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The Impact of Conservation Land on Property Taxes and Municipal Budgets in Maine: a Mixed-methods Study

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THE IMPACT OF CONSERVATION LAND ON PROPERTY TAXES AND MUNICIPAL BUDGETS IN MAINE: A MIXED-METHODS STUDY

By

Abigail Bennett

B.S. University of Maine, 2018

A THESIS

Submitted in Partial Fulfillment of the

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UNIVERSITY OF MAINE GRADUATE SCHOOL LAND ACKNOWLEDGMENT

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MUNICIPAL BUDGETS IN MAINE: A MIXED-METHODS STUDY

By Abigail Bennett

Thesis Co-Advisors: Dr. Adam Daigneault, Dr. Tora Johnson

An Abstract of the Thesis Presented
In Partial Fulfillment of the Requirements for the
Degree of Masters of Science
(in Ecology and Environmental Science)
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This study is an interdisciplinary project done in collaboration with the Municipal Budget and Conservation Working group, a group of stakeholders that formed in 2018 to study conservation and town budgets. We use mixed methods to explore the impacts of conservation and municipal budgets in Maine. We use regression analysis on 21 years of panel data to identify causal relationships between conservation and mill rates, controlling for economic and town budget factors. We found statistically significant but small effects on average, with a 1% increase in conserved acres in a town associated with average tax bill increases of $1 or less. More meaningful findings were revealed when we looked at the relationship across different regions, conservation types, and towns with certain economic characteristics.

To address the human dimensions of the issue, we designed, distributed, and analyzed responses from a survey to understand Maine people's attitudes towards conservation and property taxes. Responses revealed widespread support for conservation and concerns about high property tax rates but an absence of strong opinions about conservation as it relates to municipal budgets and property taxes. Finally, we conducted qualitative interviews with 20 conservation

and municipal practitioners. Participants shared their perspectives on the challenges faced by towns and conservation groups and provided useful examples of collaboration.

With this study, we add to a small body of research on the local economic impacts of conservation and provide insights to leaders dealing with these challenges in communities across Maine.

ACKNOWLEDGEMENTS

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1.1 Background

1.1.1 How Conservation can Impact Municipal Budgets

Over the last several decades, conserved land in Maine and New England has increased significantly (Irland 2018). When land is protected in Maine, it is usually taxed at the Tree Growth rate granted tax exempt status (Maine Land Trust Network 2019). All else equal, this reduces the tax base of the town (Schwartz 2021), putting pressure on the municipality to raise the lost revenues elsewhere. When a municipality needs additional revenue, it typically raises property tax rate (referred to in this study as the "mill rate"). Maine towns rely heavily on property taxes as they make up fifty-six percent of an average town's total revenues (Maine Municipal Association 2019), therefore "the fiscal and economic implications of open space preservation decisions are paramount" (Fausold and Lilieholm 1999, pg. 308). However, the local economic impacts of conservation in the long run are more complex than causing the town a reduction in tax revenue. This project uses a mixed methods approach to quantitatively measure conservation's impact on mill rates and study the human perceptions of conservation and town budgets. From our findings and knowledge gathering, we provide recommendations for leaders handling these local challenges.

1.1.2 Research Project Origin

In recent years there have been calls to end land trust tax exemptions. In 2018 Maine Governor Paul LePage criticized land trusts for shifting the property tax burden onto individuals without their input (Sharon 2018). These statements triggered rebuttals from land trusts and the creation of the Maine Land Conservation Task Force, which was formed to address the tensions that had developed (Maine Conservation Task Force 2019). The group was comprised of twenty

individuals with various stakes in the issue, including Republican and Democrat legislators, town managers, government agencies, and land trusts. Together, they produced a report over nine months that included recommendations for how future conservation efforts can be more community-oriented and focus on human and economic aspects. Recommendations included investing in projects and infrastructure that allow public access to lands or lands that provide public access to water. The report encouraged the state and conservation groups to seek federal and private funding whenever possible. It also pushed for better collaboration between towns and land trusts in planning conservation projects and in supporting policies that alleviate budget pressures, such as increasing state education funding. This report was a strong starting place for research, and long-term holistic thinking about conservation in Maine.

Our study takes the next step in more analytically looking at impacts of conservation and relationships between communities and conservation groups. Our work was originated by the Municipal Budgets and Conservation Working Group, a collaborative group of conservation professionals, researchers, municipal leadership, selectboard members, and town managers organized by the Downeast Conservation Network. The group formed in 2018 to study the challenges around conservation and municipal budgets in Maine by bringing together diverse perspectives. It was important that the group consist of assessors, municipal officials, and land trust professionals so that all parties could voice their concerns and be heard in an accepting and respectful setting. One of the group's goals was to create solutions together and on behalf of all stakeholders because they recognized the value of strong relationships between conservation groups and municipalities. The group agreed on conducting a study on of the impacts of conservation land on mill rates that incorporated empirical analysis and qualitative methods to address human dimensions. They acquired funding and hired a graduate student to conduct this

study under their guidance and consultation, ensuring co-creation of the project. This thesis is the product of that initiative.

1.2 Setting the Scene: Conservation in Maine

Land protection in Maine has increased significantly over the last thirty years. Conservation in Maine has increased from 5% of the state's land area in the 1980s to more than 20% today (Maine Conservation Task Force 2019). Most of this recent protection is private, held by non-governmental organizations (NGOs) such as land trusts, and much of it is in unorganized/unincorporated northern parts of the state (Figure 1.2). This increase in protected land was driven, particularly in its early days, by the Land for Maine's Future Program (LMF), the state's primary funding vehicle for conservation approved by voters in 1987 to support land acquisitions by NGOs. Irland (2018) refers to the period starting then and continuing today as an "era of acquisition" (pg. 12).

Given the fragmented nature of Maine's land ownership, 20% of conserved land is a significant amount. Conservation strategies often require patching parcels together in phases (this patchwork can be visualized in Figure 1.1) and using a combination of strategies (i.e. fee acquisition and easements). It is often a slow process and requires working with many landowners. Conservation groups are fragmented as well, with 84 land trusts in the state (Maine Land Trust Network 2019).
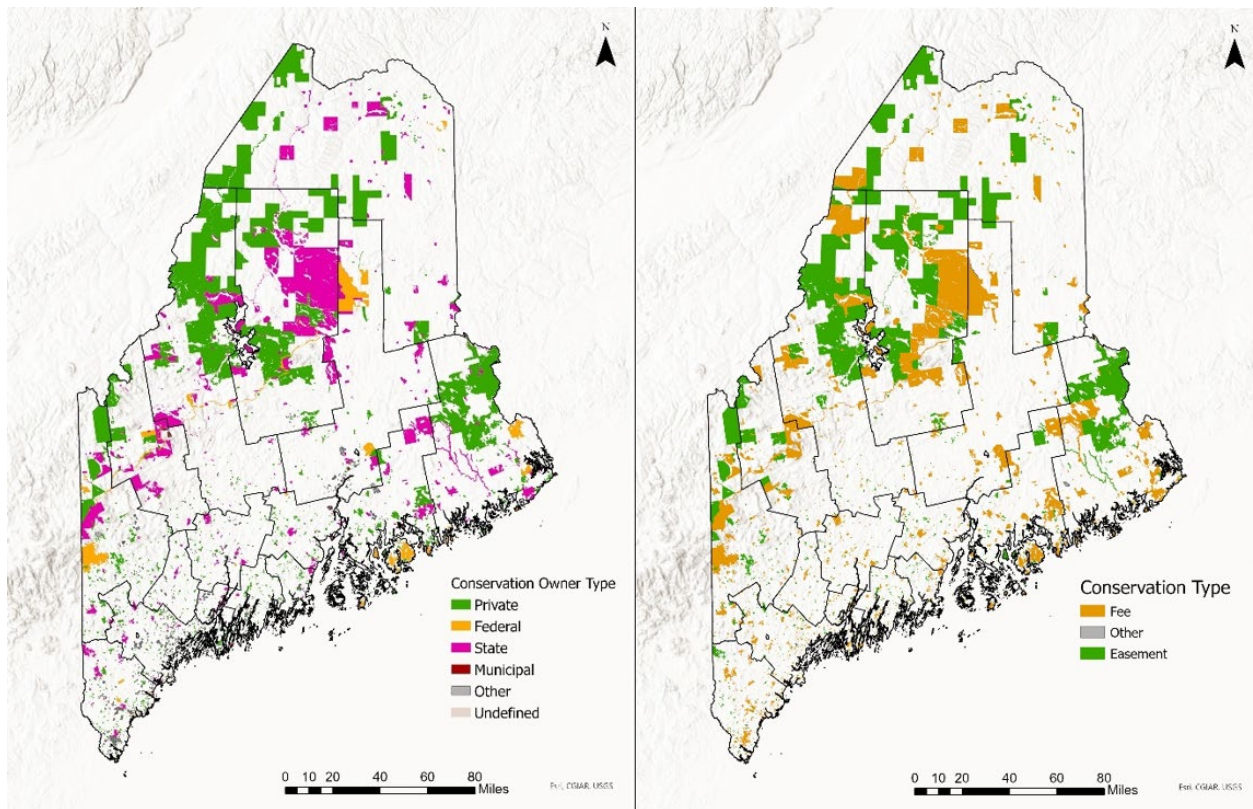
Figure 1.1: Maine's conserved lands (Maine GeoLibrary Data Catalog 2023) coded by owner type and conservation type.

Out of more than 4 million acres of protected land in the state, 56% is held by NGOs, 43% by state and federal entities, and 1% by municipalities. Easements comprise 57% of protected land, and a vast majority of easements are held by NGOs (Irland 2018).

It is important to note that 80% of protected land is in unincorporated townships (the "UT") and plantations (Maine GeoLibrary Data Catalog 2023) which have no local, incorporated municipal government. These areas are very different from organized towns as they do not have a local budget or municipal services, and property value assessment is led by the Property Tax Division of Maine Revenue Services. Therefore, these areas are excluded from our study. This unorganized territory consists of 429 townships and many coastal islands. The land area makes up more than half the area of the State of Maine (Figure 1.2). The populations are mostly

seasonal, with only approximately 9,000 people living full-time (0.7% of Maine's population) in this area (Maine Revenue Services 2023).
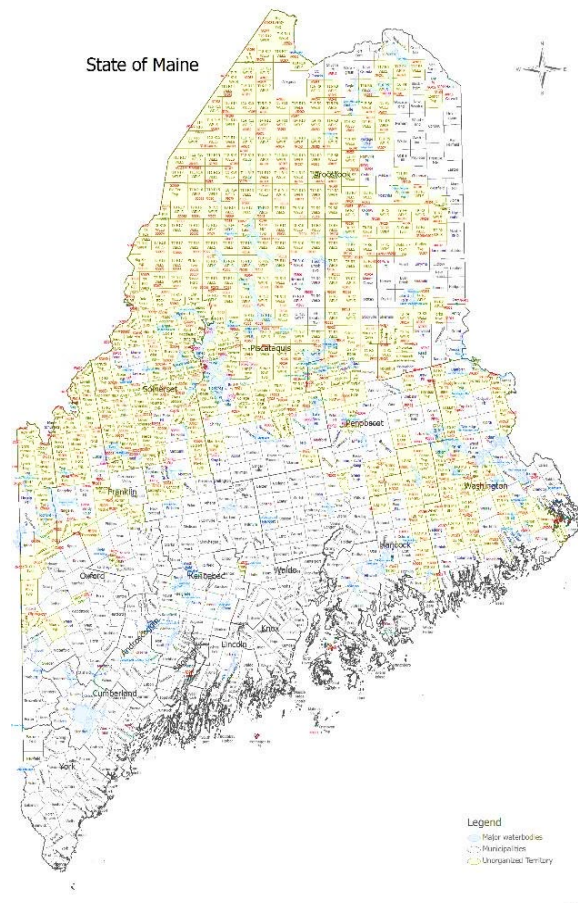
Figure 1.2: Unincorporated/unorganized areas, shaded yellow, in the State of Maine (Maine Revenue Services 2023).

Types of payments made on conservation land

Two-thirds of land trust acreage (about 422,000 acres) is enrolled in the current use taxation program known as Tree Growth (Maine Land Trust Network 2019), although much of this is in the UT. Under the Tree Growth program, land is taxed at a reduced rate based on the value of land as commercial forest rather than highest and best use. Research has found that in various parts of the United States, a current use designation reduces tax revenue on a piece of land by 46-70% (Kalinin et al 2023).

About 17% of land trust acreage is tax exempt and has payments in lieu of taxes (PILOTs) made on it (Maine Land Trust Network 2019). PILOTs can vary significantly depending on the property, land trust, and town, but statewide data on this metric is not available. These PILOTs may alleviate some pressure on town budgets caused by a reduction in the tax base from conservation, however, they are often arbitrary and decided on a property-by-property basis (stakeholder personal correspondence, May 2023). PILOTs can be stopped at any time.

The federal government typically makes the most consistent PILOTs as they are calculated using a formula established by the PILT Act of 2004. The formula is based on population, revenue-sharing payments, and the amount of federal land within a county. The Department of the Interior made $762,704 in payments on properties they owned in Maine in 2022 (U.S. Department of the Interior 2023). This equates to $2.58 per acre.

The Maine Bureau of Parks and Lands does fee sharing with municipalities in which it owns land. In 2020, the state made payments of $407,810 to towns (Turner, personal correspondence 2021), or about $0.30 per acre.

1.3 The Long-Term Effects of Conservation: Amenity Effects and Enhancement Value

Conservation can have complicated effects on local economies, including potentially increasing the value of neighboring real estate due to amenity effects. Protected land "drives up property values, and subsequently increases tax revenues, supporting local economic development" (Holland and Meyer 2018, pg. 2). Several studies focusing on areas around the world have found that permanently preserved open space significantly increased nearby property values (Reeves et al. 2018). Chamblee et al. (2011) found that in Buncombe County, North Carolina, new easements increased surrounding residential property value by 11%, and vacant

land that shares a border with a conserved parcel experiences price appreciation of 46%. Property price appreciation declined with distance from the conserved areas.

However, the impacts of open space on property values vary between towns. Metropolitan areas that have stringent land use regulations, high development densities, and relatively little open space will likely see increased property values from conservation (Wu et al. 2016). However, in urban regions, the highest and best use of land is often development (Fausold and Lilieholm 1999).

Due to the amenity effect, we might see reductions in mill rates due to the appreciation of home and real estate values. Appreciation in home values means greater tax revenue for towns, holding the mill rate constant. Therefore, towns may be able to reduce the mill rate to bring in equivalent revenue. However, although the mill rate may be smaller, it may not benefit homeowners. In Maine, property values are generally increasing, driven in recent times by the rise in remote work (van Allen and Kevin 2021). This can result in rural gentrification where long-time residents are no longer able to afford their homes. This is happening most dramatically in Maine's coastal communities (Cadot n.d.). Therefore, although mill rates may be decreasing, the tax bill may still be rising for many households due to their home appreciating in value. Homeowners gain an illiquid form of wealth through real estate equity, but personal cash flow, which is typically more important to individuals, is negatively affected (King and Anderson 2004). Our econometric analysis only examines the effects of conservation on the mill rate, however, we theorize about amenity effects and impacts on property values and provide qualitative insight around these impacts in Chapter 1 with stakeholder interviews and a public survey.

1.4 The Long-Term Effects of Conservation: Land Use Trade-Offs

Protecting land in perpetuity means that the land will never be improved/developed and taxed at a higher rate. However, more development does not necessarily lead to improved municipal budgets. Although developing raw land leads to higher valuations and increased tax revenues, it often requires more municipal services like the expansion of costly infrastructure (Brighton 2009, Scarborough Land Trust 1996). This results in greater costs of community services ("COCS") which are incurred by the town to service infrastructure. Towns with higher expenditures have been found to have higher taxes (King and Anderson 2004) as mill rates increase to fund these services (The Trust for Public Land 1999).

1.5 The Long-Term Effects of Conservation: Ecosystem Services, Community Health, and Tourism

Conserving land also has hard-to-measure economic impacts, including natural systems value and recreational value (Fausold and Lilieholm 1999). A study from Downeast Maine found that in 2017 the largest economic benefits of conservation in this region came from visitor spending, recreation, carbon sequestration, timber harvest, and clean water, respectively (Lichko et al. 2019). Economic benefits vary significantly depending on the type of conservation, location, ecosystem, and more. For example, Maine forests are estimated to provide an average value of ecosystem services of $482/ac/year, but this varies from $120 to more than $3,000/ac/year (Lichko et al. 2019).

Recreational benefits include the intangible psychological and physical health benefits that individuals get from recreating in natural landscapes (Figure 1.3). They also include tourism and local economic activity that occurs because of the protected land. On a small scale, this could mean a family visiting the local cafe or brewery after hiking on a land trust preserve, or a

group of snowmobilers stopping at a restaurant for lunch during their weekend ride. On a large

scale, in 2019 Acadia National Park was estimated to have brought in $380 million in visitor

spending, mostly to hotels and restaurants (National Park Service 2020).
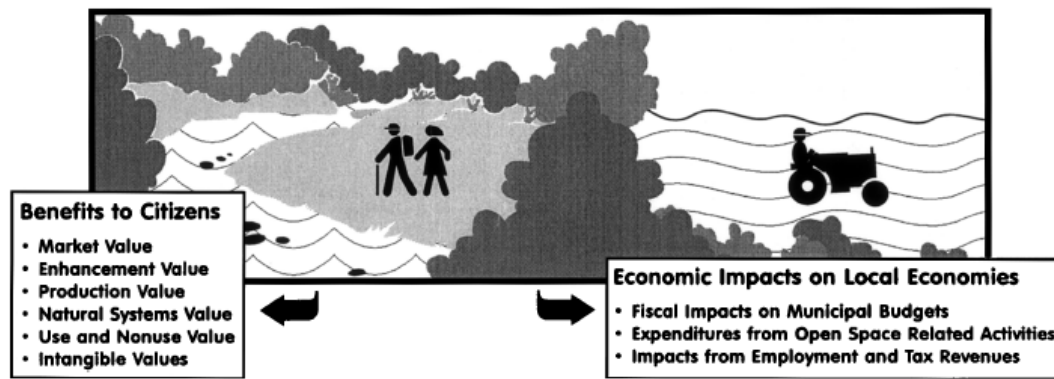
Figure 1.3: Economic and non-tangible impacts of conservation land (Fausold and Lilieholm 1999).

In Maine, conservation lands protect drinking water supplies and support activities

including commercial fishing, logging, and farming. About three quarters of land trust owned

land in Maine is held under Current Use tax programs including Tree Growth, Farmland, and

Working Waterfront. These programs exist to encourage land to be used for production and

recreation purposes (Maine Land Trust Network 2019).

Daigneault, Strong, and Meyer (2021) used cost-benefit analysis to value ecosystem

services provided by forest conservation in the Sebago Lake Watershed in Maine and estimated a

benefit-cost ratio of about 8 to 1. They found that habitat provision, recreation, and air

purification provided the greatest economic value of the services they studied.

1.6 Purpose of Study and Summary of Methods

The goals of this study are to understand the impact of conservation land on property

taxes, to gather public and expert perceptions of conservation land and municipal challenges, and

to provide recommendations and applicable tools for land use planning based on our findings.

While the Municipal Budgets and Working Group passed on the day-to-day research responsibilities to University of Maine master's student Abby Bennett and Associate Professor Adam Daigneault, they remain a key component of the research process. They continue to be involved through regular meetings with researchers and provide feedback and advice. Working closely with stakeholders through the research process has provided the opportunity to co-create the study design and ensure direction and approaches remain relevant to the beneficiaries of the research.

The group decided that it would be important to study the issue from both an empirical perspective and by engaging in qualitative research to better understand the pressures on town budgets, especially the nuanced impacts of conservation, so that towns can improve their budget situations. The group acknowledged the tension that can exist between land trusts and towns and were also interested in improving relationships and collaboration through better understanding.

Chapter 1 will focus on data analysis and an empirical approach to evaluating the relationship between conserving land and the mill rate in Maine's municipalities. We use municipality-level data from 2001-2022 to conduct an econometric analysis that quantifies the potential drivers and magnitude of the conservation land effect on mill rate.

Chapter 2 will focus on the human dimensions of conservation and municipal challenges. We conducted a state-wide general perceptions survey to help us understand Maine resident views of property taxes, conservation land, and municipal issues, and examined how these views may vary by region. We asked these questions alongside a set of quantitative indicators (e.g., unemployment rate, median income, educational attainment, etc.) so that we could analyze responses across different demographics and traits.

Continuing along the human dimension theme, the second chapter also includes semi-structured interviews we conducted with key stakeholders in the conservation, municipal, and planning spaces. We wanted to understand how involved personnel are addressing challenges and developing solutions. We recruited interviewees from four socioeconomically and geographically diverse regions across the state.

By engaging in both quantitative and qualitative work, we examine conservation's effect on towns more holistically than prior studies have. Although many economics papers focus solely on regression analysis to attempt to answer research questions, there is an increasing interest in examining complex issues with a multi-faceted approach. Jefferson, Austen, and Sharp et al. (2014) argue that a mixed-methods approach yields richer insights and better understandings of causal relationships than regression analysis alone.

Additionally, due to the complexity of the topic, we believe it is crucial to use a mixed methods approach (Kinnebrew, Shoffner, Farah-Perez et al. 2021). By measuring conservation impacts quantitatively and then about learning practitioner and public opinions around the issue we can identify whether there are disconnects. The interviews can provide context around the quantitative results and the actions that are being taken around the issue. Additionally, by conducting a general survey and stakeholder interviews, we can parse out belief differences between the general public and decision makers.

The mixed methods approach is most useful when components are brought together at some point(s) during the process (Kinnebrew, Shoffner, Farah-Perez et al. 2021). We primarily use a convergent parallel design, where each method-survey, quantitative data analysis, and interviews-is conducted individually, and then results are merged for comparison (Creswell 2013). However, we used elements of explanatory sequential design through integrating

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variables from the data analysis component into the survey data pre-analysis and discussing

findings from the data analysis in many of the interviews. See Figure 1.4 below for a flow-chart

of our mixed-methods process.
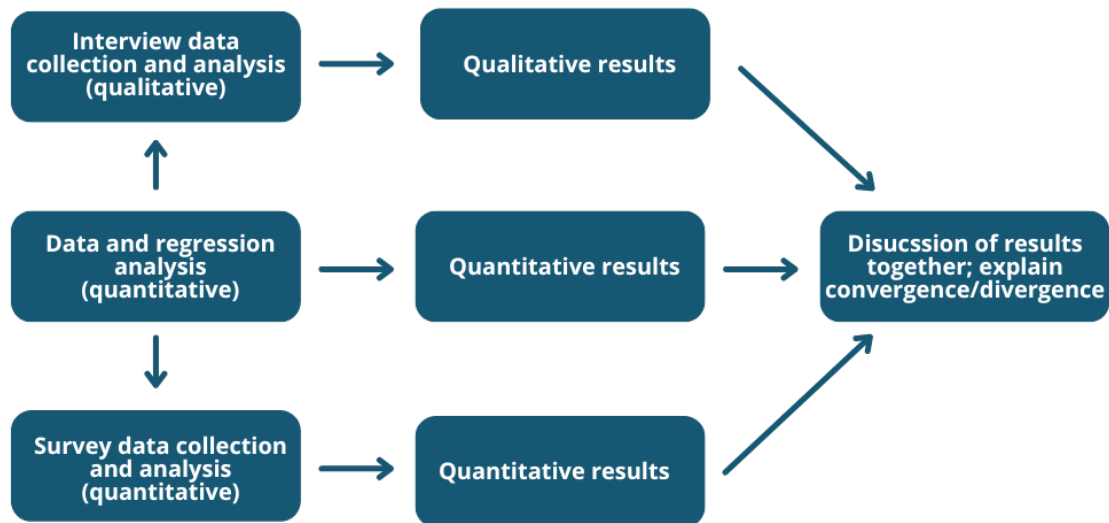
Figure 1.4: The mixed-methods process used in this study.

We discuss combined results in the discussion section of Chapter 2.

CHAPTER 1: QUANTITATIVE REGRESSION ANALYSIS

2.1 Overview

In this chapter, we use econometric methods to quantify the relationship between conservation land and mill rates in Maine towns. We want to know whether there is a causal relationship between conserving land and changes in property tax rates. An empirical evaluation of this relationship was important to the working group and demand for this research is reflected by earlier Maine studies, including the study of conserved lands done by the Maine 128th Legislature (2018) and the Land Conservation Task Force report (2019). There has been limited empirical research done on the relationship (Kalinin, Sims, and Meyer et al. 2023), but we review and build upon the existing research. We designed models that demonstrate the relationship between conservation and mill rates across different specifications. We control for confounding variables and use a 21-year panel of data on Maine towns, also controlling for unobservable time-invariant differences within towns. We find evidence that conservation is associated with small increases in mill rates three years after the land is protected, but that these effects vary significantly across different conservation types and towns with different characteristics.

2.2 Literature Review

Only two academic studies have taken an empirical approach to studying the long-term tax effects of land protection (Reeves et al. 2018), yet both focused on New England. Kalinin et al. (2023) took a broad approach and looked at the entire New England region, while King and Anderson (2004) looked at a small sample of Vermont towns.

Kalinin et al. (2023) analyzed the impact of conservation land on property taxes in New England. The empirical strategy is similar to the one used in this study. The primary model

includes control variables for the labor market (which may be a proxy variable for factors such as desirability of the area), year-specific shocks by state, and economic trends from 2001-2015. Their core regression analysis found less than a $1 increase in an average tax bill for a 1% increase in land area protected. The study also found that towns that experienced the greatest tax rate from conservation are those that have relatively slow tax base growth, smaller amounts of land in Current Use programs, and a smaller share of vacation homes.

Kalinin et al. (2023) also examined differences in the impact of different types of conservation: NGO, municipal, state/ federal, as well as easement versus fee. They found that municipal conserved lands had the largest upward impact on mill rates, followed by easements. The impacts of state/federal and NGO lands were not statistically different from zero.

King and Anderson (2004) sampled 29 towns in Vermont and used panel data over the period 1990 to 1999. Towns were grouped into six categories based on percentage of land conserved. Variables included conservation land, town budget, town demographics, and town policies. Because of the small sample size, researchers were able to collect detailed town policy information from each town, such as number of new permits issued, minimum lot size, whether there is a cap on building permits, etc. Researchers looked at the impacts of conservation annually one-to-eight years after the land protection occurred. Based on simple accounting, a decrease in tax base would result in the mill rate increasing, as the tax rate is calculated by dividing the cost of services by the tax base. They found that this is reflected in the short run, with conservation associated with a small increase in the mill rate two years after the land is protected. However, researchers found that four years after the conservation occurs, easements were associated with decreases in property tax rates. Authors theorize that the long-term effects

are due to increases in value of surrounding properties and service-cost savings from not having the land developed.

In addition to these two primary studies, it is worth discussing tangential areas of research and non-academic publications. Schwartz (2021) investigated the property tax impacts of forest tax programs (comparable to the Tree Growth program in Maine) on tax rates in parts of Michigan and Wisconsin. Forest tax programs, administered by state and local governments, reduce property taxes on private forestland to maintain timber production while encouraging the provision of ecosystem services. However, like conserving land, it can erode the tax base of the municipality. States approach reimbursements differently; Vermont reimburses towns fully for lost tax revenue, while Maine only reimburses 90% of tax losses, placing 10% of the burden on municipalities and local property owners. Schwartz (2021) found that rural towns were most sensitive to changes in enrollment, experiencing the largest increases in tax rates. We also investigate differences between rural and non-rural towns, as well as across other parameters that differentiate towns, such as unemployment rates, median household income, and percentage of vacation homes.

Outside of the academic realm, there were several articles and papers published in the late 1990s and early 2000s around the municipal implications of conservation, development, and taxes. Many of these studies were initiated by conservation groups including Maine Coast Heritage Trust and the Greater Lovell Land Trust. The consulting group Ad Hoc Associates was particularly active in the space. Other institutions that published papers and articles on the issue include American Farmland Trust (Freedgood et al. 2002) and The Trust for Public Land (1999). The studies directly address the impacts of conservation on property taxes but are biased as they

were funded by conservation interests. Although the studies do not meet academic standards, they are helpful in providing context and case studies.

One of these studies was particularly thorough. The Trust for Public Land (1999) examined the potential impact on taxes by conservation ownership types such as federal, municipal, and private/nonprofit. Authors also looked at population and the relationship between development and property taxes, and the town characteristic differences between low-tax and high-tax towns. Generally, they found that the mill rate was higher in more developed towns with higher populations and higher incomes. Conversely, the mill rate was found to be smaller in rural towns where there are more acres of open land per capita. Although this study was not empirical and only looked at correlations, it provides context for our work.

2.2.1 Contributions to Literature

Our methods build upon the work done by prior studies and our findings will advance the understanding of conservation's effect on mill rates.

We borrow the framework for analysis introduced by Kalinin et al (2023) and improve upon interpretation of coefficients on the inverse hyperbolic sine (IHS) transformed variables. We use a formula developed by Bellemare et al. (2019) to calculate elasticities at the scale of our dependent variable. Without this next step of calculating elasticity, the coefficient is not scaled appropriately and cannot be interpreted correctly.

Additionally, we look at different impacts of conservation across geographic regions in Maine, which has not been done before. Each region is a tourism region with unique characteristics, including the lakes and mountains region of Western Maine and the Downeast region consisting of Hancock and Washington counties.

2.3 Methods: Variable Selection and Data Collection

To address the research question, we designed a model with mill rate as the dependent variable and percentage of conserved land as our primary explanatory variable. We then included controls to account for confounding influences (Table 2.1).

2.3.1 Primary Variable of Interest: Conserved Land

We used State of Maine data for cumulative, detailed information on annual land protection. The State of Maine Geolibrary has an extensive database of conservation land dating back to 1801. This inventory of Maine's protected areas is broken out by town, parcel name, designation, type (fee, easement), holder name and holder type (state, federal, municipal, and private). The layer is updated when conservation organizations, land trusts, and municipalities submit new or updated fee parcels to be added to the layer.

In the dataset we used for analysis, we found that conservation increased from 4.8% of a town's acreage in 2001 to 9.3% in 2022. Of this, 69% were fee acquisition properties and the rest were easements. Approximately half was privately owned land, which includes non-governmental organizations (NGOs) and individuals.

Acres of conservation across Maine towns is skewed right (Figure 2.1).

Histogram of Acres of Land in Conservation
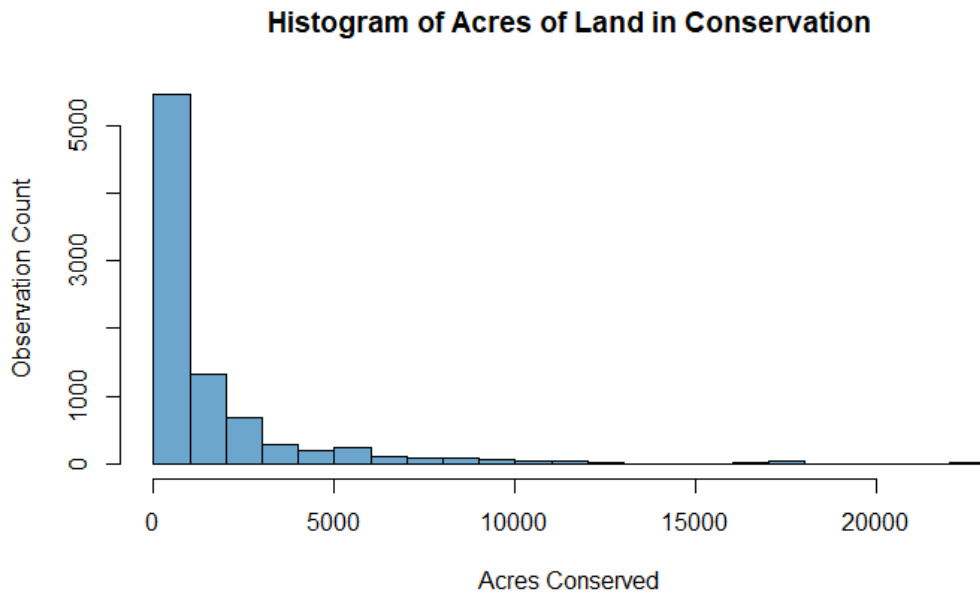
Figure 2.1: Histogram showing the distribution of acres of conservation across all observations in the data (Maine GeoLibrary Data Catalog 2023).

2.3.1 Dependent Variable: Mill Rate

The mill rate for each town is the property tax rate multiplied by 1,000 as it represents the tax owed annually per $1,000 in valuation. The rate is calculated using the property tax revenues a town needs to raise to cover expenses after other revenue sources are accounted for. As mentioned in the introduction, property taxes are the most significant source of revenue for municipalities. The nominal mill rate is calculated by dividing the amount needed to cover remaining expenses by the locally assessed value of the real property in the town, and then multiplying the result by 1,000.

There are two ways that the mill rate is measured: equalized and nominal. The nominal mill rate uses the locally assessed real estate valuation in the calculation. Towns vary significantly in how and when they do these assessments. Some municipalities have a tax assessor on staff, while others contract with tax assessment firms. Some do an annual assessment while others can take up to 10 years between assessments. Due to the inconsistent nature of

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nominal mill rates, we place more emphasis on results using the equalized mill rate as the primary dependent variable. This metric is based off the annual state valuation of real estate, so it is consistent across towns. The state valuation takes about 18 months to complete and lags actual market values by nearly two years (Maine Revenue Services 2020). While we estimate the effect of both equalized and nominal mill rates, we suggest looking to the equalized model for a better estimate for the reasons discussed.

The distributions of both mill rate variables are normal (Figure 2.2 and Figure 2.3). The mean equalized mill rate is 14.12 and the mean nominal mill rate is 15.87 across our panel.
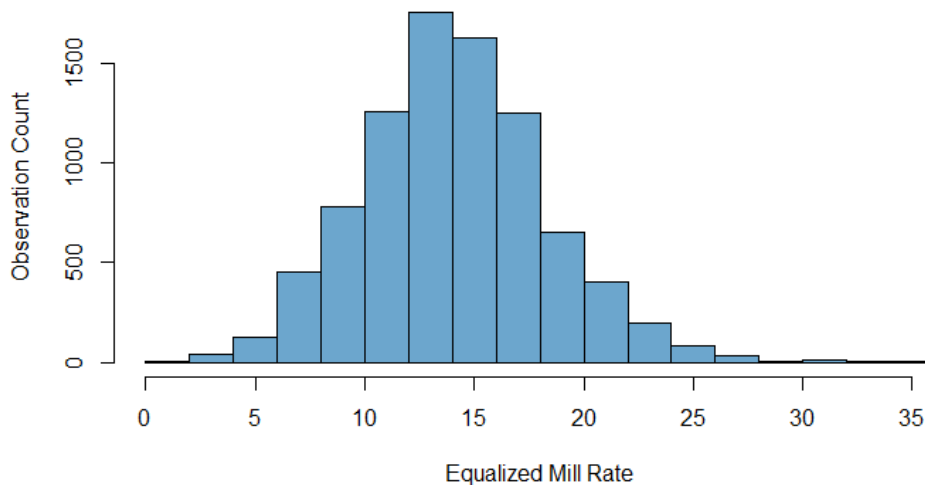
Figure 2.2: Equalized mill rate distribution (Maine Revenue Services 2001-2022).
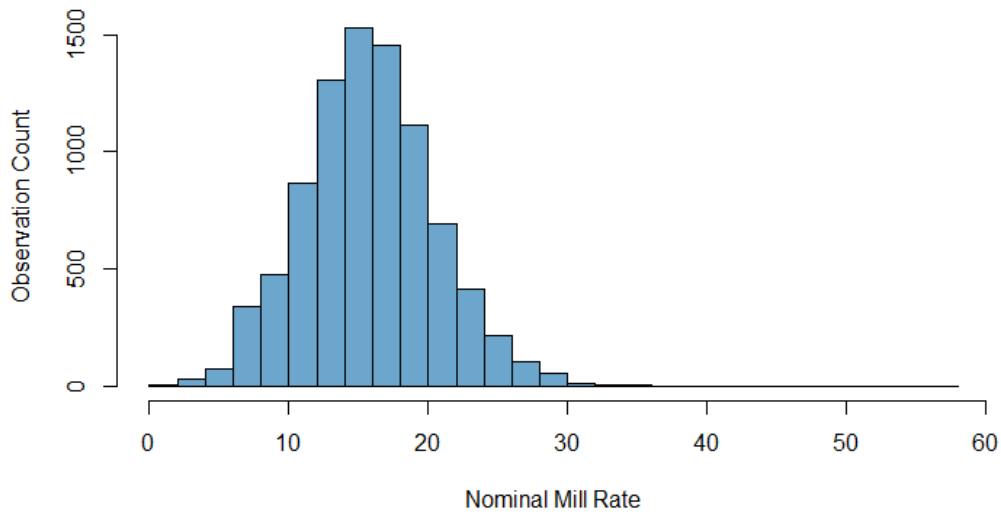
Figure 2.3: Nominal mill rate distribution (Maine Revenue Services 2001-2022).

2.3.2 Understanding Correlation between Conservation and Mill Rate

Before we did more advanced analysis with control variables, we wanted to visualize the relationship between conservation and equalized mill rate in a scatterplot. Figure 2.4 compares plots with both the untransformed variables and the inverse-hyperbolic sine transformed variables. The plots are fitted with a simple linear regression line. We see a negative correlation in both cases, where higher levels of conservation are associated with smaller equalized mill rates.
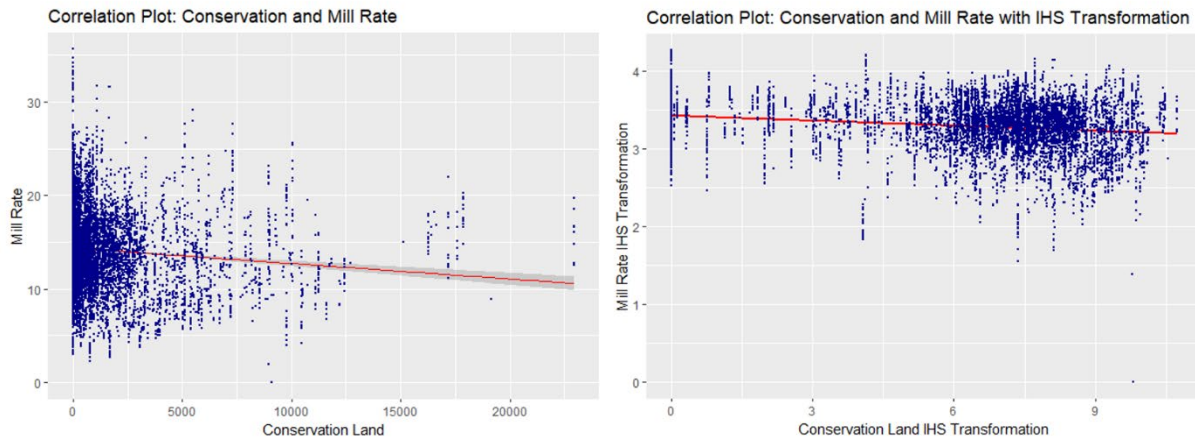
Figure 2.4: Scatterplot of conservation acres and equalized mill rate using both untransformed variables and IHS-transformed variables (Maine Revenue Services 2001-2022, Maine GeoLibrary Data Catalog 2023).

2.3.3 Control Variables

We want to know if a causal relationship exists between land conservation and property tax rates. To estimate the relationship, we designed a model that includes control variables that impact both conservation land area and the mill rate at the municipal level. To identify these factors, we reviewed the methods of comparable studies and worked with the stakeholder group. Kalinin et al. (2021) included municipal revenue and expenditures, property tax levy, equalized and assessed value, current use value and land area, socioeconomic variables including unemployment rate and median household income, and municipal characteristics including percentage of vacation homes and density class (rural, exurban, and urban). Using these two studies as examples, we determined that municipal budget factors, economic conditions, and demographics are important to include in the analysis.

After assessing what data was possible to collect, we created a final list of variables to include in the model. We decided that these variables would be necessary to control for the economic conditions and municipal budget factors that may influence a community's ability,

desire, and capacity to conserve land. See Table 2.1 for the variables used in our analysis and the

inclusion rationale.

Control Variables* *Excluding primary explanatory variable and dependent variable)	
Variable	**Inclusion Rationale**
Economic Conditions	
Vacation Homes (% of housing inventory)	This can be used as a proxy for amenity value of a town (Kalinin et al. 2023). Vacation homes are more likely to exist in scenic towns with access to outdoor recreation. We hypothesized that conservation is more likely in towns that benefit from recreation-based tourism and that already have conserved land. Vacation homes also typically require fewer municipal services as they often are located on private roads and have standalone wells/sewage systems.
Unemployment Rate	Unemployment rate is an economic factor that affects a town's ethos and budget. A town with limited work opportunities likely has a smaller tax base and may be experiencing a declining population.
State Valuation (Tax Base)	Tax base is one of the determining factors of mill rate. The equalized mill rate is calculated by dividing the municipal commitment (two years lagged) by the state valuation. A lower valuation may indicate that a town has more open space, and a higher valuation may indicate a more populated town with greater housing density and less space for conservation (but perhaps more demand). Towns with greater amounts of conserved land likely have smaller tax bases due to having less developable space. In towns with a small tax base, conservation generally has a larger impact than in towns with a large tax base (Trust for Public Land 1999).
Population	Change in population over time is a major indicator of the economic health of the town. Towns that are shrinking are likely to be disadvantaged, face municipal budget challenges, and have a smaller tax base, which could mean larger impacts from conservation (Schwartz 2021).
Housing Density Classification	Whether a town is rural, urban, or exurban can be correlated with the size of the tax base (Kalinin et al.). We expect rural towns may have smaller tax bases due to less housing infrastructure and lower land valuation. Land use planning may also be more relaxed in rural towns; with less development pressure, the decision to conserve land may not be opposed.
Median Household Income	Median household income changes can indicate coming shifts in the fiscal health of a town and subsequent real estate value, and therefore predict mill rate. The culture/value systems of communities in different brackets of household income may also vary, which can affect attitudes toward conservation.
Municipal Budget	
Revenue Sharing	The amount of revenue sharing from the state each town receives is based on a formula that includes municipal populations, state valuations and tax assessments. Therefore, changes over time in revenue sharing allotments may indicate shifts in a town which could impact land use decisions. This source makes up only a small percentage of all town revenue at an average of 6.5%, so it will likely not have a large impact.
Tax Exempt Property Value	The amount of tax-exempt property directly impacts the budget and in the long-run, likely tax rate. Municipal, state, and federal government properties make up most of the tax-exempt real estate in Maine and many of these properties require municipal services (such as schools). Conservation land is included under "charitable and benevolent" properties, which totals 16% of tax-exempt value.
Current Use Acres	Towns with more Current Use land likely have smaller tax bases and therefore may be more sensitive to conservation. At the same time, losses from moving land into conservation from a Current Use designation are less than if it were valued at higher and best use previously. On average, across organized municipalities, 18% of town land area is taxed under Current Use (MRS 2019), representing 6% of the valuation.

Table 2.1: Control variables and rationale for use in analysis.

2.3.4 Data Collection and Sources

Most of our data was retrieved from the Maine Revenue Services and the US Census Bureau. Kalinin et al. provided us with their dataset, from which we pulled the data for density class. GIS layers from the Maine GeoLibrary Data Catalog were used to gather town names, total land area, and conserved land area per town. State Treasurer Henry Beck provided revenue sharing information (pers comm., December 2021). The unemployment rate was obtained from the Maine Department of Labor local area unemployment statistics (LAUS). See Table 2.2 for sources and descriptive statistics for each variable.

Variable	Source	Type	Units	Median	Range
Equalized Mill Rate	ME Rev. Service (annual, 2001-2022)	Continuous	Mills	13.93	0-35.64
Nominal Mill Rate	ME Rev. Service (annual, 2001-2022)	Continuous	Mills	15.75	0-58
Acres in Conservation	ME DACF (annual, 2001-2022)	Continuous	Acres	625.5	0- 22,940.8
Share of Vacation Homes	US Census (2000, 2010, prorated between available years)	Continuous	Percentage *100	22.8	0-94.35
Unemployment Rate	ME Dept. of Labor LAUS (annual, 2001-2022)	Continuous	Percentage *100	5.3	0-44.4
Median Household Income	US Census, decennial and ACS (2000, 2010, 2008, 2013, 2018, prorated between available years)	Continuous	Dollars	43,988	122-120,052
Population	US Census, decennial and ACS (2000, 2010, 2008, 2013, 2018, prorated between available years)	Continuous	Persons	1,440	12-66,735
State Valuation	ME Revenue Service (annual, 2001-2022)	Continuous	Dollars	139,050,000	3,700,000-12,095,550,000
Town Assessment	ME Revenue Service (annual, 2001-2022)	Continuous	Dollars	122,541,000	33,142-14,343,679,340
Revenue Sharing	ME State Treasurer (annual, 2001-2021)	Continuous	Dollars	84,599	356-8,408,319
Exempt Real Estate Value	ME Revenue Service (annual, 2001-2022)	Continuous	Dollars	6,421,630	0-1,810,992,490
Acres in Current Use	ME Revenue Service (annual, 2001-2022)	Continuous	Acres	5,252	0-71,990
Tourism Region*	Maine Department of Economic and Community Development (fixed)	Categorical	N/A, Qualitative	N/A	N/A
Housing Density Classification	Harvard Forest	Categorical	N/A, Qualitative	N/A	N/A

Table 2.2: Descriptive statistics, sources, and other statistics on variables used in analysis.

*There are eight tourism regions in the state as defined by the Maine Office of Business Development:

1. Aroostook County: Maine's northernmost region and the largest county in the state. Natural resources (forestry and agriculture) make up a large portion of economic activity in the region. It also relies on tourism, particularly outdoor recreation.

2. Kennebec Valley: Industries in this region include healthcare, manufacturing, and construction, as well as tourism and outdoor recreation.

3. Highlands: The geographic center of the state. Includes Maine's highest peak, Mt. Katahdin, and the University of Maine, a center of innovation and research.

4. Downeast and Acadia: Downeast refers to Washington and Hancock County. This area is home to Acadia National Park, the most frequently visited location in Maine.

5. Midcoast and Islands: Coastal towns between Portland and the Downeast region. The Midcoast is home to Maine's heritage fishing and agriculture industries.

6. Lakes and Mountains: Western Maine's Appalachian Mountains, containing Maine's three primary ski mountains and the state's largest lake.

7. Beaches: South of Portland, this region contains 30 miles of sand beaches.

8. Greater Portland and Casco Bay: Includes Maine's largest metropolitan area.

2.3.5 Data Cleaning

Areas in the unorganized territory were not included in the analysis.

Data was limited in the 2000 decennial census, and in these cases, data was not pro-rated to 2000 but copied backward from the earliest available year.

There were occasional errors in the Maine Revenue Services data that required the omission of towns from the dataset. All percentage data points representing shares of total town

valuation or land area that were above 100% required omission, as these values are inaccurate and significant outliers. We assume these errors are random.

After the full data cleaning process, we were left an average of 413 observations (municipalities) per year to analyze over the 2001 to 2022 assessment period.

2.4 Methods: Model Specification

2.4.1 Average Effects of Conservation across Maine

We first estimated the average effects of conservation across all towns in our dataset three years after the land was conserved. We used a three-year lag for our core analysis because it takes municipalities one to several years to adjust their mill rate to changes in the tax base..

We used a fixed effects regression model to control for unobservable time-invariant differences within towns. There are unobservable differences such as value-systems, cultures, and past experiences that impact municipalities' conservation initiatives and local government decisions. Using a fixed effects model allowed us to reduce the risk of omitted variable bias, with the assumption that unobservable confounding factors are time-invariant. We assume there is sufficient variation in the primary explanatory variable (and in the control variables) for the model to be effective and yield accurate results.

The linear average effects model is specified below:

$$\text{(Equation 1)} \quad MillRate_{i,t} = \beta_1 C_{i,t-3} + \beta_2 E_{i,t} + \beta_3 M_{i,t} + \gamma_i + \rho_t + \epsilon_{i,t}$$

Where:

- $MillRate_{i,t}$ is the municipality and time specific property tax (mill) rate
- i represents each municipality and t represents the time period
- $C_{i,t-3}$ represents acres of conserved land in municipality t three years prior
- $E_{i,t}$ represents a vector of variables for local economic conditions in municipality t

- $M_{i,t}$ represents a vector of variables for local economic conditions in municipality t

- γ_i and ρ_t are municipality and year fixed effect

The effect of conserving an additional 1% of municipal land area three years prior on mill rate is estimated with β_1, using controls for changes in economic conditions and municipal budget.

Next, we applied a transformation to the coefficient to allow us to interpret it as an elasticity, i.e. the percentage change in mill rate that occurs from a percentage point change in conserved acres. To calculate the elasticity of the linear model, we used the following, where the x represents the average value of our percent conserved variable and y represents the average value of the mill rate variable.

$$(\text{Equation 2}) \; \hat{\epsilon}_{yx} = \hat{\beta} \cdot \frac{\underline{x}}{\underline{y}}$$

In addition to our linear model, we ran a specification with an inverse hyperbolic sine (IHS) transformation applied to our dependent variable and outcome of interest (Kalinin et al 2022). The IHS transformation is an alternative to the log transformation that allows us to retain zero-valued observations in data that is skewed right (Bellemare, Wichman, Bloem et al. 2019). Our independent variable of interest, acres in conservation, is skewed right (Figure 2.1) and approximately 10% of observations are values of zero. The transformation also allows us to interpret coefficients as elasticities. The IHS transformation applied to variable x is defined as:

$$(\text{Equation 3}) \; \tilde{x} = arcsinh(x) = log\left(x + \sqrt{(x^2 + 1)}\right)$$

To calculate the elasticity of the IHS model, we use the following specification for arcsinh–arcsinh models (Bellemare et al. 2019):

$$\text{(Equation 4) } \hat{\epsilon}_{yx} = \hat{\beta} \cdot \frac{\sqrt{y^2+1}}{\underline{y}} \cdot \frac{x}{\sqrt{\underline{x}^2+1}}$$

2.4.2 Heterogenous Effects of Conservation

Municipalities in Maine have different social, economic, and conserved land characteristics. Further, conservation projects vary in ownership type (federal, municipal, private, etc.) and protection type (easement, fee, etc.). To expand the practical application of this study, we investigate the impact of conservation on mill rate allowing the relationship to change along the dimensions listed in Table 2.3.

Municipal Characteristics	Conserved Land Characteristics
- Density classification (rural, urban, etc.) - Median household income - Unemployment rate - Tourism region the municipality falls into - Share of vacation homes in municipality	- Conservation holder type (municipal, federal, etc.) - Conservation type (easement, fee, etc.) - Percentage of land in conservation already - Percentage of Current Use value in municipality

Table 2.3: Characteristics used in the heterogeneous models.

In our heterogenous models, we limit our analysis to the linear specification to simplify interpretation across models. For each of our characteristics of interest, we run two models. The first includes only the characteristic of interest (no interactions) to establish its baseline association with the mill rate. The second model includes the interaction terms to estimate the effects of different types of conservation and in different types of municipalities.

The characteristic-only models follow Equation 5 below, with χ representing the characteristic of interest. In cases where the characteristic is categorical (density classification, for example), we use a set of dummy variables rather than a single χ variable and exclude a reference category.

$$\text{(Equation 5) } MillRate_{i,t} = \beta_1 C_{i,t-3} + \beta_2 \chi_{i,t} + \beta_3 E_{i,t} + \beta_4 M_{i,t} + \gamma_i + \rho_t + \epsilon_{i,t}$$

To study the heterogeneous relationship between conservation land and mill rate in the dimensions defined by our characteristics of interest, we add interaction terms to Equation 5 to get Equation 6 depicted below. Once again, where the characteristic of interest is categorical, we use a set of dummy variables and an interaction term is generated for each category. To obtain the effect on mill rate, we added the coefficients from the interaction terms and dummy variables for each category. The resulting number is a unit shift in the mill rate due to a 1% increase in the share of land area that is categorized as conservation land.

(Equation 6) $MillRate_{i,t} = \beta_1 C_{i,t-3} + \beta_2 C_{i,t-3} * \chi_{i,t} + \beta_3 \chi_{i,t} + \beta_4 E_{i,t} + \beta_5 M_{i,t} + \gamma_i + \rho_t + \epsilon_{i,t}$

2.5 Results

On average across the state, we found that a 1% increase in acres of conservation in a town is $1 or less increase on an average tax bill (Table 2.4).

Results get more interesting when we look specifically at different municipality and conservation characteristics.

Federal and state conservation was associated with decreases in mill rates, which may be because these entities make consistent PILOTs to towns. The multi-use nature and amenity value of federal lands may also drive up nearby home values and bring in more tax revenues to neighboring towns. Municipal conservation was associated with significant increases in mill rates. In the case of municipal ownership, this may be because towns are unable to make PILOTs to themselves.

We find that changes in land protection in coastal regions (particularly Portland and Downeast and Acadia) were associated with the largest increases in mill rates, which may reflect the higher property values in these regions and the resulting impact than removing land from the tax rolls has.

Mill rates in municipalities with a high existing amount of protected land and higher amounts of value held in Current Use programs experienced greater increases in the mill rate from conservation. We theorize that these towns have smaller tax bases and are therefore less able to absorb additional reductions in tax revenues from new conservation.

2.5.1 Average Effects of Conservation across Maine

We examined the effects of conservation on both nominal and equalized mill rates 1-year, 3-year, and 6-years after the land protection occurred. On average, we found small but positive effects of conservation on mill rates (Table 2.4).

Linear Models	1-year lag	3-year lag	6-year lag
% Change in Equalized Mill Rate	0.013*	0.025**	0.014 .
$ Increase in Avg. Tax Bill per Year	$0.62	$1.19	$0.67
% Change in Nominal Mill Rate	0.005	0.013*	0.021 .
$ Increase in Avg. Tax Bill	$0.24	$0.62	$1.00
IHS-Transformation Models			
% Change in Equalized Mill Rate	0.011***	0.020***	0.009*
$ Increase in Avg. Tax Bill	$0.52	$0.95	$0.43
% Change in Nominal Mill Rate	-0.00	0.007 .	0.017***
$ Increase in Avg. Tax Bill	$0.00	$0.33	$0.81

Table 2.4: Elasticities for the average effects of the impact increases in conserved land area using IHS transformed variables and simple linear regression. The increase in an average tax bill calculations assume a $300,000 home value and the mean mill rate of 15.87. Significance levels are indicated with the following: *** = 0.001, ** = 0.01, * = 0.05, . = 0.1

Average impacts on tax bills of a 1% increase in conserved acres were $1.00 or less across all specifications. We can use linear extrapolation to estimate the effects of larger changes in conservation. For example, if a town doubled its conserved area (an increase of 100%) in a year, the effect would be approximately a $33 increase for the average tax bill.[1] Across our

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[1] Assuming a $300,000 home value, the mean nominal mill rate of 15.87, and using the IHS-transformed nominal mill rate model elasticity of 0.007 (p<.1) (Table 2.4).

panel, conservation in an average town increased from 919 acres to 1,924 acres, or by 4.48% per year. Therefore, we find that conservation is associated with average annual tax bill increases of $1.48 to $5.33 using minimum and maximum findings from our three-year lag models.

However, there is a lot of variation in conservation changes over the last 21 years across towns. Some towns, such as Bethel, increased conservation from 154 in 2001 to 1,681 acres in 2022, resulting in a total increase of 992% or 47% per year. Other towns like Bingham have seen no changes in conservation. Additionally, different types of towns will see different impacts on the mill rate because of conservation due to socioeconomic, cultural, and other budget factors. The average effects we discuss here wash away all those distinctions and differences. We ran heterogeneous models, specified below, to glean better insights into different types of towns.

2.5.2 Heterogenous Model Results

Below, we examine the effects of mill rate on conservation in towns with different characteristics and across conservation types. We use ordinary-least squares (OLS) regression analysis with three-year lags on the conservation variables. The coefficients on our independent variables of interest are interpreted as shifts on the mill rate (units in mills) from a one percentage point shift of town land area into conservation. One percent of town land area varies by each group presented below, but for context, one percent of an average town is 216 acres. That is a significant amount of land to move into conservation.

We can use Table 2.8 as an example. Here, we list the estimated effect on mill rate from conservation in the Portland region as 0.26***. This means that a one percentage point shift of town land area into conservation within that region is associated with a 0.26 unit increase in the region's mill rate of 15.25, resulting in a mill rate of 15.51.

Town Characteristics: Density Classification

Urban/rural/exurban town classifications are based on housing unit density in 1990.[2]

Most towns in Maine and in our dataset are classified as rural.

Bins	# of Observations	Average Equalized Mill Rate	Estimated Effect on Mill Rate
Rural	6,535	13.8	-0.00
Exurban	1,974	14.4	0.01 .
Urban	174	18.0	0.13

Table 2.5: Estimated effects of a one percentage point shift of town land area into conservation on mill rate by municipality density classification. Significance levels are indicated with the following: *** = 0.001, ** = 0.01, * = 0.05, . = 0.1

We find that conservation in exurban towns is associated with small increases in mill

rates (Figure 2.5), while the other two categories were not statistically significant. The small

sample size (n=174) in the urban category may lead to less robust results.

Figure 2.5: The estimated shift effect on mill rate of a one percentage point shift of town land area into conservation in municipalities by density classification. The points represent the

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[2] [>= 0 & < 16 = "Rural"]; [>= 16 & < 128 = "Exurban"]; [>= 128 = "Urban].

regression estimates for each category, and the lines represent the confidence interval around the estimate.

Town Characteristics: Median Household Income

Median household income range	# of Observations	Average Equalized Mill Rate	Estimated Effect on Mill Rate
$0-$20,000	42	12.14	-0.23**
$20-$40,000	3,079	15.35	-0.00
$40-$60,000	4,409	14.63	0.01*
$60-$80,000	1,049	12.69	0.05***
$80,000+	105	13.92	0.10*

Table 2.6: Estimated effects of a one percentage point shift of town land area into conservation on mill rate by municipality median household income. *** = 0.001, ** = 0.01, * = 0.05, . = 0.1

We found evidence that a one percentage point shift of town land area into conservation in towns with a MHHI average of between $20,000 and $40,000 was associated with decreases in mill rates. Conversely, conservation in towns with higher median household income levels was associated with increases in mill rates.
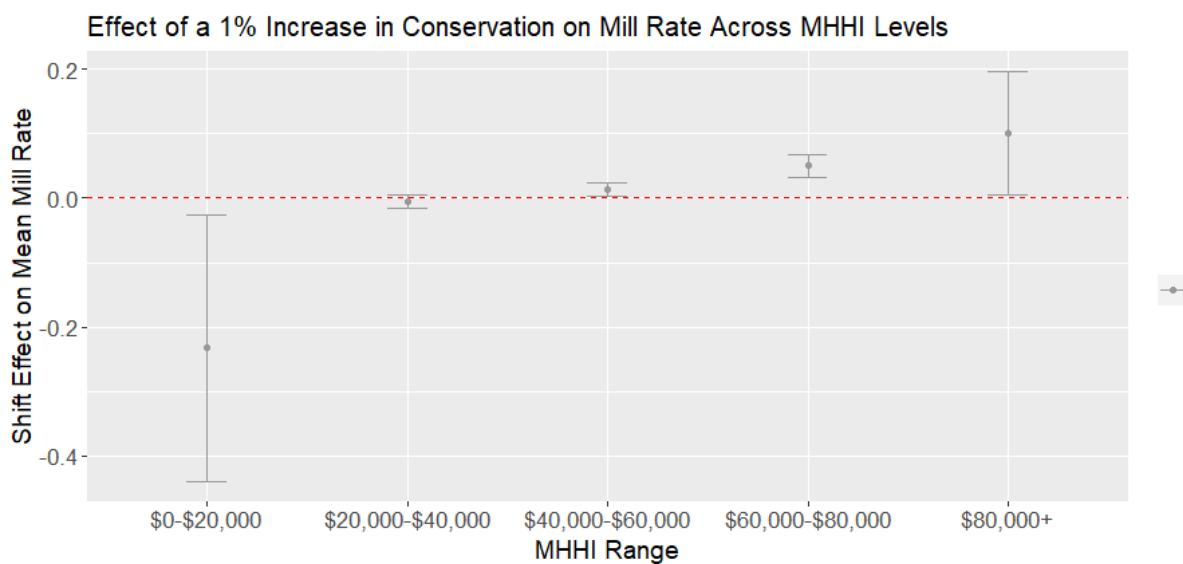
Figure 2.6: The estimated shift effect on the mean mill rate of a one percentage point shift of town land area into conservation in municipalities by median household income ranges. The points represent the regression estimates for each category of MHHI, and the lines represent confidence intervals around the estimates.

Town Characteristics: Unemployment Rate

Unemployment rate range	# of Observations	Average Equalized Mill Rate	Estimated Effect on Mill Rate
0-2.5%	326	11.96	0.10***
2.5-5%	2,800	13.14	0.02***
5-7.5%	2,304	14.31	0.01
7.5-10%	1,177	15.29	-0.01
10%+	821	15.64	-0.01

Table 2.7: Estimated effects of a one percentage point shift of town land area into conservation on mill rate by municipality unemployment rate. *** = 0.001, ** = 0.01, * = 0.05, . = 0.1

Mill rates are found to be correlated with unemployment rates (Table 2.7). Towns with smaller unemployment rates have smaller mill rates, and towns with higher unemployment rates have larger mill rates.

However, we found that conservation in towns with low unemployment rates was associated with increases in mill rates, while conservation in towns with high unemployment rates was associated with decreases in mill rates (Figure 2.7).
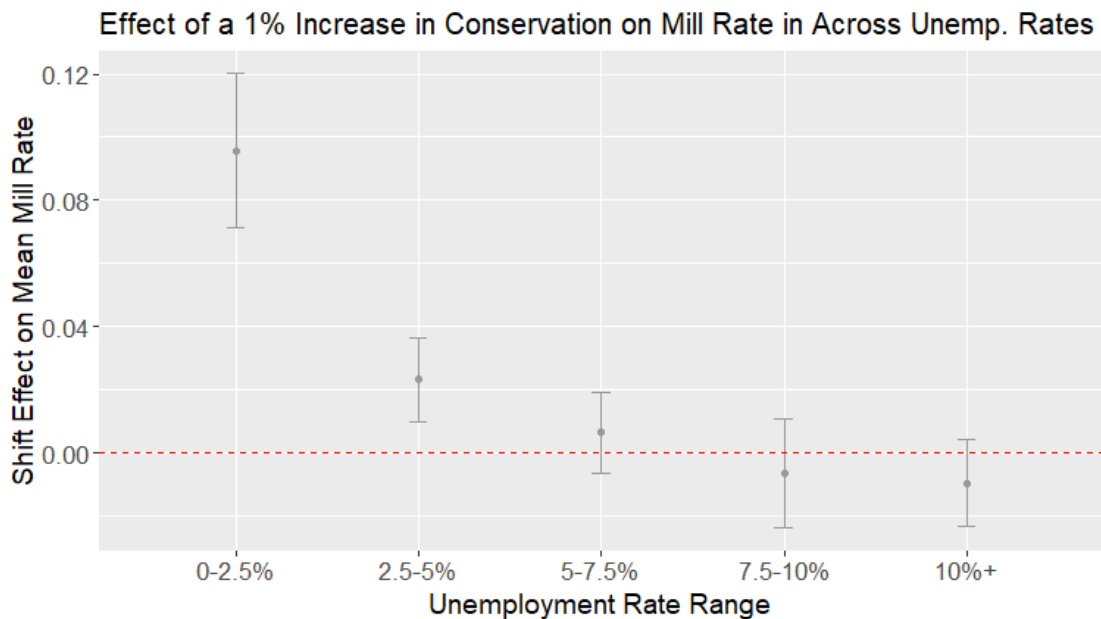
Figure 2.7: The estimated shift effect on mill rate of a one percentage point shift of town land area into conservation in municipalities with different ranges of unemployment rates. The points represent the regression estimates for each category, and the lines represent confidence intervals around the estimates.

In 2022, the Downeast and Acadia, beaches, and lakes and mountains regions had the highest proportion of protected land (Figure 2.8).
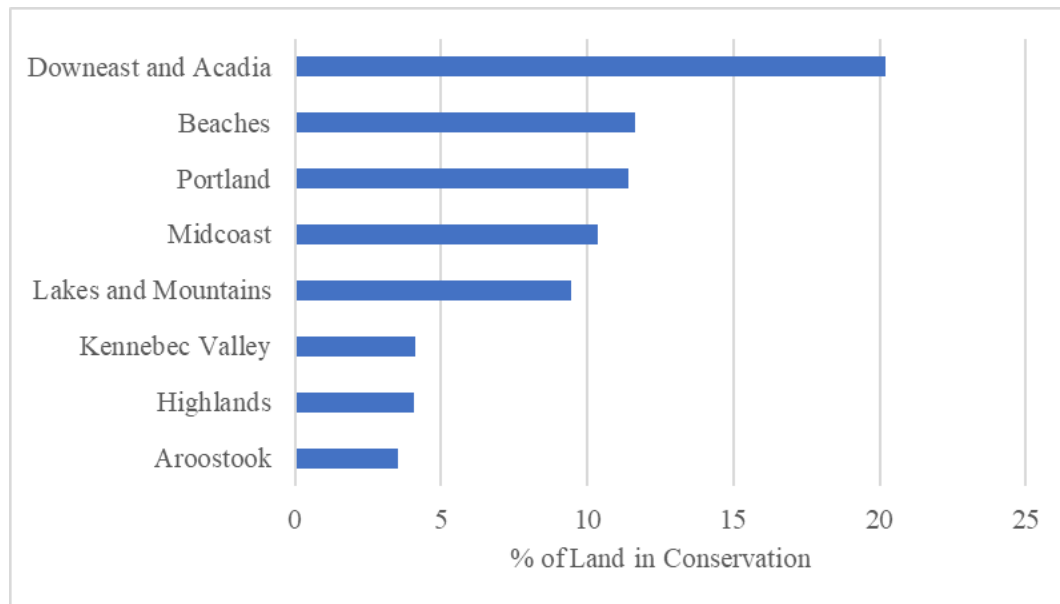
Figure 2.8: Average percent of a one percentage point shift of town land area into conservation area in towns within each tourism region in 2022.

Tourism region	# of Observations	Average Equalized Mill Rate	Estimated Effect on Mill Rate
Kennebec	1,170	14.98	0.04**
Aroostook	993	17.05	0.02
Beaches	559	11.61	0.14***
Downeast & Acadia	1,465	12.45	0.03***
Highlands	1,268	13.90	-0.01
Lakes & Mountains	1,559	13.96	-0.00
Midcoast	1,417	13.07	0.02
Portland	212	15.25	0.26***

Table 2.8: Estimated effects of a one percentage point shift of town land area into conservation on mill rate by location of municipality by tourism region. *** = 0.001, ** = 0.01, * = 0.05, . = 0.1

In looking at the effects of conservation across regions, we found that a one percentage point shift of town land area into coastal conservation was associated with increases in mill rates. This means that although mill rates tend to be lower in coastal areas, they are more sensitive to

changes in land protection. We see this most in Portland, where the effect on mill rate is a shift of 0.26 mills. As Portland is the most urban region and generally has higher property values, removing a parcel from the tax rolls may have a greater impact on municipal revenue.

The Lakes and Mountains, Aroostook, Midcoast, and Highland regions were not associated with increases in the mill rate (Figure 2.9).
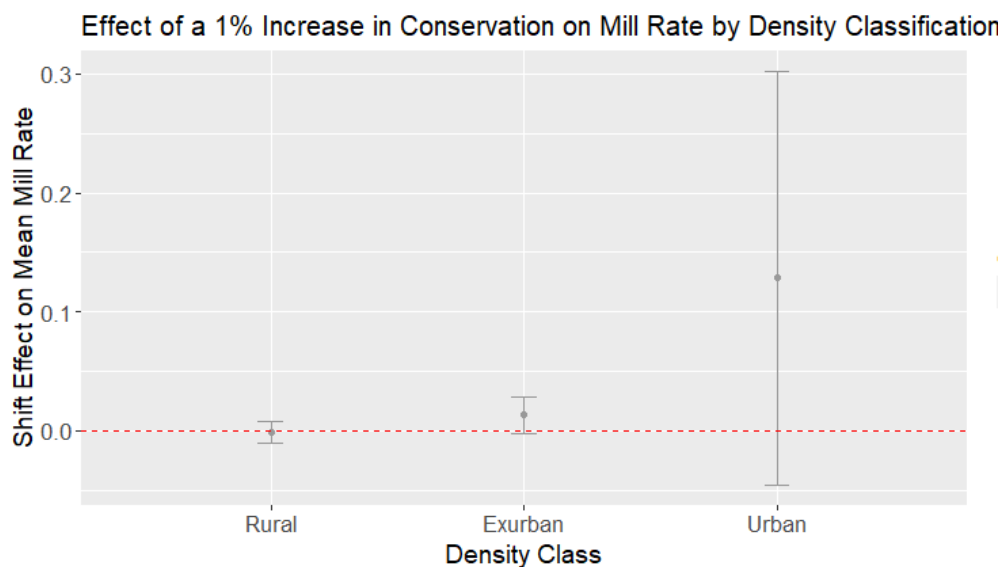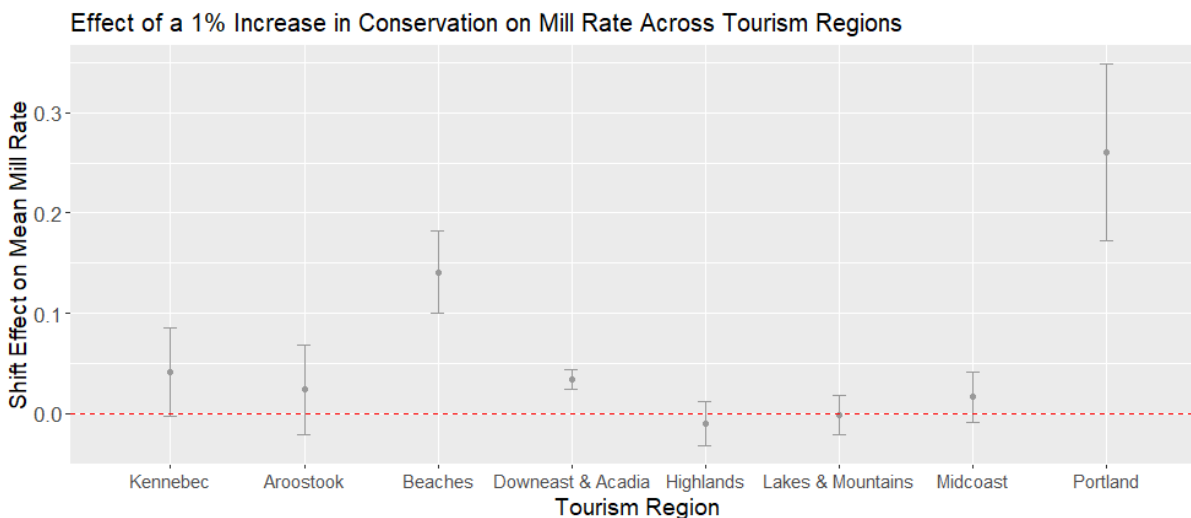

Figure 2.9: The estimated shift effect on mill rates of a one percentage point shift of town land area into conservation in municipalities within different tourism regions. The points represent the regression estimates for each category, and the lines represent confidence intervals around the estimates.

Conservation Land Characteristics: Holder Type

We theorize that conservation held by different types of entities may impact mill rates uniquely; for example, the federal government typically makes consistent PILOTs to towns, while municipalities cannot make PILOTs to themselves. Goals and uses of conservation owned by different entities also vary.

In this model, we used variables for the percentage of federal, state, municipal, and private conserved acres in a town. Private conservation has increased significantly over the study period, which is largely due to the increase in the number and activity of land trusts and other conservation groups.

Conservation land holder	Estimated Effect on Mill Rate
Municipal	0.16***
State	-0.01 .
Federal	-0.08 .
Private	0.04***

Table 2.9: Estimated shift effect of a one percentage point shift of town land area into conservation on mill rate by land holder type. *** = 0.001, ** = 0.01, * = 0.05, . = 0.1

The most striking and somewhat expected finding was that increases in municipal land was associated with the largest increase in mill rate at 0.16 mills (p<.001) (Table 2.9). Towns cannot make PILOTs to themselves, so there is no economic mitigation on this tax-exempt land.

Increases in state-owned conservation were associated with decreases in the mill rate. The state often makes some level of PILOTs to towns; in 2020, the state made $408k in PILOTs for State Park lands (Turner 2021). The Maine Bureau of Parks and Lands owns the most state land, with much of their projects comprised of multi-use land that typically involves a combination of working forest and recreation.

Federal conservation was associated with the largest decreases in mill rate. PILOTs are made annually for Department of the Interior tax-exempt Federal lands, which include lands owned by BLM, National Park Service, and the US Fish and Wildlife Service. This covers most if not all of the federally owned conservation land in our dataset, which may explain why mill rates are not upwardly influenced by federal lands. Federal lands are also often multi-use or recreational, which may bring economic benefit to the towns in the long run.

A one percentage point shift of town land area into privately held conservation was associated with a small increase in the average mill rate by 0.04 mills. Privately owned land is a broad category that includes all NGOs, which could be land trusts or individuals, and can be fee or easement. It could be conserved for the purpose of recreation or for ecosystem protection, and

the degree to which land trusts and NGOs make PILOTs varies considerably across organizations.

Conservation Land Characteristics: Fee or Easement

Towns and conservation groups may be interested to know if fee acquisition and easement lands have different effects on mill rate. Conservation entities, public or private, typically own land under both legal structures (Figure 2.11). Achieving conservation goals often requires patching together land conserved under multiple strategies.

In this model, we used variables for the percentage of fee acquisition and easement acres in a town. Consistent with our other models, we lagged these independent variables by three years. Most protected land was conserved through fee acquisition, though across the time period we can see easement land increasing at a faster rate (Figure 2.10).
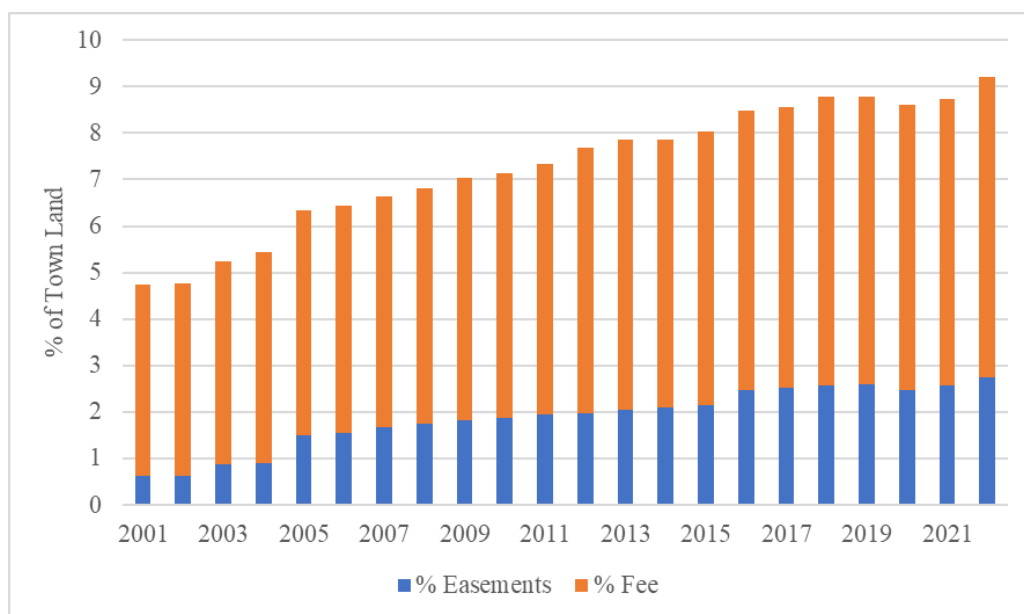
Figure 2.10: The average percent of municipal acreage conserved by type (fee or easement) within the dataset.

Type of conservation (fee or easement)	Estimated Effect on Mill Rate
% Conserved by Fee Acquisition	0.01**
% Conserved by Easements	0.02**

Table 2.10: Estimated shift effects of a one percentage point shift of town land area into conservation on mill rate by type of conservation land. *** = 0.001, ** = 0.01, * = 0.05, . = 0.1

We found that a one percentage point shift of town land area into easements was associated with a 0.02 shift increase in the average mill rate. Fee lands had a shift effect of 0.01.

Federal, state, and municipal conservation are largely done through fee acquisition, while the majority of NGO conservation is through easements (Figure 2.11). It makes sense that we see a larger increase in mill rates from easements, as this is highly correlated with private conservation which was associated with the largest increase in mill rate of the holder types.
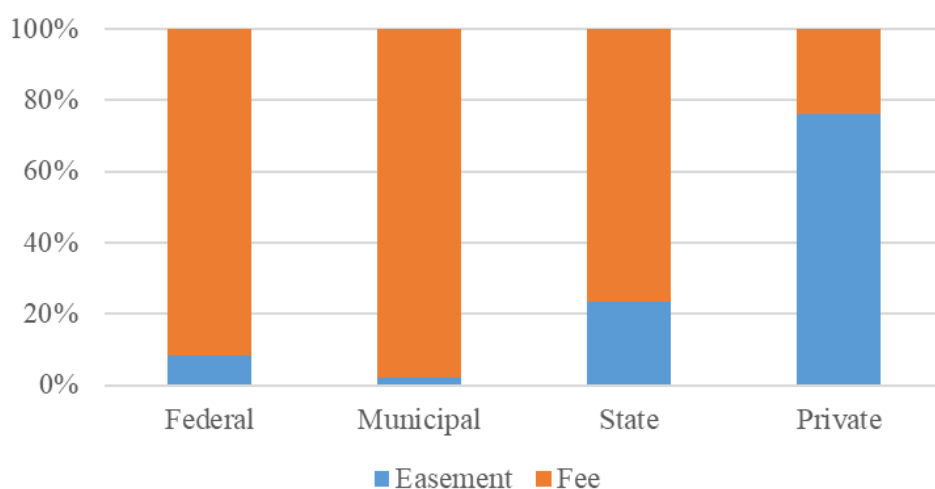
Figure 2.11: The share of conservation type (fee and easement) by holder type.

Conservation Land Characteristics: Levels of Land in Conservation

Towns with higher amounts of protected land may experience different impacts from additional conservation than towns with very little protected land. While towns with a high proportion of conserved land may be more prepared to absorb additional conservation, they may also rely more heavily on remaining fully taxed land and thus be more sensitive to land being removed from the tax rolls (Schwartz 2021).

The data is skewed right with most towns having less than 5% of land area in conservation, as is apparent by the number of observations in the categories (Table 2.11).

Percent of total municipal area conserved	# Observations	Average Mill Rate	Estimated Effect on Mill Rate
0-3%	4,252	13.36	-0.48***
3-7%	1,590	13.76	0.11 .
7-12%	1,214	13.66	-0.07
12-20%	854	12.97	0.10
20%+	773	12.48	0.10*

Table 2.11: Estimated shift effects of a one percentage point shift of town land area into conservation on mill rate by municipality's level of conservation land. *** = 0.001, ** = 0.01, * = 0.05, . = 0.1

We found evidence that conserving land in towns with large amounts of conservation, 12-20%, is associated with increases in mill rate, while towns with small amounts of conservation see a decrease in mill rate after additional conservation (Figure 2.12). Towns with less conservation we theorize have higher tax bases, as more land is on the tax rolls. These results reflect our hypothesis that towns with smaller tax bases would be less able to absorb conservation more easily than towns with larger tax bases because there is less overall property value to spread the tax shift across (Trust for Public Land 1999).

Figure 2.12: Estimated shift effects of a one percentage point shift of town land area into conservation on mill rates in municipalities with different levels of protected land. The points

represent the regression estimates for each category and the lines represent confidence intervals around the estimates.

Town Characteristics: Levels of Current Use Value

The value of town real estate taxed under Current Use may impact the influence of conservation on mill rate. Mill rates in towns with a higher percentage of value held in Current Use may be more resilient to tax changes because if land that is already taxed at a lower rate is removed from the tax rolls, the direct impact on revenue is lower. Additionally, many land trusts make PILOTs equal to the Current Use rate (Maine Land Trust Network 2019), so there may be no changes in revenue in some cases. However, as also discussed in the previous analysis on towns with existing levels of conservation, towns with high levels of Current Use may have a smaller tax base and therefore may be more sensitive to changes in revenue.

Note that most towns have less than 2% of their total valuation in Current Use as shown by the number of observations for the 0-2% category (Table 2.12).

Current use value as % of total municipal value	# Observations	Average Mill Rate	Estimated Effect on Mill Rate
0-2%	6,339	13.84	0.01***
2-5%	1,386	15.02	-0.03**
5-10%	434	14.73	0.05***
10%+	524	14.09	0.02***

Table 2.12: Estimated effects of a one percentage point shift of town land area into conservation on mill rate by municipality's level of Current Use land. *** = 0.001, ** = 0.01, * = 0.05, . = 0.1

We find evidence that mill rates in towns with more Current Use valuation are most impacted by conservation and that towns with less value in Current Use experience less of an impact (Figure 2.13).
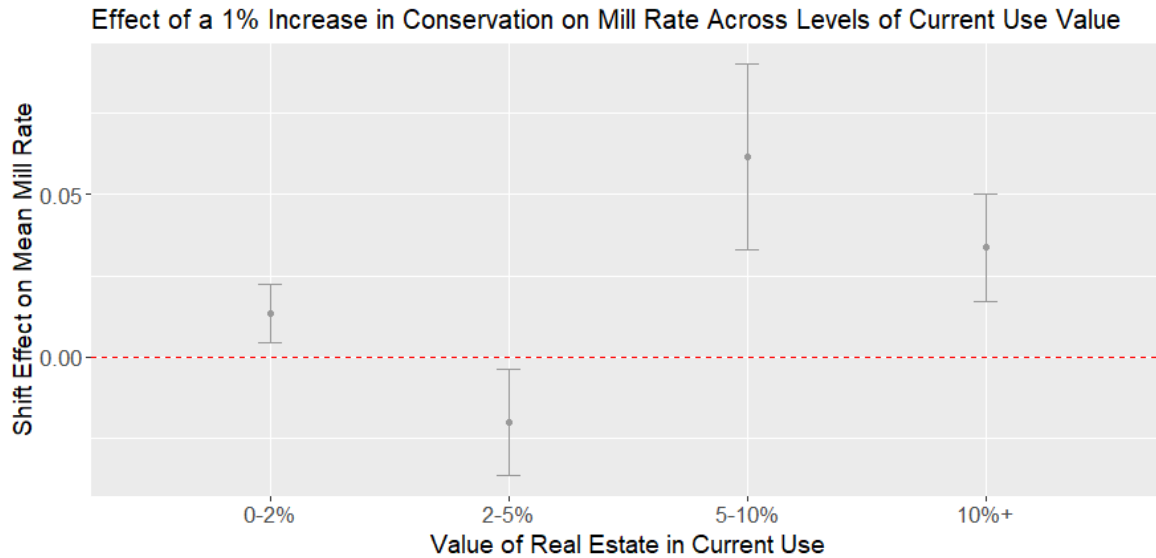
Figure 2.13: Estimated shift effect of a one percentage point shift of town land area into conservation on mill rate in towns with different levels of the total valuation held in Current Use designated land. The points represent the regression estimates for each category, and the lines represent confidence intervals around the estimates.

Town Characteristics: Levels of Vacation Homes

In looking at the average mill rate relative to the number of vacation homes, we see a negative correlation between percentage of vacation homes in a town and mill rate (Table 2.13). There is approximately a 5-mill spread between towns with less than 20% vacation homes and towns with more than 50%. This is likely because vacation homes often bring in significant tax revenue to towns while requiring fewer municipal services; they are frequently on private roads.

Share of Vacation Homes	# Observations	Average Mill Rate	Estimated Effect on Mill Rate
0-20%	3,748	15.76	0.03***
20-50%	3,787	14.56	-0.02**
50%+	1,148	10.63	0.02***

Table 2.13: Estimated effects of a one percentage point shift of town land area into conservation on mill rate by municipality's level of vacation homes. *** = 0.001, ** = 0.01, * = 0.05, . = 0.1

Conservation in towns with the lowest and highest share of vacation homes were associated with the largest increases in mill rate (Figure 2.14). In towns with a moderate number of vacation homes, conservation was associated with decreases in the mill rates. This may

indicate that conservation land has more amenity value in towns with a large share of vacation homes, attracting homebuyers and increasing property values (Kalinin et al 2021). Conservation in a region recognized for outdoor recreation-based tourism, such as the lakes and mountains region, may increase home values and therefore increase tax revenue for the towns. A growing tax base may take pressure off the need for mill rate hikes. However, as mentioned in the background section, this does not always benefit existing homeowners as property tax bills rise with increased assessment value, and they would only benefit from the appreciation by selling their home.
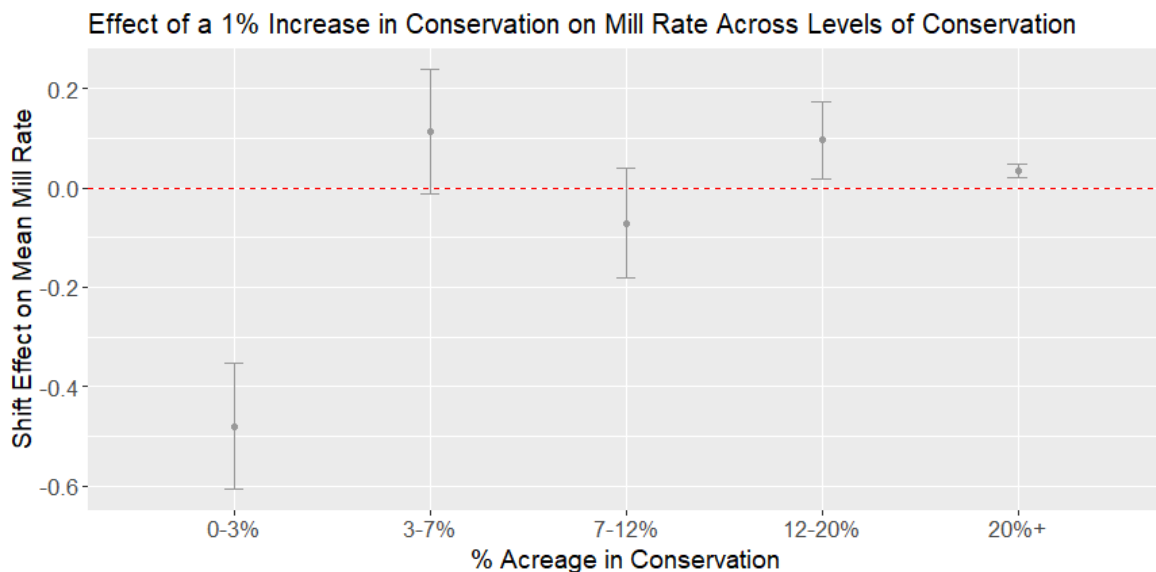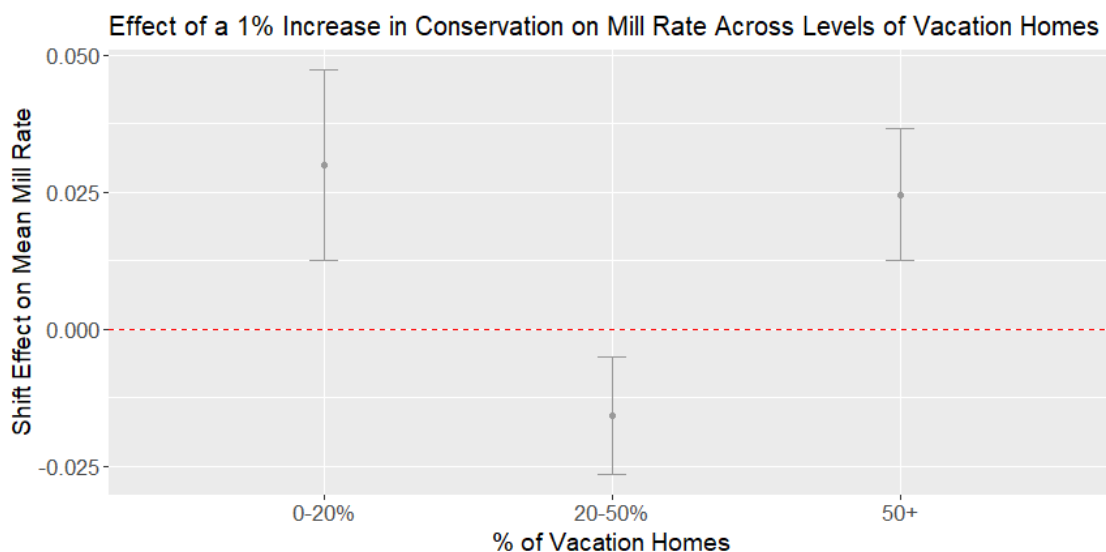

Figure 2.14: Estimated shift effect of a one percentage point shift of town land area into conservation on mill rate in towns with different levels of vacation homes.

Impacts of Moving Land into Current Use Program

Like with conservation, moving lands into a Current Use program reduces tax revenue on the property. Additionally, many protected lands are held in Tree Growth or another Current Use program, so there is significant overlap. We designed a model where the Current Use acres in a town (lagged three years) is the independent variable of interest. As with all other models, mill rate is the outcome, and we included the same control variables used in the average effects of

conservation model. We then calculated the elasticity from the coefficient using Equation 2. The elasticity would be interpreted as the percent change in mill rate resulting from a 1% change in Current Use acres.

We did not find statistically significant results, indicating that there is not a causal relationship between increases in Current Use land and mill rates.

Impacts of Tax-Exempt Real Estate in a Town

Conservation is one type of tax-exempt real estate, but it is a small subset. Tax exempt properties vary from schools to hospitals. Many of these properties are viewed as essential community services, so there is not as much scrutiny as there is with conservation. Still, we believed it would add context to examine the impacts of all tax-exempt real estate value on mill rates. We designed a model with tax exempt value as the primary independent variable. As with all other models, mill rate is the outcome, and we included the same control variables used in the average effects of conservation model. We then calculated the elasticity from the coefficient using Equation 2.

We found that a 1% increase in tax exempt real estate value is associated with a .006% increase in mill rate (p<.001), or a $0.29 increase in a tax bill.

2.6 Discussion

2.6.1 Summary of Findings

Across the state, we find that conservation has a very small impact on an average annual tax bill, resulting in less than a $1 increase 1-3 years after a 1% increase in conserved acres in an average town. When looking at more land- and municipality-specific qualities, we find more interesting results. Table 2.14 summarizes the statistically significant findings.

Categories	Direction of Effect	Shift in Mill Rate from 1% Increase in Conserved Acres
Exurban towns	+	0.01 .
MHHI $0-$20,000	-	0.23**
MHHI $40-$60,000	+	0.01*
MHHI $60-$80,000	+	0.05***
MHHI $80,000+	+	0.10*
Unemployment rate 0-2.5%	+	0.10***
Unemployment rate 2.5-5%	+	0.02***
Kennebec region	+	0.04**
Beaches region	+	0.14***
Downeast & Acadia	+	0.03***
Portland	+	0.26***
Holder type: municipal	+	0.16***
Holder type: state	-	0.01 .
Holder type: federal	-	0.08 .
Holder type: private	+	0.04***
Conservation type: fee	+	0.01**
Conservation type: fee	+	0.02**
0-3% conserved already	-	0.48***
3-7% conserved already	+	0.11 .
20%+ conserved already	+	0.10*
0-2% of land in Current Use	+	0.01***
2-5% of land in Current Use	-	0.03**
5-10% of land in Current Use	+	0.05***
10%+ of land in Current Use	+	0.02***
0-20% vacation homes	+	0.03***
20-50% vacation homes	-	0.02**
50%+ vacation homes	+	0.02***

Table 2.14: The shift effects on mill rate by a one percentage point shift of town land area into conservation by statistically significant municipal and land use qualities. *** = 0.001, ** = 0.01, * = 0.05, . = 0.1

2.6.2 Regional characteristics

- Conservation in the coastal regions of Maine drove larger increases in mill rates than conservation in the inland regions (Figure 2.9). We theorize that coastal land is assessed at higher values than inland land due to demand and scarcity, and therefore removing this land from the tax rolls has a larger impact.

2.6.3 Ownership and conservation type

- We found evidence that federal and state conservation may be associated with decreases in mill rates (Table 2.9). We theorize that consistent PILOTs made by the U.S. Forest Service and the National Park Service (The Trust for Public Land 1999) mitigate tax losses. Federally protected land is also typically multi-use and is focused on preserving scenic beauty, which may have an amenity effect on nearby property values (Fausold & Lilieholm 1999).

- On the other hand, municipally owned conservation land was associated with substantial increases in mill rates. This may be because municipalities cannot make PILOTs to themselves. Also, they may use the municipal budget to fund acquisitions, so in such cases this is a direct expense to the town.

- We also see that easements are associated with larger increases in mill rates than fee acquisition lands (Table 2.10). The majority of NGO conservation projects are easements. It is logical that we see a larger increase in mill rates from easements as this is highly correlated with private conservation (Figure 2.11).

2.6.4 Town characteristics

- Our findings indicated that economically stronger towns saw greater increases in mill rate than towns that were worse off. Towns with the lowest range of median household

incomes saw decreases in mill rate from conservation while towns with the highest

median household income levels saw increases in mill rate (Figure 2.6). Likewise,

conservation in towns with low unemployment rates was associated with increases in mill

rates, while conservation in towns with high unemployment rates was associated with

decreases in mill rates (Figure 2.7). Perhaps we are seeing these results because towns

that are better off economically may be more likely to be growing and developing and

have higher raw land values.

- Towns with greater percentages of conservation experience greater increases in mill rates

  from additional conservation than towns with less conservation (Figure 2.12). In fact,

  towns with low amounts of conservation see decreases in mill rates from additional

  conservation. We theorize that towns with 20%+ of land in conservation have smaller tax

  bases and are therefore less able to absorb additional reductions in tax revenues from new

  conservation.

- Similarly, towns with higher amounts of value in Current Use see greater mill rate

  increases from conservation than towns with less value enrolled in these programs

  (Figure 2.13). These towns may have smaller tax bases, like we assume towns with

  greater percentages of conservation do and are therefore less able to absorb any further

  reductions in revenue.

- Rural and exurban conservation did not have a striking impact on mill rates, but

  conservation in exurban towns was associated with small increases in mill rates. We

  theorize that exurban towns may have greater development potential for high-value

  homes on raw land compared to rural towns and urban towns. Additionally, raw land may

bring in more tax revenues than raw land in rural towns and the impacts of taking this

land off the tax rolls may be more impactful.

- Conservation in towns with both small and large shares of vacation homes is associated

  with greater increases in mill rate than in towns a moderate share of vacation homes.

  Perhaps the towns with 20-50% vacation homes are positioned to benefit from

  conservation and are strong economically with a mix of year-round business activity and

  seasonal activity. These towns are also likely high in amenities which have attracted

  second homeowners. These amenities are often scenic beauty or access to recreation.

  Conservation can enhance these features and add enhancement value (Fausold &

  Lilieholm 1999).

2.7 Limitations

2.7.1 Gaps in Data

We believe that our model could have been improved if we were able to control for

additional confounding variables. We were not able to obtain data for municipal budget factors

and PILOTs due to lack of consistent data available for our full study area.

In reviewing Kalinin et al. (2023) and King and Anderson (2004), we recognized that the

biggest gap in our data is related municipal revenues and expenditures, which is not collected at

the statewide level in Maine. Because we use large datasets with hundreds of observations across

21 years, it is not feasible to gather this data. King and Anderson (2004) used a smaller sample of

towns and therefore researchers were able to gather municipal data from town clerks. We assume

that in our model output, municipal budget factors are unobservable and contained in the error

term. The second largest revenue source for municipalities is state funding to education, which

comprises 19.5% of total town revenue on average. With fluctuations in education funding, a

town may have to adjust its mill rate and it may influence land use decisions. Additionally, shifts in total expenditures may indicate changes in the housing stock and therefore land use, which will impact mill rate. We are not able to account for expenditures.

Another unobservable variable that would have been useful to include in our analysis is payments made in lieu of taxes (PILOTs). PILOTs are made by conservation/government organizations to compensate towns for lost tax revenue. Fluctuations in PILOTs may indicate shifting relationships between conservation organizations and municipalities, changes in town leadership, changes in conservation efforts, or budgetary decisions, making it important to include. These vary significantly between conservation organizations and can change over time. There is no central depository of this data and collecting it would require contacting every conservation entity in the state and requesting annual PILOTs made for each parcel. Many organizations do not track payments in this way, and some PILOTs are not monetary.

Additionally, some data may be incomplete. The State of Maine Conserved Lands database relies on individual organizations to submit conservation data. As it is a submission-driven database, there are assumed to be some missing submissions and/or missing submission details. However, the missing submissions are assumed to be random and therefore plausibly exogenous from our model.

2.7.2 Model Limitations

The inverse hyperbolic sine transformation presents some challenges in interpretation, and researchers need to "be careful when interpreting inverse hyperbolic sine coefficients as semi-elasticities" (Bellemare, Wichman, Bloem et al. 2019). Commonly used transformations of variables can produce "wildly different elasticity estimates." Authors found that IHS-transformed dependent variables, such as our mill rate variable, is sensitive to scaling.

An additional consideration is the sample size in some of the categories used for heterogeneous models. Because these models splice the dataset into smaller categories, several have very small sample sizes such as the urban category (n=173), several MHHI categories, and several categories within the existing level of conserved land.

2.8 Conclusion

Following stakeholder calls for a data-driven, long-term focused approach to evaluating the impacts of conservation on mill rates, we conducted regression analysis. We used linear models and lagged the independent variable because we believe it takes towns several years to adjust to changes in land use/tax base. We applied an IHS transformation to the variables *percent conserved* and *mill rate* following widely accepted practice when working with right-skewed data that contains zero values (Bellemare, Wichman, Bloem et al. 2019). Finally, we looked at different town-level and land use characteristics by applying heterogenous specifications.

We found that on average, a 1% change in conserved acres in a town is associated with a $1 or less increase in an average tax bill increase 1-6 years later. However, over the 21-year dataset, conservation increased by 4.48% per year. Using linear extrapolation, we can estimate that conservation was associated with average annual tax bill increases of $1.48 to $5.33 across the years studied.[3]

Towns that experience the greatest increases in mill rates from conservation are towns in the Portland and Downeast regions, towns with greater amounts of existing conservation and value in Current Use, and towns that have lower unemployment rates and higher median

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[3] Using 3-year lag results minimum and maximum across both linear and IHS-transformed variables.

household incomes. Municipal conservation and easements were also associated with increases in mill rates, while state and federal conservation were associated with decreases in mill rates.

With this study, we build upon the small body of research that has been done on this topic and contribute to the conversation around land use planning in Maine and more broadly. We hope that this study will encourage productive conversations between conservation groups and municipalities and help inform decisions that will best benefit communities.

CHAPTER 2: HUMAN DIMENSIONS

3.1 Overview and Purpose

We set out to holistically study the issue of conservation and property taxes with a mixed-methods approach (Kinnebrew, Shoffner, Farah-Perez et al. 2021). In Chapter 1, we conducted quantitative regression analysis. In this chapter, we investigate the human dimensions of conservation and municipal challenges with a general perceptions survey and semi-structured interviews.

The survey was distributed across Maine and returned 607 complete responses meeting quotas by gender, race, and location. The purpose of the survey was to provide clarity around the following questions:

1. How do Maine residents view conservation in their communities?

2. How do Maine residents feel about their property taxes and town budget decisions?

3. To what extent do an individual's characteristics and mill rate impact their opinion of conservation?

Web-based surveys allow for efficient data collection, reaching a large number of respondents in a short period (Frippiat and Marquis 2010). This type of survey is also cost-effective compared to paper-based surveys, eliminating printing, distribution, and data entry costs.

Sherman and Daigneault (2023) conducted a similar survey to examine beliefs in Maine around conservation, natural resources, and community resiliency. This study was motivated by the transition in many Maine towns away from manufacturing and the differences in socio-economic qualities of rural and urban areas. Authors designed a survey containing mostly Likert-scale statements broken up into three sections. Overall, the study found that age, educational attainment, and political ideology were significant factors in shaping opinions on the importance

of conservation and its impact on the economy. Our study is tangential to this work as we also investigate conservation perceptions but focus more on economic impacts rather than resilience.

The semi-structured interviews were conducted with 20 individuals in the conservation, municipal, or assessment professions across four regions of Maine from February to June 2023. The purpose of the interviews was to gather knowledge, values, beliefs, decision-making processes, and anecdotes from stakeholders on conservation and budget issues in Maine.

A large body of interview-based research exists in the conservation space. Young, Rose et al. (2017) reviewed 227 conservation papers that used interviews as a tool. We referenced this paper significantly for the structure of our methods and findings and used it as a general guide for our study. Upon review of the literature, authors provide insight as to why interviews are being used in the conservation space. Nearly 60% of papers used interviews to gain ecological and/or socio-economic information on conservation issues and 50% used them to understand stakeholder knowledge, values, and decision-making processes. Our study's purpose falls under the latter category and within the sub-group that explored the differences and similarities in knowledge, values, and decision making across different stakeholder groups. The papers reviewed in this category investigated how different stakeholders perceive and make decisions around conservation challenges, which is what our study aims to accomplish.

Young, Rose et al. (2017) helpfully identify shortfalls in the papers reviewed and provided ways that future research can improve. Common issues included researchers failing to report methodology, not including rationale for choosing interviews, not piloting questions, and not detailing the analysis process. The paper recommends researchers provide a clear step-by-step guide in the methods section. We designed our report based on these suggestions and attempt to include all necessary pieces.

The survey and interviews received IRB approval in January 2023 through the University of Maine. The study was judged exempt from further review under Category 2 of the regulations. The application number was #2022-12-11.

3.2 Methods

3.2.1 Statewide Perceptions Survey

Survey Design

The research questions we sought to explore relate to Maine resident views on conservation, property taxes, and town decisions. We wanted to know if these views vary across different individual characteristics and demographics. To answer these questions, we created a web survey with a target sample size of 600 individuals above the age of 18. We established quotas to require one-third of responses to be from each region of north, central, and southern Maine, two-thirds non-college and one-third some college or higher, and that 7% of respondents be non-white.

The questionnaire consisted of two primary blocks of questions to gain respondent perspectives on 1) conservation land and 2) town challenges, planning, and property taxes (see Appendix A for complete survey). The blocks each contained a series of Likert-scale statements, rank-preference questions, and slider scale questions. The Likert-scale questions ranged from "strongly disagree" to "strongly agree." The rank preference questions asked respondents to rank a list of conservation services and, in a separate question, municipal services in order of importance to them. The slider scale questions asked respondents to choose a level along a scale of 0-10, representing their level of agreement with the statement provided.

Respondents provided demographic information which included factors such as age, gender, zip code, political and fiscal ideology, income level, and education. We grouped age into

18–34, 35–54, and 55 or older, political ideology into conservative, moderate, and liberal, income of $39,999 or less, $40,000–$69,999, and $70,000 or more, and education into high school or less, some college or associate degree, and 4-year degree or higher.

Survey Distribution

The Qualtrics online panel service was used to reach a sample of 607 respondents from across the state of Maine. The Qualtrics service randomly distributed the survey to its own exclusive pool of available respondents. Qualtrics respondents are enlisted from website intercepts, member referrals, targeted email lists, customer loyalty web portals, permission-based networks, gaming sites, and social media. Prior to participation in the online panel service, the names, addresses, and dates of birth of these respondents are validated through third-party verification measures. For this survey, in order to ensure that only residents of Maine participate in the study, potential respondents first indicated their state of residence through a screening question. Only those self-identifying as Maine residents could access the body of questions.

Common problems with web-based surveys are low response rates and incompletes (Couper and Miller 2008). Qualtrics takes steps to mitigate these issues by offering compensation to respondents who complete a threshold number of questions and complete the survey. The platform also flags low quality responses when the survey is completed very quickly or has patterns that indicate non-genuine responses.

Data collection occurred from February 24 through March 25, 2023. Partial responses to the questionnaire form are not recorded and the exact number of invitations delivered to eligible respondents is not reported by the panel.

Data Analysis

We conducted Kruskal-Wallis tests in SPSS to identify differences in responses across demographic and other groups, following methods laid out by Sherman and Daigneault (2023). If two groups were significantly different from each other, as identified by the test, we followed up with independent-samples median tests as post-hoc analysis to identify specific differences. Bonferroni corrections protected against Type 1 error.

We ran tests across levels of education, age, household income, density class of respondent town, and mill rate of respondent town. The latter two categories used data from our Chapter 1 analysis, demonstrating the benefits of our mixed-methods approach. We wanted to examine the differences between demographic groups to produce results valuable to decision makers. Town and conservation decision makers can categorize their community's attitudes toward conservation and budget issues by its demographic characteristics. Similarly, they can see if the mill rate or density classification of their community influences beliefs and perceptions.

3.2.2 Semi-Structured Interviews

Rationale for Interview Approach and Use with Other Methods

We aimed to gather personal and professional insights from interviewees around conservation conflicts, municipal challenges, and learn from their experiences. To this end, we believed fluid conversations guided by open-ended questions was the most effective method. We wanted to be able to compile values and approaches used by different groups across Maine.

The act of engagement, or conducting the interviews, can also add value. Interviews are a powerful tool in research and society. They allow for mutual learning through a "contextually bound and mutually created story" (Young, Rose et al 2017, pg. 11) between the interviewer and interviewee, exposing the interviewer to new ideas and perspectives they may not have

considered. They can also empower the interviewee, which can result in positive outcomes

(Young, Rose et al. 2017). See Table 3.1 for questions that guided the conversations.

Land Trust	Municipal / Assessor
Do you believe that conserving land has any economic impact (positive or negative) on the town in which it is conserved?	What have you noticed about conservation in your community and how does it affect assessments and town budget?
Have you ever faced pushback for putting land into conservation? If so, please describe.	What are the largest issues in recent years regarding town budget you have faced? Are they coming from the revenue or expense side, or both?
Please describe the relationship that exists between you and municipalities you do work in.	Please describe the relationship that exists between you and conservation groups
What is your policy on PILOTs?	Do the land conservation groups in your community make PILOTS? Do you feel like they do enough, or do you feel like there should be changes to the way that it is handled?
Have you ever faced competition for a particular parcel of land between yourself and a commercial entity?	Are you aware of competition for a particular parcel of land between commercial and land conservation entities? What played out there, what happened?
What are your opinions on Current Use programs?	What are your opinions on Current Use programs? Do you feel like the programs are working as intended?
Have you collaborated with the town on any projects? Climate / resilience / recreation? Please describe those collaborations.	What have you noticed about conservation in your community and how does it affect assessments and town budget?
When you protect land, is your priority more recreation or ecosystem protection? What are your goals? Are they shifting at all?	Is your town a tourism-driven economy? What are the drivers of the tourism?
	What kinds of real estate development pressure has the town experienced?
	Does your town have a comprehensive plan and when did you last update it? Do you have zoning?

Table 3.1: Guiding questions asked of each stakeholder type during interviews.

We found that individuals were often more complex in their experience and roles than we anticipated, and labelling each person to decide which questions to ask was impractical. Many conservation professionals had or were currently serving in municipal government roles and vice versa. As such, we often took a fluid approach to interviews, asking questions appropriate for each person and modifying as needed.

We employ interviews as one component of the broader study. Approximately 70% of interview-based conservation papers used a mixed-methods approach (Young, Rose et al. 2017). This approach allowed us to triangulate findings between methods and combine data for more holistic understanding of the issue (Kinnebrew, Shoffner, Farah-Perez et al. 2021).

We recognize that the interview method has shortfalls, such as sampling and interviewer bias and the subjectivity of the analysis process (Young, Rose et al. 2017). We believe that using a mixed-methods approach somewhat mitigates these flaws by diversifying findings and allowing us to take a more discussion-based approach with the interview findings. We were aware that attempting to code interviews more systematically could introduce excessive bias. Additionally, we did not believe there would be value in this method given the small sample size. Instead, we focused our analysis on retrieving and summarizing anecdotes that may give practitioners ideas for processes and collaboration around community-level conservation and municipal decisions. We acknowledge the inherent bias in this approach due to human review but believe it is the most appropriate strategy for our data and purpose.

Data Gathering: Target Areas

We identified four target areas in Maine to select interviewees from. These geographically and socioeconomically diverse regions are York County, Eastern Washington County, Northern Maine, and Western Maine. We chose these areas because Maine is a

geographically large state with significant differences between regions. From 2010-2020, for example, the population of southern counties grew by nearly 8% and the population of Aroostook and Washington counties decreased by 5-7% (Hallowell 2021). Other demographic trends, attitudes, and values vary between regions. We wanted to investigate strategies and values around conservation and municipal challenges in many different types of communities to provide a wide range of applicable information to practitioners.

Data Gathering: Sampling

Interviewees were sourced through websites and other publicly available avenues or through snowball sampling, in which case another interviewee provided contact information. In their literature review, Young, Rose et al. (2017) found that nearly 70% of interview-based studies in the conservation used key informants and/or snowball sampling.

Participants were recruited by email with an initial communication script and a consent form was included. Meetings were scheduled with the interviewees by email and interviews were conducted by Bennett in-person or remotely through Zoom with video. Audio from each meeting was recorded and saved on the researcher's laptop and later automatically transcribed with university-provided software.

Data Gathering: Design and Piloting

We developed a set of baseline questions was developed for the two categories of stakeholder – land trust representatives and municipal employees/tax assessors. The interview guide was piloted using two common techniques: internal testing and expert assessment (Kallio et al. 2016).

First, the guide was internally tested with the Working Group during a regularly scheduled update and feedback web meeting. Based on their review, changes were made to wording and questions were added that would make results more relevant and useful.

Next, we sought feedback from Dr. Tora Johnson. Johnson is experienced in engaging in research with individuals in rural communities. Her approach centers on dignity as a guiding principle for resolving conflict and engaging diverse people in productive decision making. Her guidance was crucial in framing the approach to discussions with stakeholders. She provided feedback to ensure questions were open-ended and appropriately worded, which is a common benefit of expert assessment (Kallio et al. 2016). She acknowledged the power dynamics that exist in the relationships we are studying, as conservation groups can choose whether to mitigate their tax impacts with PILOTs or not applying for full tax exemption. Being conscious of these kinds of power imbalances is essential in building trust with stakeholders (Delozier and Burbach 2021).

Ethical Considerations

When we made initial contact with participants, we shared a consent form detailing the project, participation expectations, how their interview would be recorded and stored, and how their contributions would be used in publication. At the start of each interview, we used a script to reiterate these points. The interview proposal received IRB approval in January 2023.

Qualitative Data Analysis

Because each interview was so unique, we determined the best way to present the insights gleaned from these conversations is to discuss broader themes that were prevalent in most interviews and provide anecdotes and case studies. We use thematic template analysis with a primarily inductive approach which emphasizes a "bottom-up" approach to coding in which

themes are developed through engagement with the data (King, Brooks, Tabari 2017). However, we also used our questions (Table 3.1) to create themes. First, we reviewed a random subset of the data for familiarization. Next, we highlighted key points of discussion in the random subset and copied these to a separate document. We then organized these points into categories which were further refined into themes. The themes we identified were 1) Community Impacts of Conservation, 2) Open Space Planning in Different Towns, 3) PILOTs: Policies and Opinions, 4) The Tree Growth Program: Considerations and Suggestions and 4) Collaborations between Towns and Conservation Groups: Case Studies.

Once we had established the themes, we reviewed all transcriptions (stored as Word documents) for discussion around these themes using key word search and highlighted relevant sections for reference. We then created separate documents for each theme and summarized discussions from the interviews here. The process may have been improved by having a different member of the research team or potentially a third party conduct the thematic analysis of our data rather than the same person conducting the interviews doing the analysis. This may have reduced the risk of bias (King, Brooks, Tabari 2017).

Finally, we created a single document to combine and edit each theme into a narrative. We included quotes from interviewees to highlight similarities and differences in perspectives and to support the narrative (King, Brooks, Tabari 2017).

3.3 Results

3.3.1 Statewide Perceptions Survey

Overview of Respondent Sample

The questionnaire returned a total of 607 responses from Maine residents distributed across the state. This sample was drawn from the Qualtrics service pool of respondent candidates

self-identifying as Maine residents above the age of 18. A summary of sample demographic characteristics is provided in Table 3.2 alongside a comparison to statewide demographics to demonstrate similarities and differences between the sample and the total state population. Some demographics align with the state averages while others are quite different. Our sample reflects the population in geographic distribution, race, age, and whether they own their residence. The median household income of survey respondents was significantly lower than the average Maine resident's. Our sample is also less educated with far lower attainment of bachelor's degrees, more female, and less liberal than the average Maine resident. These differences are important to acknowledge as the sample may not hold the same beliefs and perceptions as the average Maine person. We must be cautious when interpreting and extrapolating results from this survey more broadly.

Demographic	Survey respondents (n=604)	Maine population
Median Age	50	44.7
Gender: female (%)	65.6%	50.7%
Median household income	$32,000 (28.7% of respondents)	$63,182
Race: white (%)	91.1%	93.9%
Education: high school graduate or higher (%)	95.4%	92.1%
Education: bachelor's degree or higher (%)	14.8%	33.6%
Owner occupied	56.0%	51.0%
Mode length of residence in community	More than 20 years (45.3%)	n/a
Mode months at primary residence	10-12 months (90.3%)	n/a
Political ideology: conservative (%)	25.1%	27.8%
Political ideology: liberal (%)	20.6%	36.4%
Geography: Southern Maine (York, Cumberland, Sagadahoc, Lincoln, Knox, Waldo, Hancock, Washington) (%)	55.4%	46.1%
Geography: Central Maine (Somerset, Kennebec, Penobscot) (%)	14.7%	17.3%
Geography: Western Maine (Oxford, Androscoggin, Franklin) (%)	23.9%	24.9%
Geography: Northern Maine (Piscataquis, Aroostook) (%)	6.1%	7.4%

Table 3.2: Overview of survey sample and Maine demographic trends (US Census Bureau 2022, Sherman and Daigneault 2023).

Summary of Results – Conservation

     In reviewing the panel, we see widespread support of conservation. 40% of respondents strongly agreed with the statement "I support expansion of conservation in my community," and an additional 31% agreed. Only 8% disagreed or strongly disagreed (Figure 3.1).
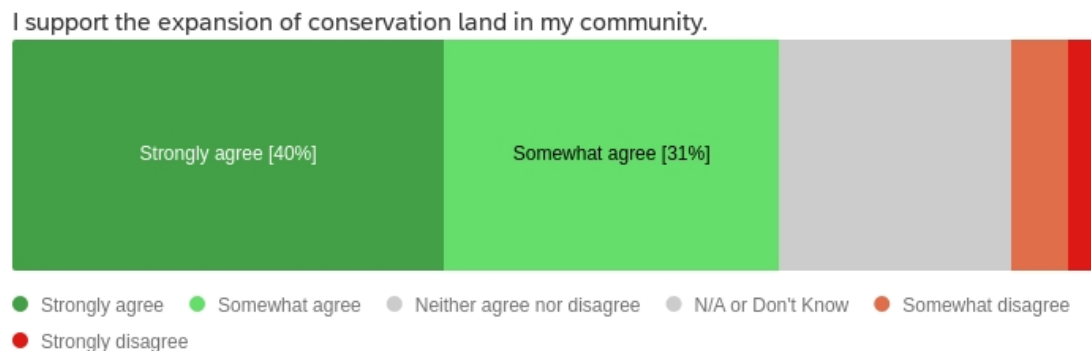
Figure 3.1: Q10 response distribution.

     In a later question, we asked about the desired level of conserved land in their community, and the median response supported a 15% expansion. Perhaps an indicator of why conservation is popular is that 70% of respondents felt that it improves the ecological and human health of their communities.

     We asked respondents to rank the conservation services most important to them, with a lower numerical value indicating higher ranking. Respondents most highly ranked clean water and flood control (mean=2.48) and wildlife habitat (mean=2.59). Of lesser importance was recreation (mean=3.71), then climate change mitigation (mean=4.00), jobs (mean=4.10), and finally timber and other forest products (mean=4.12) (Figure 3.2). It was notable that several ecosystem services were ranked more highly than recreation, which we thought may be more personally beneficial to respondents particularly because more respondents recreated often than those who did not.

Please rank the conservation land benefits/services in order of importance to you.

Figure 3.2: Respondent rankings of conservation services by importance to them, with 1 being most important and 5 being least important.

We also wanted to know whether respondents viewed conservation as hindering economic productivity or real estate development in their towns, because although there is widespread support for conservation, people may simultaneously believe it results in costs to their communities. We thought perhaps individuals in different demographic groups, different types of towns, or those who felt their taxes were too high felt differently about these questions, but we found no significant evidence of this. 45% of respondents disagreed with the statement that conservation land reduces the economic productivity of their community, and another 25% neither agreed nor disagreed. While many respondents supported real estate development in their communities (59%), a large percentage (41%) did not feel that conservation land constrains development. A large percentage (28%) neither agreed nor disagreed.

Summary of Results – Municipal Budget and Property Taxes

Nearly half of respondents agreed that their town is experiencing budget challenges (47%) and more than half believe their property taxes are too high (53%). Unsurprisingly, more than half of respondents believe the state should provide more support to their town to alleviate property tax pressures (58%).

When asked to rank municipal services most important to them (where 1 = most important and 5 = least important), respondents most highly ranked police, fire, and emergency rescue (mean=2.36), followed by public education (mean=2.48), road construction and maintenance (mean=3.05), water utilities and waste management (mean=3.17). The purchase of land for conservation was ranked last (mean=3.94) and selected as least important of the options by nearly half of the respondents (Figure 3.3). Based on the overwhelmingly positive responses to earlier questions about conservation (Figure 3.1), it is not likely that the low ranking of conservation indicates negative feelings about conservation. Instead, respondents feel that the other service options listed are more important to them.
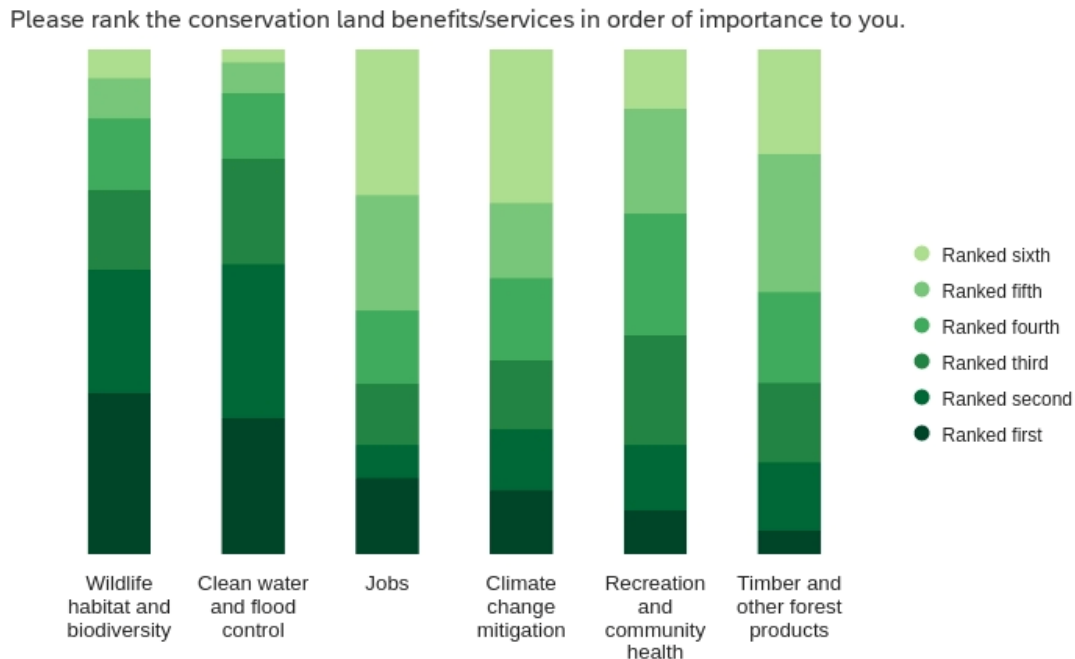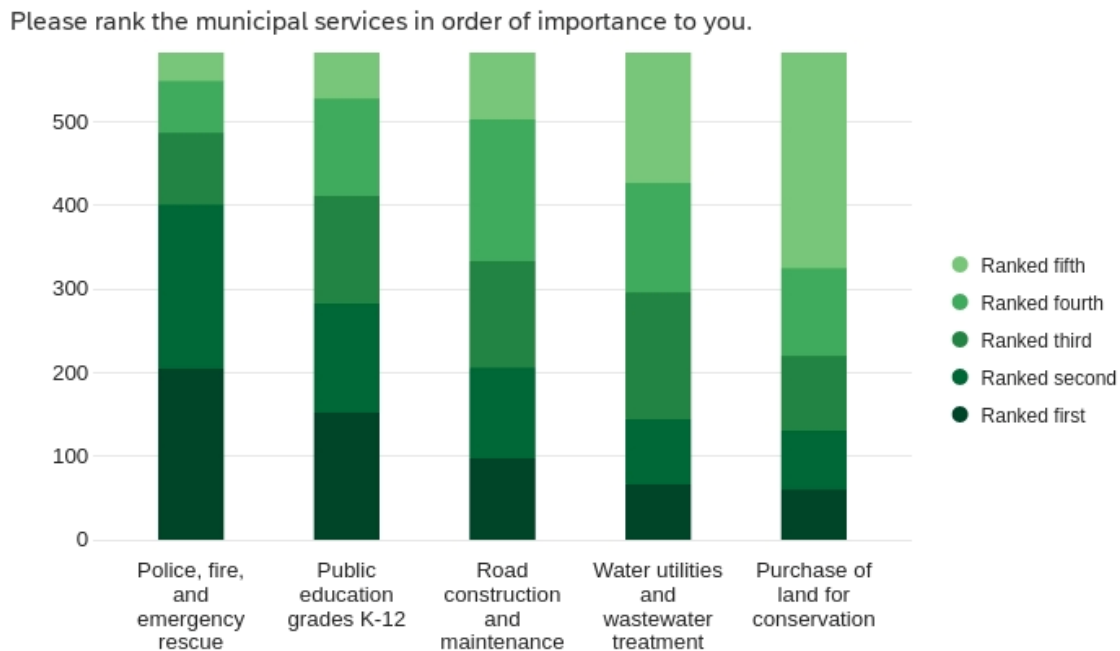
Figure 3.3: Respondent rankings of municipal services by importance to them, with 1 being most important and 5 being least important.

Respondents were asked to use a slider scale (with values 0-10, where 0 = not at all and 10 = very much so) to relay the extent to which they believe their property tax rates were impacted by 1) conservation land, 2) Current Use programs such as Tree Growth, and 3) other tax-exempt real estate. Results were not striking with medians close to the midpoint of the scale, suggesting a lack of knowledge or strong opinion on the issue (Figure 3.4).

To what extent do you believe your property tax rate is impacted by conservation, Current Use programs, or other tax exempt real estate?

Field	Min	Max	Mean	Median	Standard Deviation	Variance	Responses
Conservation Land	0.00	10.00	4.56	5.00	2.39	5.69	443
Current use tax programs (e.g, tree growth)	0.00	10.00	4.80	5.00	2.22	4.92	446
Other-tax exempt real estate	0.00	10.00	5.49	6.00	2.26	5.13	441

Figure 3.4: Q21 response statistics table.

Between-Group Results

       We used Kruskall-Wallis tests to determine perceptions of conservation and municipal challenges across different categories of respondents, ranging across individual demographics to their town's characteristics. See Table 3.3 for a summary of findings.

       We found that rural individuals generally held more pessimistic economic views, perceiving their towns as facing budget challenges and expressing concerns about high property taxes. Despite this, they were more likely to support conservation expansion. Contrary to what we expected to find, there was not a statistically significant relationship between an individual's property tax rates and their attitudes towards conservation or perceptions of municipal budget challenges. We elaborate on these results in the discussion section at the end of Chapter 2.

Table 3.3: Summary of key findings from survey.

Category	Sub-Groups	Key Findings
Mill Rate	6.04 (minimum) – 12.00 12.00 – 16.00 16.00 – 33.24 (maximum)	• No significant opinion differences between mill rate groups.
Age	18 – 34 35 – 54 55 or older	• Middle aged respondents felt less stronger that conservation is important than the younger age group ($p<.001$). • The youngest group of respondents felt more strongly that conservation reduces the economic productivity of their community compared to the oldest group ($p<.021$). • The youngest group recreated more often on conserved land than the oldest group ($p<.005$). • The youngest group felt more strongly that the state should provide funding to their town compared to the middle aged group ($p<.033$).
Education	High school or less Some college 4-year degree + Other/Prefer not to answer	• Respondents with a high school or lower level of education recreated slightly more ($p<.018$) and felt more strongly that conservation improves the ecological health of their community compared to respondents with higher education levels ($p<.017$).
Household Income	<$50k $50 – 100k $100k+ Prefer not to answer	• Individuals whose household income was less than $50k felt more strongly that conservation constrains real estate development in their town compared to those in the $100k+ group ($p<.01$).
Density Classification	Rural Urban Exurban	• Rural respondents felt more strongly that conservation reduces economic productivity compared to exurban respondents ($p<.016$). • However, rural respondents were also more inclined to support the expansion of conservation compared to exurban ($p<.002$) and urban ($p<.039$) respondents. • Rural respondents felt that their town experienced budget challenges more than urban respondents ($p<.032$). They also felt more strongly that their property taxes were too high ($p<.031$) and that the state should provide more funding ($p<.013$).

Table 3.3 continued

Own Real Estate	Yes No	• While there were no significant differences between owner and renter opinions of conservation alone, they felt differently about municipal and tax issues, and not always in the ways we expected. • Renters generally felt more strongly that conservation constrains development ($p<.008$) and that their town is facing budget challenges ($p<.005$). • Renters felt more strongly that their tax dollars fund important services ($p<.000$). • Owners felt less strongly than renters that their town makes good budget decisions ($p<.001$). • Oddly, renters felt that property taxes were too high more so than owners ($p<.000$). We hypothesize that they answered this question as if it were about their rent cost.
Tourism Region	Aroostook Beaches Downeast & Acadia Highlands Kennebec Valley Lakes & Mountains Midcoast Portland	• No significant differences in opinions between regions.

Limitations of Results

Some responses indicate that survey respondents may have lacked knowledge on some of the complex issues and questions we posed. For example, renters appear to have interpreted property tax as being synonymous with rent cost. We also ask about perceptions of Current Use program impacts on their property tax rate, which is a complicated question in several ways. Current Use programs are not widely understood, nor are tax incentive program impacts on municipal budgets generally.

We believe there is a general lack of understanding about municipal mill rate calculations and the complex factors that feed into it. Unless a person is highly involved in municipal government, they likely do not think about the implications of land use on mill rate. Additionally, property tax bill increases are more often due to the value appreciation of a property than mill rate hikes, and thus there is an initial layer complexity before a person even considers the changes behind mill rate increases as a reason for rising tax bills. We believe that this complexity leads to what we see in our survey results: there is a clear lack of strong opinions on the relationship between conservation and mill rates / municipal challenges.

3.3.2 Semi-Structured Interviews

Overview of Respondent Sample

Twenty individuals participated in this study, comprised of nine conservation practitioners and eleven professionals from the municipal/assessor side (Figure 3.5). Some individuals were involved in both. For the purpose of this summary, we assigned them to whichever role they were predominantly involved in.
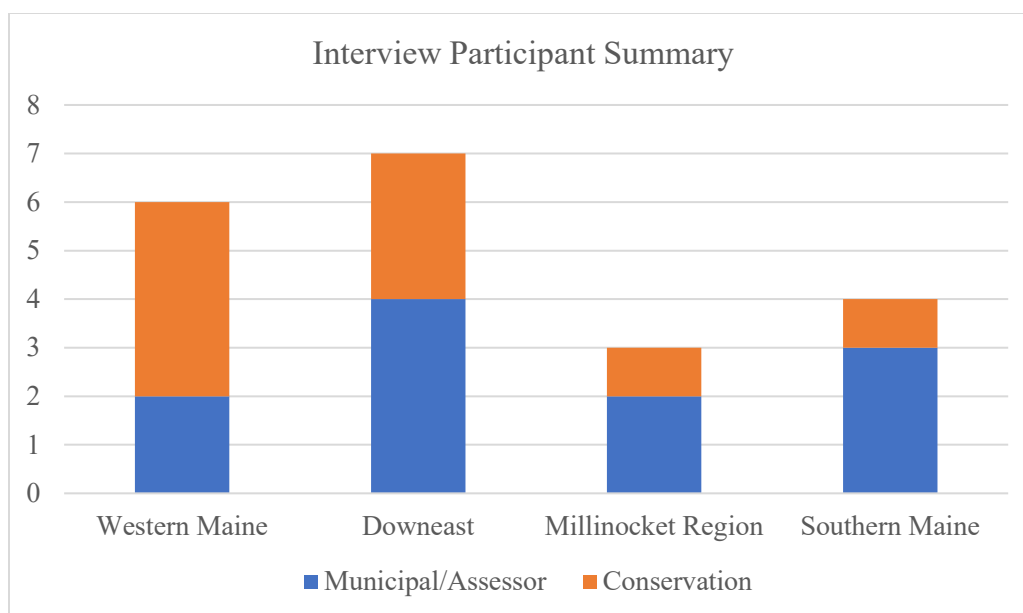
Figure 3.5: Overview of interviewee region and profession.

Thematic Analysis

Community Impacts of Conservation

      Land conservation can have broad impacts on communities. This theme covers a range of observations and lived experiences we heard about from practitioners, including direct economic impacts, amenity effects, and hunting access. We also heard from several conservation practitioners that their approach is shifting to a more community-based approach from a more myopic focus on land conservation.

Long- and short-term impacts

      We heard mixed opinions from participants about the direct impacts of conserving land. One land trust practitioner noted that while it is a very tangible loss of revenue in the moment, "most of the factors that affect town budget are larger things that are outside of most of our control, such as state and federal budgets and economic/demographic trends." Another individual with land use planning experience told us that conservation is a small portion of tax-exempt real estate. Religious institutions, educational institutions, and hospitals are other types of tax-exempt real estate that have big impacts on service-center communities in particular.

A town employee shared her opinion that although conservation may harm a town's tax base in the short term, the long-term benefits to the community, including mental and physical health, are worth the cost. This opinion was countered by an assessor who told us that although they appreciate land conservation, the loss of taxable value is harmful to towns.

A conservation director shared an argument for conservation from an economic risk perspective. They believe well-managed easements help stabilize local economies by reducing uncertainty. For example, a lumber store manager knows that they will be able to source materials from a timber harvested easement far into the future. A Maine Guide who relies on a particular spot along a river knows that if the surrounding land has a conservation easement, that spot is not at risk for development, and they will be able to continue taking clients there.

Many participants across regions offered their opinions on the long-term positive impacts of conservation. A common thread among these was the amenity effect of protected land. Two participants, one from Downeast and one from Western Maine, told us that when a property listing abuts conserved land, the posting will almost always mention it and that it is likely reflected in the price.

A frequently mentioned consideration of conservation is that it constrains development; however, we heard from several land trust participants that development is often more net costly to towns than open space. One participant elaborated, "development means higher taxes due to increased costs for schools, roads, and utilities." There is a more nuanced conversation to be had about types of development. Whether the town attracts families with children who will use the public school system or wealthy retirees who want a second home makes a substantial difference in the impact on municipal budget. Some towns are attempting to plan for the optimal mix of residential, commercial, and open space, but more rural towns with struggling budgets often take

what development they can get. One town employee told us, when we asked them what they needed to improve their budget situation, that they "need more buildings to tax."

Access and tourism

Conservation is becoming more important to hunters as "no trespassing" signs are being posted on more private lands. There used to be a culture of open borders, but now conservation land is filling that need. We heard this from several interviewees from different regions. One participant told us that they believe hunting access is "one of the reasons conservation has taken off and why it's such a bipartisan issue. Historically, there were a lot more open borders between properties [that are now closed off]." Protected land has maintained that hunting culture that has been an integral part of outdoor recreation in Maine.

In this vein, we heard from many other participants that conservation increases recreation-based tourism. A conservation practitioner told us that the impacts of this "would be too complicated and expensive to measure." They noted that trail counters help provide estimates of visitation, but these can be inaccurate and "we still don't know the economic impact of those visitors."

However, tourism can have negative impacts on towns as well. One municipal employee told us that a park in their town has attracted more tourists and traffic which means roads need to be repaired more often.

Shifts in approaches among conservation groups

A conservation practitioner noted that in their early days, land trusts would often conserve whatever they could without considering the impacts on the ecosystem or local community. This interviewee described it as a "land grab" strategy lacking community conservation spirit which harmed the reputation of legitimate conservation interests. This individual provided an example of a recent acquisition done by their group that contrasted the

land grab approach. In this case, the conservation group completed two years of studies prior to the acquisition, publishing findings, holding community meetings and hearings, and involved local schools, and went door to door to gather feedback. The participant said that this is level of engagement is a responsibility of being an accredited land trust, that the organization should have an "in depth selection process and evaluation process before you recommended to the board that the property be conserved." Another practitioner from a different region told us that as the conservation movement in Maine was taking off several decades ago, there was a perceived threat response. Conservation groups were focused on land protection without so much consideration of the community as a whole. He told us that now, conservation organizations are taking a step back and thinking more holistically about their missions.

Open Space Planning in Different Towns

A topic that arose frequently was whether different types of towns should be thinking about open space differently. One land trust practitioner noted that "some towns are more economically impacted by conservation." We wanted to explore what types of conservation might align with different types of towns. Towns can vary by ecological and economic realities as well as attitudes, personalities, and political leanings.

Many towns with greater ecological or scenic values are rural and have a small tax base. In these towns, according to a land trust practitioner, the local economy and quality of life can be directly tied to outdoor recreation which is made possible by conservation. However, towns with a smaller tax base or with a substantial amount of land already in conservation might be affected more negatively by conservation, according to a tax assessor. This assessor shared their belief that conservation in areas under more development threat, with limited amounts of open space, is more valuable than conservation in the "middle of nowhere." Another assessor from a different

region echoed this sentiment. He noted that some communities like Cumberland and Gray have experienced a rapid growth in poorly planned, unattractive development that detracts from the natural beauty of the towns. As a reaction to seeing their communities change quickly and the loss of natural spaces, residents feel a desire to protect land.

Some communities facing development pressure are attempting to be forward looking to optimize land use and prevent poorly planned developments. An interviewee from a conservation group introduced us to the concept of smart growth, or the theory of concentrating development in designated growth areas like town centers while preserving the rural regions characterized by forests, wetlands, and farms for conservation and recreational purposes. This strategy is used to prevent the unmitigated sprawling development that as mentioned is pervasive in Southern Maine. It is a preferred strategy for habitat and recreation value as well as being, as the interviewee noted, "economically beneficial to the town because well planned recreational use open space increases the value of the properties surrounding it." GrowSmart Maine is an organization that works on promoting this style of development.

Not everyone believed that different approaches should be taken in different towns. A participant who had significant planning experience told us that "the concepts of municipal planning are the same [in every town]. You want to designate areas where you're going to focus your growth and your services and infrastructure, and areas where you'd like to see natural resources protected. That basic concept is the same across the state." However, they noted that the "balance can be harder to strike" in areas that are challenged in different ways such as with creeping development and fragmentation of parcels through subdivisions.

PILOTs: Policies and Opinions

We heard a variety of perspectives on the topic of PILOTs. PILOTs can be made at the discretion of a conservation group when a property has received full tax exemption. Two-thirds

of land trust owned property in Maine is on the tax rolls by being enrolled in Tree Growth (MLTN 2019). Through this program, conservation groups pay a reduced tax rate which can be as low as 5% of market value (Neumann 2018). While only 17%-or 104 thousand acres-receives tax exemption and on which PILOTs are made, we wanted to know how conservation groups determine payments. Many told us that they calculate it based on the Tree Growth rate. For others, it was a parcel-by-parcel decision. These payments may not be monetary.

Arguments against PILOTs

Several conservation-oriented participants felt that PILOTs are an insignificant portion of the economic services protected land provides. One individual explained that conservation organizations are better off not paying taxes and instead arguing effectively for the benefits of conservation and their mission. For example, they should explain that they are investing thousands of dollars into developing recreational infrastructure for the community and that preserving land enhances the health of a community. In their opinion, making PILOTs indicates a lack confidence in the benefits of conservation and is an insult to the town. Another land trust Director from a different region echoed this sentiment, telling us, "The argument for why our land should be allowed to have tax forgiveness is that we provide huge recreational and health benefits to the community. It's hard to quantify that." This interviewee listed additional benefits of conservation such as carbon sequestration and water management which are becoming increasingly important as climate patterns are becoming more unpredictable. They argued that municipalities are spending more on infrastructure repairs due to poor flood control and storm protection, which protected land can provide. They added that it is nearly impossible to quantify money saved by having conserved land that provides these services, so they are often not credited for it.

A land trust practitioner explained that it is challenging to start making PILOTs if the organization has not historically because it adds and expense to the budget that is already stretched. It is difficult to fundraise for stewardship, let alone tax payments, according to the interviewee.

Communication around PILOTs

Several conservation groups we interviewed had mixed strategies for PILOTs. One organization, for example, did not make PILOTs on properties oriented toward human benefit and recreation but they did make payments on other properties. Other land trusts have more case-by-case approaches. Land trusts that used this mixed strategy noted that towns to which they did not make PILOTs had not pushed for payments. They often did make payments to towns that were vocal about requesting them. However, this is not a conversation that often happens, according to our interviewees: "The towns have not pushed us one way or another on this. There's not a lot of conversation that happens."

One conservation professional faced pushback from some community members over an acquisition of a parcel to be used for recreation. They held a public meeting which was attended by nearly 100 people and some individuals were skeptical, asking whether the organization would continue to pay taxes on it. The participant reassured the community that they would continue to pay taxes on the land under Tree Growth (as it had historically been enrolled), and the criticism ended. The participant noted that they would like to move from a Tree Growth strategy to a PILOT system in the future and work with the town to dedicate funds to essential programs. They believed that this would be a more community-oriented approach.

The Tree Growth Program: Considerations and Suggestions

The Tree Growth program in Maine has received criticism. We heard from participants that it is easy to abuse, lacks monitoring, and harms town's tax bases because it is not adequately reimbursed. Here, we review participant opinions on the program and what they believe could be done to improve it.

Many participants across regions and professions felt that the program is not administered fairly and that the towns should be compensated by the state. Several participants noted a specific flaw in the program was allowing water-abutting properties to be enrolled. An assessor told us that the state reimburses Tree Growth tax revenue based on the average cost of large parcel sales, and if somebody has land in the Tree Growth program on a lake or the ocean, that policy "does not come near to reimbursing towns for the lost revenue." A town employee from a different region shared their opinion that "no shorefront property should be allowed to be in Tree Growth" because it is abused by wealthy landowners looking for a tax break.

Another interviewee echoed the sentiment that the program is "highly problematic" and abused by landowners to retain vast pieces of land. Additionally, this person felt that most foresters hired to do the required forest management plan are from the commercial forestry sector and are not sustainably minded, resulting in plans that focus on harvests at the expense of forest health. This person suggested there be a "conservation Tree Growth" category that would require more sustainable forest management plans.

Not everyone agreed that the program should be changed. One conservation professional believed the general consensus around the program is to keep it the way that it is. They think that most people are opposed to amending it because so many landowners are enrolled in it. However, they believe that the Open Space program should be updated, and consideration should be given to changing the categories to create more incentives for landowners.

Collaborations between Towns and Conservation Groups: Case Studies

Perhaps the most useful takeaway from these interviews is the case studies that provide examples of collaboration between conservation groups and towns. We heard stories of land trusts providing services for town infrastructure and school districts and serving as managers of town land. Towns have also helped with land acquisition projects that benefit the community. When asked what actions foster successful collaboration between municipalities and conservation groups, one interviewee responded, "It's important to get multiple representatives from the town council, selectboard, land trust, and conservation commission outside together walking the land, talking about plans, talking about what they're seeing, and looking at maps together. By doing this, people start viewing others as human beings and the categories they put them in begin to become less important."

Case study: Competition for Land and the Need for Collaboration

Knight's Pond Preserve in Cumberland is an undeveloped area spanning 163 acres, featuring forested upland, a large pond along with smaller ponds and wetlands, and it is adjacent to an additional 50 conserved acres in North Yarmouth. The property was posted for sale for $2 million by a family who had inherited it from an older relative. There were several developers interested in purchasing it. The Chebeague & Cumberland Land Trust approached the family who were seeking to profit from the sale and were not interested in donating it. However, they were willing to give the land trust time to raise the funds needed to purchase the property. The fundraising effort was collaborative, and the towns of Cumberland and North Yarmouth contributed. It had strong community support. After two to three years, the land trust had raised enough funds to purchase the property in 2015. The property likely would have been developed if it had not been for the synergy of interests of the land trust, the seller, and the towns.

Another interviewee from Southern Maine reinforced this anecdote by observing that "even though there's been some really bad development that's happened in Cumberland, the town has been very supportive of and working with land trusts to protect these larger undeveloped places connected by trails." However, we heard from a land trust representative about a case where a lack of collaboration resulted in a lost opportunity. The seller must be on board with the mission of conserving the land and be patient while funds are raised. Land trusts often do not have the funds available to be competitive on the market. This participant provided an example where a several-hundred parcel of land along a river was posted for sale and the land trust wanted to acquire it. They approached the seller to explain their interest and reasons for wanting to protect the land, but the seller quickly sold the parcel to commercial interests. Several hundred acres were they harvested for timber and 40 acres were subdivided for development, which would be ecologically harmful.

Case study: Towns hire land trusts for community land management

The Twin Brook Recreation Area was an undeveloped area sold to the town of Cumberland by an individual several years ago. The town, contrary to the wishes of the seller, began building recreation infrastructure on the property, which created resentment. However, there were no legal constraints defining what the town could or could not do with the property, so the ambiguity led to unintentional misuse. The town now works with the local land trust when they purchase a property with specific wishes by the seller; the works with the land trust to write a conservation easement that suits the needs of the seller and town and that the land trust monitors it.

Another example of this type of collaboration is happening in Western Maine, where towns have hired a conservation group to manage town-owned properties as they do not have the

resources to do so. Because of this, trails have been built and the uses of this land have expanded, benefiting the community. This relationship has encouraged these towns to purchase more community forest land.

Case study: Infrastructure, education, and school programs

One conservation group in southern Maine is actively collaborating with towns to address and replace inefficient culverts and bridges through the Stream Smart program. They educate public works crews, engineers, and town officials on how to replace poorly functioning culverts that they monitor. This helps towns protect against road damage from flooding events and the new culverts help fish and other organisms to move up and down streams. While the latter benefit is the one the conservation group is primarily concerned with, they recognize the need for collaboration as these changes cannot happen in a silo.

Another way conservation groups and towns collaborate is through education and sports programs with local public schools. One land trust we spoke with built a recreation/education center at one of their popular preserves that serves as a base camp for these programs. They provide free equipment rentals and access to groomed trails so that the local school can have a nordic ski program. They provide "outdoor classroom" education programs to k-12 students. Advancing education programs is a top 5 goal in their five-year plan through 2024.

Case study: Open space planning as part of the comprehensive plan

Many towns are thinking about planning as their ten-year comprehensive plans, required by the Maine State Planning Office, are soon due. This is an opportunity for collaboration between land trusts and towns, but it should be done thoughtfully to improve, not worse, relationships. Towns are increasingly adding open space planning to their comprehensive plans, and this is where land trusts can help by spearheading these efforts. A land trust we spoke with in

Western Maine initiated this work with a town they operate in. Based on community feedback and observing neighboring towns, they believed there was strong support and a need for open space planning. A necessary piece was funding, which was achieved through a Community Action Grant from the state. The project is anticipated to cost less than $45,000. With these pieces in place, the land trust began the work with the town. The first step was community engagement, which started with a survey and then a public meeting in spring 2023. The goal of the plan is to provide land stewardship guidance, promote connectivity between open spaces, town services, and neighborhoods, and inform future development and infrastructure projects. The land trust also has process related goals, including building excitement in the community, helping people feel agency, and building confidence and capacity to do this type of work in the future.

This land trust hired a third-party consultant to lead the community engagement work and guide the process. There are pros and cons to working with a consultant on these projects. Another interviewee with substantial land use planning experience told us that it is often beneficial to bring in a neutral, unbiased third party when engaging a community for open space planning. Doing so mitigates exacerbating tense social dynamics and may improve relationships between conservation groups and towns. A different interviewee noted that a third party may not know the town very well and may apply principles that worked in other places but might not work there. The community might be opposed to the idea of outsiders making plans for their town. However, hiring consultants allows towns with less resources or capacity to plan in more extensive ways they would not otherwise would have.

3.4 Discussion

3.4.1 Public Perceptions Survey

Overall support for conservation in Maine was shown through the survey, as well as concern about municipal challenges. Notably, a large percentage of respondents felt that their property taxes were too high. This is expected as Maine's property tax burden is the fourth highest in the country (Mainebiz Staff 2021).

We compared the perspectives of groups within the categories of mill rate, education level, household income, and density classification. While a majority of our tests were not statistically significant, we did find some evidence for differences between groups. Individuals with a high school or lower education level recreated slightly more and believed more strongly that conservation positively improves the health of their communities as compared to respondents with higher education attainment. We theorize this may be due to a stronger sense of place and community among non-college educated individuals, are more likely to stay in the same community they were born in compared to college-educated individuals (Cohn and Morin 2008).

There were also differences between rural, exurban, and urban respondents. Rural individuals were typically more economically pessimistic than the other groups, feeling more that their towns were experiencing budget challenges and that their property taxes were too high. In our data analysis from Chapter 1, we found that rural towns had a smaller average mill rate than urban or suburban towns, but respondents may feel that their tax rate is too high for the amount of services provided or for other cultural or political reasons. Rural towns typically have less developed real estate and therefore smaller tax bases which may be why rural residents felt that their towns were experiencing budget challenges.

We expected to find results indicating relationships between an individual's property tax rate and their feelings around conservation and municipal budget challenges. For example, we hypothesized that people with the highest mill rates would feel that their town is experiencing budget challenges, that their property taxes were too high, and that they support more state funding. However, there was no statistical significance when comparing perspectives of groups with different mill rates. We also hypothesized that the higher mill rate group may feel more negatively about conservation as it puts pressure on municipal budgets, but again, there was no significant difference between this group and groups with smaller mill rates.

Further Analysis

Further work should include Kruskall-Wallis tests to compare perspectives of groups within the categories of 1) time lived in their community, 2) town assessment value per capita categorized into ranges, 3) gender, and 4) race. It would also be useful to explore whether there were different opinions on conservation among individuals who felt their tax rates are too high, or if those who supported the expansion of conservation felt differently about their tax rates than those who did not.

3.4.2 Semi-Structured Interviews

We explored a range of conservation and municipal budget topics with interviewees and collected a variety of perspectives on community impacts of conservation, including economics and access, how conservation fits into land use planning in different types of towns, PILOTs, and the Tree Growth program. See Table 3.4 below for key points made by practitioners.

Table 3.4: Summary of key perspectives from interviews.

Theme	Key Perspectives
Community impacts	• Conserving land results in an immediate loss of tax revenue (unless continued to be held in Tree Growth). • There is a long-term opportunity cost because protected land can no longer be developed. Development expands the tax base, but in some communities and with some types of development, COCS may exceed revenues. • Long term community benefits may outweigh the tax-revenue cost, but this is unfeasible to quantify. • The amenity effect of conservation can increase neighboring property values, which is good for property-owners from an equity perspective but may increase tax bills. • Conservation and easements provide clarity around a land parcel's use in perpetuity. This can provide certainty to natural-resource dependent local business which can help stabilize local economies. • As access to private land continues to decrease, conservation is filling that need particularly for hunters. • Conservation groups are shifting their approach from a narrower focus on protecting land to a holistic, whole-community approach.
Open space planning in different types of towns	• Rural towns with a small tax base may be affected more negatively by conservation. • Exurban that have experienced rapid, poorly planned development have greater need and desire to conserve land. • Smart growth strategies should be put into place, particularly in places facing increasing development, to best protect the economic, ecological, and values of the community.
PILOTs	• Conservation groups should not make PILOTs, especially if are insignificant. Instead, they should focus on articulating the benefits of conservation and making sure the community can benefit from it. • It is challenging for land trusts to start making PILOTs if it has not been built into the budget from the beginning as it is difficult to fundraise for. • Land trusts use a variety of tax strategies across their properties. A majority of land is taxed under the Tree Growth program, and on fully tax-exempt land, the calculation for PILOTs, if any are made, varies. • There is not a lot of conversation that happens around PILOTs between towns and conservation groups.

Table 3.4 continued

Tree Growth program	- Tree Growth is not fairly administered and the state should improve reimbursements to towns. - It can be abused; some landowners use it to retain large parcels. - Highly valued land, such as parcels bordering the ocean or lakes, should not be allowed in Tree Growth because the reimbursement does not come close to the lost revenue. - Tree Growth should not be amended because so many landowners are enrolled in it. The costs associated with changing it would be large. - The Open Space program should be updated, including creation of new categories to better incentivize landowners.

The variety in responses and perspectives reflect the complexity of land conservation and how it relates to municipal budgets. Overall, there were many opinions on the community impacts of conservation, and many participants were uncertain about long-term effects. This highlighted the need that the Working Group expressed for a data-driven study. Our findings from Chapter 1 may help towns better understand these long-term impacts.

Recommendations for collaboration

As expected, assessors and municipal employees were predominantly focused on the tax impact of conserving land and conservation practitioners most often discussed long term ecological and community benefits. However, both groups showed understanding of each other's concerns and a genuine appreciation for the work they do. Participants from both perspectives showed an eagerness to work together and this was reflected in their anecdotes of collaborations which they were keen to share. The respectful way participants discussed complex-and potentially tense-relationships between conservation groups and municipalities indicates an environment of optimism. Contrary to headlines (Neumann 2018), findings from the interviews indicate that relationships between conservation groups and municipalities have an opportunity to thrive. The shift in land trust approach to a more holistic, human-inclusive strategy further reinforces the idea that there is great opportunity for collaboration. Bennett et al. (2016) notes the increasing interest in human dimensions of conservation, urging the conservation community to move toward mainstreaming the social sciences in conservation policy and practice. This will require intentional work by both parties. Characteristics that lead to successful collaborations include trust, understanding, balance of power, shared mission, communication, and commitment (Shaw 2003). Based on interview findings and prior research, we provide recommendations to develop these relationships:

- Spend time together socially outside of a structured, task-oriented setting. One interview participant suggested walking together in nature. Many studies have shown the importance of having good interpersonal relationships to maintaining successful partnerships (Shaw 2003). By building relationships outside of a professional environment, as the participant told us, "people start viewing others as human beings" and removing the labels they had applied to them.

- Acknowledge power asymmetries and take steps to make sure every party feels heard. Power differentials can be economic, social, resource, or knowledge based. For example, land trusts have the ability to decide whether to make PILOTs on exempt land, which is a monetary advantage. Towns have the ability to enact zoning rules, which is a resource advantage. Power differences can prevent some actors from participating and playing an active role in the relationship (Cundill et al. 2015), so it is critical to address these together.

- Define a project to collaborate on and specify roles and timelines. Differences between groups may be overcome if there are clear, established needs and expectations (Shaw 2003). Simultaneously, the collaborative should expect changes and make room for flexibility.

- Establish a shared mission. The outcome should benefit both parties. It is important that partners are "enthusiastic about the expected outcome of the project because it is important to each one of them" (Shaw 2003). Some examples from the case studies above include a culvert project, outdoor classrooms for k-12 students, and open space planning as part of the comprehensive plan. In all of these projects, both land trust and municipality benefited. In the culvert project, towns benefit from improved infrastructure

and the land trust was able to improve ecological conditions for aquatic animals. In the outdoor classroom scenario, the town's public education program was enhanced and the land trust worked on growing the next generation of conservationists. When a land trust assists with the comprehensive plan, both the trust and the town have clearer conservation goals and less uncertainty for the future as well as community support.

One of the most important aspects of collaboration is trust, which can be fostered with the above recommendations and an overarching spirit of compassion and humility. Although it is important to define an outcome, the process of collaboration itself is perhaps the greatest benefit.

Recommendations for PILOTs and Tax Strategies

A recurring theme of the interviews was feedback about the lack of communication and standard practices around PILOTs. We also heard the wide variety of tax strategies being used both across different conservation groups and within conservation groups, as tax strategies differed parcel by parcel. Factors that contributed to conservation groups using different strategies included:

- Town pressure on conservation groups to make PILOTs or pay Current Use rates (versus not receiving pressure by other towns).

- Purpose of conservation project / parcel (public recreation, ecosystem services, wildlife habitat, mixed-use, etc).

- Location and size of conservation project / parcel.

- Historical tax strategies applied in similar situations by the organization or by other conservation groups in the area.

Recently, land trusts have taken a more community-oriented approach to both conservation itself and to PILOTs / tax status. Per Maine Coast Heritage Trust (2018): "With the increasing pressure on municipalities to fund ever more costly services… more land conservation

organizations have opted to be taxed under the Farm and Open Space Tax Law, or to forgo tax preferred status at all."

However, no institution such as the Maine Land Trust Network or leading conservation group in Maine has taken a stand on tax status or PILOT recommendations. There is no established protocol or practice, and we believe this is because of the complexities and individual conservation scenarios across Maine. Still, we believe that some general recommendations can be made with these nuances in mind. For example, one recommendation could be made to pay at least Current Use rates on all future conservation projects for which human benefit is not a primary priority. On properties acquired for community benefit (which will have to be defined more specifically), conservation groups may apply for full tax exemption. These are examples of recommendations, but we recommend further research and engagement with land trusts and conservation groups before recommendations are made. Organizations that may be in a position to make these recommendations could be leading land trusts like Maine Coast Heritage Trust or a statewide association like the Maine Land Trust Network, which has asked land trusts about their tax strategies in its past surveys.

3.5 Conclusion

Through qualitative and quantitative methods, we explored general perceptions and practitioner beliefs around conservation, municipal challenges, and property taxes. We conducted a statewide general perceptions survey around conservation and municipal challenges, revealing that conservation is well-regarded and that a majority of Maine people feel that their property taxes are too high. Some small differences in attitudes existed among categories of education level, income level, and density classification of their town.

To gain a deeper understanding of the challenges and tensions faced by towns and conservation groups, we conducted 20 interviews with conservation and municipal/assessment practitioners across four geographic and socio-economically diverse areas of the state. Participants with a variety of deep perspectives shared opinions, experiences, and anecdotes. Based on these interviews, we suggest steps toward successful collaboration that include building social relationships, acknowledging power asymmetries, establishing a shared mission with mutually beneficial outcomes, and assigning roles.

The goal of our study was to study the impact of conservation on local communities. Through this, we aimed to gather both empirical and human insights that contribute to better collaboration and conversation between local municipal and conservation leaders. Communities are facing tighter budget environments and land use decisions are increasingly scrutinized as a result. Conservation strategies are becoming more holistic, and stakeholders are being included in the decision making. It is crucial that relationships between decision makers, landowners, and other stakeholders are strong and that conservation projects are designed with human and economic systems in mind.

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Statewide Perceptions Survey

Conservation Land and Municipal Challenge Perceptions in Maine

Introduction

Dear Maine resident,

On behalf of the University of Maine, we thank you for your participation in this research project led by graduate student Abby Bennett and Associate Professor Dr. Adam Daigneault within the School of Forest Resources. The purpose of the study is to gain an understanding of public perceptions of conservation, property taxes, and municipal budgets. Recently, there have been discussions about conservation and its impact on property tax rates, and little research has been done to gauge public sentiment on these topics. This survey is part of a larger project aimed at analyzing data and conducting qualitative research around the impact of conservation land on municipal budgets.

What you will be asked: You will be asked a mix of multiple-choice, open-ended, and rank-order questions. Most questions will ask about the degree to which you agree or disagree with a proposed idea relating to conservation and municipal budget issues. There is a set of multiple-choice demographics questions. You must be at least 18 years old to participate. If you decide to participate, you will be asked to take this voluntary and anonymous survey. It should take about 8 minutes of your time.

Risks: The only risks are time and inconvenience.

Compensation: You will be compensated the amount you agreed upon before you entered into the survey.

Benefits: There are no direct benefits to you for participating, but your response will help us learn about Mainers' opinions on conservation land and municipal challenges. We hope that your participation will help inform tools and recommendations that towns like yours can use to improve municipal budgets and land use decisions.

Confidentiality: This survey is anonymous. Please do not indicate your name anywhere on this survey. There will be no records linking you to the data, and data will be kept on a password-protected computer until September 2023, when it will be destroyed.

Voluntary: Your participation is voluntary, and you may stop at any time or skip any questions you do not wish to answer.

Contact information: If you have further questions, you may reach Ms. Bennett at (207) 393-7575 or abigail.j.bennett@maine.edu. You may reach Dr. Daigneault at (207) 581-2805 or adam.daigneault@maine.edu If you have any questions about your rights as a research participant, please contact The University of Maine's Office of Research Compliance at (207) 581-2657 or umric@maine.edu.

Thank you for your time and help!

Sincerely,

Abby Bennett
University of Maine School of Forest Resources

Q1 Would you like to take this survey?

○ Yes (1)

○ No (2)

End of Block: Introduction

Start of Block: Perceptions of conservation land and development

Q2
In this survey, we ask about conservation land. **We define conservation land as property that is owned for the primary purposes of protecting natural, scenic or open space values.**

 Conservation land can be protected through an easement or fee acquisition and owned or managed by a non-governmental organization (such as a land trust) or a governmental organization (such as the Maine Bureau of Parks and Lands).

Q3-9 We will now ask about your opinion on several statements related to conservation land and town planning. Please indicate how much you agree or disagree with each statement (*select one for each*).

	Strongly disagree (35)	Somewhat disagree (36)	Neither agree nor disagree (37)	Somewhat agree (38)	Strongly agree (39)	N/A or Don't Know (40)
Conservation of Maine's natural resources is important. (8)	○	○	○	○	○	○
Conservation of land reduces the economic productivity of my community. (9)	○	○	○	○	○	○
I support the expansion of conservation land in my community. (10)	○	○	○	○	○	○
I recreate often on conservation lands in my community. (11)	○	○	○	○	○	○
The human and ecological health of my community is improved by conservation land. (12)	○	○	○	○	○	○
Conservation land has constrained real estate development in my town. (13)	○	○	○	○	○	○
I support well-planned real estate development in my town. (14)	○	○	○	○	○	○

Q10 How do you feel about the current level of conservation land in your town? (*slide left or right to indicate preference for more or less conservation land compared to today*).

-10 = currently not nearly enough	0 = currently just right the amount	+10 = currently way too much	N/A or Don't Know

-10   -8   -6   -4   -2   0   2   4   6   8   10

| Desired amount of conservation land () | ———————————|——————— |

Q11-19
We will now ask about your opinion on several statements related to conservation land and town planning. Please indicate how much you agree or disagree with each statement (select one for each).

	Strongly disagree (6)	Somewhat disagree (7)	Neither agree nor disagree (8)	Somewhat agree (9)	Strongly agree (10)	N/A or Don't Know (11)
My town is experiencing budget challenges. (1)	○	○	○	○	○	○
Our town has adequate services, including education and infrastructure. (2)	○	○	○	○	○	○
My property tax dollars fund important community services. (3)	○	○	○	○	○	○
My town makes good budget and spending decisions. (6)	○	○	○	○	○	○
My town makes good land use planning decisions. (7)	○	○	○	○	○	○
My property taxes are too high. (8)	○	○	○	○	○	○
The state should provide more funding to my town to alleviate property taxes (9)	○	○	○	○	○	○
The state should provide more services to my town. (10)	○	○	○	○	○	○
My community is tight-knit. (11)	○	○	○	○	○	○
My community is well-prepared to overcome local challenges. (12)	○	○	○	○	○	○

Q20 Please rank the municipal services in order of importance to you. (*drag each statement up or down such that your most important service is at the top).*
_____ Road construction and maintenance (1)
_____ Water utilities and wastewater treatment (2)
_____ Police, fire, and emergency rescue (3)
_____ Public education grades k-12 (4)
_____ Purchase of land for conservation (5)

Q21 To what extent do you believe your property tax rate is impacted by the following provisions? (*move slider left or right to indicate response*)

	0 = not impacted at all	5 = somewhat impacted	10 = largely impacted	Not Applicable

	0	1	2	3	4	5	6	7	8	9	10

Conservation Land ()						▮					
Current use tax programs (e.g, tree growth) ()						▮					
Other-tax exempt real estate ()						▮					

Q22 Please elaborate on why you responded the way you did to to this question.
_____
_____
_____
_____
_____

Q23 What is your primary address zip code?
_____

Q24 Do you own real estate in Maine?

○ Yes (1)

○ No (2)

Q25 How long have you lived in this community?

○ < 1 year (1)

○ 2-3 years (2)

○ 4-10 years (3)

○ 11-20 years (4)

○ More than 20 years (5)

○ Prefer not to say (6)

Q26 How many months of the year do you live at your primary residence?

○ 1-3 months (1)

○ 4-6 months (2)

○ 7-9 months (3)

○ 10-12 months (4)

○ Prefer not to say (5)

Q27 What year were you born?

_____

Q28 Please specify your gender.

○ Male (1)

○ Female (2)

○ Non-binary / third gender (3)

○ Prefer not to say (4)

Q29 What is your highest level of education?

○ Some high school, no diploma (1)

○ High school graduate, diploma or the equivalent (for example: GED) (2)

○ Some college credit, no degree (3)

○ Associate degree (4)

○ Bachelor's degree (5)

○ Advanced degree (6)

○ Other (7)

Q30 What is your occupation?

_____

Q31 Please specify your household income.

○ Less than $25,000 (10)

○ $25,000-$49,999 (22)

○ $50,000-$74,999 (23)

○ $75,000-$99,999 (24)

○ $100,000-$149,999 (25)

○ $150,000 or more (26)

○ Prefer not to answer (27)

Q32 Please indicate your political perspective. Your "political perspective" refers to how you typically align with key government policy initiatives. (Select one)

○ Very Conservative (1)

○ Conservative (2)

○ Moderate (7)

○ Liberal (8)

○ Very Liberal (4)

○ Prefer not to say (5)

Q33 Please indicate your fiscal perspective. Your "fiscal perspective" refers to your personal preference or attitudes relating to money, public funds, private funds, taxation, government spending, and/or overall economic practices represented by yourself and/or the local, state, or general government. (Select one)

○ Very Conservative (1)

○ Conservative (2)

○ Moderate (7)

○ Liberal (8)

○ Very Liberal (4)

○ Prefer not to say (5)

End of Block: Demographic information

Start of Block: Final input

Q34 Thank you for completing the questionnaire. Your responses are a valuable part of our research. Please enter any additional comments that you may have regarding the topics raised in this survey

_____
_____
_____
_____
_____

End of Block: Final input

BIOGRAPHY OF THE AUTHOR

Abby grew up in and have lived most of my life in the Oxford Hills region of Maine. She graduated from UMaine in 2018 with a degree in financial economics. In the three years that followed, she worked at an investment consulting firm in Boston as a fund manager research analyst and then at a local bank in Portland as a credit analyst. During this time, she volunteered at a local land trust, Western Foothills Land Trust, identifying and successfully applying for a grant that helped the land trust develop a "farm to town" trail to connect Norway's main street directly to recreational trails. This work inspired her to return to graduate school to pursue a master's degree in ecology.

Abby grew up canoeing, Nordic skiing, and hiking in the Maine woods and waters, with regular trips to the Allagash Wilderness Waterway. This love for the outdoors never left her, and in her free time she can be found trail running or backcountry skiing in the White Mountains and Western Maine.

Abby is a candidate for the Master of Science degree from the University of Maine in December 2023.