040	6,276,613	65.2	0.0234375	-	0.060563 963
20	131	64	0.1540	0.00241	0.99759	98,909	238	493,950	5,781,573	60.3	0.078051899	-0.12081	-
25	171	81	0.2290	0.00283	0.99717	98,671	279	492,658	5,287,623	55.4	0.114228457	-0.04469	-
30	182	93	0.3507	0.00377	0.99623	98,392	371	491,033	4,794,965	50.6	0.094935576	-0.20524	-
35	200	100	0.5723	0.00572	0.99428	98,021	561	488,703	4,303,933	45.8	0.038522986	-0.23664	-
40	264	138	1.1852	0.00859	0.99141	97,460	837	485,208	3,815,230	41.0	0.007291555	-	0.072832 048
45	277	138	1.7496	0.01268	0.98732	96,623	1,225	480,053	3,330,023	36.3	0.000467328	-	0.210295 925
50	199	81	1.5597	0.01926	0.98074	95,398	1,837	472,398	2,849,970	31.8	-	-	0.154507 987
55	149	77	2.3414	0.03041	0.96959	93,561	2,845	460,693	2,377,573	27.4	-	-	0.102311 686
60	110	62	2.9881	0.04819	0.95181	90,716	4,372	442,650	1,916,880	23.1	-	-	0.026564 881
65	105	50	3.6835	0.07367	0.92633	86,344	6,361	415,818	1,474,230	19.2	-	-0.01869	-
70	92	49	5.5137	0.11252	0.88748	79,983	9,000	377,415	1,058,413	15.5	-	-	0.03796 265
75	70	38	6.6489	0.17497	0.82503	70,983	12,420	323,865	680,998	12.1	-	-	0.156068 674
80	39	25	7.0087	0.28035	0.71965	58,563	16,418	251,770	357,133	9.1	-	-	0.046820 602
85+	18	11	11.0000	1.00000	0.00000	42,145	42,145	105,363	105,363	6.7	-	-	0.099316 429
Total	2,719	1,360											1

qx, lx = Life table for females, United States 2000

Fx=2000 NH rate (no. of births at age 5Nx/lx)

Ox = outmigration, distributed according to observed, Campton 1990-2000

Source: US Census Bureau: Census 2000; American Community Survey 2002, 2003, 2005

US Department of Health and Human Services. National Vital Statistics System, NCHS, CDC. Demographic Characteristics of Mother by State/County - 2000.

δO_x (2000, 2005)	δI_x (2000, 2005)	$\delta NETMIG_x^F$ (2000, 2005)	δB_x (2000, 2005)	δN_x^F (2005)	δN_x (2005)	δO_x (2005, 2010)	δI_x (2005, 2010)	$\delta NETMIG_x^F$ (2005, 2010)	δB_x (2005, 2010)	δN_x^F (2010)	δN_x (2010)	δO_x (2010, 2015)	δI_x (2010, 2015)
-34	0	-17		68	139	-30	0	-15		55	112	-24	0
-39	0	-19		61	119	-27	0	-13		53	110	-25	0
0	12	6		74	160	0	11	5		57	111	0	10
0	22	11	9.2218	113	212	0	20	10	12.1438	82	175	0	19
-16	0	-8	27.5218	89	188	-23	0	-11	27.6147	112	210	-25	0
-8	0	-4	49.1438	58	119	-5	0	-3	36.0220	82	173	-8	0
-37	0	-19	43.5900	69	148	-30	0	-15	31.6492	49	100	-21	0
-47	0	-24	21.7817	71	139	-33	0	-16	15.1443	53	115	-27	0
0	26	13	5.1492	94	188	0	24	12	4.7674	69	133	0	22
0	75	37	0.2777	162	310	0	68	34	0.4049	116	230	0	64
0	55	27		168	335	0	50	25		188	362	0	47
0	36	18		101	237	0	33	17		184	365	0	31
0	9	5		85	163	0	9	4		108	244	0	8
-2	0	-1		60	105	-2	0	-1		81	154	-3	0
0	14	7		48	99	0	12	6		57	99	0	12
0	56	28		59	110	0	50	25		57	112	0	48
0	17	8		44	81	0	15	8		59	107	0	14
0	35	18		20	38	0	32	16		31	57	0	30
-183	356	87	157	1,446	2,889	-150	323	87	128	1,492	2,968	-132	305

$B^F(2000, 2005)$: 76
 $B^M(2000, 2005)$: 80
 $B^F(2005-2010)$: 62
 $B^M(2005-2010)$: 65

$\delta NETMIG_x^F$ (2010, 2015)	δB_x (2010, 2015)	δN_x^F (2015)	δN_x (2015)	δO_x (2015, 2020)	δI_x (2015, 2020)	$\delta NETMIG_x^F$ (2015, 2020)	δB_x (2015, 2020)	δN_x^F (2020)	δN_x (2020)	δO_x (2020, 2025)	δI_x (2020, 2025)	$\delta NETMIG_x^F$ (2020, 2025)	δB_x (2020, 2025)
-12		54	110	-24	0	-12		57	117	-25	0	-13	
-12		42	87	-19	0	-10		43	90	-20	0	-10	
5		50	103	0	10	5		40	83	0	10	5	
9	11.6182	64	125	0	18	9	8.6594	57	116	0	19	9	7.2727
-13	36.6372	80	171	-21	0	-10	34.7446	63	124	-15	0	-7	25.6075
-4	36.8260	104	192	-9	0	-4	50.2767	72	156	-7	0	-3	46.6559
-10	23.0635	75	158	-32	0	-16	24.5116	93	171	-35	0	-18	34.6373
-14	11.1021	37	76	-18	0	-9	8.0993	62	131	-31	0	-15	8.8119
11	3.4637	52	112	0	22	11	2.6761	37	76	0	23	11	2.1083
32	0.3739	89	174	0	63	32	0.2884	72	152	0	66	33	0.2385
24		142	280	0	46	23		115	224	0	48	24	
16		203	388	0	31	15		157	309	0	32	16	
4		187	365	0	8	4		204	387	0	8	4	
-1		102	227	-4	0	-2		176	338	-6	0	-3	
6		76	141	0	11	6		95	204	0	12	6	
24		63	111	0	47	23		80	145	0	49	24	
7		57	107	0	14	7		62	106	0	15	7	
15		37	69	0	30	15		38	72	0	31	16	
87	123	1,512	2,996	-127	300	87	129	1,523	3,001	-140	313	87	125

$B^F(2010, 2015)$: 60
 $B^M(2010, 2015)$: 63
 $B^F(2015, 2020)$: 63
 $B^M(2015, 2020)$: 66
 $B^F(2020, 2025)$: 61
 $B^M(2020, 2025)$: 64

$\text{N}_x^F(2025)$	$\text{N}_x(2025)$	$\text{O}_x(2025, 2030)$	$\text{I}_x(2025, 2030)$	$\text{NETMIG}_x^F(2025, 2030)$	$\text{B}_x(2025, 2030)$	$\text{N}_x^F(2030)$	$\text{N}_x(2030)$	$\text{O}_x(2030, 2035)$	$\text{I}_x(2030, 2035)$	$\text{NETMIG}_x^F(2030, 2035)$	$\text{B}_x(2030, 2035)$	$\text{N}_x^F(2035)$	$\text{N}_x(2035)$
55	112	-24	0	-12		46	95	-20	0	-10		38	80
45	94	-21	0	-10		43	89	-20	0	-10		36	79
40	85	0	10	5		43	88	0	9	5		40	86
47	98	0	18	9	6.3891	47	99	0	17	8	5.8294	49	100
57	118	-14	0	-7	21.6661	48	99	-12	0	-6	19.0084	48	102
57	112	-5	0	-3	33.5065	52	108	-5	0	-2	28.5853	44	93
61	134	-28	0	-14	30.9913	49	96	-20	0	-10	21.3844	46	98
76	137	-32	0	-16	12.2570	46	103	-24	0	-12	10.8879	38	79
59	126	0	22	11	2.2606	73	131	0	20	10	2.8846	45	103
59	119	0	64	32	0.2041	80	167	0	59	29	0.2109	92	164
100	205	0	47	23		86	171	0	43	22		104	208
132	256	0	31	16		116	236	0	29	14		101	197
161	312	0	8	4		136	262	0	7	4		121	240
192	358	-7	0	-3		151	289	-5	0	-3		129	243
161	302	0	12	6		176	320	0	11	5		139	258
96	198	0	47	24		153	279	0	44	22		164	289
75	133	0	14	7		87	170	0	13	7		130	228
41	73	0	30	15		45	81	0	28	14		49	90
1,515	2,972	-131	304	87	107	1,478	2,882	-107	280	87	89	1,413	2,737
				$B^r(2025, 2030)$	52					$B^r(2030, 2035)$	43		
				$B^M(2025, 2030)$	55					$B^M(2030, 2035)$	45		

${}_5O_x$ (2035, 2040)	${}_5I_x$ (2035, 2040)	${}_5NETMIG_x^F$ (2035, 2040)	${}_5B_x$ (2035, 2040)	${}_5N_x^F$ (2040)	${}_5N_x$ (2040)
-17	0	-9		33	69
-18	0	-9		29	62
0	9	4		34	75
0	16	8	5.9467	47	98
-12	0	-6	17.3638	50	101
-4	0	-2	25.3548	44	93
-20	0	-10	18.6971	37	80
-19	0	-9	7.4934	36	78
0	19	10	2.5830	38	78
0	56	28	0.2456	63	139
0	41	21		115	209
0	27	14		118	235
0	7	4		106	204
-5	0	-2		114	222
0	10	5		118	218
0	42	21		132	239
0	13	6		139	237
0	27	13		62	111
-95	268	87	78	1,315	2,549
		$B^F(2030, 2035)$	38		
		$B^M(2030, 2035)$	40		

	2000	2005	2010	2015	2020	2025	2030	2035	2040
Population	2,719	2,889	2,968	2,996	3,001	2,972	2,882	2,737	2,549
Change		170	79	28	5	-29	-90	-145	-188
Percent chg		6.3%	2.7%	0.9%	0.2%	-1.0%	-3.0%	-5.0%	-6.9%
Pct due to migration		1.0	2.2	6.2	34.6	-6.0	-1.9	-1.2	-0.9
Dependency rat	61.6	58.2	53.6	56.4	73.5	95.7	110.0	113.3	109.4
Old-age depend	19.3	23.7	27.4	34.2	50.0	70.1	83.0	86.4	84.4
CBR		55.9	43.6	41.3	43.1	42.0	36.7	31.6	29.4

Cohort-component population projection for females, Campton, NH

3. Closed - no migration

Age x	${}_5N_x(2000)$	${}_5N_x^F(2000)$	nD_x^F	nq_x	nPx	l_x	$n d_x$	${}_5L_x^F$	T_x	e_x	${}_5F_x$
0	156	79	0.5838	0.00739	0.99261	100,000	739	498,153	7,766,630	79.5	
5	174	81	0.0588	0.00073	0.99927	99,261	72	496,125	7,268,478	75.1	
10	196	105	0.0868	0.00083	0.99917	99,189	82	495,740	6,772,353	70.1	
15	186	88	0.1758	0.00200	0.99800	99,107	198	495,040	6,276,613	65.2	0.0234375
20	131	64	0.1540	0.00241	0.99759	98,909	238	493,950	5,781,573	60.3	0.078051899
25	171	81	0.2290	0.00283	0.99717	98,671	279	492,658	5,287,623	55.4	0.114228457
30	182	93	0.3507	0.00377	0.99623	98,392	371	491,033	4,794,965	50.6	0.094935576
35	200	100	0.5723	0.00572	0.99428	98,021	561	488,703	4,303,933	45.8	0.038522986
40	264	138	1.1852	0.00859	0.99141	97,460	837	485,208	3,815,230	41.0	0.007291555
45	277	138	1.7496	0.01268	0.98732	96,623	1,225	480,053	3,330,023	36.3	0.000467328
50	199	81	1.5597	0.01926	0.98074	95,398	1,837	472,398	2,849,970	31.8	
55	149	77	2.3414	0.03041	0.96959	93,561	2,845	460,693	2,377,573	27.4	
60	110	62	2.9881	0.04819	0.95181	90,716	4,372	442,650	1,916,880	23.1	
65	105	50	3.6835	0.07367	0.92633	86,344	6,361	415,818	1,474,230	19.2	
70	92	49	5.5137	0.11252	0.88748	79,983	9,000	377,415	1,058,413	15.5	
75	70	38	6.6489	0.17497	0.82503	70,983	12,420	323,865	680,998	12.1	
80	39	25	7.0087	0.28035	0.71965	58,563	16,418	251,770	357,133	9.1	
85+	18	11	11.0000	1.00000	0.00000	42,145	42,145	105,363	105,363	6.7	
Total	2,719	1,360									

qx, lx = Life table for females, United States 2000

Fx=2000 New Hampshire rate (births at age 5Nx/lx)

Ix = 0

Source: US Census Bureau: Census 2000; American Community Survey 2002, 2003, 2005

US Department of Health and Human Services. National Vital Statistics System, NCHS, CDC. Demographic Characteristics of Mother by State/County - 2000.

$sB_x(2000, 2005)$	$sN_x^F(2005)$	$sN_x(2005)$	$sB_x(2005, 2010)$	$sN_x^F(2010)$	$sN_x(2010)$	$sB_x(2010, 2015)$	$sN_x^F(2015)$	$sN_x(2015)$	$sB_x(2015, 2020)$	$sN_x^F(2020)$	$sN_x(2020)$	$sB_x(2020, 2025)$
	71	146		71	146		71	146		74	152	
	79	155		71	145		71	145		71	145	
	81	174		79	155		71	145		71	145	
11.2999	105	196	11.2886	81	173	10.8658	79	155	9.3253	71	145	8.7415
29.6219	88	185	29.5892	105	195	37.5034	81	173	36.0974	78	154	30.9802
41.3600	64	130	41.2837	88	184	43.1779	104	194	54.7253	80	172	52.6698
41.2336	81	170	41.1288	64	130	34.1701	87	183	35.7451	104	193	45.3024
18.5448	93	181	18.4760	80	169	16.5886	63	129	13.7811	87	182	14.4211
4.3254	99	198	4.2987	92	179	3.4658	80	167	3.1116	63	127	2.5848
0.3207	137	260	0.3182	98	195	0.2717	91	176	0.2192	79	165	0.1967
	136	271		134	255		97	191		89	173	
	79	192		132	262		131	246		94	185	
	74	141		76	182		127	249		126	234	
	58	102		69	131		71	167		120	230	
	45	93		53	90		63	116		65	147	
	42	76		39	77		45	75		54	96	
	30	52		33	57		30	57		35	56	
	10	16		12	20		13	22		13	23	
147	1,371	2,738	146	1,376	2,744	146	1,376	2,736	153	1,374	2,723	155
72			71			71			75			76
75			75			75			78			79

${}^F N_x(2025)$	$N_x(2025)$	$B_x(2025, 2030)$	${}^F N_x(2030)$	$N_x(2030)$	$B_x(2030, 2035)$	${}^F N_x(2035)$	$N_x(2035)$	$B_x(2035, 2040)$	${}^F N_x(2040)$	$N_x(2040)$
75	154		72	146		66	136		63	129
74	151		75	153		71	146		66	136
71	145		74	151		75	153		71	145
71	145	8.2849	71	145	8.2662	74	151	8.4536	75	153
71	144	29.0405	71	144	27.5241	70	144	27.4619	74	150
78	153	45.2051	71	144	42.3742	70	143	40.1623	70	143
80	171	43.5939	78	153	37.4186	70	143	35.0744	70	143
104	192	18.2755	80	170	17.5816	78	152	15.0932	70	142
86	180	2.7061	103	190	3.4289	79	168	3.2975	77	150
62	126	0.1634	85	177	0.1712	102	187	0.2169	78	165
78	161		61	123		84	174		100	183
87	167		76	156		60	119		82	168
91	175		84	159		73	148		57	113
118	216		85	162		79	146		68	136
108	203		107	192		77	143		71	130
56	121		93	168		92	159		66	119
42	71		43	89		72	125		72	119
14	23		17	27		18	33		27	46
1,366	2,699	147	1,344	2,648	137	1,311	2,570	130	1,258	2,468
		72			67			63		
		75			70			66		

	2000	2005	2010	2015	2020	2025	2030	2035	2040
Population	2,719	2,738	2,744	2,736	2,723	2,699	2,648	2570	2,468
Change		19	6	-8	-13	-24	-51	-78	-102
Percent chg		0.7%	0.2%	-0.3%	-0.5%	-0.9%	-1.9%	-2.9%	-4.0%
Pct due to migration		9.1	28.8	-21.6	-13.3	-7.2	-3.4	-2.2	-1.7
Dependency rat	61.6	58.4	56.8	60.2	71.9	83.7	87.2	86.7	81.9
Old-age depend	19.3	19.6	21.4	25.6	34.8	43.2	45.1	44.1	40.5
CBR		53.8	53.5	53.3	56.1	57.1	55.1	52.4	51.5

Appendix 2: Forestland survey

Please answer the following questions to the best of your ability. All information will remain strictly confidential, and data will be combined for publication (no personal identifying information will be presented).

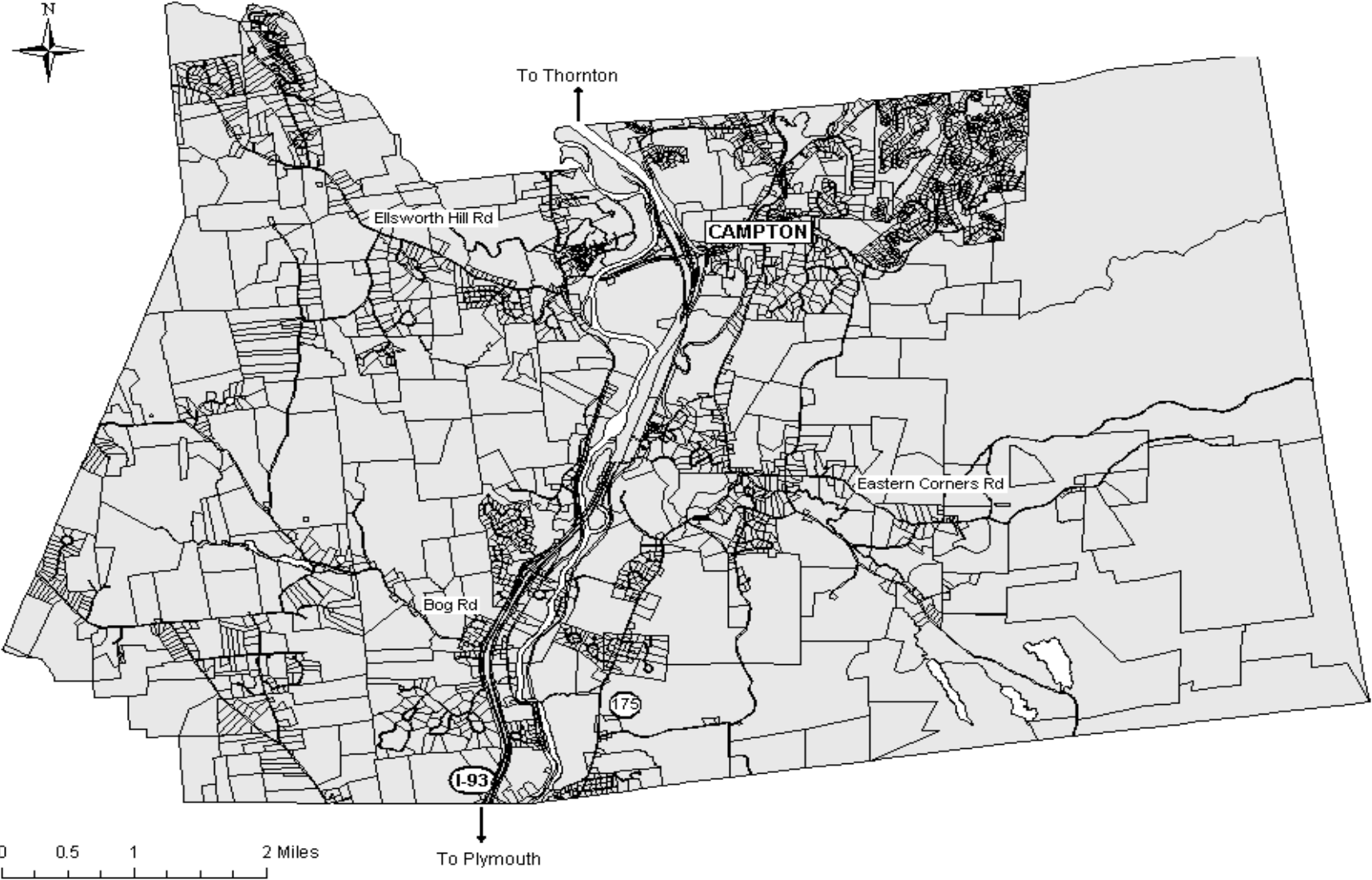
Name: (for filing purposes only) _____

1. What land do (did) you own? (Please list properties that are, or were previously, forested and greater than 10 acres)

If you need more space, please use the other side.

	Location	Size (acres)	Description (Taxlot #, forest type, historical use, etc)	Year acquired	House on the property?	Is it your primary residence?	Enrolled in Current Use?	Written management plan?
Ex	15 Ellsworth Hill Rd.	45	Taxlot 26-13-4 Half beech and maple. Other half old farm	1973	Y N	Y N	Y N	Y N
1					Y N	Y N	Y N	Y N
2					Y N	Y N	Y N	Y N
3					Y N	Y N	Y N	Y N
4					Y N	Y N	Y N	Y N

2. Please circle the location of your property on the map:



3. How did you acquire your land? (Circle. If you have multiple properties, indicate which circle

corresponds to which property)

I purchased/inherited (circle) from my:

Father Mother Spouse Brother/Sister
 Uncle/Aunt Neighbor Friend A

stranger

Other (specify)_____

4. How important are the following uses to you? (circle)

	Very important		Somewhat Important		
Not important					
Timber harvest	1	2	3	4	
5					
Farming	1	2	3	4	
5					
Investment	1	2	3	4	
5					
Conservation	1	2	3	4	
5					
Recreation/Enjoyment	1	2	3	4	5
Pass on to children	1	2	3	4	
5					
Hunting	1	2	3	4	
5					
Privacy	1	2	3	4	
5					
Other	1	2	3	4	
5					
Specify _____					

5. Have the uses that are important to you changed? How?

6. Which of the following have you done with forestland you own/owned? (check all that apply)

Sold _____

Subdivided land _____
 Developed (construction) _____
 Consolidated _____
 Placed a conservation easement on _____
 Actively managed for timber _____
 Farmed _____
 Other (specify) _____

7. Why did you take that action?

8. How likely are you to do the following with your land? (Circle)

	Very likely		Somewhat likely		Not likely
Don't know					
Sell:					
Within 5 years:	1		2	3	4
DK					
Within 10 years:	1	2	3	4	DK
Develop:					
Subdivide:	1		2	3	4
DK					
Build a house for a relative:	1		2	3	4
DK					
Other	1		2	3	4
DK					
(specify)_____					
<hr/>					
Harvest timber:	1		2	3	4
DK					
Farm:	1		2	3	4
DK					
Place a conservation easement on:					
	1		2	3	4
DK					
Other	1	2	3	4	DK

(specify) _____

9. What is your age? (check)

- Younger than 25 _____
- 25 to 44 years _____
- 45 to 64 years _____
- 65 years and older _____

10. Do you have any children? (check)

- Yes, under age 18 _____
- Yes, over age 18 _____
- No children _____

11. If you have children, what level of interest or involvement do they have in managing your land? (circle)

	Very involved/interested		Somewhat involved		Not
	involved/interested	1	2	3	
4	5				

12. What is your occupation?

13. Where is your work located? (check)

- In Campton _____
- 30 or fewer miles away _____
- 30-90 miles away _____
- More than 90 miles away _____

14. If you feel comfortable sharing, what percentage of your total income comes from your land? (check)

- None _____
- Less than 10% _____
- 10-25% _____
- More than 25% _____

15. If you are comfortable sharing, about what is your yearly income from all sources? (check)

- Less than \$49,000 _____
- \$50,000 to \$99,000 _____
- \$100,000 or more _____

The following questions are about the people who owned your land before you. If there are multiple properties, please specify which property using the numbers from the first question.

17. Do/did you know the previous owners? Yes No
What was their name(s)? _____

18. What did they use the land for? (check)

- Timber harvest _____
 - Farming _____
 - Main residence _____
 - Real estate investment _____
 - Recreation/Enjoyment _____
 - Hunting _____
 - Don't know _____
 - Other (specify) _____
- _____

19. Why did they sell the property?

20. Is there anything else that is important to know about your forestland, or forests generally in Campton?

Would you like a copy of the finished report mailed to you? Yes _____
No _____

If you would like to receive it electronically, please provide an email address:

Thank you for taking the time to fill out this survey. Place it, along with one of the signed consent forms, in the stamped return envelope provided, drop it in a mailbox and you're all done! All personal information you have provided will remain strictly confidential. Please contact me or my advisor at the number below if you have any questions. You may also contact the Brown University Research Protections Office for questions regarding research confidentiality protocol.

Celia Riechel

Brown University
Center for Environmental Studies
Box 1943
Providence, RI 02912

Celia Riechel

Rd, Campton
Celia_Riechel@brown.edu
Steven_Hamburg@brown.edu
541-731-1427

Advisor: Steven Hamburg
467 Ellsworth Hill

401-863-1261

Susan Toppin
Brown University Research Protections Office
Box 1986
Providence, RI 02912-1986
Susan_Toppin@brown.edu
401-863-9206
Toll-free: 866-309-2095