State of Maine’s Environment 2007

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The State of Maine’s Environment is a series of reports written and produced by the Colby Environmental Policy Group, senior environmental policy majors at Colby College in Waterville, Maine. This is the third State of Maine’s Environment report created by students enrolled in ES 493: Environmental Policy Practicum taught by Philip J. Nyhus, Assistant Professor of Environmental Studies at Colby College.


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Executive Summary

The students in ES 493 Environmental Policy Practicum were presented with a challenge: to plan, develop, and execute a comprehensive, collaborative class study of the State of Maine’s Environment. This is the third year the seniors in the ES Policy capstone course have tackled the issue, and this semester our class shifted the focus to broader policy based concerns in Maine. Our goal was to determine current status of the state’s environmental policy, its direction, and the policy options and responses available. Our final product is a compiled report of all the topics and includes trends, the state of the environment today, as well as forecasts and recommendations for the future.

We used a mix of classroom and field-based learning to broaden our understanding of the subject. We spent the early part of the semester reading and discussing past and current environmental issues in Maine. The lectures and speakers emphasized the interconnectedness of the wide variety of policies, laws and actors involved in shaping Maine’s environment. In the field, the class traveled around the state of Maine, meeting with key actors and gaining different perspectives on the tough issues. From these experiences, we were able to develop and frame our approach. To meet the experts, groups took field trips to Augusta where we met with people from the Maine Department of Environmental Protection, the State Planning Office, the Department of Conservation, Land Use Regulation Commission, and others.

We used a Geographic Information System, or GIS, to gather relevant data to create maps. Other data for the report were collected from primary sources. In depth analysis of these data resulted in specific policy suggestions for each of the issues detailed in the report. These issues consisted of four themes: Energy, land use planning & development in southern and coastal Maine, land use and resource access in northern Maine, and environmental attitudes in Maine.

The energy group examined the trends, actors, and legislation for renewable and non-renewable energies in Maine. They identified climate change as a key environmental issue facing energy policy, and examined CO₂ emissions, green energy supply, and energy efficiency as possible consumer-side solutions. The land use planning and development group addressed the issue of sprawl in southern and coastal Maine. Trends here reflect national transitions: rural and agricultural land is decreasing and areas surrounding service centers are suburbanizing, with significant environmental consequences. The land use and resource access group examined changes in landownership in Maine’s northern forests. The natural landscape of LURC’s jurisdiction has been especially important for the timber industry, public access for recreation, and expansive wildlife habitat. With the rapid changes in landownership since the 1980s, the future of this area is uncertain and will surely impact Maine’s character. Local environmental attitudes and interests towards environmental issues were explored by the final group. Through a survey, this group sought to capture the feelings of Maine’s people about issues involving their access to Maine’s land and value of natural resources in terms of their economic, recreational, and ecological benefit.
State of Energy

Currently, natural gas is the leading source of electricity in Maine. Since natural gas is the least environmentally damaging of the non-renewable energy sources, it is a good fuel to use during the transition to renewable energy. Wind power has also been increasing, and within five years could produce enough electricity to power 50% of the homes in the incorporated municipalities. Another way to lessen the environmental impact of energy is to reduce consumption. To this end, Maine law is beginning to encourage efficient energy use. Finally, although green energy products do exist, they do not yet have a large impact on energy consumption because the average Maine consumer is not very familiar with them.

State of Land Use, Planning, and Development

Population growth is low in both service centers and rural areas. This is leading to steadily increasing trends of suburbanization and sprawl. Furthermore, most of the construction of new houses and new businesses is taking place in the suburbs. Housing unit growth was found to be negative or very small in many service center communities, and new development permits have been located primarily in suburban townships. Maine’s rural areas, which are an important part of the culture of the state, are struggling economically. We found that municipalities with higher levels of rural character are more likely to have low incomes, high poverty rates, and high unemployment. On the coast, property values have been rising dramatically. This poses a threat to traditional public and commercial access to the coast.

State of Land and Resource Use in the Unorganized Territory

Pressures in the North Woods continue to force changes in traditional land and resource uses. The change in land ownership has resulted in the replacement of large industrial timberland owners with a new class of investor owners. In response to these trends, Maine has taken advantage of financial incentives to promote sustainable forest management practices and reduce land conversion. Although the state has increased land acquisition efforts through programs like Land for Maine’s Future, the amount of public land in the North Woods still pales in comparison to the vast acres of privately owned land and is unlikely to meet the growing demand for outdoor recreational access. Finally, habitats are at risk due to forestry practices, increased access, parcelization, and market pressures for development.

State of Environmental Attitudes

The survey showed that most Mainers are interested in and aware of environmental issues that affect their community and state. However, we found that while Maine residents are concerned about the environment, in most cases recreational access and economic well-being is prioritized over the health of the environment. Finally, although Maine has shifted to more of a service-based economy, natural resources still play an important role in the culture and identity of Maine.
Recommendations

Based on our findings, we came up with several recommendations for future environmental policy in Maine. For energy, we recommend the continued use of natural gas while the infrastructure for renewable energy continues to be developed. In the long run, the use of renewable energy sources should be increased, partly through expanding the production of wind power. Meanwhile, initiatives that encourage energy efficiency and the promotion of green energy products should be continued. Land use, planning, and development in southern and coastal Maine benefit from more cooperative and indirect methods of planning. The Gateway 1 project is a good example of municipal governments working together to solve a common problem. Other indirect policy mechanisms include transfer of development rights, and downtown revitalization projects. Policies involving land and resource use in the unorganized territory should involve LURC zoning, which is an important policy tool that could be used more effectively to guide development, conservation, and specify land use objectives within the jurisdiction. Also, the state should take full advantage of taxation schemes and penalties which create financial incentives for sustainable land use practices. Finally, we suggest that a management body be established to oversee and catalog easements and conservation efforts throughout the state and provide guideline to define easements. Finally, if policies are made while considering the opinions of Mainers these policies are more likely to be accepted and therefore will be easier to implement. It is also clear from the survey that recreational use and access to Maine’s land must be considered in future policy development.
The State of Maine’s Environment 2007: Introduction

This report was written by senior Environmental Policy majors in the Environmental Studies Program at Colby College, Maine. As part of the requirement for our senior environmental policy capstone course, we were asked to write a collaborative report to assess the state of Maine’s environment in 2007. This is the third year that the senior environmental policy majors in the Environmental Policy Practicum course at Colby College have tackled this issue. Our goal was to evaluate the current state of Maine’s environment and examine potential future policy options and responses.

Our research was framed around subjects that are important to current environmental policy challenges in Maine. As a group we decided to focus on the following four themes: energy, land use planning and development, land and resource use in the Unorganized Territory, and Mainers’ attitudes toward the environment. All of these areas have changed significantly since the 1970s, with important implications for Maine’s environment. We divided into four teams, and each team wrote a collaborative chapter. In each chapter we identify statewide and regional trends and provide a comprehensive analysis of the State of Maine’s Environment. We identify key stakeholders, laws, and institutions. Finally we forecast future scenarios and conclude with a series of specific policy recommendations based on our findings. The following is an overview of what is covered in the report.

Maine faces a unique set of challenges and opportunities within its energy sector. Both non-renewable and renewable energy sources have played an important role throughout the state’s history. The state is endowed with potential sources of renewable energy, including hydropower and biofuel. However, Maine is still heavily dependent upon non-renewable energy sources such as home heating oil. Concerns about climate change and air pollution are influencing the consumption of energy. Specifically by increasing efficiency and purchasing clean energy from alternative renewable resources.

One of the most important environmental issues in southern and coastal Maine is sprawl. In Maine, and across the country, rural areas are decreasing as suburbs surrounding urban service centers are increasing. The environmental challenges that result from this development are numerous, and will likely have a significant impact on Maine’s economy because of the state’s heavily reliance on the quality of its natural resources.

Northern Maine is also in a state of transition. The state of Maine’s environment is tied to the uncertainty facing this region. The Unorganized Territory are sparsely populated and heavily forested, with a remote and wild character atypical of the heavily developed northeast region of the United States. This region is important for Maine’s timber industry, public access for recreation, and wildlife. Rapid and significant changes in land ownership, and pressure from new landowners to change historic land and resource use patterns, are forcing the state to tackle the challenge of balancing competing visions for Maine’s future.

Finally, Maine’s population is changing along with its landscape. As newcomers arrive, the identity of “Mainers” is less easy to define. Historically, residents in Maine have valued their natural resources for economic, recreational, and ecological reasons. Today, Maine’s population is being challenged to balance these competing values. It is important to consider the attitudes of Maine’s residents when creating policy in order for its successful implementation.
We used a variety of tools and resources to undertake our studies. Primary and secondary literature reviews provided the foundation for our analysis. We collected data from a wide variety of sources and used a Geographic Information System (GIS) to create maps, and spreadsheets and statistical software to identify indicators and trends that illustrate the state of Maine’s environment within each category. The students studying environmental attitudes in Maine used a phone and in-person survey to better understand the attitudes and perceptions of Maine residents toward these issues. All of us contacted experts at environmental organizations, state agencies, and others.

This is a momentous period in Maine’s history as the state faces transitions that may fundamentally alter its character, and its future. In the energy sector, Maine could rise as a national leader in the use of renewable energy sources. Suburbanization and development of southern and coastal areas could permanently change the landscape of the area. In northern Maine the future of the vast forested areas is uncertain because of the rapid changes in land ownership. In the context of statewide transitions, the attitudes of Mainers to their environment will be directly related to the future of Maine’s environment. Each of these issues will have a key role to play in the future of Maine’s environmental policy.
The State of Energy

Joel Alex, Jeff Carroll, and Jake Pinkston

Executive Summary

The State of Energy in Maine, the first of four chapters in The State of Maine’s Environment 2007, focuses on the state of Maine’s energy policy and its relation to the environment. We characterize historical trends in non-renewable and renewable energy consumption, and we identify and describe the significant laws, institutions, and actors that influence Maine’s energy policy. Climate change is currently one of the most prominent environmental energy concerns. Our study evaluates carbon emissions in Maine and consumer-side policy options for CO$_2$ reduction.

Our analysis shows that non-renewable energies account for the largest proportion of Maine’s energy consumption. Natural gas is the cleanest option and is currently the largest source of electricity in the state. For home heating however, Maine’s reliance on oil is high. In order for natural gas to supply a greater proportion in this sector, the gas supply and pipeline infrastructure must increase. Renewable energy consumption is rising in Maine, although significant infrastructure and policy obstacles must be overcome before it can be widely accepted and implemented. Wind power shows the greatest potential for future renewable energy resources in Maine. Maine should continue pursuing reductions in CO$_2$ emissions. This can be accomplished by increasing the state’s Renewable Portfolio Standard to a more challenging level and boosting the underdeveloped market demand for “green energy products”. Energy efficiency is another strategy for lowering CO$_2$ emissions and is beginning to be successfully promoted in Maine.

We identify three possible scenarios for energy in Maine: the ineffective status quo, a successful implementation of current policies, and finally, an increase in policies promoting renewable energies. We recommend that in the near term natural gas be used as a transition fuel, but in the long term the state should promote the utilization of its renewable energy resources through state incentives. This, in addition to the promotion of green energy products and increased energy efficiency, would help Maine lower its CO$_2$ emissions in its efforts to mitigate climate change.

Introduction

The state of energy in Maine is changing due to internal and external pressures. As Maine updates and expands its infrastructure to meet growing demand, it faces important decisions concerning the future sources of its energy. Energy deregulation, integrated regional infrastructures, and changes in federal policy mean that Maine’s supply choices are and will increasingly be made out of state$^1$. For example, Maine’s current energy portfolio includes petroleum from the Middle East, natural gas from the Caribbean, and hydroelectric power from neighboring Canadian provinces.
Globally, concern about climate change has become a central issue driving changing patterns of energy production and consumption. Today, 80% of the world’s energy needs are met by the combustion of fossil fuels. This combustion releases 25 billion tons of carbon dioxide (CO₂) annually into the atmosphere. This poses a considerable threat to the environment; CO₂ is the major greenhouse gas contributing to current human induced climate change. Maine’s electricity industry produces 15 million metric tons of CO₂ emissions annually, and in response, the state has begun to take serious steps to mitigate its CO₂ emissions.

In this study we asked: How has energy production and consumption in Maine changed over time? Is Maine making progress towards climate change mitigation? How might Maine’s energy consumption patterns change in the future? What policies are available that could positively influence these trends? We address these questions by focusing on consumption trends of non-renewable and renewable resources over the past half century. We begin by identifying the events which have shaped these trends, and discuss their possible implications for Maine’s energy future. We also identify the laws, institutions, and actors that influence each individual energy source as well as the larger pattern of energy consumption in Maine.

We focus primarily on the electricity and home heating sectors, which account for approximately 80% of Maine’s energy consumption. Energy used for transportation is also important, and accounts for roughly 20% of Maine’s total energy use, but it is not the primary focus of this paper. We compare Maine’s CO₂ emissions to regional and national emissions. Finally, we explore the potential role of Maine energy consumers to influence climate change mitigation efforts through the purchase ‘green’ power and by increasing energy efficiency.

We conclude by presenting three scenarios for Maine’s energy future, and discuss how different political climates and policies could influence these distinct scenarios.

**Non-renewable Resources**

**Trends and Current Status**

**Historical Consumption Trends and Current Status**

The vast majority of the energy consumed in the United States comes from non-renewable sources. For the past 50 years, it has equaled about 94% of the country’s energy consumption (Figure 1.1). In New England, it is a smaller but still significant share, accounting for 82% of energy consumed (Figure 1.2). Maine has a lower dependence on non-renewable energy, with 32% of its energy coming from sources other than fossil fuel and nuclear (Figure 1.3). To further understand these domestic trends, we describe consumption by type of fuel used.

**Coal**

The use of coal in the US propelled the Industrial Revolution in the 19th century, but dropped precipitously in the early to mid-1900s with the ascent of petroleum as the nation’s leading energy source (Figure 1.1). However, coal has remained the leader in the electricity sector, consistently producing at least 50% of the electrical power America consumes for the last 50 years (Figure 1.6). It is the country’s most abundant and inexpensive hydrocarbon resource.
New England and Maine are a stark contrast to the rest of the nation, both consuming on average less than 10% of their energy from coal in the past half century (Figure 1.2 & Figure 1.3). This trend is a reflection of the lack of in-state sources and the proximity to out of state coal mines. The messy nature and high bulk-to-energy output ratio coal compared to other fossil fuels has likely dissuaded use as well. In the 1990s, Maine began consuming electricity from coal fired power plants, but this is generated outside the state (Figure 1.8). There is currently a proposal by Point East / Twin Rivers to build a coal gasification plant in Wiscasset on the site of the now decommissioned Maine Yankee Nuclear Power Plant. Local support is thin however, and considering that initial zoning approval was recently voted down in the November 2007 election referendum, it is unlikely to occur.
Petroleum

Of all non-renewable resources, petroleum is the most versatile. Countless fuel and non-fuel products are derived from petroleum. As a result, it is consumed twice as much as its nearest competitor nationally and regionally. This has been the trend for the last five decades since it overtook coal as the nation’s most consumed energy source in 1949 (Figure 1.1). Consumption in the US has since tripled, and that steep rise shows no sign of slowing, even with decelerating production.

![Figure 1.3 Maine Energy Consumption by Source from 1960 to 2006 (%)](image)

Home heating oil replaced coal in the 1920s as a cleaner, less work intensive, and more efficient alternative fuel. It is part of the distillate fuel family, similar in properties to diesel fuel. While only 9% of Americans use fuel oil to heat their homes, 55% of New England households use the distillate fuel. The state of Maine leads the country with 80% of its households burning fuel oil.

In New England and especially in Maine, fuel oil has been the major source for home heating because of the cold winters, its ease of transportation and storage, and a lack of access to natural gas pipelines. Because of fuel oil’s low national demand, production is not always consistent, especially in the summer months when overall consumption is low. This can cause supply to run low, especially during the winter months, resulting in price spikes and shortages. Maine’s high demand for fuel oil puts it especially at risk, but strategic reserves and prepay programs, which lock in the price before winter starts, have been created to respond to this concern.

Petroleum is also used to generate electricity, although not on a large scale in the United States. The power plants burn what is known as petroleum residuum, the heaviest product from the refining process that has no other real use. While it made up about an eighth of US...
consumption in the early 1980s, petroleum generated electricity has since fallen off to under 2% (Figure 1.6). This trend will likely continue with the rise of oil prices.

In New England and Maine, petroleum has played a much larger role in the electricity sector. New England’s consumption rose sharply to over 70% from 1965 to 1973 as coal use fell. Use has declined since then, congruent to national trends (Figure 1.7). During the 1960s, electricity consumed from petroleum in Maine peaked at 65% but dropped off drastically after the opening of Maine Yankee Nuclear Power Plant (Figure 1.8). The largest capacity power plant in Maine, the William F. Wyman in Yarmouth, runs on petroleum and has a net summer capacity of over 800 MW. Petroleum electricity made a resurgence to fill the electricity void left after the closing of Maine Yankee, climbing to over 35% of the state’s electricity consumption, but decreased rapidly after the year 2000. It now accounts for only 5% of the state’s total consumption of electricity (Figure 1.5).

**Natural Gas**

While natural gas was used at a small scale as early as 1816 for street lighting, it was not until after World War II that advances in metallurgy and construction technology allowed for commercial development. Its use in the US grew significantly through the 1960s, peaking at a 33% of all domestic energy consumption (Figure 1.1). This led to investment in expanding infrastructure. Price irregularities and a number of gas shortages due to in part to overregulation led to a decline in consumption in the next few decades (Figure 1.4). This fall has stabilized in recent years with gradual deregulation of the industry. Natural gas is the preferred fuel for home heating, utilized by 51% of US households. It represents a significant source of electricity production, accounting for nearly 20% of the nation’s consumption (Figure 1.6).
New England’s consumption of natural gas has been comparatively lower for most of the 20th century. It rose noticeably in the late 1980s as pipelines began connecting parts of the region to production facilities in the southern US and Canada (Figure 1.5). 37% of the households in New England use natural gas for home heating, well below the nation average.

Maine entered the natural gas market much later than the rest of the nation, consuming almost no natural gas before the new millennium (Figure 1.3). In 1999, the Portland Natural Gas Transmission System, which connects from the New Hampshire border, and the Maritimes & Northeast Pipeline, which enters from the New Brunswick boarder, brought Maine into the North American Natural Gas Pipeline Network. In 2000, five new electrical generation plants went online, and natural gas became the state’s most consumed source of electricity in Maine, maxing out at 57% of total electricity consumption (Figure 1.8). High prices in a volatile gas market, however, have resulted in a recent drop in consumption (Figure 1.5). It is currently holding at 42%.

As a source for home heating, natural gas is used by only 4% of Maine households, due to its new status, high cost to change system, and limited infrastructure access within the state. Multiple requests to build Liquefied Natural Gas Terminals along the coast of Maine have been submitted to the Federal Energy Regulatory Commission. State license requests have also been submitted, most notably by Quoddy Bay LNG and Downeast LNG, who are planning to build facilities in the towns of Pleasant Point and Perry, and Robbinson, Maine respectively. This has been the source of contentious debate as communities weigh environmental and security concerns against the need for economic development.
Nuclear

In the period after the end World War II, the United States developed plans for civilian nuclear power. In 1957, the Shippingport Nuclear Power Plant went online in Pennsylvania, the first of over 100 large-scale commercial nuclear power plants that would be built in the United States over the next 30 years. US consumption of electricity from nuclear power jumped from 1% in 1968 to 13% in 1977, then grew more gradually before leveling out around 20% from the early 1980s onward (Figure 1.6).

Figure 1.6 US Electricity Consumption by Source from 1950 to 2006 (%)

New England’s first nuclear plant was built in 1960 on the Deerfield River in Rowe, Massachusetts, and consumption of nuclear power increased rapidly for the next 15 years as more plants came online in the region. Nuclear power has contributed about 30% of New England’s electricity since then (Figure 1.7). In 1972, Maine built its own nuclear power plant, Maine Yankee, in Wiscasset. Maine Yankee dramatically changed the face of the state’s electricity production, supplying over 60% of the state’s electricity within three years of opening (Figure 1.8).

However, the nationwide flurry of proposals and orders for new plants ceased after a partial meltdown at the Three Mile Island Nuclear Power Plant in 1979. Fears of nuclear power’s dangers were confirmed a decade later when the Chernobyl disaster devastated the Ukraine.
Maine nuclear power was also facing a crisis during this period. In response to the apparent dangers, public referenda were introduced to close Maine Yankee in 1980, 1982, and 1987\textsuperscript{20}, but were defeated. Poor maintenance of the facility resulted in the cracking of the plant’s steam generator pipes, forcing the plant to close for repairs in 1995\textsuperscript{21}. Although it reopened in 1996, the plant was closed permanently in 1997 because the state’s deregulation of the electric utilities, which began that year, would have made the plant uneconomical to run. Consumption of nuclear electricity in Maine fell to zero (Figure 1.8). In 2005, decommissioning was completed and the site is now looking at proposals for development. However, the spent fuel rods from the reactor still remain on the premises in dry casks, awaiting removal by the US Department of Energy to a yet to be determined nuclear waste dump\textsuperscript{19}. In March of 2007, the Maine legislature passed LD 1851, Item 7, which established the Maine Nuclear Power Council. The purpose of the council is to investigate the need for carbon-free substitutes for power generation, opening up the possibility of a new nuclear facility in Maine’s future\textsuperscript{22}. 

Figure 1.7 New England Average Electricity Consumption by Source from 1960 to 2006 (%)\textsuperscript{6}
Stakeholders

There are several key stakeholders involved in Maine’s non-renewable energy policy. These include federal and state government actors, the regional transmission organization (RTO), power and fuel oil companies, special interest groups, and Maine energy consumers.

**National**

Several federal departments and agencies are responsible for developing and implementing US energy policy, which impacts energy policy in Maine. They are given their mandate and direction by either the President or the Congress through the subcommittees in the two house’s respective Committees on Energy (Table 1.1). The Federal Energy Regulatory Commission (FERC) regulates the interstate transmission of electricity, natural gas, and oil. It played an important role in the deregulation of Maine’s utilities and the extension of natural gas pipelines into Maine. The construction and decommission of the Maine Yankee Nuclear Power plant was done under the regulations and oversight of Nuclear Regulatory Commission (NRC). Maine is currently negotiating with the Department of Energy over the remaining spent fuel rods that remain at the Wiscasset site, which the DOE was contracted to remove a decade ago. The Energy Information Administration (EIA) compiles national and state energy data, which are cited in many Maine legislative proposals. The EPA regulates emissions under the Clean Air and Clean Water Acts and dictates where new facilities such as power plants can be cited.
Table 1.1 Description of Federal Government Actors in Non-Renewable Energy

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<td>Forms groups cabinet groups to develop initiatives concerning national energy policy direction. These have recently included the National Energy Policy Development (NEPD) Group and the Advanced Energy Initiative</td>
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<tr>
<td>House Energy Subcommittee on Energy and Air Quality</td>
<td>Oversees national energy policy generally, including: non-renewable and renewable energy; energy conservation; information; regulation and utilization; interstate energy compacts; nuclear energy and waste; and The Clean Air Act.</td>
</tr>
<tr>
<td>Senate Energy and Natural Resources Subcommittee on Energy</td>
<td>Oversees and legislates non-renewable and renewable, non-water sources of energy, climate change; utility policy; strategic petroleum reserves; oil and gas pipeline transportation systems within Alaska; energy production, refining, distribution, regulation, research, development and conservation.</td>
</tr>
<tr>
<td>Senate Energy and Natural Resources Subcommittee on Water and Power</td>
<td>Oversees and legislates power marketing administrations; energy development impacts on water resources; groundwater resources and management; hydroelectric power; low head hydro; and energy related aspects of deepwater ports.</td>
</tr>
<tr>
<td>Department of Energy (DOE)</td>
<td>A cabinet level department that sets energy policy, funds research and is in charge of nuclear safety.</td>
</tr>
<tr>
<td>Federal Energy Regulatory Commission (FERG)</td>
<td>An independent agency under the DOE that regulates the interstate transmission of electricity, natural gas, and oil. It also regulates natural gas and hydropower construction.</td>
</tr>
<tr>
<td>Energy Information Administration (EIA)</td>
<td>The statistical agency of the DOE, it provides policy-independent data, projections, and analyses to promote public understanding, solid markets, and good policy making.</td>
</tr>
<tr>
<td>Nuclear Regulatory Commission (NRC)</td>
<td>An independent agency that regulates commercial nuclear power plants and other uses of nuclear materials (nuclear medicine), through licensing, inspection and enforcement of its requirements.</td>
</tr>
<tr>
<td>Environmental Protection Agency (EPA)</td>
<td>Non-cabinet agency charge to protect human health and the environment through development and enforcement of policy, funding grants, education, and research.</td>
</tr>
</tbody>
</table>

**State**

At the state level, Maine’s energy policy is organized around the Energy Resources Council, which was created in 2002 by the Maine Legislature to facilitate coordination among agencies with regard to energy policy making. The Council is made up of nine agencies (Table 1.2). Their decision making is done according the 10 Principals of Maine Energy Policy, which they drafted when the Council was founded. The 10 Principals promote values of competitive pricing, security, reliability, environmental protection, and public information in regards to energy policy in the state of Maine. The Maine Public Utilities Commission (MPUC) has the most hands-on role of the Committee in executing policy, regulating the electrical, natural gas, telephone, water, and ferry services. The Public Advocate represents the interest of the ratepayers under the MPUC, posting recommendations concerning utilities policy and filing complaints. These two agencies’ work is coordinated through the governor’s office and the state legislature’s Joint Standing Committee on Utilities and Energy.
<table>
<thead>
<tr>
<th>Actor</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Governor of Maine</td>
<td>As head of his administration, works to direct and promote energy policy initiatives for the state and meets with other governors to cooperate in regional projects.</td>
</tr>
<tr>
<td>Joint Subcommittee on Utilities and Energy</td>
<td>Committee of three senators and ten representatives that oversees state energy policy, including: energy resources and efficiency; electric industry; natural gas industry; Public Utilities Commission; Office of the Public Advocate; and Energy Resources Council.</td>
</tr>
<tr>
<td>Maine Public Utilities Commission</td>
<td>Regulates electricity, gas, telecommunications, water, and ferries in the state. Three appointed members charged with overseeing the operations of utilities and reporting violations to the attorney general.</td>
</tr>
<tr>
<td>Public Advocate</td>
<td>Represents Maine utility consumers in issues under the jurisdiction of the MPUC, promoting affordable, quality energy.</td>
</tr>
<tr>
<td>The Commissioner of Environmental Protection</td>
<td>Head of Maine Department of Environmental Protection. The department is mandated to prevent, abate and control pollution while preserving, improving and preventing diminution of the state’s natural environment.</td>
</tr>
<tr>
<td>The Commissioner for Transportation</td>
<td>Head of Department of Transportation, which oversees the construction, repair, safety, and usage of Maine’s roads.</td>
</tr>
<tr>
<td>Commissioner of Administrative and Financial Services</td>
<td>Head of Administrative and Financial Services, which performs a host of fiscal, administrative, training, maintenance, IT, and postal services while overseeing the state lottery and alcohol tax.</td>
</tr>
<tr>
<td>Commissioner of Economic &amp; Community Development</td>
<td>Head of the Department of Economic &amp; Community Development, which is the umbrella organization to the offices of Tourism, Business Development, the International Trade Center, Community Development, Film and Innovation and Science.</td>
</tr>
<tr>
<td>Commissioner of Conservation</td>
<td>Head of Department of Conservation, a natural resource agency that oversees the management, development and protection of forestland, unorganized territory, parks, historic sites and public reserved land.</td>
</tr>
<tr>
<td>Director of the Maine State Housing Authority</td>
<td>Head of Maine State Housing Authority, which bridges public and private financing to assist Mainers in obtaining and maintaining decent, safe, affordable housing, targeting low to middle income families.</td>
</tr>
<tr>
<td>Director of Main State Planning Office (Chair)</td>
<td>Head of the State Planning Office, which advises the governor, state legislature, regional and local entities on development through research and technical expertise.</td>
</tr>
</tbody>
</table>

**Regional Transmission Organizations**

The regional transmission organization, Independent System Operator - New England (ISO-NE), operates the region’s bulk electric power system, controlling generation and flow of electricity across high voltage interstate transmission lines. Originally established as the New England Power Pool (NEPool), the central dispatch station of the region, deregulation policies in the mid-1990s expanded its role to managing the newly created power markets and the bulk electric power being bought, sold and traded. Many Mainers are currently unhappy with the current system. The Maine legislature commissioned a report that was given to the Utilities and
Energy Committee in 2007, which investigated perceived transmission, generation and price inequities within the current structure. It also examined and concluded favorably on the proposal to leave ISO-NE and develop a power market with one or more of the Canadian Maritime Provinces, establishing a new RTO. One of the most substantial arguments for such a move is it would increase efficiency and balance within the grid in both regions because peak load occurs in the winter in the Canadian provinces and in the summer in Maine. ISO-NE is discouraging the withdrawal, and there are several barriers and questions to be answered because of the international nature of the cooperative, such as the implications of NAFTA rules.

**Companies – Power and Oil**

The power companies in Maine are split between suppliers and distributors, which was required by deregulation in the late 1990s. The suppliers produce and sell energy to the distributors, who deliver it to the customers and are required to maintain the electricity infrastructure. Supply is competitive but distribution remains a monopoly, with service divided into regions. There are three main distributors: Bangor Hydro-Electric Co., Maine Central Power, and Maine Public Service Co. There are a variety of suppliers, the largest including Florida Power and Light, Constellation, Dominion, and TransCanada.

The fuel oil suppliers tend to be small, family businesses that buy from larger suppliers and deliver the fuel oil by tanker. Fifty Maine fuel oil businesses advertise on the Yellowpages.com, and many are members of the Maine Oil Dealers Association, which advocates for its 450 members and promotes the petroleum industry.

**Interest Groups**

Interest groups also play a role in Maine’s energy policy. Through grassroots lobbying, political action committees, education campaigns, and media events, these groups have made their views known about how Maine should frame its energy policy, especially concerning nonrenewable sources and the environment. They represent a broad spectrum of positions and politics, including industry groups (Maine Petroleum Association, the Maine Oil Dealers Association), law firms (Pierce Atwood, LLP), economic promoters (the Chamber of Commerce), and environmental groups (Natural Resources Council of Maine, Environment Maine). Interest groups have been particularly active in regards to the LNG proposals along Maine’s coast, advocating strongly on both sides of the argument.

**Maine Consumers**

The consumer is a very important stakeholder, especially now that they have a choice in what energy they buy. This is discussed in greater detail in the later in this section.

**Laws, Institutions and Management**

Laws, institutions and management play a key role in framing Maine’s energy policy with respect to non-renewable sources. We will distinguish them by Federal (Table 1.3) or State (Table 1.4) levels.
The federal government has taken an active role in regulating non-renewable energy since it passed the Public Utility Holding Company Act in 1935, effectively breaking up large energy conglomerates that were poorly managing the country’s energy and overcharging their customers. As natural gas became economically viable, Congress began regulating it as well. The development of civilian nuclear power was spurred by the federal initiatives. While initially the country’s energy policy was rather restrictive, subsequent legislation aimed to open up the energy industry and encourage more energy development. However, the federal government has still maintained a strong oversight power, a source of conflict with the states.

The Price-Anderson Act in 1957 reduced the liability of nuclear power producers in the event of a nuclear accident, which in part led to a rapid expansion in nuclear plant requests and construction during the next two decades. Eager to respond to the oil crises of the 1970s, Congress passed the 1978 National Energy Act, which carried with it five different sections. The most important to non-renewable energy were the Natural Gas Policy Act and the Public Utility Regulatory Policies Act (PURPA). The Natural Gas Policy Act gave FERC authority over inter- and intrastate gas production and established price ceilings to keep the fossil fuel affordable with the goal of expanding consumption. PURPA required electric utilities to increase their conservation and efficiency while providing equitable rates for consumers. It was instrumental in breaking the monopoly that the large utilities had on the power grid and paved the way for the expansion of renewable energy, which will be discussed later in this chapter.

These new players in the market were further encouraged by the passing of the 1992 Energy Policy Act. The act created a new category of electric producer, the exempt wholesaler, further opening up development of non-utility electrical generation. The subsequent FERC Order 888, in an attempt to reduce consumer costs, required that the wholesale transmission of electric energy be unbundled from the sale of power, essentially separating the power lines and the power plant. This initiated the nationwide deregulation of utilities that Maine took part in. The year 2000 marked the creation of the Northeast Fuel Reserve to guard against shortages in the event of an unexpectedly harsh winter, an important piece of legislation for the state that consumes more fuel oil than any other.

The latest major piece of federal energy legislation concerning non-renewable resources is the Energy Policy Act of 2005. It is heavily supportive of fossil fuels, allocating a large amount of funds to oil and gas exploration and production, coal technology, and nuclear expansion. It also empowers FERC with even greater oversight capabilities, a reflection of the recent disaster with the California utilities. Controversially, the act revokes PUHCA, with the hope that it will open utilities to much needed investment and encourage expansion of infrastructure. There are current proposals in the Maine legislature revoke similar state laws. However, any new mergers will have to be monitored lest there is a regression back to the oversized, poorly run utilities of the past.
<table>
<thead>
<tr>
<th>Law</th>
<th>Year</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Utility Holding Company Act</td>
<td>1935</td>
<td>Broke up large, corrupt PUHC trusts that controlled the electric industry, giving what would be FERC regulatory control over them and requiring transparency and complete focus on utilities, pushing out non-utilities from the market.</td>
</tr>
<tr>
<td>Natural Gas Act</td>
<td>1938</td>
<td>Gives FERC authority to set rates for transmission of natural gas in interstate commerce. FERC may give permits for companies to charges customers for some of costs of building pipelines.</td>
</tr>
<tr>
<td>Price-Anderson Act</td>
<td>1957</td>
<td>Provides system which significantly reduces liability in the event of a nuclear accident.</td>
</tr>
<tr>
<td>Public Utility Regulatory Policies Act (PURPA)</td>
<td>1978</td>
<td>Requires increased conservation/efficiency by electric utilities with equitable rates, improved whole sale distribution and reliability of electricity and increased hydropower. Utilities must interconnect and buy whatever amount and capacity is offered by qualified facilities.</td>
</tr>
<tr>
<td>Natural Gas Policy Act</td>
<td>1978</td>
<td>FERC has authority over inter and intra state gas production. Established price ceilings with eventual phase out, which resulted initially in shortages farther from the source and later extremely high prices.</td>
</tr>
<tr>
<td>Natural Gas Wellhead Decontrol Act</td>
<td>1989</td>
<td>Removed all price ceilings, although effect minimal as most prices below ceiling at this point.</td>
</tr>
<tr>
<td>Energy Policy Act (EPACT)</td>
<td>1992</td>
<td>Creates new category of electric producer, the exempt wholesaler, further opening up development of non-utility electrical generation.</td>
</tr>
<tr>
<td>FERC Order 888</td>
<td>1996</td>
<td>Requires wholesale transmission of electric energy be unbundled from the sale of power.</td>
</tr>
<tr>
<td>Energy Policy Act of 2005</td>
<td>2005</td>
<td>Mandates cleaner coal use, increased oil and production, technological development improving extraction of oil and in finding ways to use coal to replace oil, encourage nuclear energy expansion. FERC is given expanded authority it to prevent abuses. Streamline PUHCA to open up utilities to investment and encourage expansion of infrastructure.</td>
</tr>
</tbody>
</table>
**State**

Maine’s recent legislative initiatives have been focused on moving away from non-renewable resources\(^{34}\). This trend is largely due to concerns over climate change and energy security but would not be possible without deregulation. The deregulation of Maine’s utilities, which required the power companies to sell off their generation assets so that consumers could buy competitively priced energy, began in 1996 with the goal of retail competition by March of 2000. In 1997 the plan went on the legislation docket. The three major power companies submitted plans for divesting, which were then approved by the PUC. New itemized billing systems separated generation and delivery costs. The standard service price would be set by bidding, rather than the typical predetermined command price. This failed in the first round because the prices were too high. While prices initially rose after deregulation, they have since fell to below previous rates, although Maine continues to have some of the highest energy costs in the country\(^{12}\).

The legislation that Maine has enacted with respect to non-renewable fuel has focused primarily on protecting Mainers (See Table 4). In the pursuit lowering consumer costs, the Legislature has passed a resolve in 2007 that the Maine Public Utilities Commission should promote the use of “smart meters,” which will charge different electric rates depending on the time of day, and report their findings. They have also empowered the MPUC to enter into long term contracts with transmitters and distributors, thus preventing unfavorable regional capacity requirements, which could increase prices for Maine consumers. The state Senate and House of Representative have funded programs to subsidize low income and elderly heating costs across the state as well\(^{35}\).

<table>
<thead>
<tr>
<th>Law</th>
<th>Year</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>An Act to Restructure the State's Electric Industry</td>
<td>1997</td>
<td>To provide effective competition in the generation and sale electricity market, each investor-owned electric utility must divest all generation assets and business activities, thus creating a competitive generation market while retaining a monopolistic transmission system.</td>
</tr>
<tr>
<td>Resolve, To Reduce Energy Costs for Consumers</td>
<td>2007</td>
<td>MPUC will promote the use of smart meters and report back by January 2008 to the Joint Subcommittee on Utilities and Energy, who may then propose legislation.</td>
</tr>
<tr>
<td>An Act To Ensure That Maine Residents Have Reliable Winter Heating Assistance</td>
<td>2007</td>
<td>Appropriates $17 million per year in fiscal year 2007-08 and 2008-09 to the Maine State Housing Authority for the Low Income Home Energy Assistance Program,</td>
</tr>
</tbody>
</table>

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Table 1.4 Description of Maine State Laws and Statutes Relevant to Non-renewable Energy

---

21
Renewable Resources

Trends and Current Status

The United States suffered two severe shortages of oil imports in 1973 and 1979. The Organization of Petroleum Exporting Countries (OPEC) restricted oil supplies in 1973 to states which supported Israel in the Yom Kippur War, the result of which drove the price of oil to a point where people felt a considerable strain. In addition to the expensive prices posing a problem for consumers, many politicians felt that relying on foreign imports of fossil fuels posed a considerable national security threat. This movement developed the beginning of renewable resource use for energy production in the US. After the OPEC oil embargo was lifted in spring 1974, the pressure to research and implement renewable resources was lessened. Again in 1979 towards the end of President Carter’s administration the Shah of Iran was overthrown temporarily disrupting the oil industry causing oil prices to increase significantly once again. The Iranian infrastructure eventually increased, bringing more oil into the US when the prices receded in 1979, once again slowing the development of renewable resources. However, in the 1980s and 1990s, that drive regained momentum when it was determined that renewable sources were not as detrimental to the environment as were fossil fuels. This change in perception can be attributed to a shift in national consciousness of the environmental damage being caused by humans.

Renewable energy is derived from harnessing sources naturally occurring on Earth. They are either used to directly heat, or to generate electricity. This study focuses on the following renewable energy sources: hydroelectric, biofuels, solar, wind, and geothermal. Other sources of renewable energy exist, however, these five represent the major components of the current alternative fuel market both nationally and in Maine.

While it is possible to tie both the development and rapid expansion of most renewable sources of energy to the OPEC embargos of 1973 and the elevated prices of 1979, hydroelectric power has been used in the US, and Maine, in particular well before the use of fossil fuels. Currently there are 88 hydroelectric dams in Maine, which produce roughly 22% of the state’s energy production, yet accounts for only about 14% of Maine’s total energy consumption.

Biofuels are the other major renewable energy which played a significant role in Maine energy before the birth of the renewable resource movement. “Biofuels” is a catchall term for every type of fuel which is non-fossil derived and is burned to produce energy to turn turbines or produce heat energy. They have a considerable impact on Maine’s energy use because Maine has such a natural abundance of wood products: 90% of the state is forested land. Traditionally, biofuels have been wood fuel; however, since the 1980s, other products have been developed which fall into three broad categories: wood, waste, and alcohol fuels. Biomass is a significant portion of Maine’s renewable energy use however; it is difficult to regulate what is being used as fuel. For this reason, we will not put forth in this report any recommendations on biofuel usage, but focus on other technologies.

Wind power is a rapidly growing sector of Maine’s energy production and was the quickest growing renewable energy source in the United States, rising from 2.8 billion kWh in 1990 to 10.7 billion kWh in 2003, a 282% increase. There is currently only one large scale wind project in Maine, but Maine is slated to increase the amount of energy produced by wind power significantly by 2010. Wind is a compelling source of energy because it has zero carbon emissions. Compared to conventional fuel sources, as well as some renewables, wind-derived
energy is vastly cheaper because the majority of costs are associated with the installation process, and once that is completed the energy sold is essentially free. There are however, some concerns associated with wind power. Wind is an intermittent energy source because the wind does not always blow steadily. Wind turbines are loud and have disturbed local residents, which is why they should be placed out of hearing range. In addition, they are quite large and many feel that they are not aesthetically pleasing. They should be located in an area in which they do not obstruct the view of a landscape.

Solar energy is another new sector of renewable resources which plays an important role in the state of Maine. It is broken up into two major sectors: solar thermal heating, and solar electric. Solar thermal heating systems use sunlight to heat air or water to provide internal heating for houses, while solar electric systems convert sunlight directly to electricity. One method of solar electric uses photovoltaic (PV) systems. These systems can provide electricity for residential and industrial buildings, but can also be used on a much larger scale to produce electricity for regional and national distribution.

Lastly, geothermal heating involves tapping into the natural heat of the earth to provide heating for houses. Geothermal energy is harnessed by using ground source heating pumps to tap into the ground. These pumps provide a double service for Maine’s heating needs. First, they provide a constant source of heating during the winter when Maine uses a significant amount of energy in heat production. Second, quite recently Maine has become a summer peaking state reversing the historical trend. That is to say currently, residents of Maine are using more energy in the summer than in the winter to cool their homes and other summer related activities. Geothermal energy is perfectly situated to deal with this shift in demand because it can provide cool air during the summer. The temperature of the air brought up from the ground remains at a fairly constant temperature all year long, providing heat during the winter and cooling during the summer. Geothermal is used on a very small scale in Maine, but has the potential to become a larger source of energy for the state.

**Trends**

Nationally, renewable resource consumption has steadily increased over the past half century. In 1960, national consumption of all renewable energy sources was approximately 3,000 trillion British Thermal Units (Btu), roughly 6% of national consumption, and has since reached 6,000 trillion Btu, doubling in size, yet remaining only 6% of national consumption (Figure 1.9). This is important because while it demonstrates that more and more renewable resources are being used nationally, the proportion of renewable energy relative to total consumption of all energy sources is remaining constant.

New England has mirrored the national trend. From a baseline 1960 value of roughly 150 trillion Btu, energy consumption peaked in 1995 at roughly 400 trillion Btu and has dipped back down to roughly 325 trillion Btu (Figure 1.9).
Maine’s renewable energy consumption over the past half century has also mirrored national and regional trends. Maine consumed about 50 trillion Btu of renewable energy in 1960, increasing to 150 trillion Btu in 1990 (Figure 1.10). As of 2004 Maine consumes almost 155 trillion Btu of renewable energy.\(^{36}\)
Increasing Renewable Use: Portfolio Standards

Maine has signed onto the Regional Greenhouse Gas Initiative (RGGI), and has stipulated a plan to complete the emissions standards set out in RGGI. RGGI established specific regulations on states in New England with the purpose of controlling and mitigating the amount of anthropogenic pollutants released into the atmosphere to address concern caused by climate change. In 2003, Maine passed the Maine Climate Action Plan (MCAP) to help the state reach its RGGI standards which include reducing emissions to 1990 levels by 2010, reducing a further 10% by 2020, and 75% by 2050. Maine is not currently meeting its requirements, and will require significant reductions in emissions if it hopes to remain in compliance with RGGI.

While initially, most of the major laws impacting renewable energy were federal, state governments are beginning to play a larger role in promoting alternative energy sources. In 1997, as part of an Act to Restructure the State’s Electric Industry, Maine adopted a renewable portfolio standard (RPS), which mandated that 30% of the energy sold in Maine must come from eligible renewable resources by 2000. The purpose of this bill, LD 1804, is to “ensure an adequate and reliable supply of electricity for Maine residents and to encourage the use of renewable, efficient and indigenous resources.” Under the authority of the Maine Public Utilities Commission, Maine’s RPS required that by 2000, “each competitive electricity supplier, including standard offer suppliers, must provide no less than 30 percent of its total kilowatt-hour sales to customers from renewable resources.” Maine’s RPS is larger than any other state in the country as a percentage of total energy sold. However, this figure is misleading because over 30% of Maine’s energy already came from renewable resources, indicating that while the RPS level is higher than any other state, it is not imposing a change in energy production in Maine, in direct contrast to some states which are forced to make significant changes in energy production to achieve their RPS standards, such as California which has set an RPS 200% higher than current state renewable production at the time of inception.

While this bill was aimed at setting a standard for the amount of renewable resources used in Maine it was not designed to increase the amount of renewable energy generated in Maine. In response, the 2006 State Legislature passed a new bill, LD 2041, stipulating that “the share of new renewable capacity resources as a percentage of the total capacity resources in this State on December 31, 2007 increase by 10 percent by 2017.” This amendment promotes growth in the renewable energy production industry while providing environmental benefits to Maine. Under LD 2041 a source is eligible for the RPS as long as they are a “qualifying small power production facility under the Federal Energy Regulatory Commissions (FERC) rules or a generation facility whose nameplate capacity does not exceed 100 megawatts,” and produces power from one of the specified pre-approved sources. These sources include various types of fuel cells, different solar arrays installations, wind and geothermal power installations, hydroelectric generators [which meet all state and federal fish passage requirements], biomass generators, high efficiency cogeneration systems of any size as well as other smaller sources. While these all qualify under the amendment, “generators fueled by municipal solid waste (MSW) in conjunction with recycling” do not, despite the fact that they are considered a renewable energy source under the original RPS bill. In addition, self-generation of electricity is not eligible either under the amendment.

Electricity generators are required to have a New England Power Pool Generation Information System certificate indicating that they are in compliance with all RPS regulations. In addition, the PUC has the authority to audit any electricity provider at any time, confirming that they are in full compliance with the regulations of RPS. If an electricity provider is not in
compliance with the RSP standards during the prescribed period, indicating that it has not sold the minimum 30% renewable energy, but has instead only sold between 20 and 29%, it is allowed to fix the imbalance during the second period as long as at the end of both periods the aggregate amount of energy from renewable energy is 30\%^{43}.

LD 2041 is an important bill for the future of Maine in many ways. First, it provides incentives for the increase in production of renewable energy, and second it promotes a shift in overall energy production. While a RPS of 40% by 2017 is still lower than the current amount of energy sold in state from renewable resources, the mandate for new and additional energy source use will propel Maine further into the forefront of renewable energy production. This situation could provide an economic benefit for Maine. The state is currently one of the largest producers of energy supplying southern New England and the greater Boston area. It has been shown that certain individuals will pay a significant premium for green energy^{45,46}. The demand for clean non-polluting energy at the doorstep of Maine is an economic force which could be harnessed.

\begin{figure}
\centering
\includegraphics[width=\textwidth]{Figure11.png}
\caption{Portfolio Standards and Renewable Energy as a \% of Total Energy Produced in Maine^{43}}
\end{figure}

\textbf{Wind Programs}

Maine has a high potential for wind power. The mountain areas of central Maine along the Appalachian Mountains, and areas of the coast are perfectly situated for wind farms. The inland high wind potential sites are situated in area of low population and are ideal locations. While the majority of the state provides weak potential, these highlighted sites offer more than enough power to drastically alter Maine’s energy profile.

The Mars Hill Wind Farm (Table 1.5) is currently the only wind farm in Maine. It provides an amount of energy equivalent to approximately 4\% of all the homes located in the incorporated municipalities as of 2000 (Figure 1.13).
Aside from Mars Hill, there are seven other wind farm proposals in Maine, each in different phases of development. However, only three projects are close to final approval and construction. The Black Nobble and Kibby Mountain Projects are currently undergoing public hearings, and the Stetson Ridge project has already received approval from Land Use Regulation Committee (LURC)\(^{47}\) (Table 1.5). These three projects if constructed, could along with the Mars Hill Wind Farm, provide enough energy for roughly 19\% of all homes in the incorporated municipalities as of 2000 (Figure 1.13).

Of the other 4 projects proposed for Maine, two seem likely to be developed, one has had its permit overturned, and the other has not yet provided enough information to be discussed here. The Freedom Project, a relatively small wind farm, only slated to provide 3.4 MW of energy had its permit overturned by the local Appeals Board in early 2007\(^{48}\). The project in Prentiss Township on Passamaquoddy land is in the process of collecting wind data and has not indicated the number of turbines or expected MW produced (Table 1.5). The last two proposals are The Partridge & Flathead Mountains and Record Hill Project (Partridge Project), and the St. John Valley Projects (Table 1.5). If these two projects are passed along with the Black Nobble, Kibby Mountain, and Stetson projects, the amount of wind energy produced in Maine will rise from only 4\% of homes in the incorporated municipalities (from the Mars Hill Project), to a staggering 50\% (Figure 1.13). These numbers indicate a significant shift in energy production for Maine which could occur within the next five years.
Figure 1.12 Wind Power Potential in Maine
Figure 1.13  Houses in the Incorporated Municipalities Complied Supplied with Wind Energy from Current and Pending Wind Projects

Table 1.5  Current Wind Projects Nov. 2007

<table>
<thead>
<tr>
<th>Status</th>
<th>Name</th>
<th>Size (MW)</th>
<th>Turbines</th>
<th>Equivalent Homes Energy Use</th>
<th>CO₂ Offset (tons)</th>
<th>NOₓ Offset (tons)</th>
<th>SOₓ Offset (tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completed</td>
<td>Mars Hill</td>
<td>42</td>
<td>28</td>
<td>24,000-25,000</td>
<td>120,000</td>
<td>288</td>
<td>420</td>
</tr>
<tr>
<td>Close to Approval</td>
<td>Black Noble</td>
<td>54</td>
<td>18</td>
<td></td>
<td>73,000</td>
<td>17</td>
<td>45.5</td>
</tr>
<tr>
<td></td>
<td>Kibby Mountain</td>
<td>132</td>
<td>44</td>
<td>40,000*</td>
<td>201,470</td>
<td>99</td>
<td>358</td>
</tr>
<tr>
<td>Pending More Studies</td>
<td>Stetson Ridge Partridge</td>
<td>57</td>
<td>38</td>
<td>27,500</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Information Gathering</td>
<td>Partridge</td>
<td>50*</td>
<td>25</td>
<td>15,000*</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>St. John’s Valley</td>
<td>500-600</td>
<td></td>
<td>180,000*</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

* Estimated
**Solar Rebate Program**

As part of Governor Baldacci’s 2005 Solar Initiative, the Maine Solar Energy Rebate Program was created and was made a law under the title “An Act to Encourage the Use of Solar Energy” 35-A MRSA §3211-B. This program was created to provide incentives for the use of solar energy. Rebates became available for the installation of both solar electric and solar thermal systems such as: photovoltaic (PV), solar hot water, and solar air systems. Solar electricity generating systems, or photovoltaics, are eligible for a $3/watt rebate on the first 2000 watts of installed capacity, and a $1/watt rebate for the next 1,000 watts, providing a potential incentive of $7,000. The solar thermal systems (solar hot water and solar air) are eligible for a 25% rebate on the installation process or $1,250, whichever costs less. This program was allocated $500,000 annually through 2008; however, the cap for the program is $1.75 million, and it is stipulated that “25% ($437,500) of the total funding be allocated to PV systems and 75% (1,312,500) be allocated for solar thermal systems”. From July 1, 2005 to June 30, 2006, 69 systems were installed, and 26% of the allocated funds were used. There is a significant demand for all the systems, but PV systems were extremely popular, using roughly 30% of the allocated funds in the first year. Those 69 systems installed in the first year have an annual CO₂ savings of 123.1 metric tons, (a lifetime savings of 2,463.0 metric tons), and these PV systems produced a predicted 3,463kWh per year. The solar rebate program is important for two reasons. First, it increases the amount of solar energy being used in Maine and reduces the state’s dependency on non-renewables. Second, this rebate program expands the infrastructure supporting solar energy in Maine, because not only does it provide money for individuals to use solar power, but it also increases the number of certified installers of solar technology. By increasing the number of certified installers, the state facilitates future expansion of the sector.

**Stakeholders**

There are two main sectors of stakeholders involved with renewable energy use in Maine. First are the independent producers who physically create the energy distributed throughout the state and the region. Second are the associations which facilitate the purchasing of renewable energy for third parties.

The primary association representing the various producers of energy is the Independent Energy Producers of Maine (IEPM), which is comprised of 18 energy producing members, and 19 non-producing members. IEPM members produce electricity in a “sustainable manner from hydro, biomass, wind, and waste”. This non-profit organization represents its members in the state legislation and to the PUC.

The second group of actors assembles energy from different sources, and makes it readily available to consumers in Maine. There are two main players in this group, Maine Power Options (MPO), and Maine Interfaith Power and Light (MIPL). MPO negotiates prices for renewable resources for different governmental and non-profit entities in Maine, serving as a mediator between a number of energy providers and the customer. MIPL is a non-profit organization which aggregates energy from a number of different producers and provides energy packages to individual consumers, as well as carbon offset opportunities.
Case Study 1.1 Upcoming Energy Choices: Presidential Implications

The State of Maine’s energy could be significantly impacted from the federal level with the upcoming presidential election. Energy has quickly moved to the forefront of national politics, and there is a considerable divide between the presidential candidates over the direction the nation should head.

For the most part, the presidential hopefuls are towing their party’s line. The Democratic candidate’s energy policy focuses mainly on reducing domestic oil consumption, linking the issue to the need to mitigate climate change. The Republican candidate’s policy on the other hand concentrates on domestic energy production, opening up drilling in the Arctic National Wildlife Refuge (ANWR) and developing coal gasification. They are divided on the issue of taxation and regulation, the Democrats support repeals on tax breaks for oil and gas companies and a significant increase in CAFÉ standards, while the Republicans oppose such measures. Only Republican John McCain has broken ranks, opposing tax breaks, drilling, and ethanol subsidies, while supporting fuel economy increases.

These policies are directly tied to Maine’s own energy policy, especially in regards to oil and gas prices and whether carbon emissions reduction will become a major issue of the Federal government or remain largely a state initiative. The direction of energy for Maine and the rest of the nation will be largely decided this coming November.54

Laws, Institutions, and Management

Since the early 1970’s, federal and state governments have promoted the use of renewable resources by creating fiscal incentives. Initial legislation associated with the promotion of renewable resource energy use was primarily focused on providing funding for research development starting during the 93rd Congress. These bills included the Solar Energy Research Act and the Geothermal Energy Research, Development and Demonstration Acts of 1974. These acts served primarily as research tools to push these renewable sources towards becoming major national sources of energy.

The next major round of Congressional legislations occurred during 1978, when four key statutes on energy were passed. Perhaps the single most important bill ratified that year was the National Energy Act of 1978 (NEA) as explained earlier in this chapter. The main purpose of this bill was to “decrease the Nation’s dependence on foreign oil and increase domestic energy conservation and efficiency” 55. This bill served as the catalyst which began a significant push towards the development of renewable resources as a viable source of energy. The Public Utility Regulatory Policies Act (PURPA), mentioned earlier in this chapter, had significant bearing on the use of renewables because it forced open the energy market to renewable energy. PURPA was monumental because it “requir[ed] utilities to buy electricity from qualifying facilities (QF), which are … nonutility facilities that produce electric power using cogeneration technology of renewable power plants with capacities of less than 80MW”55. This allowed small scale renewable energy sources to become viable and compete with larger, established fossil fuel industries. The third law was the Solar Photovoltaic Energy Research, Development and Demonstration Act which promoted making PV systems cost effective for energy production. Lastly, Congress passed the Energy Tax Act (ETA) in 1978, which in part created considerable incentives for the use of renewable resources. The ETA provides residential consumers a 30% tax credit on their investment in solar and wind energy equipment. As well as a 10% tax credit for businesses which install certain renewable energies including, but not limited to solar, wind, and geothermal 56.
The 96th Congress passed the Wind Energy Systems Act of 1980, which helped speed up the research and development of wind energy to be implemented mainly by the Department of Energy and the National Aeronautics and Space Administration (NASA)\textsuperscript{56}.

The next major bill came during the 101st Congress: The Solar, Wind, and Geothermal Power Production Incentives Act of 1990 removed all size restrictions on renewable energy production as defined by PURPA in 1978. This allowed larger renewable projects to bloom, because according to the original wording of PURPA, qualified renewable energy production facilities were defined as having “capacities of less than 80MW”\textsuperscript{55}. The removal of these size restrictions allowed the renewable energy sector to expand and create greater production capacities. The restriction was temporarily reduced to 50MW. This short-term opportunity was available until Dec 31 1994\textsuperscript{57}.

During the 102nd Congress the Energy Policy Act (EPACT) of 1992 was passed. This bill created a production tax credit (PTC) which provided a further incentive for the production of wind and closed circuit biomass production (an internally contained biomass system) at the small scale tax-paying level\textsuperscript{55}. In addition EPACT provided an incentive known as a Renewable Energy Production Incentive (REPI) for larger “tax-exempt publicly owned utilities and rural cooperatives” which produce larger amounts of energy from wind, geothermal, solar, and biomass sources\textsuperscript{55}.

<table>
<thead>
<tr>
<th>Table 1.6 Federal and State Laws Impacting Renewables in Maine</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Law</strong></td>
</tr>
<tr>
<td>Solar Energy Research Act</td>
</tr>
<tr>
<td>Geothermal Energy Research, Development and Demonstration Act</td>
</tr>
<tr>
<td>National Energy Act (NEA)</td>
</tr>
<tr>
<td>PURPA</td>
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<tr>
<td>Solar Photovoltaic Energy Research Development and Development Act</td>
</tr>
<tr>
<td>Energy Tax Act (ETA)</td>
</tr>
<tr>
<td>Wind Energy Systems Act</td>
</tr>
<tr>
<td>Solar, Wind, and Geothermal power Production Incentives Act</td>
</tr>
<tr>
<td>Energy Policy Act (EPACT)</td>
</tr>
<tr>
<td>Act to Restructure the State’s Electric Industry</td>
</tr>
<tr>
<td>Act to Encourage the Use of Solar Energy</td>
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<tr>
<td><strong>Year</strong></td>
</tr>
<tr>
<td>1974</td>
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<td>1974</td>
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<td>1992</td>
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<td>1997</td>
</tr>
<tr>
<td>2005</td>
</tr>
<tr>
<td><strong>Description</strong></td>
</tr>
<tr>
<td>Initiated the Research into Solar Energy becoming a useful source of energy production</td>
</tr>
<tr>
<td>Initiated the Research into Geothermal Energy becoming a useful source of energy production</td>
</tr>
<tr>
<td>Shifted the focus of Energy production away from foreign sources and boosted the drive for domestic energy sources including renewable resources</td>
</tr>
<tr>
<td>Created system where Qualified facilities (QF) (renewable producers of energy under 80 MW) could produce energy which utilities Were required to purchase. It made small producers viable.</td>
</tr>
<tr>
<td>Worked to make Photovoltaic Systems cost effective</td>
</tr>
<tr>
<td>Created tax credits for residential and business consumers of renewable energy</td>
</tr>
<tr>
<td>Sped up Research and Development of Solar power</td>
</tr>
<tr>
<td>Amended PURPA. Temporarily reduced the size restriction of 80MW to 50MW for QF</td>
</tr>
<tr>
<td>Created Production Tax Credit (PTC)</td>
</tr>
<tr>
<td>Created the Maine State Renewable Portfolio Standard (RPS)</td>
</tr>
<tr>
<td>Maine State Law to reduce the cost of solar installations to promote an increase in solar energy use</td>
</tr>
</tbody>
</table>
Energy and the Environment

Trends and Current Status

Climate change by definition is a global problem, but its effects will have regional and Maine specific implications. A recent report released on the effects of climate change on New England reported that without climate change mitigation Maine would within a hundred years have a climate similar to that of Washington D.C. today\textsuperscript{58}. While Maine cannot solve climate change unilaterally, it can lead efforts to develop mitigation and adaptation strategies that will help Maine business and residents adjust to new climate realities\textsuperscript{59}.

Mentioned earlier, Maine has taken lead in recent years on the issue of greenhouse gas emission reduction. The 2004 “State of Maine Climate Change Action Plan” drafted by the Department of Environmental Projection at the request of the legislature, identified ways in which Maine could reduce its carbon emissions to 1990 levels by 2010 and 10% below 1990 levels by 2020. The suggested policy actions are meant to be consistent with a Memorandum of Understanding signed in 2001 between the New England Governors and the Eastern Canadian Premiers which set these tentative goals in carbon emission reduction\textsuperscript{59}. In 2003, an invitation was extended to Maine to join a regional initiative to reduce greenhouse gas emissions and establish a cap and trade system for CO2 emissions from fossil-fuel based electric generation systems, of which there are six in Maine\textsuperscript{60}. This initiative became known as the Regional Energy Greenhouse Gas Initiative (REGGI), discussed earlier, which the Maine legislature formally adopted early in 2007 committing Maine’s large fossil fuel driven power plants to reach the CO2 emissions reductions targets set in the Climate Action Plan\textsuperscript{60}. CO2 reduction targets set by REGGI are the closest thing to mandatory CO2 emission reductions as of yet anywhere in the nation.

Carbon Dioxide Emissions

Indicators such as the Carbon Footprint have been developed to account for CO2 emissions at all levels of production and consumption. Although we did not have the time or resources to calculate the carbon footprint of Maine within the context of this report, we do use state emissions data provided by the EIA to analyze CO2 emissions trends over the last decade and a half (1989 to 2005). The data represent the CO2 emissions for the electric production sector and therefore offers a good but not entirely complete picture of CO2 emissions associated with energy use in Maine (i.e. energy use from transportation and home heating is left out).

Figure 1.14 represents Maine CO2 emissions by source for petroleum, natural gas, coal, and municipal solid waste over the period for which data was available, 1989-2005 (solid waste data is only available from 2000 onward). Over this period coal and municipal solid waste emissions stay relatively constant at around 1 to 2 million metric tons of carbon emissions, with coal making a peak at 2.7 million metric tons in 2002. More dynamic are the trends of petroleum and natural gas. From 1989 to 1999, petroleum accounts for the largest percentage (58%) of emissions from the electricity producing sector. Beginning in 1999 petroleum emissions begin to decline after reaching a peak at just more than 11 million metric tons, apparently stabilizing at just under 5 million metric tons in 2002. This contrasts with the pattern seen in natural gas: from 1989 to 1999 CO2 emissions from natural gas are extremely low compared to emissions from other energy sources. Beginning in 1999, natural gas emissions begin to rise peaking in 2002 at
over 12 million metric tons. At this peak, CO₂ emissions from natural gas represented 61% of total emissions from the electricity sector. There is a sharp decline in emissions in 2003 and natural gas emissions remain under 10 million metric tons for the next couple of years. Throughout the period CO₂ emissions are relatively stable CO₂ emissions at around 10 million metric tons but peak in 2002 at 20.3 million metric tons. This peak occurs at the same time we see a switch from petroleum to natural gas, and although CO₂ emissions fall they remain above pre-2000 levels.

These trends are perhaps unsurprising when policy and production sources over the time period are considered. Outlined in the non-renewable energy section, it was around 1997-1999 that the first natural gas pipelines were completed, and five new natural gas power plants went on line in Maine. The emissions data does show an interesting trend in the years just before and just after 2000. During this period we see a major shift in the composition of Maine’s CO₂ emissions from the previous leading contributor, petroleum, to a previously non-existent source natural gas. Explanations for this are many: it was in 2000 that Maine’s energy de-regulation policy went into effect and electric suppliers and distributors became separate entities. Also, Energy trends for Maine in the mid 1990s were characterized by the increased availability and comparatively low price of natural gas due to the building of the first natural gas pipeline. Natural gas was also strongly promoted by environmentalists, who wanted to see the region’s energy mix move away from “dirty”, heavily polluting fossil fuels such as coal and oil to the “clean” energy of natural gas which, while still a fossil fuel, pollutes significantly less. When combined these factors produce the most plausible explanation for this shift in the composition of CO₂ emissions. That Maine’s CO₂ emissions seem to stabilize above 1990 levels is a result of deregulation; Maine Yankee Nuclear Power Plant, which had previously provided more than 60% of Maine’s energy mix, became uncompetitive, and shut down. Thus an overall increase in CO₂ emissions may account for this replacement of nuclear power (which does not produce CO₂ in production) by CO₂ emitting sources.

Figure 1.14 Maine CO₂ Emissions for Energy Sector by Energy Source
How do these CO₂ emissions compare to national source trends? Figure 1.14 identifies national trends in CO₂ emissions over the same period of time, 1989-2005. National trends in carbon dioxide emissions closely follow emissions from the coal sector, at least in electric production. Coal while playing only a minor role in Maine’s energy mix is the nationally preferred energy source. This combined with the fact that the environmental qualities of coal make it the most polluting of the fossil fuels, creating roughly twice the CO₂ emissions of oil and four times the emissions of natural gas. The coal production sector is so overpowering that trends in other energy production sectors are lost when looking at national trends. Among the sectors represented in the graph, the overall CO₂ emissions trend is one of increasing emissions which indicates increasing energy production (and by default consumption). Petroleum is the only production sector that seems to be remaining relatively constant and even slightly decreasing. This only means that petroleum for the production of electricity has remained relatively constant. It is important to note that in contrast petroleum for use in transportation accounts for the largest total CO₂ emissions nationally (as well as in Maine).

Figure 1.15 National CO₂ Emissions for Electricity Sector by Energy Source

Providing a regional context for CO₂ emissions, Maine roughly ties New Hampshire in total emissions (11.7% and 10.5% of total emissions over the time period respectively), while Massachusetts is the clear leader in total emissions accounting for 51% of total emissions over the time period (Figure 1.16a). However, Maine is a leading state in per capita CO₂ emissions having per capita emissions over the entire study period of 157.5 metric tons per capita (Figure 1.16b). Maine CO₂ emissions from the electric industry rank third in overall emissions, but when CO₂ emissions are determined on a per capita basis, Maine’s becomes the largest CO₂ emitter. At its peak in 2000, Maine produced 9.7 metric tons of per capita CO₂ emissions compared to the regional per capita emissions of 7 metric tons. As stated earlier Maine is the only New England
state in which industrial energy use accounts for a greater percentage of use than the residential sector. Industry is more energy intensive than a household which may in part account for this disparity in per capita CO₂ emissions. Even so, many industries in Maine including many paper mills (Maine’s largest Energy Consumer) produce some percentage of their own power, which means that the Maine consumer probably does use more energy than the average New England resident. Vermont is unique among New England states in that 85% of its energy mix is supplied by nuclear power and a significant portion of the rest is supplied by hydropower out of Canada; this explains why Vermont’s CO₂ emissions are so low compared to the rest of New England.

In per capita calculations, there will be increased inaccuracy the further one moves away from the reference point (in this case 2000 census population data); though general trends are still identifiable.

![Figure 1.16 New England Total and Per Capita CO₂ Emissions](image-url)
“Green” Electricity Options in Maine

With the adoption of electricity deregulation in 2000, it became possible for Maine electricity consumers to choose their energy supplier. With this choice came the potential for Mainers to choose to buy “green energy”, energy produced in ways that minimize or negate the environmental impacts of its production. Mentioned earlier these often include solar, wind, biomass, and some hydropower. There are two ways that consumers can use their purchasing power to support green energy supply. The first is directly purchasing green energy. The second is by purchasing green energy certificates, also called green credits or “green tags.” Though these two options fundamentally achieve the same purpose, the first option of directly purchasing the green power is the easier to understand. Since deregulation lets the consumer choose his or her energy supplier, the consumer can simply choose an electricity package that comes from hydropower, wind, or other renewable energies. The second choice of buying green energy certificates essentially achieves the same thing, only here the consumer is buying these in addition to his or her standard electricity package. Money from certificates goes to electricity suppliers that produce green energy, ensuring that the amount of energy represented by the certificate is produced at their facility. The difference to the electricity consumer is that choosing green energy supply means higher monthly electricity bills, whereas certificates means the same energy bill but paying additional electricity charges elsewhere. Both end up costing consumers approximately the same amount.

The Maine Energy Investment Corporation (MEIC) maintains a Green Power Products Menu for the state of Maine. The “Menu” has been reproduced in Table 1.7 with a key to the energy providers given in Table 1.8. Due to the nature of the power grid, once electrons go in from any source they become part of a giant pool of electrons. This means the electricity that you use could in reality come from any one of multiple power sources, but by buying that power, the consumer is paying that source to produce that quantity of energy into the grid. According to the MEIC, an average Maine home uses 6,000 kilowatt-hours per year which, when using clean electricity over conventional sources, would add $10 per month. Because it does not matter where the energy is put into the grid, the Maine consumer can purchase clean energy produced anywhere in the nation or even North America; this is represented by the fact that some green energy providers in Maine offer national service.
Table 1.7 "Green Power Product Menu"\(^{64}\)

<table>
<thead>
<tr>
<th>Certificate Products</th>
<th>Description</th>
<th>Location</th>
<th>Certification</th>
<th>Provider</th>
</tr>
</thead>
<tbody>
<tr>
<td>NewWind Energy®</td>
<td>100% new wind</td>
<td>NY, NJ, &amp; New England</td>
<td>Green-e</td>
<td>CEI</td>
</tr>
<tr>
<td>Green Tags</td>
<td>99% wind, 1% solar</td>
<td>MT, WY, OR</td>
<td>Green-e &amp; Climate Cool</td>
<td>BEF/ MeIPL</td>
</tr>
<tr>
<td>WindWatts</td>
<td>100% new wind</td>
<td>ME</td>
<td>Green-e</td>
<td>MeIPL</td>
</tr>
<tr>
<td>WindBuilders</td>
<td>100% wind</td>
<td>Midwest</td>
<td>Climate Cool</td>
<td>NE</td>
</tr>
</tbody>
</table>

**General Electricity Supply**

**Residential and Small Business**

<table>
<thead>
<tr>
<th>Product</th>
<th>Description</th>
<th>Location</th>
<th>Certification</th>
<th>Provider</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maine Clean Power</td>
<td>100% small hydro</td>
<td>ME</td>
<td>Low Impact Hydro Institute</td>
<td>MRE/MeIPL</td>
</tr>
<tr>
<td>Maine Clean Power Plus</td>
<td>80% hydro, 20% new wind</td>
<td>ME, National</td>
<td>Low Impact Hydro Institute</td>
<td>MRE/MeIPL</td>
</tr>
</tbody>
</table>

**Large Business, Institutions, and Municipalities**

<table>
<thead>
<tr>
<th>Product</th>
<th>Description</th>
<th>Location</th>
<th>Certification</th>
<th>Provider</th>
</tr>
</thead>
<tbody>
<tr>
<td>ElectricGreen: Green-e</td>
<td>10% new LFG, 15% new wind, 30% biomass, 45% hydro</td>
<td>New England</td>
<td>Green-e</td>
<td>CNE</td>
</tr>
<tr>
<td>ElectricGreen: Maine Made</td>
<td>50% small hydro, 50% biomass</td>
<td>ME</td>
<td>None</td>
<td>CNE</td>
</tr>
<tr>
<td>MPO Maine Made</td>
<td>50% small ME hydro, 50% biomass</td>
<td>ME</td>
<td>None</td>
<td>MPO</td>
</tr>
<tr>
<td>MPO Green-e</td>
<td>10% new LFG, 15% new wind, 30% biomass, 45% hydro</td>
<td>New England</td>
<td>Green-e</td>
<td>MPO</td>
</tr>
</tbody>
</table>

Table 1.8 Key to Energy Providers on "Green Power Product Menu"\(^{63}\)

<table>
<thead>
<tr>
<th>Name</th>
<th>Acronym</th>
<th>Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community Energy Inc.</td>
<td>CEI</td>
<td>National</td>
</tr>
<tr>
<td>Constellation New Energy</td>
<td>CNE</td>
<td>North America</td>
</tr>
<tr>
<td>Bonneville Environmental Foundation</td>
<td>BEF</td>
<td>National</td>
</tr>
<tr>
<td>Maine Interfaith Power &amp; Light</td>
<td>MeIPL</td>
<td>Maine</td>
</tr>
<tr>
<td>Maine Power Options</td>
<td>MPO</td>
<td>Maine's local governmental and non-profit organizations</td>
</tr>
<tr>
<td>Maine Renewable Energy</td>
<td>MRE</td>
<td>Maine</td>
</tr>
<tr>
<td>Native Energy</td>
<td>NE</td>
<td>Native Energy</td>
</tr>
</tbody>
</table>
Third-party certification is currently used in other sectors of Maine’s economy, like forestry, to ensure the practices and methods being utilized are done so in a sustainable manner. “Third party” means inspected by an outside organization that theoretically has nothing to gain or lose by the certification of a specific product or practice. The idea behind this certification is that it is a win-win situation, as a company or industry obtaining third-party certification can market its energy as green to its buyers, and conscientious consumers can be reassured that the product that they are buying is produced (in this case) with high environmental standards. To what extent is this notion being utilized in Maine for energy? Currently, there are only three programs offering third-party certification for energy in Maine: the Green-e Renewable Energy Certification Program (Green-e), the Low Impact Hydro Institute (LIHI), and the Climate Neutral Network’s Climate Cool™ certification program (Table 1.8). None of these programs are Maine-specific, but rather operate on a national scale. The first two deal with energy sources commonly referred to as “renewable”; LIHI dealing with hydropower specifically and Green-e, hydro and most every other renewable energy source. Climate Cool, on the other hand, certifies that throughout the entire lifespan of a product, a company offsets all greenhouse emissions so the end product is completely greenhouse gas neutral.

While purchasing green electricity might seem like one of the most straightforward methods of reducing the impacts of energy consumption on the environment, the reality is that there is little demand for such products. From 1998 to 2002 the Maine Public Utilities Commissions conducted a survey of Maine households to determine residential electricity attitudes and power product choices. The survey showed that consumers showed even after deregulation 41% of household consumers felt “not very well informed about electricity deregulation” 65. It also identified that the “vast majority of Maine consumers have never bought energy from a competitive supplier” meaning they have only bought the “standard package” offered by transmission companies 65. Maine like the rest of the nation seems not to care where their energy is produced as long as it is cheap, the survey showed that the majority of consumers would prefer a lower costing “standard offer” over increased competitiveness in the electricity market 65. The survey does identify some interesting trends though: in the years leading up to 2002 there was an increasing percentage of household consumers who would be willing to pay slightly more for more environmentally benign sources of electricity, though the percentage wise this is still half of the population 50%, and a very few (4%) were willing to pay a premium price. If giving the option of an “environmentally clean check off box” more than half of consumers, 56%, indicated then might be somewhat like to choose it while 46% indicated they would not or were not likely to take advantage of the option 65. These survey results show that there is interest in environmentally benign sources of energy though very few household consumers take advantage of deregulation to purchase it. The vast majority of those who indicated that they were interested in purchasing green power were only somewhat interested in the possibility. The take home here is that, they may be interests but price seems to be the largest influence on electricity purchase. Only a very small percentage, 2% in 2002, use deregulation to buy from energy competitors and it is uncertain how much of this small percentage buy from environmental benign competitors 65.

The State of Maine’s government is one of the notable exceptions since this survey. Though not a residential consumer, since 2005 all electricity used in the government buildings in Maine has been offset by green credits from a hydropower facility in Rumford Maine. The Rumford facility is currently awaiting ISO approval to sell its green credits on the regional market, but until then, Maine’s government has agreed to purchase them.
**Energy Efficiency**

Energy demand has long been seen as synonymous with economic growth, so much, that some have suggested that high energy demand means high economic growth, but energy efficiency questions whether this is necessarily true\(^2\). Because the most environmentally benign ton of CO\(_2\) is the one that is never emitted\(^6^6\), energy efficiency technologies are now seen as one, if not the key, solutions to climate change mitigation, at least in the immediate and near future\(^6^7\). In recent years Maine has agreed and made this its primary policy towards CO\(_2\) emission reductions and climate change mitigation\(^4^1\). Historically, Maine’s energy efficiency initiatives have been small-scale, spread across government agencies, and lacking in coherent goals. Increasing realization of the benefits of energy efficiency led the Maine legislature to call upon the State Planning Office (SPO) in 2000 to develop an energy efficiency plan for Maine. Although by 2002 SPO had, their plan was never implemented\(^6^8\), and that same year the Maine Legislature made energy efficiency a mainstream policy with the passage of “An Act to Strengthen Energy Conservation,” which set up a separate program under the Maine Public Utilities Commission called Efficiency Maine to fulfill the task of promoting energy efficiency. Efficiency Maine is now the central actor for implementing energy efficiency within the state.

Modeled after its New England counterpart, Efficiency Vermont, Efficiency Maine has the primary purpose of promoting energy efficient technologies, help Maine residents and businesses reduce energy costs, and improve Maine’s environment\(^6^6\). Its four primary objectives outlined in its 2006 Annual Report are to: (1) increase consumer awareness of efficiency options, (2) create favorable market conditions for efficient products and services, (3) promote sustainable economic growth while reducing environmental damage, and (4) reduce the price of energy over time by reducing the energy demand. The primary method with which it currently promotes these objectives is through the implementation of six programs: the Business, Residential, Low Income, Building Operator Certification, High Performance Schools, and Education and Training Programs (Table 1.9). These programs all promote aspects of Efficiency Maine’s objectives. For example, the residential lighting campaign educates consumers about the benefits of energy efficiency, while at the same time subsidizing efficient lighting products until they become accepted and normalized\(^6^6\). For a specific case study of the Education and Training Program see Case Study 1.2.
Mentioned above one of Efficiency Maine’s key purposes is to reduce environmental damage from energy use. In 2004 it began calculating annual benefits in terms of metric tons of carbon dioxide, sulfur dioxide, and nitrogen dioxide savings. Efficiency Maine estimated that it saved 90,503, 162,659, and 320,849 metric tons of CO2 emissions over 2004, 2005, and 2006 respectively (Figure 1.17) (Table 1.9) (Table 1.6). These estimates are calculated base on Maine-specific marginal emission rates published by ISO in its “2004 New England Marginal Emission Rate Analysis” report. It is also important to note that these are the CO2 savings over the lifetime of the energy efficient appliances, not annual savings. Looking at CO2 emissions data presented earlier in this report we find that these numbers are very small compared with Maine’s overall CO2 emissions. Carbon dioxide emissions for the electricity industry alone in 2004 and 2005 were both above 14 million metric tons, and there is no reason to believe 2006 emissions did not reach similar levels.
Case Study 1.2 Maine Energy Education

Efficiency Maine co-sponsors two state wide education programs for primary and secondary school aged students as part of its Education and Training Program.

**Maine Energy Education Program (MEEP)**

This program sponsored in part by Efficiency Maine provided education on energy issues for students in Central and Southern Maine. It is a non-profit organization started in 1985, with the primary purpose of helping participants understand the relationships between the economic, social, and environmental impacts of energy through experiential learning.

**Electrical Education by Maine Public Service Company**

This program operated by the Maine Public Service Company provides classroom and out of classroom programs for a range of community groups in Northern Maine. The majority of programs are student oriented, such as the “Energy Eagles Patrol” in which team of students check school spaces and turn off lights if they are not being used.

**NEW Maine Energy Education Curriculum Project**

Starting in 2007, this program is a three year project to design to develop consistent standards and curriculum for energy education throughout the state. The focus is curriculum for students in fourth through eighth grades. An advisory committee made up of public and private organizations such as the Maine Department of Environmental Protection and the Chewonki Foundation that will oversee the development of this curriculum.

Figure 1.17  Efficiency Maine Carbon Dioxide Savings
Discussion and Analysis

While consumption of individual sources of energy has changed significantly in the last 50 years, non-renewable sources as a whole continue to play a dominant role in providing Maine’s energy. Natural gas has supplanted coal, petroleum, and nuclear as the most consumed source of electricity. Fuel oil dominates the home heating sector, with natural gas a very distant second.

This balance among sources is not stagnant. Rather, it remains in constant flux, changing according to price, supply, and consumer preference, among other factors. Natural gas has completely changed the state’s electricity distribution in the same way nuclear power did in the 1970s. Its low emissions and high efficiency makes it the least environmentally harmful choice for fossil fuel use for both electricity and home heating. However, consumption of natural gas has been unstable because of supply and price issues. Some policy makers have suggested that investment in LNG terminals would stabilize the market and help meet increasing energy demands in both electricity and home heating. Proposed projects have been stymied by environmental and security concerns. Regardless of supply, the state of Maine currently lacks the pipeline infrastructure to offer natural gas everywhere. Thus, most Maine residents must rely on home heating oil, which has more environmental consequences and is less efficient.

Renewable resources are on the rise in Maine. With the adoption of a higher Renewable Portfolio Standard, Maine is expanding its current base of renewable resources to include technologies that historically have not been part of the Maine energy portfolio. Although Maine has the highest RPS in the country, its current standards are more a reflection of previously existing infrastructure rather than an aggressive commitment to expanding renewable energy use. Hydroelectric and biomass power have always played a large role in Maine, and will continue to do so in the future. Yet other sources such as solar and especially wind, have the potential of dramatically alter the way Maine approaches energy.

The Maine Solar Energy Rebate Program is gradually making inroads into the state’s energy portfolio. In its first year, 69 systems installed in Maine were given rebates. While this quantity is small, the initiative has begun to create a market for installation services. Greater numbers of qualified technicians will make future installations cheaper and easier. This will increase the amount of systems installed and make solar power a larger part of Maine’s energy mix. Wind has the capability of providing multiple benefits for Maine. If all of the current projects proposed are approved and implemented, Maine could power the equivalent of roughly 50% of the homes in the incorporated municipalities with electricity from wind. Unlike fossil fuels, wind turbines create zero carbon emissions.

Maine has already taken steps towards addressing climate change by reducing CO₂ emissions. Targets set by the New England Governors and the Eastern Canadian Premiers, MCAP, and the recent adoption of RGGI have all shown that, in many ways, Maine has taken a lead role in climate change mitigation. However, Maine has the highest per capita CO₂ emissions in the region and nationally is ranked 10th nationally for per capita emissions. Of the other policy options available to meet CO₂ emissions reduction targets, efficiency promotion shows great promise. Efficiency Maine has made positive steps in recent years in marketing efficiency solutions and this it is projected to continue.

Green energy products, on the other hand, are not known or used by most consumers. Over half of the consumers in a recent MPUC survey indicated that they would likely check an
option for green energy on their energy bill. This indicates that there is great potential for expansion this area, but lack of consumer education has left it underutilized.

Conclusion

Scenarios

We see three possible scenarios for future energy consumption in Maine. In the first scenario, current policies continue and the status quo remains: fossil fuel use continues to be high; energy demands grow at a significant rate; energy sources come primarily from out-of-state sources; CO₂ reduction targets are not met, and CO₂ emissions actually increase.

In the second scenario, current policies are implemented more effectively but little or no new policy initiatives are undertaken: planned increases in the RPS are met; energy efficiency initiatives continue to grow; energy demand grows but at a reduced rate because of energy efficiency; renewable and in-state energy sources increase, general fossil fuel use as a proportion of total energy decreases, natural gas remains a significant contributor; and current CO₂ reduction targets are still not met.

In the third scenario the state adopts additional climate change mitigation policies. These initiatives result in increases to the RPS; continued growth in efficiency; effectively promote green energy products to consumers; renewable, in-state sources become the primary source of energy as the state transitions away from fossil fuel sources; and Maine meets current CO₂ reduction targets.

Recommendations

Based on these scenarios, we have several recommendations concerning how the State of Maine should frame its energy policy with respect to the environment. These are most consistent with the third scenario. While long term goals should phase out fossil fuel use and promote renewable energies, in the short run, the state should pursue the cleanest and safest non-renewable fuel available and continue to promote energy efficiency.

Maine’s best non-renewable option is natural gas but increased commitments from both the Federal and Maine governments will be required to achieve statewide benefits. The lack of pipeline infrastructure must be addressed if people are to have a heating alternative to home heating oil besides wood. The Maine government should extend its efficiency subsidization initiatives to include tax rebates for switching over to natural gas, as the cost of new equipment runs in the thousands of dollars. As a means to stabilize the market, we support the selective installation of LNG facilities along Maine’s coast. LNG would increase state gas supplies to meet growing and offer economic development to surrounding areas. Although risks exist, LNG has a much better safety record than oil tankers, which already deliver crude oil to Portland on a regular basis. The siting must be sensitive to local communities but also be done in the most effective location. It is in the best interest of Maine to invest in natural gas while it transitions to more sustainable energy sources.

In the long run, Maine has the potential to radically shift its energy mix away from fossil fuels to renewable resources. While energies such as solar and geothermal should be expanded,
wind power has the potential to drastically alter Maine’s energy portfolio. Within five years, Maine could supply an equivalent amount of energy necessary to power roughly 50% of the homes in the incorporated municipalities. In addition, Maine should market the renewable energy it will generate to regional markets because of the premium price green energy commands.

Two main problems must be addressed before wind can become a dominant source of energy for Maine. Apart from lacking infrastructure, Maine has not effectively marketed wind power as a viable alternative to its residents. To overcome these obstacles, the state should improve infrastructure by subsidizing turbine installation, while facilitating the connection of these farms to the state’s power grid. The state should also improve public knowledge of the benefits of wind power through education initiatives. Because wind power can be loud and disruptive, the state should site wind farms away from residential areas. It should be cognizant of the aesthetic beauty of Maine’s environment when making their proposals as well.

This would be a major step towards shifting reliance away from fossil fuels and would significantly reduce the amount of pollutants released into the atmosphere. It would also help Maine in achieving the goals laid out by RGGI and MCAP. In addition to the above suggestions concerning CO₂ reductions, Maine should pursue the two following policy options to meet reduction targets. The state should continue to expand and promote energy efficiency, while promoting green energy products, as a large market could exist if consumer information is increased. Lastly, Maine should increase the RPS to a more challenging level that better reflects its renewable potential.
Work Cited

The State of Land Use, Planning, and Development

Beth Darling, Eric Hansen, and Courtney Larson

Executive Summary

Land Use, Planning, and Development in Maine is the second chapter of the report The State of Maine’s Environment 2007. This chapter focused on the environmental impacts of land use policy and change in Maine among the incorporated municipalities. For our analysis, we broke the state down into three regions: urban and suburban areas, rural areas, and the coast. Within each region, we looked at trends in land use and development, and explored how these trends affect Maine’s environment. We also examined statewide trends and looked at the current state of transportation in Maine.

Our analysis showed that recent demographic and economic changes in Maine have had a significant impact on land use and planning. In urban and suburban areas, population shifts from service centers to the suburbs are affecting the economic vitality of both areas and changes commuting patterns. In rural regions, areas with higher rural character have lower incomes, higher poverty rates, and higher unemployment rates. On the coast, increasing property values and high in-migration rates are causing a conflict between public and private access rights and are threatening the traditional character of the coast. Altogether, trends in land use are negatively affecting environmental quality in Maine.

We evaluated and propose a range of policy options to address these problems. Overall, we concluded that an increase in regional planning would combat environmentally harmful trends such as sprawl. Ideally, this regional planning would come from an institutional restructuring, so state government could regulate planning practices on a regional level. However, the current political situation in Maine makes this restructuring impossible. Instead, creative indirect planning approaches like transferable development rights, downtown revitalization plans, and continued use of already successful programs like the Working Waterfront Access Pilot Program can address these problems without significant additional involvement of the state government.

Introduction

Since 1950, land use and population distribution in the United States have changed dramatically as vast expanses of agricultural land have become increasingly urbanized and suburbanized. From 1950 to 2000, urban areas increased from 1 to 2% of the country’s land use, while exurban (low-density suburban) areas expanded from 5% to 25%.1 In contrast, the proportion of the country covered by agricultural land dropped from 35% to 31% during this time period, and decreased by over one-half in the states that make up the Northern Forest
ecoregion, including parts of northern Minnesota, Wisconsin, Michigan, New York, Maine, New Hampshire, and Vermont.

These changes in land use have profound implications for the health of the environment. The demographic shift from rural to urban and suburban areas, resulting in increased density, has lead to air and water quality problems and increased resource use. Low-density suburban land use is associated with a set of specific environmental problems, including loss of open spaces, habitat fragmentation, loss of ecosystem services, and wildlife population declines. Because of these and other problems, urbanization, sprawl, and patterns of development are now important environmental issues.

Although Maine has its own unique history of land use and development, it is undergoing many changes similar to the rest of the country. The history of urban areas in Maine started with towns as industrial centers, usually centered around mills or factories. These early industrial centers were situated alongside the rivers that supplied them with both energy and a means of transportation. From 1970 to 2000, the forestry and manufacturing sectors of Maine’s economy gradually declined in importance compared to other sectors such as services, wholesale and retail, and government. The changing economy, along with the increasingly efficient road-based transportation system, meant that compact industrial towns began to transition into service centers surrounded by lower-density suburban housing.

From 1970 to 2000, suburban development increased in Maine, mirroring a national trend of suburbanization. In 2000, urban areas occupied only 1.5% of Maine’s total land area, but this represents an increase of 16% since 1950. Suburban areas increased from about 3% in 1950 to 6% in 2000, while agricultural areas declined by approximately 60% over this same time period.

However, Maine differs from the rest of the country in that current land use change and development are on a smaller scale than in much of the nation; in 2000, 90% of the state was still covered by forests. Maine’s coastline also plays an important role in the patterns of land use change and development, since this is one of the main draws for the state’s tourism industry. In general, Maine is more dependent on its natural areas than many other states – whether for timber harvesting, agriculture, recreation, or tourism. Although the health of Maine’s environment is important for reasons such as wildlife habitat, human health, and climate change issues (among many others), it also has tremendous economic value for the state. Therefore, incentives for planning and limiting growth and development in Maine already exist.

This chapter examines trends in land use, planning, and development in Maine on the statewide level and makes comparisons between different municipality types. To this end, we analyzed statewide data using the following four municipality types as categories: regional service centers, existing suburbs, emerging suburbs, and rural areas. Regional services centers are defined by the Maine State Planning Office and are based on four criteria: the level of retail sales, jobs-to-workers ratio, the amount of federally assisted housing, and the volume of service sector jobs. The determination of both existing suburbs and emerging suburbs follows Evan Richert’s definitions. Existing suburbs are municipalities that have a housing density of at least one unit per ten acres, based on census data as projected to the 2010 census. Emerging suburbs have at least one unit per twenty acres, but less than one unit per ten acres. Rural areas are the municipalities that do not fall into any of the above categories. To draw conclusions about coastal Maine, we also categorized the four municipality types as either inland or coastal in accordance with the Coastal Zone Management Act of 1972 and therefore including any municipality that has land along the coast or a tidal waterway. The spatial distribution of the municipality types in shown in Figure 2.18.
We limit our chapter’s analysis to Maine’s incorporated municipalities, meaning those that do not fall under the jurisdiction of the Land Use Regulatory Commission (LURC). The rationale for this decision is that while organized municipalities may create their own comprehensive plans for development, LURC creates a single comprehensive plan for all of its territory. Furthermore, as there are no real urban or suburban areas in LURC territory, the inclusion of these municipalities would not further our analysis.

This chapter attempts to answer several questions about land use, planning, and development in the state of Maine. In the first section, we analyze statewide data, divided into the categories outlined above, to address the questions: Do patterns of land use, planning, and development vary between urban, suburban, and rural areas? Is there a difference between inland and coastal areas? What do these patterns mean for Maine’s environment? The second section discusses the transportation system in Maine and how it affects land use, planning, and development, as well as the environmental impact of the current system. The following three sections address land use, planning, and development and how they affect Maine’s environment in each of our sub-categories: urban and suburban areas, rural areas, and coastal areas. Each of these five sections discusses historical trends and Maine’s current status, relevant laws, and influential stakeholders. We conclude with a look at the future of land use, planning, and development in Maine and a set of recommendations for growth.
Figure 2.18  Classification of the Incorporated Municipalities of Maine
Statewide Demographic and Economic Comparison

Trends and Current Status

Before analyzing the current state of land use, planning and development in Maine, it is important to examine both the history and the current trends that affect Maine’s people, economy, and environment. Maine is changing rapidly in all areas, and these changes are affecting development patterns and land use policy in the state. This, in turn, has a direct impact on environmental quality. This section will look at changes in Maine’s population, economics, and development trends across urban, suburban, rural, and coastal regions to explore their effects on land use and the environment. As discussed in the introduction, these changes in Maine are a part of a larger network of changes that extends across New England and the United States. In recognition of this, trends within Maine will be analyzed alongside regional and national trends to illustrate the relationships between them.

Maine’s population has been growing steadily since 1900, and has shown a relatively rapid rate of growth since 1970 (Figure 2.19). However, the growth rate of Maine’s population from 1970-2000 is still slow compared to other states. While the average state in New England is growing only slightly faster than Maine, the average American state is growing about six times faster. Although Maine’s population is growing overall, different areas of the state are not growing evenly, and this causes population differences among the regions of Maine.

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Figure 2.19 Population Growth in Maine, 1900-2000

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Like the rest of the nation, the majority of Maine’s population has been concentrated in urban areas. Currently, 50% of Maine’s population resides within the areas designated as service centers by the State Planning Office, but in 1960, 64% of the population lived in these same cities. Maine’s cities are the only region in the state that has lost population in the past forty years. Figure 2.20 shows the percentage of Maine’s population that resides in each of the eight study regions, and the change in these percentages over time.

![Figure 2.20 Percent of Maine's Population Living in Each Region, 1960-2000](image)

Despite the fact that more than half of Maine’s organized municipalities are rural, only a little over a quarter of the population lives there. However, unlike with urban areas, this proportion has remained relatively stable since 1960, so the decrease in urban population cannot be attributed to loss of population from rural areas. The unexplained population loss comes from a dramatic increase in the population in inland suburban areas during this period. Between 1960 and 2000, inland suburban areas had a 55% increase in population, which not only explains the loss of population in the cities, but also represents natural growth and growth from migration.

Migration contributes a significant portion of Maine’s total population growth. Between 1985 and 1990, 60% of the state’s total growth came from in-migration, both from domestic and international sources. In contrast, between 2000 and 2006, 93% of Maine’s total growth was due to in-migration. According to Evan Richert’s survey of residents of Maine’s mid-coast region, one in five in-migrants come from Massachusetts, and 27% come from another New England or Mid-Atlantic state. However, almost all states are represented by in-migrants, and survey respondents alone reported ten different countries of origin on four continents.

Economically, Maine is struggling. While household income rates are consistently increasing in Maine, they are still well below the average household income for the United States, and for New England. Figure 2.21 shows the relationship between household income values for Maine, New England, and the United States between 1969 and 1999. Maine currently ranks 32nd in the nation for average household income, and has the lowest income of all Northeastern states. Household income rates are not evenly distributed within Maine: people
living in suburban areas have higher household incomes than those in rural or urban areas, and overall, people living on the coast have a higher household income than those living inland (Figure 2.22).

![Figure 2.21 Change in Household Income over Time, 1969-1999](image1)

![Figure 2.22 Household Income by Region in Maine (US$), 1999](image2)
Maine’s poverty rate is also relatively high. While it has been lower than the United States average over the past thirteen years, Maine still almost always has the highest poverty rates in New England. Within Maine today, the highest poverty rates are found in the service centers and rural areas. Figure 2.23 shows the relationship between the poverty rates of regions in Maine. Both existing and emerging suburbs have much lower poverty rates than urban and rural areas: poverty rates in inland rural areas are more than double the rates in inland existing suburbs. Overall, wealth and poverty are not evenly distributed in Maine, and suburban areas enjoy more wealth in general than urban or rural areas.

![Figure 2.23 Poverty Rate by Region in Maine, 1999](image)

There are some dramatic trends emerging in Maine’s population and economy. Maine is growing, but mostly in suburban areas. Forty years ago, many of the emerging suburbs that are currently experiencing rapid growth were rural areas. Their relative proximity to service centers and existing suburbs combined with changes in transportation patterns (see Transportation section, below) to facilitate the movement of people into these areas. This increased development pressure and led to the rapid conversion of land from traditional agriculture or timber uses to the low-density housing typical of suburbs. At the same time, people were moving out of the cities to these rapidly-growing suburbs (for more discussion on suburbanization and sprawl, see the State of Maine’s Urban and Suburban Areas section).

The economic state of Maine’s population mirrors trends in demographics. In general, Maine has a low household income and high poverty rate, but in suburban areas, these values are closer to, and sometimes better than national and regional averages. Unfortunately, this means that the majority of wealth and population in Maine are pouring into one area. Economic disparity causes policy debate, because it contributes to a divergence of values and priorities among the population of Maine. When the percentage of in-migrants is considered as well, the potential for policy consensus diminishes further. This makes it difficult for state government to create and implement laws regarding development.
These trends will lead to increased environmental degradation in the future in Maine. Because suburban areas convert land from traditional agriculture and timber uses to low-density housing, they increase fragmentation of natural habitat and also increase the percentage of impervious land. Both of these things are detrimental to environmental quality. The low economic status of rural areas causes a disincentive for people to want to support policies that protect the environment, because environmental policies are commonly considered in opposition to policies that promote economic growth. Rural areas have the highest concentration of open lands and the majority of the natural resources that need conservation.

The trends described above are mirrored in trends in land use and development in Maine. Figure 2.24 shows the number of development permits issued by the Maine Department of Environmental Protection’s Division of Land Resource Regulation (DLRR) under the Site Location of Development Act (see Rural Character section) by region. In 1985, the number of permits per square kilometer in regional service centers was higher than for any other region. By 2005, this number had fallen by nearly a half, while the number of permits in existing suburban areas rose (the only region to have an increase in permit number between 1985 and 2005). This illustrates the effects that demographic and economic shifts have on land use practices: as wealth and population shift away from the service centers and into the suburbs, new development does the same. Changes in economics and demographics do have an impact on land use, and thus on the environment.

The following sections of this paper will be devoted to studying the trends within the rural, urban and suburban, and coastal regions in Maine, and their implications for the environment.
Transportation

The issue of transportation is important in understanding land use change, development, and sprawl, as the transportation system is the physical link between areas of differing land use. It is a key element of land use planning and development because the expansion of the transportation system into new areas allows for new residential, commercial, and industrial development. Development cannot happen without a transportation system in place. Historically, the related trends of suburbanization and the changes in the nation’s transportation system have worked together to determine land use in late twentieth century America.13

Transportation is inherently an environmental issue because of its many effects on the health of the environment. The impacts of transportation and the environment can be divided into two categories: those caused by driving and those caused by the roads themselves. Environmental impacts caused by driving include air pollution, greenhouse gas emissions, and resource consumption. The physical impacts of roads are habitat fragmentation, decreased water quality, and the invasion of non-native species. Transportation impacts make up a significant amount of the total environmental impacts of development; for example, transportation is responsible for one-third of Maine’s contribution to global climate change.14

Maine faces some distinctive challenges in the establishment of an efficient transportation system. Maine’s low population density (38th highest of the 50 states) means that driving is the primary means of transportation, since mass transit is typically not efficient in the absence of large population centers. As a result, Maine residents have a higher per capita cost of road construction and maintenance than residents of many other states. In 1999, Maine received only $23,000 in federal highway aid per mile of eligible road compared to the New England average of $52,000, despite the fact that Maine is second only to Massachusetts in total road miles in the region.15 Finally, the transportation system must be built to accommodate the vast number of visitors that come to Maine in the summer, meaning that many of these roads are not used to their full capacity year round.

Trends and Current Status

There are many variables used to measure changes in the transportation system and how it is used, including commute length, average annual daily traffic, and delay. Commute length is one way to get a rough understanding of how far people drive on a regular basis, since traveling to and from work makes up 28% of the total vehicle miles driven by the average person in the United States.14 According to data from the US Census Bureau, Mainer’s commute times steadily increased between 1980 and 2000. This is consistent with nation-wide trends; average commute time in the United States increased from 22.4 minutes in 1990 to 25.5 minutes in 2000.17 As shown in Figure 2.25, commutes under 20 minutes have been decreasing since 1980, while commutes longer than 20 minutes have increased steadily. This is most likely due to the increased suburbanization and congestion that have occurred in the past few decades. Figure 2.29, in the Maine’s Urban and Suburban Areas section (this chapter), supports this hypothesis, demonstrating that average commute times are higher in suburban areas than in service center communities, especially on the coast.
Average annual daily traffic (AADT) is a basic measurement of road use based on the number of vehicles that pass a location on a road in one year, divided by 365. It is frequently used in land use planning and road management. Figure 2.26 shows trends in AADT in Maine during three different time periods – early 1990s (1990-1994), late 1990s (1995-1999), and early 2000s (2000-2004). All of the values for the early 1990s are quite high, and it is unclear whether this is due to the method of data collection or to high actual traffic values. The number of data points recorded for the early 1990s was 985, compared to 1119 for the late 1990s and 1145 for the early 2000s. This means that the number of locations that recorded AADT data increased over these three time periods, and perhaps expanded to cover more than just major highways, which would bring down the average AADT for the later time periods and could possibly explain the high values.
Despite this potential problem, there are some relevant conclusions that can be drawn from the change in AADT over this time period. First, if the data from 1990-1994 are excluded, there was an increase in traffic volume in every category except the inland service centers. The deterioration of urban centers that occurred during this period explains this result. The most dramatic increases between the late 1990s and the early 2000s occurred in inland existing suburbs and coastal rural areas, and there were also noteworthy increases in inland emerging suburbs, coastal service centers, and coastal emerging suburbs. This implies that as towns spread out beyond the borders of the service centers, traffic increased in those suburban areas. The 89% increase in coastal rural areas between the late 1990s and early 2000s could be a result of sprawl into rural areas as high coastal property values force people to move further from their jobs in coastal communities (see Access and the Coast, this chapter).

Congestion is an important factor to consider in evaluating the current status of the transportation system in Maine. Due to the seasonal nature of large sectors of Maine’s economy, traffic in the summer months is far worse than during the rest of the year. Delay is a measurement of congestion; it is a ratio of vehicle miles traveled to vehicle hours traveled (or more simply, a ratio of distance traveled to time). The Maine Department of Transportation (DOT) estimated that in 2004, total delay on highways was over 38 million vehicle-hours. Delay is expected to continue growing at two and a half times the rate of growth in travel between 2004 and 2030\(^1\). In response, the DOT has proposed a number of mobility improvements to relieve congestion in targeted areas, including Gorham, Skowhegan, Bangor, Bath, and Wiscasset\(^2\).

All three of these indicators – commute times, AADT, and delay – show that road use has been increasing over the past few decades. This has important implications for air quality and global climate change issues, because as the number of cars on the road increases, so does pollution and greenhouse gas emissions. Air pollution related to transportation includes the emission of nitrogen oxides, volatile organic compounds, sulfur dioxide, particulate matter, and carbon monoxide. In 2006, automobiles were responsible for 51% of Maine’s emissions of nitrogen oxides and 38% of emissions of volatile organic compounds\(^3\). The southern and coastal sections of the State do not comply with federal air quality requirements for ozone under the Clean Air Act for parts of every year. Although this is partly caused by emissions from the Midwest drifting east, over half of the volatile organic compounds that cause ozone non-attainment are from in-state automobile emissions\(^4\).

The burning of the gasoline used in cars and trucks also releases carbon dioxide, a major greenhouse gas; in Maine, transportation accounted for 33% of carbon dioxide emissions in 2006\(^5\). A report produced by the Environment Maine Research and Policy Center and the Natural Resources Council of Maine estimated the amount of carbon dioxide emitted by each township in Maine based on commute length and found that commuters living on the fringes of metropolitan areas produce, on average, three to seven times the amount of carbon dioxide of those living in the State’s largest cities\(^6\).

Unfortunately, usable data on the other category of transportation-related environmental issues – impacts resulting from the roads themselves – are more difficult to find. Although data on the density of State roads in each township are available, this data does not reflect actual changes in road miles very accurately because it does not include local subdivision roads, which is currently the fastest growing type of road in Maine\(^7\).

Roads affect the natural flow of both surface water and groundwater, creating a number of problems. Since roads are impervious surfaces, they create additional runoff, which can lead to increased flooding in areas below them. Water quality along roadsides is also an issue. One
study found that 83% of the chemicals found along roads are from vehicles themselves in the form of oil, grease, fuel, rust, and tire wear among others; the remaining chemicals are from sanding and deicing agents, road surface wear, and herbicide and pesticide use along the edge of roads. Rain washes these chemicals into local watersheds, where they flow into lakes, streams, and wetlands. Given the large amount of wetland areas in Maine, this effect could be quite serious.

The construction of roads results in direct habitat loss through conversion of land to pavement and roadsides. Roads also carve up landscape into smaller contiguous patches that have a high percentage of edge area. This process of habitat fragmentation limits the species that can occupy patches of land, depending on the species’ required amount of contiguous land and their sensitivity to edge effects. Edge habitat is subject to higher levels of noise and pollution, changes in microclimate (sunlight, moisture, temperature, and wind), and is more vulnerable to disease and invasive species. Roads can function as corridors for invasive species, which often grow particularly well in the open areas along the sides of roads.

Modes of transportation that are less harmful to the environment have been making modest headway in the last decade. The DOT has been making an effort to increase the availability of passenger transportation through the Explore Maine system, which incorporates ferries, trains, airplanes, and buses. There are some transit systems aimed primarily at tourists, such as the four Explorer bus routes which run on Mt. Desert Island, the southern coast, the Portland area, and Bethel/Sunday River, but there are also inter-city bus lines provided by private companies. The Amtrak Downeaster route was reopened in 2001 and provides transportation from Portland to Boston. Use of these transit options increased by 42% between 1994 and 2004. However, the percentage of Mainers that use alternative transportation on a regular basis is quite small. The 2000 Census found that only 0.8% of commuters use any kind of public transportation on their journey to work, whereas 89.8% drove, of whom 70.6% drove by themselves to work.

Stakeholders

Traditionally, transportation in Maine has been regulated at the federal, state, or local level; therefore, the US Department of Transportation, the Maine DOT, and town governments are all influential stakeholders in transportation planning. However, planning often makes the most sense on a regional or county level, as individual roads normally go beyond town boundaries but often are not important enough to warrant the attention of the State government.

The Gateway 1 project in the midcoast region of Maine is an innovative regional approach to transportation planning. This project seeks to mitigate the problems with congestion on coastal Route 1 from Brunswick to Prospect, a distance of 110 miles that directly includes 21 townships. Representatives from these townships and from the Maine DOT, the Federal Highway Administration, and the Maine SPO have formed a steering committee to address the issues that face this important section of highway, including population growth, development, tourism, and congestion. The Gateway 1 project, if successful, could represent a breakthrough in transportation and land use planning.
The history of federal transportation policy has played an important role in the evolution of the transportation system of every state. From the first Federal-Aid Highway Act in 1916 to the more well-known Federal-Aid Highway Act of 1956 (also known as the Interstate Highway legislation), the federal government directed the way states constructed their road systems by limiting how federal transportation grant money could be used. As a result of the federal regulations, two biases in transportation planning became institutionalized and continue to impact the way land is used for transportation today. First, there were no federal funds dedicated to urban roads until 1944, and even then they were given the least funding compared to primary routes (interstate roads) and secondary routes (county rural roads). The result of this policy was that traveling from homes outside of the city into urban workplaces, shopping areas, or other destinations by car became very easy, while transportation within or between urban areas did not improve. Similarly, the movement of raw materials and manufactured goods from rural or suburban areas into cities was efficient, but transport between cities was not.

The second trend that emerged from federal highway funding policies was that motorists were consistently undercharged for the construction and maintenance of roads because the cost was spread across the entire population, including people that did not own cars (which in 1954 comprised over one fourth of the population). As a result, a large number of people adopted driving as their primary means of transportation, since they were not paying the full cost of their road use.

After the highway building boom of the 1950s and 1960s following the Federal Aid Highway Act of 1956, no new major federal transportation laws were passed until the Intermodal Surface Transportation Efficiency Act of 1991. This policy shifted much of the funding and responsibility for the transportation system from the national level to the state and local levels. It also provided funding for public transit and small amounts for environmental mitigation, bike paths, and the restoration of historic transportation facilities such as canals, rail stations, and waterfronts. However, the patterns established by national transportation policy in the early to mid-twentieth century continue to hold in the form of the physical road structures and a still-growing national dependency on the automobile.

Historically, Maine state law has not tightly regulated the state transportation system, although there are some notable laws, including Title 30-A, Section 4404, (1989) which states that new subdivisions (defined as the division of a parcel of land into 3 or more lots) cannot cause undue traffic on highways or public roads. Furthermore, if a subdivision requires a new entrance or driveway onto a highway or public road, the developer must have a traffic movement permit from the DOT under Title 23, Section 704-A (1999). Traffic movement permits are also required for any project that will add an estimated 100 passenger cars to a state road during peak travel hours. The purpose of these permits is both for the safety of travelers and to prevent unnecessary traffic and congestion.

More recently, the Sensible Transportation Policy Act was passed in 1991 with the aim of making transportation in Maine more environmentally sustainable. Some of its terms state that harmful effects of transportation on human health and the environment should be minimized, alternative modes of transportation should be considered with all proposed highway projects, and the use of energy-efficient forms of transportation should be encouraged. Table 2.1 provides a summary of the notable federal and state transportation laws discussed in this section.
### Table 2.10 Description of Laws Relevant to Transportation

<table>
<thead>
<tr>
<th>Law</th>
<th>Level</th>
<th>Year</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal-Aid Highway Act (Interstate Highway legislation)</td>
<td>Federal</td>
<td>1956</td>
<td>Provides federal grant money for state road construction and maintenance. Stipulations on how funding could be used had a large influence on transportation planning.</td>
</tr>
<tr>
<td>Intermodal Surface Transportation Efficiency Act</td>
<td>Federal</td>
<td>1991</td>
<td>Shifted much of the responsibility of the transportation system to state and local levels. Also provided funding for public transit and environmental impact mitigation.</td>
</tr>
<tr>
<td>Title 30-A, Section 4404</td>
<td>State</td>
<td>1989</td>
<td>Requires local governments to ensure that new subdivisions do not cause undue traffic and congestion on state and other public roads.</td>
</tr>
<tr>
<td>Title 23, Section 704</td>
<td>State</td>
<td>1999</td>
<td>Requires any new entrances or driveways onto highways or state roads or any transportation project that will increase traffic volume by 100 cars during peak travel periods to obtain a traffic movement permit. The purpose of the permits is to control congestion and increase safety.</td>
</tr>
<tr>
<td>Sensible Transportation Policy Act</td>
<td>State</td>
<td>1992</td>
<td>Aims to make transportation in Maine more environmentally sustainable by requiring negative environmental impacts of transportation to be minimized and encouraging energy efficient transportation and alternative modes of transportation.</td>
</tr>
</tbody>
</table>

### Maine’s Urban and Suburban Areas

The word “urban” may seem strange in the context of Maine, since the state is known largely for its wilderness areas and quaint coastal towns. Only three cities – Portland, Lewiston-Auburn, and Bangor – and their surrounding suburbs are considered to be metropolitan areas by the United States Census Bureau. In the case of Maine, it makes more sense to use the regional service centers as a category rather than these three metropolitan areas. The service center communities function like urban areas do in other states – namely, as hubs of business, government, and services for the surrounding areas. Therefore, for the purposes of this chapter, regional service centers are included in the analysis of urban areas.

Beyond the boundaries of the service center communities lie the suburban townships. Suburbanization, which we examine in this section, refers to the movement of people into established suburban areas, either from cities or from rural areas. By contrast, the term “sprawl” implies new settlement expanding out beyond existing suburbs. It is important to remember that the demarcation of urban, suburban, and rural townships is not permanent; over time, townships tend to shift along the urban-rural continuum. This movement has important implications for the environment, as the conversion of rural land to suburbs causes habitat loss, fragmentation, increased resource consumption, pollution, and other issues.
Trends and Current Status

Although Maine has a reputation for being a largely rural state, in the last few decades urban and suburban regions have grown in both size and importance. Urban and suburban areas currently account for only 7.5% of Maine’s land, but together contain approximately 89% of the State’s population. These areas are also the base of the majority of Maine’s economic activity; the Portland region alone, which includes Cumberland county and parts of Oxford and York counties, produced 47.2% of Maine’s gross State product, earned 44.2% of the State’s total personal income, and provided 42.4% of total State employment in 2005. As the Portland example demonstrates, cities and their surrounding areas make up relatively little of Maine’s land area, but they are disproportionately important in terms of both population and economic activity.

The issues of sprawl and rapid suburbanization have recently become areas of concern in Maine, especially because of their inclusion in prominent publications such as Changing Maine, 1960-2010 and Charting Maine’s Future, as well as increased awareness of the environmental consequences of rural land conversion. The attention is well deserved, as the fastest-growing category of land use in Maine is low-density suburban communities. Suburban and suburbanizing areas are characterized by rising numbers of housing units, population growth, and long commute times into cities; these are the indicators used in this chapter to evaluate the state of land use, planning, and development in Maine’s urban and suburban areas.

Housing unit growth over time shows two trends: where land has been converted to housing from other uses and where areas already used for housing have become denser. Figure 2.27 shows where housing unit growth has occurred in Maine over a 30-year period. High levels of growth occurred in many of the regional service centers, especially Augusta, Lewiston-Auburn, Bangor, and Portland and its bordering service centers. On the other hand, some regional service centers experienced low or even negative housing unit growth; these were mostly towns in more remote areas of the State such as Greenville, Limestone, and Oxford. High rates of housing unit growth characterized the majority of the southern region of the State. Suburbanization can be seen particularly clearly around the Portland area and in between regional service centers along highway I-95, especially Lewiston-Auburn, where three of the bordering municipalities experienced over 75% growth in housing units.

Population growth over time is another way to show where development occurs (Figure 2.28). From 1990-2005, there were some areas with rapid population growth and others with significant negative growth. Many of the regional service centers experienced negative growth in this period, including Portland, Lewiston, Auburn, Augusta, Waterville, Lincoln, Dexter, Rockland, Rumford, Calais, and Caribou. On the other hand, townships around and in between regional service centers in the southern part of the State showed rapid positive growth. Clusters of townships outside of Portland and north of Kittery experienced the highest levels of growth, and population also grew rapidly around Lewiston-Auburn, southwest of Waterville, and outside of Bangor.
Figure 2.27 Housing Unit Growth in Maine, 1980-2000

Legend
- Regional Service Centers
- Percent Change in Housing Units
  - <0
  - 1 - 25
  - 26 - 50
  - 51 - 75
  - 76 - 100
  - >100

0 25 50 100 Kilometers
Figure 2.28 Population Growth in Maine, 1990-2005
Changes in the distance that people drive to work can also function as an indicator of suburbanization, since as housing growth occurs in areas further and further from central cities, commute times will become longer. As discussed above in the Transportation section (this chapter), commute times in Maine have generally been increasing since 1980. Figure 2.29 adds a comparison across township types; it shows that regional service centers, both coastal and inland, have the shortest average commute times and existing and emerging suburbs have the longest commutes on average. Inland rural commute times are 18% shorter than inland suburban commutes, but on the coast rural commutes are 23% longer than suburban commutes. We expected rural commutes to be shorter than suburban commutes because a large amount of the rural population does not commute to urban areas. However, commute length patterns on the coast were contrary to this hypothesis. One possible explanation is that because of rising coastal property values, those who work in coastal cities can no longer afford to live near their workplace and are forced to spread out into rural areas in search of lower property taxes (see Access and the Coast, this chapter).

These three trends combine to show a distinct trend toward suburbanization and sprawl. Both the number of housing units and population have risen in areas surrounding regional service centers, particularly in the southern part of the State. Commute times are longer in suburbs than in any other township category. It seems clear from both Figure 2.27 and Figure 2.28 that suburbs are filling in the areas north of Kittery, through the Portland area, up I-95 to the Waterville and Bangor metropolitan areas. This can be contrasted with the relatively low growth in population and the number of housing units in the northern and eastern parts of the State.

Understanding the motivation behind the patterns of suburbanization and sprawl requires an appreciation for the economic issues that are involved. In rural townships, land prices and taxes both tend to be lower than in urban areas. However, this can be deceiving because as new homes accumulate in an area, property taxes remain the same until the township needs to expand their services, at which point property taxes are likely to jump to a higher level. Sprawl is an
iterative process; as new housing developments drive up the prices of neighboring lots, newcomers looking for cheaper land are forced to move even further out from the central city.

Furthermore, new housing developments are often inefficiently cheap because the local municipality (and therefore all its residents through taxes) bear the cost of necessary new schools, roads, and other infrastructure to support the development. Between 1970 and 1995, school enrollment dropped by 27,000 students, but nonetheless new schools were being built to serve students whose families had recently moved to fast-growing suburban and emerging suburban towns. Similarly, new roads necessary to connect development are often paid for by local governments instead of developers—in essence, a subsidy to those who choose to move to these areas. These types of expenses—schools, roads, and other necessary infrastructure and services—are ultimately paid for by taxpayers in the township, which drive up taxes of the area.

However, the decision to move to the suburbs or a more undeveloped area is not always based on economic considerations. A survey of recent movers conducted by the Maine SPO in 1999 found that the most frequent reasons cited for moving away from an urban area to a suburb or to a more remote location were that in their old location the houses were too close together, there was a lack of privacy, there was too much noise, there was too much traffic, and/or it was too far from nature. These preferences reflect those of people across the country; the National Homebuilders Association found that the top five features people look for in a new home are: spread-out houses, low amounts of traffic, low property taxes, bigger homes, and bigger lots. These findings demonstrate that although economic reasons such as land prices and property taxes can partly explain the trends of suburbanization and sprawl, people also move because they want to live in a suburban neighborhood.

The implications of increasing suburbanization and sprawl are both environmental and cultural. Since these trends lead to increased amounts of vehicle miles traveled, the negative environmental impacts of transportation mentioned above are magnified. Another environmental consequence of suburbanization and sprawl has to do with the size and consumption level of suburban housing developments. Since new suburban houses tend to be large, they require more land to be converted to development and generally use more resources, including water and fossil fuels. Suburban houses also tend to be located on large house lots, which require more road area and often result in higher amounts of runoff contaminated with chemicals. The desire for large lots means that land is being consumed at a much higher rate than the population is growing: in Maine, the amount of developed land increased by 16.4% between 1985 and 1999 while the population only grew by 8.6%.

Cultural implications of suburbanization and sprawl revolve around the deterioration of downtown areas in service center communities. As people move out to suburbs, a variety of businesses, including shopping malls, restaurants, and other services, move out to accommodate these new developments and to take advantage of the same low property taxes that draw people to live in the suburbs. The result of this migration is that downtown businesses begin to falter due to competition with suburban businesses. Combined with the declining populations in service centers, this pattern leads to abandonment of historic buildings and underutilization of downtown areas, which are part of the classic small-town culture that Maine is known for.
Stakeholders

There are a variety of entities that have a role in the planning of urban and suburban areas. Although the state has a nominal role through the Growth Management Act (see laws section below) and the Maine SPO, it is the townships that have the most influential role in local land use planning. Due to the strong tradition of local control in Maine, townships are often reluctant to relinquish control over their territory, despite the fact that issues like watershed management and road construction are often better planned on a regional level. Therefore, town councils and related organizations frequently have a stronger role than the SPO in determining how development and growth are managed.

There are also a variety of nongovernmental organizations that are involved in working with local governments to promote better land use, planning, and development. GrowSmart Maine is a nonprofit organization whose mission is to “promote sustainable prosperity and to protect the state’s distinctive character and quality places”\(^33\). To this end, they have produced the report *Charting Maine’s Future* (discussed above in the Statewide Demographic and Economic Comparison), held town meetings, and coordinated the GrowSmart Maine Summit, among other activities. The Maine Downtown Center, an organization associated with state offices as well as the nonprofit group Maine Development Foundation, works to revitalize deteriorating downtowns through new investment, businesses, and jobs. Since 2000, they have provided resources and assistance to six towns: Saco, Bath, Gardiner, Waterville, Eastport, and Norway, which they call the Main Street Maine communities\(^32\) (see Case Study 2.3). Another non-profit organization, Beginning with Habitat, is a joint effort of federal and state agencies, regional governments, and conservation groups. The program is based on promoting conservation of habitat by providing townships with data, maps, and advice on critical habitat areas to use in land use planning efforts\(^34\).

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**Case Study 2.3 Downtown Revitalization in Gardiner**

Gardiner, Maine, is a service center community located along the Kennebec River just south of Augusta. Historically, its location on the river allowed it to become home to various industries, including paper mills, wharves, lumber yards, tanneries, and ice production. After many of the town’s businesses closed in the 1960s, Gardiner became more of a bedroom community from which people commuted to nearby cities such as Augusta, Bath, and even the Portland area. The town’s population shrank from 6,897 in 1960 to 6,198 in 2000\(^9\). Meanwhile, the suburban townships surrounding Gardiner (Pittston, Richmond, and West Gardiner) grew. The result of the changes in population and closing of industries was a deterioration of the downtown area of Gardiner; vacant shop windows dotted the main streets and historic buildings fell into disrepair\(^32\).

However, the township has been taking meaningful steps to counteract the decline of its downtown area. In 1999, the city council developed a Downtown Revitalization Plan and in 2001, the town was chosen by the Maine Downtown Center as one of their Main Street Maine communities. This designation resulted in $2,575,000 for revitalization efforts, including restoration of a historic theater and enhancement of public access to the shoreline of the Kennebec River. From 2002 to 2004, 17 businesses moved into the downtown area and 29 new jobs were created. Gardiner is an example of a service center community that has suffered a decline in population and economic activity, but because of the dedication of its citizens and the Maine Downtown Center, is now on the upswing\(^32\).
Laws, Institutions, and Management

The most important law in recent Maine history governing land use, planning, and development is the Growth Management Plan of 1988, which includes the Comprehensive Planning and Land Use Act (PL 1989, c. 104, Pt. A, §45). The Act allows the State government (and specifically the SPO) to assist communities in designing and implementing comprehensive plans for growth at the local level, but does not require that municipalities adopt these plans. Municipalities that choose to create a comprehensive plan are required to identify growth areas, where increased development will be permitted. They are also required to develop zoning plans that restrict development to the most appropriate areas. This not only protects the natural environment and character of the area, but also encourages economic growth in the areas that are most suited for development. A 2000 amendment to the Growth Management Act requires that all state buildings must be located in downtowns, preventing the state from adding to the problem of sprawl that they are attempting to minimize.

While this Act has several beneficial implications for communities, including preservation of open spaces and stimulation of the economy, the general framework plan has several major flaws. By allowing municipalities to choose whether or not they want to participate and develop a comprehensive plan, the Act allows municipalities to simply opt out of the plan altogether. The SPO found that only 29.8% of the incorporated municipalities in Maine have some sort of zoning regulations in place beyond the state mandated shoreline zoning. This means that more than two-thirds of Maine’s communities are not receiving the benefits of the Act, and have no practical, state-controlled limits on their growth. Furthermore, even those that do have comprehensive plans do not always follow their own guidelines for growth; Evan Richert found that “only a handful… have meaningfully implemented them.” This is one of the reasons for continuing unmanaged sprawl – townships are simply not enforcing the provisions of their comprehensive plans, if such plans even exist.

Downtown rebuilding plans are subject to a number of codes and requirements that often impede revitalization efforts. For example, the state fire code can prevent old, historic buildings from being used because they do not comply with modern code regulations and it is costly to remodel them. Although safety is important, historic buildings are unique and must be evaluated differently from new buildings. Requirements to meet the Federal Americans with Disabilities Act are similarly problematic; hallway width requirements alone can be enough to necessitate demolition of a building.

Finally, municipal zoning ordinances, when they exist, control what kind of development is permitted. The most basic zoning concept is to separate residential areas from commercial and industrial areas; however, this idea led to the construction of suburbs across the nation. In many Maine towns, ordinances dictate the allowable housing density and the location of residential, commercial, and industrial areas. These ordinances prevent the development of “smart growth” communities, which feature mixed-use development and moderately dense settlement in order to reduce land use conversion and dependence on the road system.
Table 2.11 Description of Laws Relevant to Land Use, Planning, and Development\textsuperscript{8, 12, 35, 36}

<table>
<thead>
<tr>
<th>Law</th>
<th>Level</th>
<th>Year</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comprehensive Planning and Land Use Act</td>
<td>State</td>
<td>1989</td>
<td>Allows the State government to assist in designing and implementing comprehensive plans for growth at the township level. Municipalities are only required to develop plans if they have some kind of zoning already in place.</td>
</tr>
<tr>
<td>Site Location of Development Act</td>
<td>State</td>
<td>1970</td>
<td>Requires plans for large-scale development to be submitted to the Department of Environmental Protection’s (DEP) Division of Land Resource Regulation (DLRR) for approval before construction can begin.</td>
</tr>
<tr>
<td>Erosion and Sedimentation Control Law</td>
<td>State</td>
<td>1995</td>
<td>Requires any project that displaces significant amounts of earth to implement measures to control erosion and sedimentation. Controlled through the DEP DLRR.</td>
</tr>
<tr>
<td>Stormwater Management Law</td>
<td>State</td>
<td>1995</td>
<td>Requires any development project of greater than one acre to implement stormwater and runoff protection measures. Controlled through the DEP DLRR.</td>
</tr>
<tr>
<td>Coastal Zone Management Act</td>
<td>Federal</td>
<td>1972</td>
<td>Defines the coastal zone. Provides funding for states that create a management plan with the federal government. Administered through National Oceanic and Atmospheric Administration and State Planning Office in Maine.</td>
</tr>
<tr>
<td>Mandatory Shoreline Zoning Act</td>
<td>State</td>
<td>1971</td>
<td>Requires shoreline areas must be zoned within 250 feet of high water line of a water body or upland edge of a wetland. Controlled through the DEP DLRR.</td>
</tr>
</tbody>
</table>

**Rural Character**

**Trends and Current Status**

In 2007, after the publication of *Charting Maine’s Future*, Governor Baldacci created a Council to study the effects of Maine’s Quality of Place on the future of the state’s growth and development\textsuperscript{37} \textsuperscript{2007, 2007}. *Charting Maine’s Future* states that “land development patterns are… consuming rural land, increasing government costs, and degrading the state’s small towns and environments,”\textsuperscript{33}. It is the latter portion of this statement that this section will focus on: the degradation of the state’s small towns and environments. Town meetings across the state are populated with interest groups who fight against development to save this same “rural character,” and these groups often come into conflict with others who are striving to promote economic development. The question is: are these two groups necessarily in conflict? How exactly does rural character impact Maine’s economy? Can we come up with policies that both promote economic development and protect rural character? While groups such as the Governor’s Council on Quality of Place have taken considerable steps toward addressing some of these questions, there is still a lot of work to be done before we can implement policies to protect rural character.

For the purposes of this study, we define rural character as a combination of three variables: low population density, low housing density, and low road density. Towns that exhibit rural character will be those that have a population, housing, and road density falling within the lower third of all municipalities (and not to exceed the mean value for emerging suburbs). Figure
2.30 shows towns that exhibit rural character by these criteria in relation to other, and also to the regional service centers, emerging suburbs, and existing suburbs of Maine. The constraints of the criteria mean that not all towns defined as rural by our study have rural character, and some towns that fall under other categories to have rural character traits. However, the similarity of the rural character towns in all relevant characteristics make them a valid data set for analysis.
As we saw in the statewide demographic and economic trends section, Maine is below average economically. Low incomes, high poverty rates, and high rates of unemployment hinder the State’s development and limit its economic competitiveness with other states. Within Maine, rural areas are more economically depressed than most (see Figure 5 and Figure 6 for regional comparisons of wealth indicators), and within an even tighter focus on rural areas, municipalities that have higher rural character ratings have lower wealth indicators than those that have lower rural character ratings. The relationship between rural character rating and wealth, as indicated by a Comparative Wealth Index (a composite of household income, poverty rates, and unemployment rates) is shown in Figure 2.31. Municipalities showing rural character in general have poorer values of wealth indicators than rural areas that do not show rural character.

![Figure 2.31 Comparative Wealth Index Value in Relation to Rural Character Rating](image)

In addition, there is an interesting and unexpected relationship between wealth and rural character on the coast. In general, the coast has better values of wealth indicators than inland areas, and this trend holds true for coastal and inland rural areas as well. However, among rural areas that show rural character, coastal communities have a lower income and higher poverty rate than similarly rated inland communities. Rural character seems to have a detrimental effect on a community’s wealth, but this cost is disproportionately large on the coast.

Stakeholders

The major stakeholders in rural areas are the communities that possess these traits, and can use it as a resource. We estimate that there are 218 municipalities in Maine that meet the criteria of population density, housing density, and road density sufficiently to exhibit rural character. These communities are in the best position to benefit from the economic and social advantages that rural character brings to their area, and thus should show the most interest in its preservation.
The people who spend time in rural character communities are also major stakeholders, whether they live there permanently or simply visit the area. However, residents of local communities are often divided between the desire to preserve the natural beauty of their towns and the need for economic growth. The lack of available options that link the two drives individuals to support the need for growth, often at the expense of the environment. However, rural character also draws people to move to rural areas, and these people often place a higher value on the preservation of the natural environment than permanent residents. The conflicts that arise between the differing opinions on growth of these two groups often manifest in the “native” vs. “from-away” duality of Maine politics, but these apparent disagreements can potentially be solved by the third group of people who have an interest in rural areas: tourists.

Tourism is the largest single contributor to Maine’s economy, bringing in more than $13 billion dollars in sales every year. Areas that are rich in natural resources and opportunities for outdoor recreation consistently attract more tourism-based income than areas that do not have these resources. Tourists are interested in the rural character of places, and are willing to spend money to enjoy it. It is one of the central conclusions of Charting Maine’s Future that the future of Maine’s economic growth lies in the state’s unique local and environmental character. According to Spreading Prosperity to All of Maine, a report by the Maine Center for Economic Policy, Maine’s rural communities could become a world-class tourist destination, which would provide a significant increase in economic benefits for Maine.

Tourists enjoy Maine because it is different from where they live, and if Maine continues to suburbanize and lose its rural character, the opportunities for economic growth in the tourism sector will be lost.

Laws, Institutions and Management

The State of Maine has enacted a series of laws and rules to regulate growth within its communities. Limits to growth are beneficial to the preservation of environmental quality, but most current planning laws in Maine are not structured in a way that prevents growth to protect the environment, but rather to mitigate environmental degradation without hindering development. However, this is not to say that Maine’s laws do not protect the environment. There are provisions within many planning laws that are specifically designed to protect open places, water and air quality, and wildlife habitat. In addition, separate legislation that is specifically aimed at the detrimental environmental effects of development minimizes the negative impact of new projects.

Some of these specific environmental protection rules are the Site Location of Development Act (38 M.R.S.A. §§ 481-490), Storm Water Management Act (38 M.R.S.A. § 420-D), and Erosion and Sedimentation Control Act (38 M.R.S.A. § 420-C). All three of these laws are managed through the Department of Environmental Protection’s Division of Land Resource Regulation (DLRR), and require new plans for development over a certain size to apply for permits. Permits are issued on the condition that the development meets the environmental standards in the legislation. While these laws provide some protection, their focus on the environment weakens them as planning laws, since there is no control or monitoring of where in the municipality the development is located. Areas and developments falling under these laws do not receive all of the planning benefits that comprehensive plans and the designation of growth areas provide, and are not an effective replacement for such programs.
The framework legislation for growth management in Maine, the State Growth Management Act and the Comprehensive Planning and Land Use Act (PL 1989, c. 104, Pt. A, §45) are described in Table 2.11. Both laws have direct relevance to rural planning, but since only 52 of the 238 rural towns in this study have formulated Comprehensive Plans under this legislation, the laws only apply to a small portion of the data set. The Mandatory Shoreland Zoning Act (which is discussed in detail in the Access and the Coast section) requires zoning around all waterways, and given the high density of surface water in Maine, these rules apply to most municipalities. However, the majority of land in rural Maine is not covered by zoning laws or other organized, state-managed planning legislation.

Given the inefficiencies of existing planning legislation in Maine, and their inability to effectively regulate development, other strategies have been developed to address growth management that do not involve formal legislation. One of the most promising of these alternatives is the Transfer of Development Rights (TDR) program, which seeks to provide management of growth areas within municipalities through the use of market incentives. In a TDR system, conservation easements are placed on undeveloped lands in a municipality while increased development density rights are given to the growth region. The easements are funded by developers with an interest in increased development within the growth region. Although TDR programs have not yet been successful in Maine, other states have found them effective, and they are a promising option for future growth management in Maine.

While rural character may be a difficult concept to define, and therefore a difficult concept to analyze quantitatively, it is nonetheless vital to Maine’s economic and environmental vitality. Therefore, comprehensive legislation and creative, nongovernmental programs need to be implemented in a timely manner to preserve rural character before it disappears. Unfortunately, decision makers are too often preoccupied by the fact that rural areas are some of Maine’s poorest areas (see Statewide Demographic and Economic Comparison section), and programs that encourage economic growth are chosen over those that preserve rural character. Today, rural character is still common in Maine’s small towns, and the opportunity to use this resource for economic benefit still exists. How long it will continue to be available, given current trends in sprawl, is subject to opinion. As we look to future options in planning policy, it is important to remember that as Maine continues to grow and change, rural character will continue to have an impact on the state’s overall character, and the composition of its economy.

Access and the Coast

Trends and Current Status

Coastal areas in the US face significant development pressure. It has been predicted that in this decade the coastal population of the United States will increase by 60%. This is especially true in the Northeast; by 2010, coastal county population density in this area will be 10 times the national average. The population is growing along the coast because of waterfront access. However, at the same time, the increasing population is putting pressure on already existing access points. This makes planning for development on the coast critical, since new access points have both economic and environmental implications. This section addresses the conflict between commercial and private access and their relationship with changing property value. It then outlines some policy tools that have been created to address the changing access on the coast.
There are several different types of access points. Many access points are recreational, used for boat launches or beach access. Both of these functions are important for tourism. This section, however deals with commercial access points and new private access points. Commercial fishing access points typify the traditional economy on the coast of Maine.\textsuperscript{43} Commercial fishing points generally have multiple users and they are much more economically important than coastal residential construction. A study by Charlie Colgan showed that the “the working waterfront contributes anywhere from $15 million to $168 million more per year to our gross state product than does coastal residential construction.’’\textsuperscript{44}

Working Waterfronts in Maine, which have become the center of the commercial access discussion, are defined only in the Maine Revenue Service tax code. This states that “‘Working waterfront land’ means a parcel or portion of a parcel of land abutting tidal waters or is located in the intertidal zone (located between the high and low water mark) the use of which is more than 50\% related to providing access to or in support of the conduct of commercial fishing activities.”\textsuperscript{45} There are currently 1,045 working waterfront access points on the Maine coast. These points amount to approximately 20 miles of coastline, out of a total 5,300 miles of coastline in Maine. Fifty-five percent of these points are privately owned; the rest are publicly owned.\textsuperscript{43} The number of commercial fishing access points by municipality is shown in Figure 2.32. The majority of municipalities in the coastal zone have two or fewer commercial fishing access points. There are only 20 of a total 142 municipalities that have 20 or more points. These points are relatively evenly distributed across the state.

While the number of commercial access points has remained relatively static, property value has been rising dramatically (Figure 2.33). There has been a 50\% increase in total assessed property value between 2002 and 2007. This rise has not been evenly distributed across all coastal townships, however. The rural areas on the coast currently have the highest assessed property values per capita. This is followed by established suburbs, emerging suburbs, and finally regional service centers.
Figure 2.32 Number of Commercial Fishing Access Points by Municipality, 2007

Figure 2.33 Assessed Property Value per Capita for all Coastal Counties, 2002-2007
Increased property value indicates that waterfront property has become more desirable in Maine. This is not, however, an issue of overall increase in property value; distribution of where this property value rise occurs plays an important role. There is a positive relationship between property value and commercial fishing access points. Municipalities with assessed property value per capita in the top 50% have a significantly higher number of access points than those in the bottom half (Mann-Whitney Test, $z=-2.318$, $p<.000$). There is also a relationship between property value and the number of new permits approved for piers on the coast. Under the Mandatory Shoreline Zoning Act, the Maine DEP must issue a permit for any new piers, since they fall in the regulated zone under this act. These new piers generally are private access points and not working waterfront access points. There is also a positive relationship between assessed property value and the number of new pier permits (Mann-Whitney Test, $z=-4.132$, $p<.000$). This relationship suggests that the new coastal landowners, who are driving up the price of the land, value private access. This also suggests a negative outlook for public and commercial fishing access points. By building private access points, these landowners demonstrate that they have different values than those people who are not building these new points. Thus, they are more likely to remove these other access points than landowners who are not building a private access point.

In addition to the impacts on the economy and character caused by this shift in property value, there are environmental implications of this change as well. The coast has a number of sensitive habitats, including dunes and wetlands. These habitats benefit from as little disturbance as possible. States have been relatively effective at coupling natural resource protection and public access. Solutions have included dune walkovers, wetland catwalks, and limited public access regulations. However, by adding more access points, there is an increased risk of environmental harm. This is only augmented by adding private access points, where the state has less control over their execution.

Stakeholders

There are two sets of stakeholders that deal with public access in Maine. These are the actual resource users and the public agencies that are involved in regulation. Within the resource users group, there are the old and new residents on the coast. The old residents are the people with an expectation for resource use. These include fishermen and this is the group that has traditionally used group public access points to get to the water. The new users are the people moving into the state of Maine or to the coast and purchasing new land. This group drives up the property values on the coast and builds the new, individual private access points, that restrict the access of old residents.

There is also several government agencies involved in regulation of coastal areas. The DEP is the agency that issues new permits for construction in the coastal zone, a regulated activity. The SPO also plays a key role in management of the coast. It is the agency that produces the Maine Coastal Plan and serves as the intermediary between the federal regulatory structure and the local governments. For public access specifically, the Department of Marine Resources executes the Working Waterfront Access Pilot Program. They do this in conjunction with the private organizations Coastal Enterprises, Inc. and the Island Institute. In addition to working on this project, the Island Institute represents coastal and island communities more generally.
Laws, Institutions, and Management

The state of Maine uses zoning to address new growth on the coast. The Mandatory Shoreline Zoning Act dictates that all shoreline areas must be zoned within 250 feet of the normal high water line of any saltwater body and within 250 feet of the upland edge of a coastal wetland (Table 2.11). There are also provisions for freshwater bodies and wetlands. The statute states that these requirements are in place to protect environmental quality, commercial fishing, historical sites, and access points. The statute also states that the purpose of zoning is to “anticipate and respond to the impacts of development in shoreland areas.” The effect of this statute is that the Department of Environmental Protection must issue permits for development. All new construction within this zone must be approved by the DEP.

There has been action on the federal level as well. In 1972, the United States Congress passed the Coastal Zone Management Act (CZMA). Congress found that the coastal zone is of particular environmental and economic importance and this act is designed to assist states in the management of this zone. This act provides funding for states that work with the federal government on a management plan. In Maine, this plan has taken the form of the Maine Coastal Program, administered by the Maine SPO. This Program was created in 1978 as a partnership between several public and private actors. In Maine there are 136 organized municipalities that fall into the coastal zone as defined by the CZMA.

Every five years the Maine Coastal Program releases an assessment and strategy document, called the Maine Coastal Plan. This document is meant to address the nine policy areas that are dictated by Section 309 of the CZMA. These are Public Access, Coastal Hazards, Ocean Resources, Wetlands, Cumulative and Secondary Impacts, Marine Debris, Special Area Management Planning, Energy and Government Facilities Siting, and Aquaculture. About $400,000 a year is available from the National Oceanic and Atmospheric Administration (NOAA) to fund program enhancement strategies under this Plan.

Within the public access policy areas, The Working Waterfront Access Pilot Program has been developed. This program was created in 2005 through the passage of the Land for Maine’s Future Bond, which secured $2 million in funding to “protect strategically significant working waterfront properties.” The purpose of this project is to buy covenants on current working waterfronts to protect commercial fishing access even if there is future transfer of property ownership. This program is administered by the Department of Marine Resources and the Land for Maine’s Future Board. Using this approach, Maine has been more successful than any other state at protecting working waterfronts.

There is a changing pattern of land access on the coast. Land is becoming more desirable and as a result more expensive. Traditional public access rights may begin to disappear and the most vulnerable places are the most at risk. Maine has pursued a number of different policy tools to deal with this issue. This diversity of solutions should be encouraged; it has been shown that the wider the variety of tools a state uses to secure public access, the more public access points there are.
Case Study 2.4 Environmental Implications of Access Points in Pleasant Bay, Massachusetts

Piers and docks have been demonstrated to have numerous environmental impacts. These impacts include vegetation loss from shading, loss of shellfish habitat, and leaching of chemicals from treated wood, as well as impacts from construction and the boats that use these access points. In Pleasant Bay, Massachusetts, the regional resource management plan completed a comprehensive assessment of the impacts of current and potential piers in the bay. This study found that more secluded areas are more resource sensitive and therefore directly threatened by the impact of new docks and piers. As a result, the study deemed these areas as inappropriate for new docks and piers. This model of scientific assessment and regional planning could be used as a model for Maine.

Analysis and Discussion

Our analysis shows that the current development trends in Maine have resulted in a loss of character in all municipality types of the state. In urban areas, people are leaving the regional service centers in favor of suburbs. The downtown urban centers that characterize Maine’s cities are shrinking. In rural areas, housing density is increasing, converting these areas into emerging suburbs. Emerging suburbs have less open space and they are losing their rural character. On the coast, commercial fishing access and public access points are threatened with disappearing. These traditional types of access points define the image of the coast and without them the coast loses its character.

The character of Maine’s municipalities is an integral part of tourism in Maine. David Vail highlights this importance with his discussion of tourism on the coast. He states that, “With its lighthouses, lobsters, and L.L.Bean, the Maine coast Down East to Mt. Desert has a potent brand image in national as well as regional markets.” Without its character, Maine would not be as effective at drawing tourists. Since tourism is the second largest sector of the economy in Maine, this is a significant concern.

In addition to the loss of character, our analysis showed that current development patterns have shown negative environmental impacts in all municipality types. New roads result in environmental impacts from runoff and habitat fragmentation. The creation of new suburbs also fragment habitat and Maine’s natural landscapes, as well as instigate erosion and sedimentation problems. Additionally, there is increased resource consumption for new development.

Finally, our analysis showed that, within each municipality type, there are policy tools that have been developed to address the impacts of development. The Gateway 1 Project is looking at transportation planning on a regional scale. In regional service centers, downtown revitalization projects are attempting to draw people back out of suburbs and into urban areas. In rural areas, transfer of development rights has the potential to protect open space, as it has in other states. Nature-based tourism is also being used to draw tourists to, and increase the value of, undeveloped land. And on the coast, covenants on access point function are protecting character and the environment. Finally, the Maine Coastal Plan, which works within a federal framework, is being used to leverage federal funds. All of these policy tools are starting to make much needed headway against the trends suburbanization and sprawl.
Conclusions

Scenarios

We suggest three possible future scenarios for land use in the incorporated municipalities of Maine. The first scenario continues the current trend of suburbanization and land conversion. The suburbs would continue to grow, while service centers shrink in population. There would be less open space as more land is converted to residential and commercial use. This would result in a loss of rural character, an increase in commute time to work, and a decrease in public access on the coast. This scenario is a continuation of the current planning policies. Planning is decentralized and is not mandatory. There would be no new growth management policies.

In the second scenario, the character of Maine’s communities would be preserved. Planning would restrict growth to set areas, lessening habitat fragmentation as the new planning process would take these impacts into account. Congestion and commute time would also decrease, as planning would consider these issues as well. While Maine’s communities would retain their structure and organization, their “feel,” they would lose much of their local planning power. While these communities would appear as they traditionally have, they would lose some of their actual community as decision making is transitioned to higher levels of government. Planning would take place on a regional level. There would also be mandatory comprehensive planning and zoning and there would be enforcement of these plans.

The final scenario strikes a middle ground between the previous two. While the formal planning process would not change, there would be a strengthening of informal planning. This would allow for preservation of open space, prevention of habitat and landscape fragmentation, and control of suburbanization and sprawl, but only on select projects. Several informal planning tools already exist. Downtown revitalization projects are making regional service centers more desirable places to live, preventing the spread to the suburbs. Transfer of development rights, while unsuccessful currently, has the potential to be an effective policy tool. This tool has been used successfully in other states. The Working Waterfront Access Pilot Program has been successful at preserving working waterfronts by allowing the state to buy a covenant on this function. There would be protection for open space and public access, but on a case-by-case basis. There would also be increased controls and restrictions on growth, also on a case-by-case basis. In this scenario, planning would stay primarily at the municipal level. These indirect tools leverage funding from a variety of sources and use positive incentives to alter the planning process. This is not as effective as direct planning at achieving planning goals; however it preserves the tradition of planning at the local level.

Case Study 2.5 Town of Brunswick Comprehensive Plan

Brunswick has one of the most effective comprehensive plans in Maine. In its plan, Brunswick outlines profiles of key demographic and development indicators, as required by the Maine SPO. Brunswick also outlines key policy areas and groups these together separately. In its policy objectives, Brunswick takes a relatively strong stance on zoning and development. The town has recognized that there have been problems in limiting growth to their defined growth areas and recommends specific policies to address this problem.

A problem in land use planning is the strength and enforcement of comprehensive plans. While enforcement is not an issue that can be addressed within the plan itself, Brunswick is actively working on strengthening its plan. Brunswick’s comprehensive plan is available at:
Recommendations

While the direct planning scenario is the most effective at achieving better planning, it is not a viable alternative for Maine currently. Local municipalities feel too strongly about planning at the local level. While this could be a long-term goal, it will take considerable time to realize this scenario.

The indirect planning scenario is therefore a more viable alternative to the status quo. We recommend increasing the number of indirect planning tools. In the case of coastal management, using the federal regulatory framework under the Coastal Zone Management Act has been effective at both leveraging funding as well as communicating ideas with other states. We recommend using an approach such as this for other areas of planning. Creating coalitions of both public and private groups has also been effective at discovering and implementing new tools. These arrangements should also be encouraged and actively pursued by the state government.

It is our hope that planning in the state of Maine will move towards direct regional planning with as few negative effects as possible. By starting this process with indirect mechanisms, we hope that over time public opinion will shift to become more accepting of regional planning. There are many positive elements to the current trends in development in Maine. For example, household income is higher in suburban areas. We would like to see planning solutions that embrace these positive aspects while controlling the negative aspects. Starting with case-by-case planning would allow for some experimentation of the best way to keep all of the positive effects. This could be used later on to create a statewide model.
Works Cited

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The State of Land and Resource Use in the Unorganized Territory

Aime Schwartz, Emmie Theberge, and Emily Sinnott

Executive Summary

The State of Land and Resource Use in the Unorganized Territory in Maine is the third chapter of the report The State of Maine’s Environment 2007. Over 50% of the state of Maine is sparsely populated, lacks municipal authority, and is primarily privately owned; this area is officially referred to as the “unorganized territory” and historically has been called the “North Woods”. The unorganized territory contains the largest contiguous undeveloped forest in the northeastern United States. However, with roughly 95% of its forests in private ownership, Maine has one of the lowest percentages of public ownership in the country. Landownership conditions have changed dramatically over the past few decades and have made the future of the region very uncertain.

The unorganized territory traditionally has been identified as a working landscape important to the forest products industry, while the undeveloped, backcountry landscape is also valuable to recreational and conservation interests. Consequently, in this paper we assess the transition of land ownership in Maine’s unorganized territory and its implications for the forest products industry, recreational access, and conservation interests.

Our analysis shows that rapid changes in landownership have created an unprecedented potential for parcelization, conversion, and conservation of timberland. This challenges timber management as well as industrial access to timber resources. These changes also threaten traditional resource access in the North Woods and Maine’s open land tradition. At the same time, popularity for motorized recreation is increasing rapidly in Maine, increasing the demand for large tracts of open space. Changes in ownership, parcelization, and conversion are major forces which threaten biodiversity in the unorganized territory. Habitats are at risk due to forestry practices and market pressures resulting in land conversion, liquidation harvesting, and fragmentation.

Based on the results of our research and our projected scenarios for the future of the North Woods, we provide specific policy recommendations to encourage appropriate land and resource use in the state’s unorganized territory. These recommendations focus on: state-wide comprehensive planning, reducing stakeholder conflict, LURC zoning, defining easements, increasing Land for Maine’s Future Program Funding, taxation, biodiversity concerns, capitalizing on sustainable marketing opportunities, and specifying CLUP language.
Introduction

History and Context

Over 50% of the state of Maine is sparsely populated, lacks municipal authority, and is primarily owned by timber companies, investor owners, non-industrial private forest owners, and nonprofit organizations. This area is officially referred to as the “unorganized territory” and historically has been called the “North Woods” (Figure 3.34). The unorganized territory contains the largest contiguous undeveloped forest in the northeastern United States. However, with roughly 95% of the Maine’s forests in private ownership, Maine has one of the lowest percentages of public ownership in the country5.

With 17.7 million acres of forestland, 90% of the state, Maine is the most heavily forested state in the nation5. The unorganized territory traditionally has been identified as a working landscape important to the forest products industry, but the undeveloped, backcountry landscape is also valuable to recreational and conservation interests. Maine has a longstanding history of free or low cost public access and multiple-use management on private land. However, the ownership of Maine’s private forestlands has undergone rapid change in the past decade. A prominent transition is taking place as traditional industrial owners are increasingly being replaced by investor-owners.

The state of Maine’s environment is tied to the uncertainty of the future of northern Maine. With development and sprawl expanding in southern Maine, the North Woods are often viewed as an oasis for backcountry recreation and escape from development. However, development and sprawl are encroaching on the unorganized territory, contributing to widespread change in this northern part of the state. This paper focuses on changes in land and resource use in the unorganized territory, but the patterns and trends we identify have implications for stakeholders and land use throughout the state. Given the significance of timberland resources, ecological diversity, and non-consumptive forest-based activities within Maine’s working forests, the North Woods are central to the state’s forestry heritage and open land traditions.

LURC

The Land Use Regulation Commission (LURC) was created in 1971 by the Maine Legislature to be the planning and zoning authority for the state’s unorganized areas. The commission was established in response to increasing building and development pressures in the unorganized territory during the late 1960s.

LURC applies land use controls to over 10.4 million acres, and within that area 9.3 million acres make up the unorganized territory, which lacks local governmental authorities. LURC is responsible for directing land use policy for the largest undeveloped area in the Northeast, over half the State of Maine2.

The Commission has established resource-based zoning districts to identify permissible activities in each zone as well as policies and regulations for guiding development within its jurisdiction. LURC standards such as development guidelines, subdivision, and timber harvesting practices are designed to ensure that activities and land uses do not have an “undue adverse effect on resources and existing uses”1.
LURC’s land use decision-making aims to reflect local concerns as well as public interest in the state. While LURC is directly accountable to permanent residents and commercial bodies in the jurisdiction, the commission recognizes other constituencies with interests in the region and its resources ranging from non-resident landowners to recreationists to conservationists. 95% of LURC territory is forested, comprising more than half of Maine’s forestland. LURC will play an important role in preserving this resource for traditional uses. LURC’s objectives are: “to extend the principles of planning and zoning; to preserve public health, safety, and welfare; to encourage the well-planned, multiple use of natural resources; to promote orderly development; and to protect natural and ecological values”

Defining the Resource

Maine’s forests have been an integral part of Maine’s economy, culture, and wild character. The timber industry and the raw materials provided by forestlands have been the long-standing foundation for the state’s economy. Culturally the forest industry supports Maine communities and their traditional way of life through providing jobs and an economic base. They are also culturally significant in providing areas for recreation such as camping, hunting, fishing and other sports through the tradition of open access to private lands. Ecologically the forest is an important transitional zone between the southern range of the boreal forest and the northern range of the deciduous forest and is a sink of biodiversity. It also provides wildlife habitat and watershed protection.

New landowners may use the forest resource in ways that conflict with traditional uses. For example, new financial investors who parcel and sell land for the highest economic profit, make long term management of forest resources difficult because smaller parcels are less economically and ecologically viable as a working forest. Also, if land is developed for seasonal housing in remote areas, this may limit the activity of adjacent recreational users, like hunters, or commercial foresters. Traditional uses and there dependence on the maintenance of large forested landscapes, which is more difficult with new landowners and economic pressures to develop. The forest is an important resource for industrial use, remote recreational activities, and maintaining biodiversity. These assets are best preserved by careful management of growth and development in the forests and protection of areas that sustain the cultural heritage of Maine’s forests. LURC will play an important role in preserving this resource for traditional uses. 95% of that land under LURC’s jurisdiction is forested, and this comprises more than half of Maine’s forestland.

Goals and Objectives

In this paper we assess the transition of land ownership in Maine’s unorganized territory and its implications for the forest products industry, recreational access, and conservation interests. A primary objective of our research is to address current pressures and relevant issues in Maine’s unorganized territory, which have extensive implications for the future of the North Woods. We hope to accurately reflect public concerns and policy issues regarding the provision of public access, recreational opportunities, protection of plant and wildlife habitats, and the economic viability of Maine’s traditional forest products economy. We consider the following questions pertaining to land use in the unorganized territory: What is the state of land and resource use? How did timberland ownership change in Maine, why, and what does the future hold for the forest-products industry? What is the state of recreation and public access?
the state of conservation? How do landownership trends impact recreation and conservation interests and what are plausible policy tools to address this change?

The first section addresses changing landownership in relation to the forest products industry and pressures which have contributed to emerging landowner interests in the unorganized territory. The second section discusses trends in recreation and the impact of landownership change on recreational access. Finally, we assess ongoing conservation efforts and the relationship between land use change and ecological viability of the North Woods. We then present an analysis and discussion to address major findings and relationships between these three topics. We conclude the paper with a discussion of potential scenarios for the future of land use in the jurisdiction. Based on these projected scenarios and the results of our research, we provide a specific policy recommendations to encourage appropriate land and resource use in the state’s unorganized territory.

Figure 3.34 LURC Territory

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Forest Products Industry

Trends

Maine has the biggest, most diverse forest products industry cluster in New England, consisting of pulp and paper companies, sawmills, biomass energy, forest-based recreation, forest owners and managers, and trade associations. Given the forest products industry’s heavy reliance on wood from the unorganized territory, emerging pressures in these areas have a direct impact on the viability of traditional resource-based industries in Maine. While forested acreage in Maine’s unorganized territory has remained constant for several decades, land ownership has changed significantly in the past 20 years. Beginning in the 1980s, there was a general shift in forest ownership from large timber companies to emerging investment oriented land owners as new uses and interests continue to surface in the unorganized areas. An analysis of these trends, as well as the current state of Maine’s forest products industry, gives an indication of the challenges faced by Maine’s working forests and the future of land use in LURC territory.

During the past three decades, market competition and the global expansion of trade exposed the North American forest products market to global economic forces. Consolidation in the forest products industry in response to these pressures has contributed to the loss of jobs, as well as dramatic changes in land use practices and ownership across New York, Vermont, New Hampshire, and northern Maine. Between 1980 and 2005, roughly 23.8 million acres changed ownership in this region, constituting a pervasive change throughout the 30 million acre region.

The Northeastern US has shown some of the most dramatic transitions in ownership from traditional industrial owners to other owner types. The transition in Maine’s forestland ownership patterns is a reflection of these regional, national, and international patterns. In the past decade alone, industrial ownership of tracts over 5,000 acres declined from 60% to 15.5% in Maine. During the same period, financial investors increased holdings of the large forest tracts from 3% to over 30%. These prominent changes can be attributed to pressures and trends beginning in the 1980s, which impacted timberland ownership patterns throughout the nation.

During the 1980s investors and global market pressures increased the value of forestland beyond traditional values associated with timber harvesting and non-consumptive recreation. Stock market values of timberland assets of vertically-integrated forest products companies (VIFPCs) declined later in the 1980s, while new land use values such as development emerged simultaneously. During the same time period, public and non-profit organizations became increasingly involved in conservation efforts through large land acquisitions and easements. As VIFPCs disintegrated, easements were established as market mechanisms to monetize land values in an effort to compete with rival interests of emerging landowners and investors.

In the 1990s, a convergence of international financial pressures instigated dramatic changes in timberland ownership in the US. An increase in global wood production prompted a decline in prices, creating a more challenging commercial environment for the US forest products industry. The US-based forest products sector struggled to earn back the cost of capital expenditures as wood and paper prices declined during the course of the decade. Price decreases coupled with a depreciation of timberland assets prompted many VIFPCs to undergo a process of strategic restructuring in an effort to eliminate unnecessary costs and improve efficiency. Many VIFPC’s responded to rising expenses and strategic management concerns by divesting timberlands, liquidating assets, and establishing long-term fiber supply contracts as a
Still, industries faced the need to make critical capital investments to maintain competitiveness and business efficiency in an increasingly competitive global economy. Internationally, the forest products sector shifted centers of production to foreign countries with lower-cost and higher productivity timberlands. As companies continued to divest timberland holdings in Maine, land transactions prompted concern among communities, environmental groups, and politicians that Maine’s forests were at risk for development. In response to these concerns, private conservation funding increased dramatically during the 1990’s, resulting in large-scale conservation easements and purchases.

Since 2000, the pace of large land sales has accelerated and reports show that industry owners accounted for over half the land sales between 2000 and 2005. As indicated in Figure 3.35 investment-oriented landowners have become even more active since 2000 as both buyers and sellers of forestland in the unorganized territory. Current trends demonstrate that inadequate returns from long-term forest management have increased pressures for owners to convert land assets to more profitable uses. This has resulted in practices such as liquidation harvesting, whereby owners exploit commercial timber values and convert lands to development purposes.

Figure 3.35 Landownership Change 1994, 1999, 2007 (courtesy of Manuel Gimond, Colby College)
Current Status

Despite the growing number of land transactions in Maine’s unorganized territory during the past few decades, the majority of the land is still working forest. Maine’s forest products industry remains a vital component of the state’s economy; however, the industry is facing rising competition in an increasingly competitive global market. Maine’s forest products industries face deteriorating production cost advantages as large-scale mills elsewhere in North America and abroad shift economies of scale away from Maine. In response to the competitive nature of the globalized forest products market, the forest products industry in Maine has adopted changes to reduce costs and improve efficiency through technical improvements.

Improvements in processing and harvesting technologies have caused a steady decline in employment for the forest products industry, as capital investments help to increase worker productivity. Between 1990 and 2003, employment in Maine’s forest products industries dropped from 27,400 to 18,300 workers. Despite these long-term declines in employment and loss of market share in major natural resource markets, Maine’s natural resource industries still play an important role in national and international markets. Maine’s forest products sector generates approximately half of the wood production in New England. In 2005, forest-based manufacturing accounted for $2.468 billion or 50% of manufacturing contributions to the gross state product in Maine. During the same year, direct annual contributions of the industry amounted to $6.2 billion, while indirect contributions totaled $10.2 billion.

Currently, harvested acreage in Maine covers roughly 3% of the state’s forestland annually, 51% of which is subject to partial harvesting methods. In 2005, harvesting in Maine was just over 500,000 acres per year, allowing for a harvest of just over 6 million cords per year. Between 1995 and 2003, timber harvesting in Maine increased from 470,599 acres to 511,070 acres, while clearcut acreage declined from 39,295 acres to 18,389 acres. This increase in harvested acreage can be attributed to industry compensation for the loss in timber volume caused by the shift in harvesting practices from clearcutting to partial harvesting techniques. While the full extent of the long-term impacts of harvesting practices are still unclear, timber harvesting has effects on ecological integrity as well as the composition of forested areas. Partial harvesting may remove higher or lower quality trees, changing the composition of tree stands as well as their ability to grow in volume and value.

Maintaining the economic viability and sustainable management of Maine’s working forests is fundamental to protecting public values, industrial output, and the tradition of open access in Maine. However, changing land ownership has added to the prevailing climate of uncertainty in regard to the future of Maine’s land base as well as the forest products industry. As this transition in land ownership continues, non-industrial private forest landowners are playing an increasingly important role in the future of Maine’s timber supply as well as recreational access and conservation interests.

Parcelization in the unorganized territory poses an increasing challenge for active timber management and commercial productivity and output. The break up of large properties, such as the Great Northern Paper transaction detailed in Case Study 3.1, increases the development potential on lands that were previously used exclusively for commercial timber harvesting. A number of factors contribute to pressures which relate to parcelization in the unorganized territory, including growing seasonal housing demands, changing recreational preferences, and development pressures. As these dynamics continue to encroach upon the unorganized territory from the south, the disparity between land values for forestry and development is becoming more
and more apparent. This process of parcelization has a direct impact on recreational access to areas in the unorganized jurisdiction as well as implications for conservation efforts as development pressures continue to build.

### Breakup of Great Northern Paper: Example of Parcelization

<table>
<thead>
<tr>
<th>Land Owner Type in 2005</th>
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<tbody>
<tr>
<td>State (Public) 1%</td>
</tr>
<tr>
<td>Other 4%</td>
</tr>
<tr>
<td>Nonprofit 2%</td>
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<tr>
<td>New Timber Barons 3%</td>
</tr>
<tr>
<td>Tribal 2%</td>
</tr>
<tr>
<td>Financial Investors 60%</td>
</tr>
<tr>
<td>Industry 28%</td>
</tr>
</tbody>
</table>

The breakup of Great Northern Paper’s extensive 2.3 million acre parcel demonstrates the rapid rate of parcelization that is taking place in Maine’s unorganized territories. This transaction amounted to a cumulative exchange of 9.5 million acres between 1980 and 2005, ultimately being divided into 15 separate parcels. The graph shows the share of different owner types as of 2005. Parcelization of large properties like this increases the potential for land conversion and further fragmentation and challenges the state’s management capacity.

**Case Study 3.1 Breakup of Great Northern Paper: Example of Parcelization**

As indicated by Figure 3.36, the most dramatic occurrence of parcelization has been in the southern parts of the unorganized territory. This trend, parallel to increasing development pressures, generates concern regarding the potential decline of forestry-related land uses and further development. In contrast, forestry activities still dominate the northern parts of the jurisdiction where larger parcels are still dominant. However, large holdings in these areas have been subject to parcelization and they remain vulnerable to further fragmentation. The current pattern of parcelization has major implications for the future viability of Maine’s forest products industry, as resource partitioning and varying ownership objectives are changing the face of traditional management and industrial access to forest resources.

Regulation and management strategies are challenged by the growing number of landowners, fragmented distribution of timberland, varying land use objectives, and changing attitudes toward timber harvesting in the unorganized territory. While it remains unclear how these changes will affect long-term industrial viability, the landownership trends pose a challenge to timber management and availability and could potentially threaten industrial access to critical timber sources in the North Woods.
In the past two decades, a number of new actors have emerged in the unorganized territory, representing a new era for forest management and stewardship (Figure 3.37). As traditional industrial ownership is being phased out, Maine is witnessing a growing chasm between land ownership and forest product manufacturing. Industrial owners historically used forestland assets as a fiber source for industrial needs and inherently held an interest in long-term management strategies. New investor owners, are not concerned with meeting supply needs of the industry and therefore employ different objectives and management strategies for timberland. Changing attitudes towards silviculture, tree growth, and timberland
management pose a direct challenge to Maine’s forest products industry, which already faces cost disadvantages nationally and internationally.

The replacement of local “timber barons” (traditional industrial owners) with distant, profit maximizing investor owners has caused concerns among local environmental groups and communities. While large industrial owners were traditionally recognized as prominent actors and engaged in public discourse, new investor landowners, primarily controlled by stockholders, have taken a more private approach\textsuperscript{12}. As landowners become increasingly disengaged from public discourse on sustainability and forest management, it is difficult to ensure that landowners are participating in collective initiatives such as forest certification standards to ensure the long-term viability of forest practices and land use.

The new class of timberland owners in Maine includes Timber Investment Management Organizations (TIMOs), Real Estate Investment Trusts (REITs), non-profits, and other non-industrial private forest owners (NIPF). Emerging investor landowners seek to protect stockholder interests by maximizing returns on land assets and are thus inclined to manage timberland in a much different manner than industrial owners. TIMOs, which are playing an increasing role in acquiring timberland assets divested by integrated forest products companies, build land asset portfolios for institutional owners\textsuperscript{22}. TIMOs’ strategic objectives are to attract capital to timber assets, diversify land portfolios, maximize returns on investment, and maintain low management costs. REITs, like Plum Creek, are tax-efficient landowner entities which aim to maximize funds generated by timberland investments\textsuperscript{22}. In 2005, financial institutions like these held approximately 3.75 million acres in Maine. Corporate actors, which own parcels for 10 to 15 years on average, contribute to rapid changes in ownership which have created an unprecedented potential for conversion, fragmentation, and conservation of forestland and challenge the state’s forest management capacity\textsuperscript{5}.
Laws, Institutions, and Management

Table 3.12  Description of Laws and LURC Zones Relevant to Land and Resource Use in the Unorganized Territory

<table>
<thead>
<tr>
<th>LURC Zoning Subdistricts</th>
<th>Abbrev.</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>General Management Zone</td>
<td>M-GN</td>
<td>Applies to the most of the LURC jurisdiction, forest and agricultural activities allowed without significant limitations.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Law</th>
<th>Year</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maine Forest Practices Act</td>
<td>1989</td>
<td>Maine’s most comprehensive forestry law, regulates clearcutting, forest regeneration, and liquidation harvesting.</td>
</tr>
<tr>
<td>Tree Growth Tax Law</td>
<td>1972</td>
<td>Reduces property tax rates for woodlots and forestlands.</td>
</tr>
<tr>
<td>Farm and Open Space Tax Law</td>
<td>1975</td>
<td>Reduces property tax rates for farmland and open space.</td>
</tr>
<tr>
<td>Public Law 2003, Chapter 422</td>
<td>2003</td>
<td>An Act to Promote Stewardship of Forest Resources.</td>
</tr>
</tbody>
</table>

**LURC**

LURC’s statutory mandate is implemented primarily by zoning, permits, and land use. Zoning districts have been established in the unorganized territory as a means to determine which activities and land use practices are permitted in different areas. Management zones, which account for 79% of the jurisdiction, are designated to areas used for commercial forestry practices and agriculture. Protection zones are established as a protective measure to limit land use activities which compromise natural, recreational or historically significant areas, and represent 21%. Development zones, which make up only 1% of the unorganized territory, allow for intensive uses for recreational, residential, commercial and industrial purposes. Sub-districts within each zone designate specific uses and requirements for certain areas. Industry functions primarily in management districts, which are divided into three sub-districts. General Management Zones, which cover the majority of LURC territory, allow for and encourage multiple use and do not impose significant restrictions on land use. Highly Productive Management Zones and Natural Character Management Zones represent areas with productive agricultural or forestlands and limit development opportunities to protect industrial and recreational interests, but have not yet been implemented by LURC.

Despite the current predominance of management zones in the jurisdiction, they are generally recognized as areas ripe for conversion to other uses and have been subject to a continuous rezoning for development. The Commission has recently adopted Prospective Zoning as an instrument to guide development and growth in different parts of the jurisdiction. This approach considers existing development patterns, natural resource characteristics, and other trends to determine suitable areas for development. The Commission can use Prospective Zoning as an effective means to control growth in the jurisdiction and limit the conversion of working forests to other uses.

While LURC is the primary authority within its jurisdiction, other agencies with statewide statutes are given a status of limited jurisdiction within the unorganized territory and exhibit distinct responsibilities. The Maine Forest Service remains active in the unorganized territory to oversee timber harvesting practices and ensure industry compliance with the state Forest Practices Act. In addition to monitoring industry activities, the Forest Service enforces
requirements and standards concerning forest regeneration and clear-cutting. The Forest Service administers rules by requiring landowners to submit a notification of intent to harvest as well as a report of products harvested and sold\(^5\).

**Laws**

The Maine State Legislature has shown determination to address forestry issues around the state. As part of Governor Baldacci’s Administration’s Forest Stewardship Initiative, An Act to Promote Stewardship of Forest Resources was passed in 2003 to address the problem of liquidation harvesting practices in the state\(^23\). The act substantiated a legislative agenda to uphold long-term forest management principles and identify solutions to liquidation harvesting\(^23\). In 2005, the Maine Forest Service adopted the Timber Harvesting Standards to Substantially Eliminate Liquidation Harvesting rule in an effort to address unsustainable harvesting practices that threatened long-term management of forest resources. Liquidation harvesting is defined by the State Legislature as “the purchase of timberland followed by a harvest that removes most or all commercial value in standing timber, without regard for long-term forest management principles, and the subsequent sale or attempted resale of the harvested land within 5 years”\(^24\). The rule requires that, prior to harvest, a timber harvest plan be submitted to the Forest Service providing a rationale and justification for harvesting. This rule is important in ensuring sustainable harvesting of tree stands, as well as preventing short-term profit driven land owners from compromising the ecological viability of forest resources\(^24\).

Maine has two programs that act as landowner incentives for long-term management by reducing tax property burdens on undeveloped lands. The Tree Growth Tax Law (TGTL) establishes a lower taxation level for land involved in timber production in comparison to lands with more intensive uses\(^5\). The tax law allows for the valuation of classified forestland on the basis of productivity value as opposed to fair market value. The tree growth tax program acts as an incentive for woodland owners to maintain productive forest values and imposes penalties for conversion to other uses. Currently 7.6 million acres in the unorganized territory are enrolled in the tree growth tax program, demonstrating significant landowner commitment to manage forestland and forestry-related uses\(^25\). TGTL requires the submission of a Forest Management and Harvest Plan to ensure both long-term and short-term tree growth objectives are met by landowners. Data from the TGTL indicates an increase in rate of parcelization in the unorganized territory.

Figure 3.38 shows a 1,835 acre decline in the average size of parcels enrolled in the program between 1988 and 2004\(^5\). The Farm and Open Space Tax Law acts in a similar manner to provide incentives which protect farmland and open space through the designation of special tax status. For open space, the law requires that land be preserved to provide public benefit by protecting scenic attributes, improving public recreation opportunities, upholding game management, or preserving wildlife habitat\(^26, 27\).
Maine is a national leader in forest certification. In 2003, Governor Baldacci initiated Maine’s Forest Certification Initiative (MFCI), constituting the first state-led forest certification effort in the US\textsuperscript{23}. MFCI facilitates a state partnership with the forest products industry, landowners, and others with a stake in Maine’s forest resources to help make Maine a national leader in the production of certified forest products\textsuperscript{23}. Forestland certification involves third-party auditors which assess landowner management practices and apply specific standards to sustainable forestry. While certification helps to ensure sustainable management and long-term yields, it is also used as an effective market mechanism to distinguish the sustainable forest products in an increasingly competitive international market. As an effective market-based approach, certification helps to compensate for regulatory challenges faced by the state by using market incentives to promote sustainable forest management\textsuperscript{28}.

MFCI is an important part of a statewide effort to distinguish Maine’s forest products industry and protect the long-term viability of forest resources in the state. The Certification Advisory Committee, which operates under the Maine Forest Service, was established to assess the state of certification systems in Maine and ways improve certification efforts throughout the state\textsuperscript{28}. In 2005, Maine had roughly 7 million acres of certified forestland or 37\% of the state’s productive forestlands, including 6 million acres of large-parcel private land, 350,000 acres of small-parcel private lands, and 500,000 acres of public land (Figure 3.39)\textsuperscript{18,23}. Industrial and non-industrial parcels larger than 5,000 acres accounted for 87\% of Maine’s certified forestlands\textsuperscript{5}.

Three main certification systems are used in Maine: Forest Stewardship Council (FSC), Sustainable Forestry Initiative (SFI), and American Tree Farm System (ATFS). Both ATFS and SFI have state implementation groups which coordinate with landowners to ensure compliance with management guidelines\textsuperscript{28}. ATFS has been operating in Maine since 1952, however ATFS certification is relatively new. ATFS certifies parcels up to 10,000 acres, and places an emphasis on family forests with smaller parcels between 100-150 acres\textsuperscript{28}. SFI was initiated in 1995 and certifies forestland holdings larger than 10,000 acres. Participation in SFI is a prerequisite for

Figure 3.38 Tree Growth Tax Law Average Parcel Size, Unorganized Territory, 1988-2004\textsuperscript{5}
membership in the American Forest and Paper Association and many of Maine’s industrial forestland owners have pursued SFI certification to protect market interests. FSC, established in 1993, operates under a regional structure and relies on other certification bodies to enforce standards and verify compliance. FSC focuses on certification of large, corporate holdings but has also adopted initiatives to incorporate family forests. The Master Logger Certification Program is the only third-party certification for forestry practitioners in the state. Since its inception in 2001, Master Logger has certified over 100 companies in Maine and has expanded to several other states.

Figure 3.39 Change in Amount of Forest Certification in Maine 1995-2005

Recreation

Trends and Current Status

Maine has a 200-year-old tradition of open access to its resource rich lands; this is especially true for the northern part of the state. The open land tradition is rooted in the relationship pulp and paper companies have historically had with the people of Maine. The public uses these large tracts of undeveloped, privately owned land as if it were a common property resource and many Mainers do so with a feeling of entitlement: using the land of others for recreation is one of their traditional rights. Beyond being a cultural phenomenon, Maine law facilitates and, in some cases, guarantees public access to private land. Moreover, Maine state policy encourages landowners to continue allowing the public access to their land. Both of these points are explained in detail in later sections.

The open land tradition is applicable to the entire state, but holds true especially in the North Woods. As noted previously, the northern two-thirds of the state are sparsely populated.
and most parcels of land are owned by timber companies and investment corporations in large tracts (hundreds of thousands of acres in many cases). This vast, undeveloped space along with an abundance of natural assets makes a landscape ideal for recreational opportunities.

**Natural Assets**

According to LURC’s 2008 Comprehensive Land Use Planning draft, within the unorganized territory alone there are more than 3,000 lakes and ponds, totaling over 622,000 acres of surface area. The area has the highest concentration of undeveloped rivers in the eastern United States including over 21,000 miles of rivers and streams. Included in these thousands of miles of waterways are the famous St. John River, the Allagash River—the nation’s first state-administered wild and scenic river—and five significant whitewater river segments with dependable summer flows. The unorganized territory has roughly 100 mountain peaks over 3,000 feet high, excluding Baxter State Park. There are abundant and diverse wildlife and fishery resources including moose and deer, martin and fisher, lynx and bobcat, bear, wild landlocked salmon and trout, and populations of rare species including the Canadian Lynx and golden eagles. Additionally, the unorganized territory has roughly 300 miles of coastline, including 301 coastal islands; however, the coastal areas are not a focus of this paper.

This plethora of resources combined with little development makes the unorganized territory ideal for recreation. Recreationists enjoy the territory’s ecological values; including the wealth of water, fish and wildlife, scenic, and cultural resources. Opportunities range from more primitive and traditional recreation to motorized sports. These activities include: sightseeing and nature observing, hiking, mountain climbing, backpacking, camping, snow shoeing, canoeing and kayaking, Nordic skiing, hunting, trapping, fishing, snowmobiling, power boating, and the use of backcountry vehicles such as ATVs, dirt bikes, and four-wheel drive trucks. Still other activities often require a facility of some sort. In the unorganized territory these facilities include: boat launches, campsites, campgrounds, sporting camps, whitewater rafting bases, and Nordic and alpine ski resorts. Like most of the activity itself, the majority of these recreational facilities in the territory are located on private lands.

So what is the state of resource access for recreational use? The way in which these natural assets are distributed in the unorganized territory between public and private land has implications for recreational use. Presently, land access is widely available although without written guarantee. While unspoken or implied permission has always been the standard in the North Woods, recent shifts in landownership has sparked conversations across the state among policymakers and citizens alike, created anxiety for recreationists fond of the area, and left many Mainers wondering what the future of recreational access will be in the Maine woods.

The following sections provide a description of land available for recreation both statewide and in the unorganized territory more specifically.

**Public Land**

Over 1.2 million acres of conservation and recreation land in Maine is owned by state or federal agencies; about 668,000 acres of these lands are in the unorganized territory. This comprises about 56% of all public land in the state, but only 6% of all unorganized territory land. Not included in these figures of State ownership, however, are the Great Ponds—bodies of standing water ten or more acres in size. These are owned by the State under Common Law rights, which guarantees public and use access. There are 1,345 Great Ponds in the unorganized
territory, totaling approximately 617,000 acres in surface area\(^2\). More information on the Great Ponds law is provided later in this section.

State government has attempted to obtain more land for recreational uses either through fee, conservation easements, or increased infrastructure including trail ways. In the last 20 years, the State has increased its ownership within the territory by about 50,000 acres\(^2\). Figure 3.40 and Figure 3.41 show the success of public land acquisition statewide over the last decade.

While this land acquisition certainly benefits recreationists, it does not tell the whole story. Private lands surround some of these public lands, particularly in the northern parts of the state, which means access to public lands often requires one to cross private land. Therefore, in some cases public land acquisition alone does not guarantee public access. If private landowners cut off access on their land, then public land is essentially inaccessible except by air. The Allagash Waterway is an example of public land surrounded by private land. To gain access to the Allagash Waterway one must pass through the North Maine Woods gate at the Telos Gate. The North Maine Woods, an organization of forest landowners, is described in detail in Case Study 3.2.
Private Land

90% of Maine’s land is privately owned, while the state and federal government own 8.7% and 1.8% respectively. The North Woods are no exception; private land is predominant in the unorganized territory. The recreational experience is influenced heavily by the ever-changing land ownership patterns of these privately owned lands. As mentioned earlier, there is a common fear among state agencies, policy makers, and citizens alike that landownership changes will adversely affect on public access. Although much of these lands continue to remain open for many recreational activities, the certainty and traditional open land sentiment is changing now from even two generations ago. Policy makers unfortunately cannot calm the public’s anxiety as they lack the power to protect Maine’s outdoor heritage and remote lands. Nevertheless, the access issue is at the forefront of state politics and has reached both the executive and legislative branches of Maine’s government. Recommendations from these government bodies and other policy mechanisms are described in depth later.

Individual landowners generally manage recreation use of private land; as such, access varies from open to restricted to closed. Posting is the prominent way of controlling access to one’s land. Subjectively, wardens, Maine guides, and sportsmen have noticed an increase in the number of posted lands; areas that historically were open for recreational use are now posted. A study done in 1991 by the Small Woodland Owners Association of Maine (SWOAM) showed that of the landowners surveyed 14.9% were posting their land; by 2005, the percentage grew to 39.4%. This suggests an enormous increase in postings in the last 15 years. The North Maine Woods is another example of a private management scheme. In this system, access to the land and facilities is controlled through a series of gates and numerous stakeholders are active in the management scheme. The gate system is not limited to the North Maine Woods region, and is a popular management scheme across the jurisdiction.
With changes in landownership come the emergence of new owners including non-industrial private forest owners such as Real Estate Investment Trusts (REITs) and Timber Investment Management Organizations (TIMOs). As noted in the previous section, these actors often have different land use objectives that may not be conducive to public access. Additionally, they generally operate on a much shorter time period (generally 10-15 years on average) than “timber barons” (traditional industrial owners). Furthermore, while large industrial owners were traditionally recognized as prominent actors engaged in public discourse, new investor landowners, primarily controlled by stockholders, have taken a more private approach. Both this private, distant approach and the short time period this makes building trust and relationships with other stakeholders difficult or unimportant.

Investment trusts are not the only new owners in the North Woods. Non-profit conservation organizations have emerged as owners and stakeholders in the region; the amount of privately owned lands held in fee or in easement by non-profit conservation organizations has increased. In fact, of all the types of landowners in the unorganized territory, non-profit conservation groups have the highest rate of increase in ownership over the past several decades. These organizations increased their fee holdings from about 57,000 acres in 1985 to approximately 300,000 acres in 2006, an 81% increase. These figures are conservative because they do not include the land held in easement by these organizations. Recreational activities like hunting, fishing, boating, camping, and hiking have been allowed to continue on many of these conservation lands, although some types of recreation, namely motorized activities, have been restricted from place to place. With the changing face of recreation, which is discussed in the following section, this access restriction will likely cause conflict between stakeholders. About 90% of recreation in Maine occurs on private land. This is especially true for popular motorized sports such as snowmobiling and ATV riding, but is also the case for hunting, fishing, and some other primitive recreational sports. This demand for access combined with the shrinking supply of recreational land available is a major concern within the state. Furthermore, decreased access, or the threat thereof, combined with changing trends within the recreationist community poses an additional layer of contention. These changing trends are described below.
Case Study 3.2 The North Maine Woods (NMW)\(^1\)

The North Maine Woods (NMW) is an organization of forest landowners, both large and small. It is also a partnership of corporations, individuals, and families joined with Maine’s natural resource agencies to address growing concerns and plan for the future. Together, these actors have coordinated the management of recreational use within the NMW area; State Personnel serve on various NMW committees, helping with the administration and planning for the organization. The organization was established in 1972 and has had a couple of large expansions since then. Presently, it involves an area of over 3.5 million acres in the undeveloped northwest quadrant of the state. Included within these boundaries are top quality commercial forests and two famous rivers: the St. John and the Allagash. The Allagash Wilderness Waterway incidentally is completely surrounded by the North Maine Woods.

The region it encompasses is neither wilderness nor park. In most areas, two generations of timber have been harvested and there are over 3,000 miles of permanently maintained roads and several thousand miles of temporary, unmaintained roads. Likewise, there are no rangers and campsites are primitive. Every visitor must log in and log out at one of the ten checkpoints and logging trucks always have the right of way.

Stakeholders

**Primitive and Traditional Recreationists**

Primitive recreation still proves to be popular in Maine. However, trends within traditional recreation may be surprising. Traditional sports, like hunting and fishing are declining statewide; between 1993 and 2001, the number of hunting and fishing licenses issued statewide declined by 6% and 12%, respectively (Figure 3.42)\(^3\). This trend is mirrored within the unorganized territory. According to the 2008 draft LURC CLUP since the 1970s, the number of travelers to the North Maine Woods (Case Study 3.2) region primarily seeking fishing or hunting opportunities has declined, while the number going camping or visiting private camps has increased\(^2\).

Furthermore, overall, public use in some of the more remote recreation areas has been declining, including Baxter State Park, where day use at the park dropped by approximately 5% between 1990 and 2000, and the Allagash Wilderness Waterway, where total public use declined by 18% from 1993 to 2002\(^2\).
The popularity trends overtime of primitive recreation sports such as skiing, hiking, bird watching, etc. are less documented. Additionally, the percentage of primitive recreationists coming into the state from away may be a significant constituency. Not only do the data not illustrate this constituency well, these recreationists do not have a solidified or active lobby voice within the state. This makes them even less acknowledged during decision-making processes. Other trends and relationships surrounding the visitor dynamic are discussed in detail below.

![Figure 3.42 Percent Change in Licenses and Registrations 1993-2001](image1)

![Figure 3.43 Licenses and Registrations by Activity Type 1993-2001](image2)
**Motorized Recreationists**

Motorized recreation is increasingly popular in Maine. Snowmobile registrations grew by over 50% between 1993 and 2001, with approximately 98,000 snowmobiles registered in 2001. ATV registrations more than doubled during that time (an increase of 109 percent), with nearly 45,000 ATVs registered in 2001 (Figure 3.42 and Figure 3.43). Funding for and development of motorized trails proportionally increased with this demand (Figure 3.44). Boating registrations have also increased overall, particularly for cabin boats, pontoon boats, and personal watercraft.

![Miles of Motorized Trails Funded by Year 1995-2006](image)

Motorized recreationists have numerous clubs and organizations. Their lobbying power and voice within the state is quite strong. The Sportsman’s Alliance of Maine (SAM) is one such club. SAM, Maine’s largest sportsmen’s organization, was organized in 1975 as a non-profit membership organization to “promote conservation of Maine’s wildlife resources and to be an advocate for hunters, anglers, trappers and gun owners throughout the state.” While SAM also represents primitive and more traditional sports, they are known to be a prominent lobby voice for motorized recreation. SAM staff work on critical issues in the legislature and with state agencies, and is one of the loudest lobbying voices in Maine for recreational access issues.

Motorized recreational activities differ from primitive activities in a couple of key ways. First, these activities require more space, which creates an even greater demand for public access points. As Table 3.13 and Table 3.14 show, most of the area that ATV and snowmobile trails are located on private land. Secondly, these sports are generally louder and more disruptive than primitive recreation. This decreases the supply of public access as more private land is being posted for no motorized recreation. The increasing demand for ever shrinking space creates rifts between private landowners and recreationists, and this trend may trickle down to primitive recreation as landowners feel more justified posting their land for no access.
Table 3.13 Trails on Private and Public Land as of August 2007 (in miles)

<table>
<thead>
<tr>
<th>Type</th>
<th>Private Land</th>
<th>Public Land</th>
<th>Total</th>
<th>% on Private Land</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATV</td>
<td>4626</td>
<td>500</td>
<td>5126</td>
<td>90%</td>
</tr>
<tr>
<td>Snowmobile</td>
<td>13137</td>
<td>700</td>
<td>13837</td>
<td>95%</td>
</tr>
<tr>
<td>Rail Trails Only</td>
<td>100</td>
<td>210</td>
<td>310</td>
<td>32%</td>
</tr>
<tr>
<td>Total</td>
<td>17862</td>
<td>1410</td>
<td>19273</td>
<td>93%</td>
</tr>
</tbody>
</table>

1 Includes BP&L, WMNF, IF&W, municipal lands, etc.
2 Rail Trail miles included above

Table 3.14 ATV Riding on Land Types (number of miles ridden)

<table>
<thead>
<tr>
<th>Miles Ridden</th>
<th>% Ride on Your Land</th>
<th>% Ride on Other Private Land</th>
<th>% Ride on ME State Land</th>
<th>% Ride on Local or National Land</th>
<th>% Ride on Unknown Ownership</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 100 miles</td>
<td>45.3%</td>
<td>33.2%</td>
<td>4.8%</td>
<td>4.2%</td>
<td>12.7%</td>
</tr>
<tr>
<td>100– 249 miles</td>
<td>42.1%</td>
<td>33.5%</td>
<td>7.5%</td>
<td>4.3%</td>
<td>12.7%</td>
</tr>
<tr>
<td>250– 499 miles</td>
<td>24.8%</td>
<td>39.8%</td>
<td>13.7%</td>
<td>5.2%</td>
<td>16.4%</td>
</tr>
<tr>
<td>500 or more miles</td>
<td>20.7%</td>
<td>42.8%</td>
<td>13.8%</td>
<td>5.7%</td>
<td>17.1%</td>
</tr>
</tbody>
</table>

Mainers/Visitors

The distribution of Mainers and visitors and their contribution to different recreational activities is noteworthy. As seen in Figure 3.45, in 2001 Mainers dominated fishing license activity and to a much greater degree ATV and snowmobile registrations; visitors, however, comprised the majority of hunting license holdings. This shows that Mainers certainly dominate the motorized sport activity. Furthermore, Table 3.15 shows how trends have changed overtime for fishing, hunting, and wildlife watching for both Mainers and visitors. This table shows that while these traditional and primitive sports have experienced a decreasing trend, it is especially apparent for visitors.

The economic benefits from primitive and motorized sports as well as those from visitors and Mainers are less clear from the data. It is important that the state collects this data so that possible economic loss from landownership changes can be projected for each of these four constituencies.
Figure 3.45  Comparison of Department of Inland Fisheries and Wildlife Licenses by Residence Status 2001

<table>
<thead>
<tr>
<th>Recreationist Type</th>
<th>1991</th>
<th>1996</th>
<th>2001</th>
<th>% change (91-02)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mainer Anglers</td>
<td>236</td>
<td>207</td>
<td>216</td>
<td>-8%</td>
</tr>
<tr>
<td>Visitor Anglers</td>
<td>212</td>
<td>149</td>
<td>160</td>
<td>-25%</td>
</tr>
<tr>
<td>Mainer Hunters</td>
<td>123</td>
<td>148</td>
<td>123</td>
<td>0%</td>
</tr>
<tr>
<td>Visitor Hunters</td>
<td>42</td>
<td>47</td>
<td>41</td>
<td>-2%</td>
</tr>
<tr>
<td>Mainer Wildlife Watch</td>
<td>542</td>
<td>433</td>
<td>501</td>
<td>-8%</td>
</tr>
<tr>
<td>Visitor Wildlife Watch</td>
<td>217</td>
<td>140</td>
<td>174</td>
<td>-20%</td>
</tr>
</tbody>
</table>
Laws, Institutions, and Management

Table 3.16  Laws and LURC Zones Relevant to Land and Resource Use in the Unorganized Territory

<table>
<thead>
<tr>
<th>LURC Zoning Subdistrict</th>
<th>Abbrev.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recreational Protection Subdistrict</td>
<td>P-RR</td>
<td>Applied to important primitive recreation areas; grants protection from “incompatible development or other intensive land uses”</td>
</tr>
<tr>
<td>Special River Transition Protection Subdistrict</td>
<td>P-RT</td>
<td>Protects the special resource values “of Maine’s outstanding river segments through certain communities”</td>
</tr>
<tr>
<td>Resource Plan Protection Subdistrict</td>
<td>P-RP</td>
<td>More effective and efficient management of protection zones.</td>
</tr>
<tr>
<td>Unusual Area Subdistrict</td>
<td>P-UA</td>
<td>Applied to areas of significant value that may also possess important recreational resources.</td>
</tr>
<tr>
<td>Great Pond Protection Subdistrict</td>
<td>P-GP</td>
<td>Regulates development on Great Ponds to protect water quality, recreation, habitats, and scenic character.</td>
</tr>
</tbody>
</table>

Taskforces/Management

<table>
<thead>
<tr>
<th>Taskforces/Management</th>
<th>Year</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maine Legislature Committee to Study Access to Private and Public Lands in Maine⁴¹</td>
<td>2001</td>
<td>To assess the impacts of landownership changes on public access to private lands for recreation and to develop policies to best ensure public access to private and public lands that would meet the growing demand for outdoor recreation.</td>
</tr>
<tr>
<td>Maine Legislature Committee to Study Issues Concerning Changes to the Traditional Uses of Maine Forests and Lands⁴²</td>
<td>2001</td>
<td>To assess the impacts of landownership changes on the tradition of leasing lots for family camps and commercial sporting camps.</td>
</tr>
<tr>
<td>Gov. Baldacci’s Executive Order for a Task Force on Traditional Uses and Public Access to Lands in Maine⁵⁵</td>
<td>2004</td>
<td>Formulate recommendations about how best to address the issues relating to access to land for traditional uses in the face of changing landownership trends.</td>
</tr>
</tbody>
</table>

Law

<table>
<thead>
<tr>
<th>Title</th>
<th>Year</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Great Pond; access or egress</td>
<td>1973</td>
<td>Public access guarantee for ponds 10 acres or greater. Denial of this access is punishable up to $100 fine or imprisonment up to 90 days.</td>
</tr>
<tr>
<td>Maine Revised Statutes: Title 17 Section 3860⁴⁶</td>
<td></td>
<td>Landowners, whether permission is given or not, cannot be held accountable for injury or damage and are protected from suits by people who get hurt on their land. (Subsections 2 and 3)</td>
</tr>
<tr>
<td>Limited liability for recreational or harvesting activities</td>
<td>1979 1995</td>
<td>Landowners, whether permission is given or not, cannot be held accountable for injury or damage and are protected from suits by people who get hurt on their land. (Subsections 2 and 3)</td>
</tr>
<tr>
<td>Maine Revised Statutes: Title 14 Section 159A²⁷</td>
<td></td>
<td>Landowner liability for actions of others</td>
</tr>
<tr>
<td>Landowner liability for actions of others</td>
<td>2001</td>
<td>Further limits landowner liability specifically regarding environmental harm caused by others.</td>
</tr>
<tr>
<td>Maine Revised Statutes: Title 38 Section 347-A, subsection 7³⁸</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
LURC

The Land Use Regulation Commission (LURC) holds policies that “promote primitive recreational activities and diversified, non-intensive, nonexclusive use of recreational resources. Nonexclusive uses are those in which a wide range of people can participate, generally at a reasonable cost”\(^2\). LURC seriously considers adverse impacts to recreation when reviewing development or rezoning proposals. For this purpose, there is a section in their Comprehensive Land Use Plan (CLUP) designated solely for recreation issues.

Primitive recreational activities are allowed in all zoning districts under LURC jurisdiction. Additionally, the Recreational Protection (P-RR) Subdistrict has been created to apply to areas that “support or have opportunities for unusually significant primitive recreational activities, to protect them from incompatible development and other intensive land uses”\(^2\). As of 2007, the Commission has placed P-RR zones on:

- Approximately 300 miles of hiking trails, including nearly the entire Appalachian Trail; major portions of the Lower Dead, the Moose, the Penobscot, and Allagash Rivers, and a number of other rivers and streams because of their significance as canoe trails or for other forms of recreational boating; and 177 remote, undeveloped ponds having a cold water game fishery.\(^2\)

Other protection zones support different significant recreational resources such as the Special River Transition Protection (P-RT) Subdistrict, the Resource Plan Protection (P-RP) Subdistrict, and the Unusual Area (P-UA) Subdistrict\(^2\).

Additional, because LURC considers potential adverse impacts on recreational resources in evaluations of any development proposal, this policy also impacts recreational facilities, as they are generally regulated like other types of development. Campsites and other low impact facilities are allowed in management zones and in most protection zones without a permit. Sporting camps, campgrounds, and other facilities with substantial improvements are permitted less commonly but are allowed in General Management (M-GN) Subdistricts and, as a special exception, in Great Pond Protection (P-GP) Subdistricts. Large-scale, high impact recreational facilities are considered to be similar to large-scale developments and are regarded with extreme caution by.

Congressional Committees, State Taskforces, Management Plans

There are two legislative committees applicable to the issues of changing ownership in the North Woods and public access; both committees met in 2001. The focus of the Committee to Study Access to Private and Public Lands in Maine\(^3\) was to assess the impacts of landownership changes on public access to private lands for recreation and to develop policies to best ensure public access to private and public lands that would meet the growing demand for outdoor recreation. Some recommendations of the Committee included: improved information on land ownership in regards to annual reports on the number of landowners owning over 500 acres of commercial forestland; land transfers of 10,000 acres or more, including those enrolled under Tree Growth Tax Law, within the unorganized territory; and land enrolled under tree growth by parcel size categories. Moreover, the Committee recommended that other Joint Standing Committees meet and develop an approach for further planning on tax incentives to encourage
access to private lands. Furthermore, they recommended that a set of principles be developed for state agencies to follow when considering the acquisition of conservation easements so that the interests of the public are assured. The Committee concluded with a “renewed awareness of the important of Maine’s outdoor heritage and remote lands in defining the character of our State”.

The objective of the Committee to Study Issues Concerning Changes to the Traditional Uses of Maine Forests and Lands\(^ {34} \) was to assess the impacts of landownership changes on the tradition of leasing lots for family camps and commercial sporting camps. In their recommendations, the Committee concluded that a statute should be enacted to set minimum standards for owner and lessee relationships within the unorganized territory. These standards are meant to balance the conflicting rights and interests of the parties, namely: “the rights of private land owners, the importance of freedom of contract, and the long-standing interests and expectations of owners of commercial sporting camps and recreational camps and homes.” Additionally, the Committee recommended that the contribution of commercial sporting camps to the culture and economy of the State should be recognized in a Joint Resolution, and that landowners who lease land to the camp owners should be urged to continue to respect the tradition of sporting camps in the State. Furthermore, the Committee recommended that an economic impact of the loss of public access to the North Woods be calculated for both the state and regional economies alike.

In 2004, Governor John Baldacci signed an Executive Order creating the Task Force on Traditional Uses and Public Access to Land in Maine\(^ {35} \). The task force is charged with submitting recommendations to the Governor about the best ways to address access to land for traditional uses in the face of the changes in land ownership.

As mentioned above, LURC has a Comprehensive Land Use Plan (CLUP)\(^ {2} \), which establishes policies to guide the Commission’s work and is the basis for the Commission’s regulations. The CLUP is updated every ten years and the Commission is completing the third update of this plan, which is scheduled to be finished in 2008. The CLUP is comprised of definitions and guiding principles for various aspects of LURC’s authority. Included in the 2008 draft is an entire section devoted to recreation (section 5.9) which outlines the recreational landscape in the unorganized territory, land and facilities that are available for recreation, projected future demand, and possible issues surrounding recreation resources in the North Woods.

The Department of Conservation’s Bureau of Parks and Lands is responsible for writing a Statewide Comprehensive Outdoor Recreation Plan (SCORP)\(^ {32} \). A SCORP is required by the federal Land and Water Conservation Fund program (LWCF) and provides the supply and demand for outdoor recreation facilities in the state and how they might be met.

**Laws**

The open land tradition in Maine dates back to the time when Maine and Massachusetts were one state, and historically is a tradition that is shared among most New England states. Maine’s tradition, however, is unique compared to the national norm and typical conception of private property. The law and policies of Maine’s government today still encourage this tradition. Common law in Maine provides for public access, and legislative policy and statutory law encourage public access on private lands\(^ {29} \).

One of the most noted common laws providing public access is the “Great Pond Law”. This law stems from a Colonial Ordinance of 1641-1647 that became accepted as part of Maine law when Maine became a state in 1820\(^ {29} \). This law has been modified over time through a
number of court cases, which clarify that “Great Ponds” (over 10 acres) are public ponds. The “State holds them in trust for the public and the public has a right to fish, and fowl and cut ice upon them.” Still another case clarified that “the public has a right to access such ponds through unimproved land, but not by crossing improved agricultural lands” and sets penalties for landowners who “deny access or egress over unimproved land to a great pond” of up to $100 fine or up to 90 days of imprisonment (Maine Revised Statutes Title 17 Section 3860).

Such lawful access is not the only driver of the preserved open land tradition in Maine; there is also strong landowner liability law in Maine, namely Title 14, §159-A: Limited liability for recreational or harvesting activities. This statute is generous with respect to landowners; it eliminates liability for outdoor recreational activities, has few exceptions, and thus encourages public access on private land. In particular, it exempts landowners from the duty “to keep the premises safe for entry or use by others for recreational or harvesting activities or to give warning of any hazardous condition, use, structure or activity… this subsection applies regardless of…permission.” Furthermore, granting permission for access does not “extend any assurance that the premises are safe… or assume responsibility or incur liability for any injury to person or property caused by any act of persons to whom the permission is granted.” Thus landowners, whether permission is given or not, cannot be held accountable for injury or damage and are protected from suits by people who get hurt on their land. This makes the issue of permissive use less of a threat to landowners than in other states. Finally, a second landowner liability law worth noting is Title 38, §347-A, subsection 7: Landowner liability for actions of others. This statute further limits landowner liability specifically regarding environmental harm caused by others.

Despite tradition and aforementioned laws ensuring public access to private land, landowners do have a right to control the activities that take place on their land or to restrict access altogether. Maine has a criminal statute that prohibits trespassing on posted land. However, while it may be a legal right for landowners to keep people off their land, impracticality of enforcement may create disincentives to post in the first place or prosecute violators. “One of the problems is that there are more than 100 trespass laws scattered throughout the statues, which make is difficult for landowners to know which laws apply and what their rights are… Wardens will not prosecute trespassers unless the landowner is willing to go to court to testify about the nature of the violation.” The costs of enforcement and mitigation may negate the posting attempt altogether.

**Conservation**

**Trends and Current Status**

**Biodiversity**

Maine’s forested landscape is a medley of mountains, hills, uplands, wetlands, flatlands, lakes, ponds, rivers, streams, and coastal areas. The forest is in a transitional zone between the southern range of the eastern boreal forest and the northern range of the deciduous forest. The region supports a high level of plant and animal species diversity because of the transition between ecosystems. Here the deer, bobcat, and fisher reach the northern limit of their range, and the moose, lynx, and marten reach the southern limit of their range.
Plant and animal habitats in LURC jurisdiction are unique. The region has some of the largest unfragmented forest blocks in the northeastern US. Extraordinary habitats like large peatland systems and alpine areas host rare species that are especially adapted to live in those areas. Endemic terrestrial and aquatic species and natural communities are located largely in LURC jurisdiction. There are relatively few invasive species that have damaged more southern regions of Maine. The forests also host game species and furbearers like pine marten, beaver, otter, and coyote. Brook trout habitat and inland waterfowl and wading bird habitat exist in the region. Endangered and threatened species like wild Atlantic salmon, Arctic charr, freshwater mussels, lynx, bald eagles, and roseate terns all live in LURC jurisdiction.

The forests host 30% of rare plant species in Maine, and 15% are limited to northern Maine. Natural communities are identified by the Maine Natural Areas Program. They are areas with minimal human impact and are characterized by plant and animal interactions in their environment across a landscape. An example of an imperiled natural community in the northern forests is the alpine ecosystem, while more secure ecosystem in northern Maine is the spruce-fir northern hardwood forest ecosystem. MNAP is also responsible for listing rare, threatened or endangered plants, which includes several hundred plants.

Since 1995, MNAP has conducted systematic eco-regional surveys to locate and assess the conservation status of threatened and endangered species, plants, and natural communities. Information gathered from these inventories has shown that some species and communities are more common than previously thought. Thirty plants have since been downlisted from the threatened and endangered species list.

The State’s biodiversity is still being surveyed and the complete inventory for Maine’s northern woods is incomplete. According to current available information, loss of biodiversity is not an imminent threat.

Conservation

Public and private conservation efforts in Maine have grown since the 1970s. The pace and scale of conservation efforts and the array of conservation tools have also increased. Conservation tools include certified sustainable forestry, the Tree Growth Tax Law (TGTL), conservation easements, and land acquisition by public agencies and conservation oriented non-profit organizations.

Sustainable forestry certification and the Tree Growth Tax Law both encourage good biodiversity practices by requiring long-term forest management practices. Sustainable forestry certification is an important tool used to protect biodiversity and the forest-based economy. It not only requires long-term management of forests, but also gives timber products a special niche in the global marketplace.

Conservation easements are a relatively new tool that were started in the 1980s and have since become heavily used to conserve land by restricting a landowner’s right to develop on their private land. Landowners usually give up certain development or land use rights and management is placed under a land trust, a public agency, or a non-profit conservation group. Working forest easements are the most common easement used to protect the North woods. This easement allows sustainable forestry, but restricts commercial or residential development. An example of a working forest easement in the North Woods is the West Branch Project, shown in Case Study 3.3.

Table 3.17 shows the scope of various conservation easement terms. These range from very limited access and resource use in ecological reserves, like the State’s Debsconeag Lakes, to
open access and a wider range of permitted traditional recreation and forestry activity, like in the lands conserved under the Kathadin project\textsuperscript{40,41}.

Table 3.17 Access and Use of Lands Under Conservation Easement\textsuperscript{3,39-42}

<table>
<thead>
<tr>
<th>Easement</th>
<th>Acres</th>
<th>Public access</th>
<th>Recreation</th>
<th>Industry</th>
<th>Commercial and Residential</th>
</tr>
</thead>
<tbody>
<tr>
<td>West Branch Project</td>
<td>329,000</td>
<td>Yes</td>
<td>traditional</td>
<td>sustainable forestry</td>
<td>none</td>
</tr>
<tr>
<td>Nicatous Lake</td>
<td>22,370</td>
<td>Yes</td>
<td>traditional</td>
<td>sustainable forestry</td>
<td>none</td>
</tr>
<tr>
<td>Kathadin project</td>
<td>200,000</td>
<td>Yes</td>
<td>traditional</td>
<td>sustainable forestry</td>
<td>none</td>
</tr>
<tr>
<td>Pingree Easement</td>
<td>750,000</td>
<td>limited</td>
<td>traditional</td>
<td>sustainable forestry</td>
<td>none</td>
</tr>
<tr>
<td>Roxanne Quimby wildlife sanctuary</td>
<td>40,000</td>
<td>limited</td>
<td>no hunting, snowmobiling</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>Debsconeag Lakes ecological reserve</td>
<td>41,000</td>
<td>limited</td>
<td>hunting, fishing</td>
<td>none</td>
<td>none</td>
</tr>
</tbody>
</table>

Conservation easements can be sold to public or non-profit organizations interested in conservation or they can be donated by landowners and managed through a land trust. The Pingree easement, for example, covers 750,000 acres of land owned by the Pingree family. The family worked with NEFF to develop the easement, which is managed by the New England Forestry Foundation\textsuperscript{39}. The Common goals in easements are protection of biodiversity and recreational access, maintaining a landscape, such as a working forest, and preventing fragmentation\textsuperscript{3}.

Land acquisition for conservation by public and non-profit organizations is more expensive and is used much less extensively in Maine than easements. Unlike conservation easements, land ownership actually changes hands in fee ownership transactions. This tool is used for lands that are especially important to Maine’s culture or recreation, under considerable development pressures, or ecologically sensitive. The State owns 80,000 acres of ecological reserves \textsuperscript{43}.
Case Study 3.3 West Branch Project: A Cooperative Success

The West Branch Project covers 329,000 acres, making it the largest contiguous block of land ever protected in Maine. The deal was completed in 2003 between the Forest Society of Maine and the landowner, Merriweather, LLC. It protects areas in the West, North, and South branches of the Penobscot River, Baker Lake, and parts of the St. John Rivers headwater ponds. This was a landmark project in its scale of working forest protection, utilization of public funds for conservation easements, and meaningful cooperation among diverse interests and public opinion.

The West Branch Project effectively met the goals of protecting the working forest landscape, public access for recreation, and ecologically significant areas that sustain important wildlife habitat. The Forest Society of Maine achieved this through a public-private partnership that included over three hundred contributors. Major partners were federal and state actors, the forest industry, local communities and private individuals, recreational-interest groups, and environmental groups.

- Forest Society of Maine
- USFS Forest Legacy Program
- Maine Department of Conservation
- Maine Department of Inland Fisheries and Wildlife
- Merriweather LLC
- Wagner Forest Management
- The Nature Conservancy
- Northern Forest Protection Fund

The Forest Society of Maine in cooperation with the Department of Conservation went through multiple rounds of negotiations with the landowner to ensure that the working forest easement design met the objectives of various partners. Of particular concern was the assurance of that easement terms met the state’s standards for sustainable forestry and public access. These terms were met and today the Forest Society of Maine monitors an easement of 282,000 acres. The State acquired an adjacent 47,000 acres of lands in fee ownership that are of special recreational value and ecological sensitivity.

Lands managed by the FSM under easement are protected from development, but allow sustainable commercial forestry that also conserves the landscape’s ecological value. Current standards for sustainable forestry are strengthened with performance expectations based on an initial ecological baseline inventory. Baseline data establishes performance expectations by documenting the location of rare, threatened, and endangered plants and animals, as well as stocking data for stand types. This allows for evaluating management practices to see if the goals of maintaining the forest and ecological health are being met. Adaptive management of the easement is a flexible mechanism for future management success through ongoing dialogue between FSM and the landowner.

Conservation easements can be a tool to maintain the economic, cultural, and ecological values of Maine’s forests in the face of rapid transitions in land ownership. The West Branch Project models the cooperative efforts necessary between public and private groups to develop a meaningful protection strategy of the forest resource.
Threats to Conservation of Biodiversity

There are three major threats in Maine’s North Woods to the conservation of biodiversity: fragmentation, parcelization, and harvesting practices. Fragmentation happens when development, roads, utility corridors, or clearings disrupt the landscape. Forestland is divided into smaller, more isolated parcels with less connectivity between patches, and habitat area is lost. Parcelization occurs when landowners divide and sell their land into smaller parcels. Fragmentation and land parcelization make landscape-level management of biodiversity and good harvesting practices difficult. Harvesting practices are influenced by the marketplace and laws. One problem resulting from market driven harvesting practices is lack of incentive for landowners interested in profit to maintain old growth or late successional stands. The Maine Forest Practices Act (MFPA) limits clear cutting, and thereby threatens species that rely on this disturbance for early successional habitat.

Compared to southern Maine, LURC jurisdiction is not significantly fragmented by roads and development. Land management roads, major utility lines, and some development in riparian areas are features in the region that fragment the landscape. Land management roads are necessary for utilizing the resources of a working forest. Development pressures on LURC land today do threaten to fragment the land in the future. If more profitable land uses like residential development are lucrative enough to pursue over working forest, fragmentation will have a much more extensive impact on landscape-level habitat protection.

Division of land into smaller parcels is caused by rapid changes in ownership. TGTL enrollment and land transactions both show the average size of parcels has been declining. This is visible in the TGTL over the last twenty years and in transaction deals between 2002 and 2005. Parcelization threatens biodiversity because of reduced contiguous habitat and possibly discordant management schemes. Studies show smaller parcel sizes, higher land values, proximity to roads, and higher population densities all reduce a landowner’s commitment to long-term forest management. Good forest management that results in better biodiversity practices is more difficult and therefore less likely on smaller parcels of forestland. Landscape-level management of biodiversity is difficult because of the array of landowners and management strategies. Stable ownership of northern forests will decrease the sale of land into smaller parcels and promote long-term management of forests. Land ownership stability is the foundation for strong biodiversity practices.

Human development disturbs natural communities that provide habitat for the diverse flora and fauna of the North Woods. Species can be categorized as generalists or specialists based on their sensitivity to human disturbances. Generalists are not negatively impacted by this loss of natural landscape, but habitat specialists are sensitive to human disturbances that cause habitat loss, fragmentation, and increased predation. Specialists include species dependent on specific habitat characteristics for survival, such as large habitat blocks, riparian areas, early successional or old growth forests, pristine cold or warm-water aquatic habitat, vernal pools, or wetlands. Area sensitive species like the American marten require large blocks of non-fragmented and undisturbed forests habitat. Some forest birds, large mammals, and turtles also require large blocks of undisturbed forests. Riparian areas are especially valuable for over half of the forests’ fauna who live, forage, reproduce or travel there. Brook trout are specialists who survive only in cold, pristine rivers and streams. LURC has warm-water habitat, vernal pools, and wetlands that support a rich diversity of “fish, waterfowl, wading birds, amphibians, and aquatic invertebrates.”
Today old growth and late successional forests are facing harvesting pressures that could threaten their already limited distribution across Maine’s forested landscape. It is estimated that in 1800 84% of stands were older than 75 years and 59% were older than 150 years. In 2005 late successional forests made up about 2.8% of forest land statewide. Harvesting history left pockets of late successional forests and individual old trees within harvested stands due to historically limited access, a lack of markets, and different landowner objectives. Today these remaining late successional patches and individual old trees are threatened by improved road access, better timber markets, and new silviculture practices. Landowners today do not have an economic incentive to leave late successional trees and patches standing. Economic necessities, changes in technology and good markets make it more profitable to a landowner to harvest smaller diameter trees at younger ages when they have a fast growth rate. Ecological reserves and passively managed forests alone will not continue to protect late successional forests across the landscape with these new market and access pressures. More direct and active management is necessary to conserve these areas.

Early successional habitats are also threatened by changes in the forest industry. With the passage of the Maine Forest Practices Act (MFPA) in 1989, clear cutting was severely limited as a harvesting method. Clear cuts were the main source of stand-replacing disturbances necessary for regeneration and the establishment of early successional habitats. Species that rely on these habitats like the woodcock, snowshoe hare, and Canada lynx may be negatively impacted as the early successional habitat from the 1970s and 1980s clear cuts mature and no new early successional habitat is established.

Liquidation harvesting is a fast profit-driven management scheme that has no regard for long term forest management. The practice is characterized by new landowners coming in, harvesting intensively for a short period of about five years, and then selling the land for uses other than forestry. This harvesting severely damages wildlife habitat by spoiling water quality, soil productivity, stand structure and the forest’s ability to regenerate. Liquidation harvesting is a larger threat today than it was 20 years ago because of the changes in land ownership, and new landowners are typically less interested in long term management. This practice harms both the environment and rural Maine communities, whose long-term economic needs are not met. Liquidation harvesting puts long-term forest management at a competitive disadvantage in the marketplace because the company is not incurring the cost of management and time required for forest regeneration and health.

A 2003 study analyzed the impact of liquidation harvesting and found lands that were bought, harvested quickly, then resold suffered prevalent degradation of residual stand quality. 82% of stands barely met the minimum required post-harvest stocking levels required by the MFPA. Despite heavy harvesting, no violations of MFPA were found.

Stakeholders

Maine Natural Areas Program

The mission of the Maine Natural Areas Program (MNAP) is to “ensure the maintenance of Maine’s natural heritage for the benefit of present and future generations”. Within Maine’s Department of Conservation, MNAP manages a data system with information about natural features of the State. This department collects information through surveys on rare, threatened, and endangered plant species and natural communities. Informed decision-making in development planning, conservation and natural resource management is encouraged through the
distribution of this data. MNAP is responsible for protecting endangered plant species and natural communities. Natural communities are ranked on a scale of one to five based on their relative rarity, geographic distribution, and threats from conflicting land uses\(^2\). Many of Maine’s natural communities, such as alpine summits and floodplain forests, are within LURC jurisdiction.

MNAP also maintains a list of threatened and endangered plants. The conservation status of plant species is determined by their scarcity, special habitat requirements, geographical restrictions, range limitations, and population vulnerability. “Endangered plants are those in danger of extinction throughout all or a significant portion of their range within the state, while threatened plants are those likely to become endangered within the foreseeable future”\(^2\). MNAP collaborates with the Maine Field Office of The Nature Conservancy (TNC) and Maine Department of Inland Fisheries and Wildlife on conservation projects\(^43\).

**Maine Department of Inland Fisheries and Wildlife**

The mission of the Maine Department of Inland Fisheries and Wildlife (DIFW) is “to preserve, protect, and enhance the inland fisheries and wildlife resources of the state”\(^44\). In Maine, the DIFW has worked with MNAP to establish the Beginning with Habitat program. This program provides GIS maps of areas of ecological significance that are meant as a non-regulatory tool for informed and responsible development. Maps include high value plant and animal habitats, undeveloped habitat blocks, and water resources, and riparian habitats\(^44\). MDIFW also enforces Maine’s Endangered Species Act (MESA), which deals with animal species of concern in the State.

**Management of Conservation Easements**

Non-profits like The Nature Conservancy and public agencies like the Department of Conservation usually purchase land through conservation easements to protect biodiversity and maintain working forests. Landowners sell development rights to these groups, which purchase them in a cost-effective manner. The terms of the easement are negotiated between the landowner and the conservation-interest groups, and the easement buyer monitors and manages the land according to the easement terms. Land for Maine’s future is a State program that offers grants to purchase easements and oversees the easement-design process. The State sometimes purchases lands in fee or through an easement for conservation and public recreation. When the State purchases land in fee, meaning ownership is given to the buyer, agencies like the Bureau of Parks and Lands within the Department of Conservation are responsible for management. The Nature Conservancy (TNC) is a major purchaser of conservation easements in Maine; it purchased land south of Baxter State Park in the Kathadin Project. Private landowners can establish conservation easements on their own land by setting the terms of an easement and then placing management responsibilities in the hands of a land trust. Major land trusts in Maine include Maine Coast Heritage Trust, New England Forestry Foundation, and the Forest Society of Maine.

There are several difficulties when managing easements, including accountability, clarity, and the perpetuity of easement terms\(^45\). Those who manage easements must be accountable and adhere to terms of the easement. This is probably not an issue when large organizations such as the State government or conservation groups like TNC and Forest Society of Maine (FSM) are managing easements, but smaller land trusts that may be less financially endowed or are not held accountable to the public may encounter difficulties monitoring and enforcing the terms of an
easement. When a private landowner places land under a conservation easement, the public does not normally have the power to enforce the terms of an easement because it is a biparty agreement between the owner and the trust. Clarity is also important when defining easement terms because certain rights are given up, and therefore managers would benefit from clear guidelines that define what the allowable potential land uses are. Loopholes could lead to unforeseen exploitation opportunities. Possible activities allowed by easements could include types of acceptable resource extraction, specific biodiversity stipulations, and the level of public access. Finally, conservation easements are meant to be in perpetuity. A difficulty faced is that easement terms need to be strong and clear enough to provide meaningful management guidance, but flexible enough to survive the uncertainty and changes of the future, for example new scientific knowledge and changes in the political climate.\(^{45}\)

The incentive for landowners to place their land under conservation easements is that they provide income, estate, and property tax benefits to the landowner.\(^{46}\) Taxes are lowered because conservation easements reduce the value of land by restricting current and future development options. Lower income and property taxes on easement lands makes large blocks of land less costly to own; additionally, reduced taxes ease the financial burden on future generations who inherit large blocks of land and otherwise may not have been able to afford the estate tax.

Public and non-profit conservation groups have limited financial resources and therefore purchase of lands in fee or through conservation easements is determined by a cost-benefit analysis. Lands under development pressure, such as shoreline, are more expensive than more remote forested areas. About 85% of lands purchased by the State of Maine and nonprofits are purchased via conservation easements, and the remaining 15% are purchased in fee ownership of the land.\(^{13}\) It is cheaper to buy conservation easements than lands in fee ownership.

Conservation easements have costs associated with them aside from the initial purchase of development rights from the landowner. Administrators of the conservation easement must pay for recreation management. As an example, the Bureau of Parks and Lands (BPL) pays for this cost with funding from the legislature and their general fund. BPL also increased timber harvesting on existing public lands and established recreation fees. Administrators must also pay for monitoring costs, which include monitoring timber harvesting practices, enforcing easement terms through the legal system, and penalizing violators. Due to the perpetual nature of conservation easements, monitoring costs are indefinite. There is also the opportunity cost of conservation easements, which is the cost of forgoing the most profitable alternative land use option, such as development.\(^{47}\)

The economic benefits of easements include protection of land from unwanted development and keeping certain land use options open for the future by limiting current development. Additionally, guaranteed access and protection of the ecological forest values through provisions for protecting biodiversity provide a public benefit. By purchasing conservation easements instead of land ownership in fee, the government can continue to collect taxes from the landowner.\(^{47}\) Conservation easements are limited by funds available to establish and monitor them, so resources have to be allocated efficiently.
Laws, Institutions and Management

There are three major Maine state laws that affect biodiversity protection in Maine’s north woods. These are the Maine Endangered Species Act (MESA), the Natural Resources Protection Act (NRPA), and the Maine Forest Practices Act (MFPA). LURC also has its own statutes to protect habitat and does so primarily through zoning that is designated based on the fragility of different ecosystems.

Table 3.18 Description of Laws and LURC Zones Relevant to Land and Resource Use in the Unorganized Territory

<table>
<thead>
<tr>
<th>LURC Zoning Subdistricts</th>
<th>Abbrev.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish and Wildlife Protection Zone</td>
<td>P-FW</td>
<td>Protects deer wintering habitat, coastal seabird nesting sites, and other important fish and wildlife habitat</td>
</tr>
<tr>
<td>Accessible Lake Protection Zone</td>
<td>P-AL</td>
<td>Protects accessible, undeveloped, high value lakes</td>
</tr>
<tr>
<td>Great Pond Protection Zone</td>
<td>P-GP</td>
<td>Covers lakes and ponds more than 10 acres and a 250 foot wide buffer bordering those water bodies.</td>
</tr>
<tr>
<td>Special River Transition Protection Zone</td>
<td>P-RT</td>
<td>Applies to developed shorelines on outstanding river segments in LURC jurisdiction next to organized towns</td>
</tr>
<tr>
<td>Shoreland Protection Zone</td>
<td>P-SL</td>
<td>Protects shorelands of rivers, streams, ocean, and small ponds</td>
</tr>
<tr>
<td>Wetland Protection Zone</td>
<td>P-WL</td>
<td>Encompasses all submerged lands and other wetlands</td>
</tr>
<tr>
<td>Mountain Area Protection Zone</td>
<td>P-MA</td>
<td>Covers mountainous areas higher than 2,700 feet elevation</td>
</tr>
<tr>
<td>Unusual Area Protection Zone</td>
<td>P-UA</td>
<td>Applies to unusually significant scenic, historic, scientific, recreational, and natural areas not adequately protected by other zoning</td>
</tr>
<tr>
<td>Resource Plan Protection Zone</td>
<td>P-RP</td>
<td>Allows landowners to create a resource management plan for an area and allows land use activities approved by LURC</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Law</th>
<th>Year</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maine Endangered Species Act (MESA)</td>
<td>1975</td>
<td>Identifies threatened and endangered wildlife species and provides protection of their habitat</td>
</tr>
<tr>
<td>Natural Resources Protection Act (NRPA)</td>
<td>1988</td>
<td>Identifies and protects Significant Wildlife Habitat</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Identifies threatened and endangered plants and natural communities of Maine</td>
</tr>
<tr>
<td>Maine Forest Practices Act</td>
<td>1989</td>
<td>Limits the number of acres allowed to be clearcut</td>
</tr>
</tbody>
</table>

Maine’s Endangered Species Act (MESA) protects endangered and threatened animals and their habitats. It is the State version of the national Endangered Species Act. Under MESA the Maine Department of Inland Fisheries and Wildlife (DIFW) identifies and maps Essential Habitats, which are areas critical to the conservation of a species. Development projects that require state or municipal permits or funding and are located in Essential Habitat must be reviewed by MDIFW. Development usually continues after review, but plans are modified to mitigate negative impacts on animals and habitats. Forest management concerns less than one fourth of endangered and threatened species, and not all endangered and threatened species require essential habitat designation for survival. The bald eagle and the roseate tern are the only
State listed endangered or threatened species that have designated Essential Habitat in LURC jurisdiction. The Natural Resources Protection Act (NRPA) protects significant State resources from degradation by providing identification and maps of habitats for species with very specific requirements; these are Significant Wildlife Habitats (SWH). Under NRPA endangered and threatened species habitat, high and moderate value deer wintering areas and travel corridors have been mapped. Maps also exist for waterfowl, shorebirds, seabirds and in the future will include vernal pools and Atlantic salmon habitat. Seabird habitats are the only ones that have been formally designated as SWH.

The Maine Forest Practices Act (MFPA) has had a significant impact on timber harvest practices in the North Woods as well as on biodiversity and habitats. This law restricted the size of clear cuts to smaller harvesting units. There is a concern that harvesting practices as a result of MFPA will promote fragmentation of habitat types and fewer large blocks containing interior forest. Before the MFPA, 90% of forestry practiced was clear cutting; today, as a result of the MFPA 96% of forestry practiced is partial cutting and shelterwood harvesting and less than 5% of harvest practice is clear cutting. MFPA resulted in a strong shift away from large-block clear cutting in northern Maine and lead to smaller and more fragmented patches of habitat where clear cuts are still used. Clear cuts create a large block of early successional habitat. Partial harvesting can maintain blocks of relatively mature forests. Shelterwood harvesting creates large blocks of early successional forests and is not limited in size by MFPA. The volume of timber harvested has not changed significantly since before the MFPA because what the MFPA limited in clear cuts was compensated for by putting more acreage under partial and shelterwood harvesting. In 1999 an amendment to MFPA allowed for more flexibility in the use of clear cuts, but the acreage of partially harvested forest has not decreased.

LURC is obliged to protect biodiversity and preserve the ecological values of the forest resource. LURC uses zoning, land use standards, and directs development to protect ecologically significant areas. Zoning is the most direct tool for habitat protection, and conserves deeryards and coastal nesting islands. The Fish and Wildlife Protection Subdistrict (P-FW) directly protects habitat, like deer wintering areas and seabird nesting islands by prohibiting land uses that would degrade those habitats. Shoreland zones that protect riparian and aquatic habitat include the Accessible Lake Protection (P-AL) Subdistrict, the Shoreland Protection (P-SL) Subdistrict, and the Flood Prone Protection (P-FP) Subdistrict. The Wetland Protection (P-WL) Subdistrict is a major zone area that covers over 300,000 acres in LURC jurisdiction. The Unusual Area Protection (P-UA) Subdistrict has been used to protect old-growth forests, and the Resource Protection (P-RP) Subdistrict conserves Furbish’s Loueswot habitat, an endangered plant species. In addition to zoning, LURC manages habitat on a landscape level by allowing organized development in appropriate areas, near existing developed areas to avoid sprawl.

To preserve the ecological values of the North Woods, LURC works in cooperation with the Maine DIFW and MNAP. Both state agencies provide LURC with data and maps from surveys and input on potential large development projects, such as Plum Creek’s proposed development of Moosehead Lake (see case study). LURC works in accordance with new scientific evidence that supports landscape-level protection. This approach is appropriate for the Commission because of its vast territory; as of 2006, LURC jurisdiction has over 1.6 million of its 17.1 million acres of land under conservation easements.
Ecological Health

The level of biodiversity protection on land in Maine’s North Woods is influenced by several factors including landowner type, certified sustainable forestry, and the nature of any existing easements.

**Biodiversity Practices by Landowner Type**

According to a Manomot survey of landowners, industry, large family landowners, public and non-profit groups are the landowner types with the best forest practices, most compatible with the existing biodiversity. Overall land management of these owners included better biodiversity staff training (public owners), biodiversity monitoring and assessment, better forest structure, habitat management, rare species and habitats protection, landscape level management, and late successional forest management. Contractors and Financial Investors, all of whom are newer landowner types, have weaker biodiversity practices in these categories overall in forest management. These new landowners are also the ones most involved in the purchase and sale of large amounts of land transactions today.

Additionally, the survey found that no contractors or developers were certified sustainable for forestry. In contrast, financial investors, industry owners, and large family landowners had a large proportion of lands certified. Financial investors that bought certified land continued sustainable forest certification despite the change in ownership. Sustainable forestry practices on lands certified by the Sustainable Forestry Initiative or the Forest Stewardship Council are less damaging and better preserve wildlife habitat.

In maintaining the ecological value of Maine’s forest within LURC jurisdiction, it is important that new land owners continue the quality of land management standards of traditional landowners like the State, industry, and large family landowners. Traditional landowners are better at managing their lands in ways that sustain biodiversity supported by the forest. Sustainable forestry certification is also an important tool for protecting biodiversity and should be pursued by new landowners. This highlights the threats to biodiversity resulting from rapid transitions in ownership and the entry of new landowners.

**Habitat Protection and Harvesting Practices**

Land use in the northern forest is dominated by the timber industry because of its enormous economic importance to the State. Harvesting inevitably impacts the forest habitat, and species with specialized habitat needs can be easily disturbed by industrial land uses. Protection of rare habitats in a limited area has been easier to safeguard than habitats scattered across the landscape, such as deer wintering areas and riparian and aquatic ecosystems.

Forest harvesting is much more compatible overall with habitat preservation than other land uses that are more permanent, like residential development. New development pressures for residential areas are a more permanent land use and threaten to fragment Maine’s forests. Harvest practices have left a much more natural landscape because they are less intensive and allow forest regeneration. In fact, early successional habitats are established by clear cuts, which creates habitat for certain specialist species, like the lynx.
Large Blocks of Habitat & Umbrella Species

The American marten has been suggested by DIFW as an umbrella species for biodiversity planning efforts and to protect species richness in Maine’s northern forests. The marten could be used as an indicator species because it is considered the most area-sensitive forest specialized mammal in northern Maine. Martens strongly prefer habitat where stands are over forty feet tall with greater than 30% winter canopy cover and a residual basal area of over eighty square feet per acre.\(^4\) Martens will not travel between several small patches to meet home range-scale requirements; they require a large contiguous patch of habitat. Martens do not inhabit landscapes with scattered clear cuts and areas of residual and partially harvested stands. 700 to twelve 1,250 acres of high quality marten habitat are required to support five resident males and ten resident females.\(^4\) If blocks of forest are managed to protect marten habitat, then this umbrella species will also help protect other plants and animals within that area. Habitat loss and fragmentation will adversely affect this species, which requires maintenance of large blocks of forest.

Early Successional Species & Clear Cutting

Clear cutting was restricted by MFPA and since then there has been a shift in timber harvesting practices. The acreage of clear cuts has decreased enormously, while partial and shelterwood harvesting have increased substantially to maintain timber harvest volumes. The sharp decline in clear cuts from 90% to 5% of harvests has not benefited species that require early successional habitat, which regenerates from stand-replacing disturbances.\(^4\) These disturbances open the canopy and allow for the regeneration of shade-intolerant tree species. Black bear and moose feed in early successional habitats. The woodcock, Canada lynx and snowshoe hare are particularly dependent on young forests regenerated after clear cuts, but now face habitat loss as a result of alternative harvesting methods.

The woodcock is heavily reliant on early successional habitat for survival. Woodcocks require all phases of early successional habitat to complete their life cycle, and they are most densely populated in areas composed of all phases of early successional habitat. The larger the distance between early successional habitats the higher the energy costs and predation risk, which leads to reduced survival rates.\(^4\)

Another more charismatic species that will be negatively impacted without stand replacing forest practices is the Canada lynx, an elusive wildcat. When clear cutting was broadly used in the 1970s and 1980s, regenerating early successional forests provided good habitat for snowshoe hare, the main prey of Canada lynx. Large areas with dense stands of balsam fir and northern hardwood 10-20 years after a major forest disturbance, such as a clear cut, also provide good den sites for lynx.\(^8\) The MFPA restricted clear cutting and in doing so, the disturbance required to renew snowshoe hare habitat and lynx prey. Partial harvesting practices that have since replaced clear cutting do not create new habitat for snowshoe hare. As a result, prime early successional habitat created from clear cutting in the 1970s and 1980s is aging and lynx and snowshoe hare habitat is decreasing.\(^4\)

Old Growth and Late Successional Forests

Old growth and late successional patches of forest and old individual trees still remain today because they were historically inaccessible and unmarketable. Today landowners have access and markets to harvest these areas and convert them into younger more profitable forests. There are no economic incentives for landowners to maintain late successional forest habitats.\(^5\)
They are, however, a valuable component of biodiversity. Late successional forests are areas that have survived a long period without a major stand-replacing disturbance and have individual trees or stands older than the average time between major disturbances. They contain both small young trees and large trees that can be over 100 years old. They have multiple canopy layers, pit and mound forest floor topography, and an array of old-growth moss, lichen and fungi specialists\(^5\). Old growth forests are characterized by a stabilized tree species composition and a net growth of about zero. The forest is older than the time between the average natural disturbance and dominant trees have reached their life expectancy. Some vertebrates require old growth forests for nesting, roosting, and denning. Although vertebrates are more mobile and less closely tied to old growth habitat, they still are at risk of extirpation or extinction if this habitat is lost. Certain mosses, fungi, lichens and insects specialize on old growth habitat for survival\(^44\). Scientifically, old growth forests are important as benchmarks from which to compare human disturbance. The structure, function and natural disturbance regimes of forests without human disturbances are important to science and are used in forest management.

**The Distribution of Conserved Land Across Maine**

The distribution of conserved land across Maine is uneven, with much more acreage conserved in the northern half of the State than in southern and coastal areas. This reflects the tradeoffs in conservation due to limited resources, alternative competing land uses, and varying degrees of ecological sensitivity. There is some competition between conservation and other land uses, like industry, recreation and development. Public opinion and economic pressures weigh heavily on which land use is most appropriate. Within conservation efforts, resources are limited and have to be allocated strategically to protect ecological values. In some cases, money is used to buy vast areas for conservation, especially if the land is relatively inexpensive and may contain a variety of ecosystems that each support distinct clusters of species. In this way, an array of biodiversity is protected. On the other hand, conservationists may also choose to allocate their money to preserve fewer acres of more expensive lands if the area contains an especially sensitive or rare ecosystem or faces heavy development pressures, like shorelines. Lands in Maine have been conserved with these tradeoffs in mind.

Maine has fifteen Biophysical Regions. These were classified by Janet McMahon in 1990 based on 95 woody taxa and 22 environmental variables that characterize the different climates of the regions\(^49\). Because each Biophysical Region provides habitat for distinct groups of biodiversity, I was interested in researching the amount of conservation lands in each region. I used Geographic Information System (GIS), ArcEditor, and data from MaineGIS to determine what percentage of land was conserved by Biophysical Region and what percent of total conserved land was located in each biophysical region. Maine’s Biophysical Regions and conserved lands are shown in Figure 3.46.
Figure 3.46 Conserved Lands by Biophysical Region$^{49,50}$

There were limitations on the available data for this analysis. Some data on conserved lands on islands off the coast of Maine did not overlap with the data for the Biophysical Regions. Because of this, I was not able to include 127 acres of these coastal conserved lands in my analysis. Additionally, the data on conservation lands was incomplete. The most obvious deficiency was that a large conservation easement in Down East Maine was not included in the data.
Table 3.19  Distribution of Land Conserved by Biophysical Region in Maine\textsuperscript{49, 50}

<table>
<thead>
<tr>
<th>Biophysical Region</th>
<th>Acreage Conserved</th>
<th>Percent Conserved</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aroostook Hills</td>
<td>752712</td>
<td>28.0</td>
<td>26.3</td>
</tr>
<tr>
<td>Aroostook Lowlands</td>
<td>21417</td>
<td>2.4</td>
<td>0.7</td>
</tr>
<tr>
<td>Boundary Plateau</td>
<td>511168</td>
<td>50.5</td>
<td>17.9</td>
</tr>
<tr>
<td>Central Interior</td>
<td>50566</td>
<td>2.1</td>
<td>1.8</td>
</tr>
<tr>
<td>Central Mountains</td>
<td>509463</td>
<td>29.3</td>
<td>17.8</td>
</tr>
<tr>
<td>East Coastal Region</td>
<td>102672</td>
<td>14.2</td>
<td>3.6</td>
</tr>
<tr>
<td>Eastern Interior</td>
<td>99661</td>
<td>4.4</td>
<td>3.5</td>
</tr>
<tr>
<td>Eastern Lowlands</td>
<td>61458</td>
<td>7.6</td>
<td>2.2</td>
</tr>
<tr>
<td>Midcoast Region</td>
<td>9768</td>
<td>2.5</td>
<td>0.3</td>
</tr>
<tr>
<td>Penobscot Bay Region</td>
<td>19850</td>
<td>3.3</td>
<td>0.7</td>
</tr>
<tr>
<td>Saint John Uplands</td>
<td>188394</td>
<td>11.8</td>
<td>6.6</td>
</tr>
<tr>
<td>South Coastal Region</td>
<td>15662</td>
<td>3.9</td>
<td>0.5</td>
</tr>
<tr>
<td>Southwest Interior</td>
<td>46012</td>
<td>4.2</td>
<td>1.6</td>
</tr>
<tr>
<td>Western Foothills</td>
<td>86528</td>
<td>5.7</td>
<td>3.0</td>
</tr>
<tr>
<td>Western Mountains</td>
<td>381924</td>
<td>14.4</td>
<td>13.4</td>
</tr>
</tbody>
</table>

Figure 3.47 Percent of Total Conserved Lands by Biophysical Region\textsuperscript{49, 50}

Table 3.19 summarizes the results. Of all the biophysical regions, the Boundary Plateau by far has the highest percentage of its land conserved (51\%) followed by the
Central Mountains (29%) and the Aroostook Hills (28%). The Central Interior and Midcoast Region have the lowest percentage of their land conserved, 2.1% and 2.5% respectively, indicating it may be worthwhile to invest more resources into conserving lands in those Biophysical Regions. Of the total lands conserved in Maine, most occur in the Aroostook Hills (26%), and the least acreage of conserved lands are contained within the South Coastal Region (0.5%) and Midcoast Region (0.3%). These results are shown in both Table 3.19 and Figure 3.47.

Case Study 3.4  Plum Creek Proposal for the Moosehead Region

Moosehead Lake is surrounded by the working forest landscape of Maine’s North Woods, and is the largest lake within one state east of the Mississippi. Recreationists take advantage of this natural place for recreational activities like bird watching, skiing, fishing, hunting, snowmobiling, and ATV use. The rapid transition in landownership of the North Woods has affected the Moosehead Lake region, which is now under high development pressure. In the 1970s, development was mostly restricted to the southern end of Moosehead Lake, but between 1971 and 1991 building permits, including 452 residential permits, were issued in nearly every township along the lake. Plum Creek Timber is a Seattle-based Real Estate Investment Trust (REIT) and the largest private landowner in the country. It currently owns 928,000 acres of land in Maine, about half of which around the Moosehead region. plum Creek has petitioned LURC for rezoning 421,000 acres surrounding Moosehead Lake. Their concept plan (Figure 3.48) includes 20,500 acres for residential, nonresidential, and resort development, with no development beyond the proposed development zones. This includes a maximum of 975 residential lots, including 236 shorefront lots, and two resorts with 250 and 800 housing units respectively. A conservation easement of 91,000 acres to balance development is also included in the concept plan. Additionally, a conservation framework comprised 340,000 acres to be sold to the Nature Conservancy and the Appalachian Mountain Club. This sale is stipulated on the approval of the development component of the concept plan. The plan also includes stipulations on recreation, including hiking, fishing, canoeing, cross-country skiing, and snowmobile trail easements.

Plum Creek’s concept plan is the largest development plan in Maine’s history and has created widespread publicity and debate statewide. The debate that has emerged is primarily over the scope of the plan. Proponents of Plum Creek’s plan cite the proposal’s vast conservation lands that guarantee public access and, because conservation easements are in perpetuity, provides for stable access in the North Woods. Proponents also advocate for the contribution this development will bring the regional economies. Opponents of Plum Creek’s plan argue that the development proposal is too large, some development occurs in inappropriate places—mainly not near existing development, and that the proposal will change the wild character of the region. Additionally, many opponents have also questioned the integrity of the conservation easements proposed in the concept plan.

LURC will review the concept plan, which has gone through three rounds of revision. The goal of LURC is to balance conservation and development interests by ensuring new developments are well-planned, while allowing for multiple uses of the natural resources, and preserving ecological values within the jurisdiction. Criteria for accepting concept plan proposals and new development include avoid having undue adverse effects on the region and promoting orderly development. LURC’s decision regarding Plum Creek’s proposal could be a turning point for the region and may result in further efforts to develop the region for land uses other than forestry, particularly residential developments for second-home demands.
Figure 3.48 Plum Creek Concept Plan\textsuperscript{51}
Analysis and Discussion

Pressures in the North Woods continue to force changes in traditional land and resource uses, bringing the unorganized territory into the heart of environmental concerns in Maine. Global changes in the forest products industry have contributed to a dramatic change in land ownership in Maine’s unorganized territory, resulting in the replacement of large, industrial timberland owners with a new class of investor owners. Transitioning landownership has sweeping implications for conservation, public access, and traditional resource use. Over the past few decades, investor owners and conservation groups have established a presence in the unorganized territory and introduced new interests in land use, resulting in a deviation from long-term industrial management practices. Emerging interests in land and resource use has the potential to erode the working landscape in the North Woods, since many new landowners no longer prioritize industrial timber supply. Landownership change could challenge the industry’s ability to compete with international market pressures as access to fiber sources in Maine’s North Woods becomes more restrictive. This growing uncertainty as to the future viability of Maine’s forest products industry has increased public concern about forest sustainability and traditional recreational access to privately owned forest around the state.

Rapid changes in landownership have created an unprecedented potential for fragmentation, conversion, and conservation of timberland and pose a threat to traditional resource access in the North Woods. In response to changing landownership conditions, Maine has taken advantage of financial incentives to promote long-term forest management practices and reduce land conversion. Forest certification efforts are a financially viable and effective means of ensuring the long-term viability of forest practices and land use. Programs such as Tree Growth Tax Law and the Farm and Open Space Tax Law serve as positive incentives to support Maine’s forest-based economy, protect biodiversity, and preserve the state’s open land tradition.

The open land tradition in Maine is being challenged and may continue to be strained in the future as shifting landownership patterns in the North Woods persist. With these shifts come changes in attitudes for land use and possible negative implications for resource access. While the state continues its campaign for land acquisition, the amount of public land in the North Woods still pales in comparison to the vast acres of privately owned land and is unlikely to ever meet the demand for outdoor recreational access. However, open access is more than just a tradition; laws and policies in Maine encourage and, to some extent, guarantee the continued public use of private lands and right to access. Coupled with landownership changes is the changing face of recreation in Maine. Popularity for motorized recreation is increasing rapidly in Maine; this trend is reflected both by the increase in licenses for snowmobiles and ATVs as well as the increase in trail funding from the State. Meanwhile, more primitive and traditional sports such as hunting and fishing are declining, particularly from visitors. The transitions in ownership and recreational preferences conflict in a number of ways and could pose a challenge for stakeholders and policymakers in the future.

The rapid changes in ownership in Maine’s North Woods and the resulting instability of the future of forest resources in Maine threaten the natural landscape and wild character of the region. Changes in ownership, parcelization, and conversion are major forces which threaten biodiversity in the unorganized territory. In contrast, long-term forest management practices help to promote biodiversity, ecological processes, and a sustainable working landscape. In response to these dynamic changes, conservation efforts have increased dramatically in the region. Public,
non-governmental, and private groups have allocated funding to acquire development rights and land for the conservation of unique ecological values of the area. Conservation easements and buying lands in fee have been a new and heavily used tool to preserve the forest character of the region.

Habitats are at risk due to forestry practices, increased access, and market pressures resulting in land conversion, liquidation harvesting, and fragmentation. Parcelization has direct impacts on species like the American marten, which require large tracts of undisturbed forest to survive. Currently, early successional habitat is decreasing in the North Woods, which negatively impacts species that specialize in this habitat type like lynx and the American woodcock. Significant decline in the use of clear cutting in forest harvesting practices have reduced the major source of stand-replacing disturbances necessary for the generation of early successional habitat. Market pressures and improved access threaten the remaining, and very limited, old growth forests in the North Woods. Stability in landownership and long-term management schemes are necessary for the protection of biodiversity and the ecological value of Maine’s forest resource. As impacted acreage continues to increase in the North Woods, it is important that we assess the implications of forestry practices on the ecological viability of wildlife habitat as well as the role of productive tree stands in the sustainability of Maine’s forest-based industry.

The prevailing climate of uncertainty in Maine’s unorganized territory has implications for interests in recreation, conservation, and biodiversity. As new management schemes, land use practices, and objectives are introduced, the North Woods will continue to face extensive change. Processes of parcelization could potentially jeopardize Maine’s open land tradition, as well as the viability of critical habitat. These processes, in addition to rapid changes in landownership pose a challenge to timber management as well as industrial access to timber resources in the North Woods. Public and private conservation funding have played an important part in landownership trends. Thorough and persistent conservation efforts help to ensure stability in the forest products industry, as well public recreational access, and ecological integrity.

Conclusions

Scenarios

Having discussed the status of land and resource use in the unorganized territory and the causal trends and processes, we project some scenarios for the future of the unorganized territory and possible changes in the landscape. Results from our analysis and discussion and these projections are used to make policy recommendations.

As the central governing body of the region, LURC’s decision-making process is integral to the future of the North Woods; management hinges on this mechanism. LURC’s goals, policies, and implementation measures are based on “a vision for the future” of the area. As such, the Commission’s decisions are based on LURC’s land use objectives and how it ultimately defines the “distinctive character” of the region. While seemingly subjective, this character is based on four principal values that “cannot be compromised”.

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These four principals include:

1. Diverse, abundant, and unique natural resource values
2. Fiber and food production, and the tradition of a working landscape
3. Diverse and abundant recreational opportunities, particularly for primitive pursuits
4. Remoteness and natural character values

Scenario one illustrates the status quo. Currently, it is likely that parcelization and land ownership transitions will continue; likewise, conflicts for recreation and conservation constituencies will probably continue. Furthermore, as pressure from investor owners to maximize the profitability of land assets continues to increase, so will demand for development. Plum Creek Timber Company’s experience in Maine (Case Study 3.4) exemplifies these current pressures and the challenges posed to LURC’s regulatory capacity. The absence of public policy responses to address these trends will result in further conversion and erosion of the jurisdiction’s working landscape.

In the second scenario, development and suburbanization take over. Population, sprawl, and subdivision of land grow and expand into the unorganized territory from southern Maine. Lots preserved for working forest and fiber harvest decline and the tradition of a multi-use forest becomes constrained. Land is not reserved for critical habitat or other conservation purposes and endangered species’ populations decline in the region. Little land is set aside for public use causing conflicts between landowners and recreationists to intensify. Maine Guides and other people dependent on open access for nature-based tourism have fewer places to access for their business, which has implications for an important part of the North Woods’ economy. The level of trust and cooperation among stakeholders in the region declines; the open land tradition dies.

There are several pressures and key policy instruments that contribute to the evolution of this scenario. A key tipping point could be LURC’s approval of the Plum Creek proposal for the rezoning of 421,000 acres in the Moosehead Lake region. By approving this proposal, LURC, as the planning and zoning authority for the region, would set a precedent that such development is appropriate and does not compromise the four principal values from which it guides its policy. Likewise, independent of whether the Plum Creek proposal is approved, LURC could also facilitate the development of this scenario by expanding Development Zones within the jurisdiction at the expense of current General Management Zones designated for multiple use.

A third plausible factor contributing to this scenario is that the State government recognizes, welcomes, and exploits the development potential of the unorganized territory. Although the State has a lesser degree of control over changing management schemes, it could promote an environment conducive to investment and development. The State could court institutions within and from outside the state, and advertise the North Woods as a place where development activity will flourish. A fourth factor is that parcelization persists and investment owners continue to flock to the North Woods. Lastly, a fifth plausible, although less likely, factor is that the state’s forest products industry declines, and that forestry related uses become less profitable; thus, land conversion toward development would become an economic driver of the region.

In the third scenario, preservation and conservation becomes the focus of management decisions. Land is set aside for fiber harvest, recreational use, and preservation of critical habitat. Development is contained and not permitted on a large scale. Characteristically conflicting
stakeholders adopt a collaborative approach and pursue common objectives. Natural resource-based economy thrives and natural resources are devoted to traditional uses.

There are several pressures and key policy instruments that contribute to the development of this scenario. As with the first scenario, a major factor could be LURC’s decision surrounding the Plum Creek proposal and future rezoning bids. A rejection of the proposal would indicate that development of such a scale is not compatible with the character of the jurisdiction, as defined by LURC. Likewise, independent of whether the Plum Creek proposal is rejected, another policy instrument conducive to scenario three is LURC expanding the number of Protection Zones within the jurisdiction.

A third policy instrument is an increase in taxation schemes analogous to the Tree Growth Tax Law program. These types of taxation programs, in addition to independent certification schemes, could be used to promote long-term management as well as forestry related uses that preserve habitat for biodiversity. A fourth policy instrument is the continuation of popular referendums that increase funding opportunities for the Land for Maine’s Future program. This would enable the state to purchase larger tracts of land for recreation and wildlife preservation and secure access points in the North Woods. Another factor is requiring more stringent conservation easements. Easements with provisions for biodiversity protection and recreational access would be an effective means of acquiring more land in the North Woods for these two purposes. A sixth possible, although unlikely, policy tool is the acquisition of land through charitable donation from philanthropists, as was the case in Acadia National Park and Baxter State Park. Lastly, a plausible, although even less likely tool is the State seizing land for public access and for habitat preservation through eminent domain.

Recommendations

Fragmentation and changing ownership in the North Woods have posed considerable challenges to regulatory and management efforts in Maine. We have identified a number of policy recommendations, which complement a vision for the North Woods identified in our third scenario. Our policy recommendations are designed to support sustainable communities, economies, and working forests while preserving the integrity of wildlife populations. Governor Baldacci’s Steering Committee on Maine’s Natural Resource-based Industry (2006) has identified the network of open space, natural land, and access facilities as the major components of the state’s ‘green infrastructure’\(^52\). Green infrastructure can be interpreted as “the availability of and access to rural lands and natural resources” which contribute to the economy in various ways\(^52\). Despite the significance of these resources, there is a lack of coordinated and comprehensive planning to help determine future of resource use in the state. Collaboration between private, public, and non-profit sectors is fundamental to the State’s ability to address current challenges and to maintain the viability of green infrastructure. By prioritizing planning and investment in green infrastructure, the State will protect natural resources as well as their economic potential. The following policy recommendations seek to maximize and protect the assets and opportunities associated with resource use in the unorganized territory.
Statewide Comprehensive Planning

The State Planning Office has acknowledged that comprehensive municipal planning has not been successful in managing and containing local growth. In order to preserve rural character throughout the state, planning efforts and initiatives should be designed to reinforce green infrastructure and encourage appropriate community growth by limiting sprawl. As indicated in our research, and as depicted in Figure 3.36, sprawl and parcelization are already beginning to impact the southern portions of the unorganized territory. While several planning initiatives have been implemented to address issues associated with green infrastructure, they have failed to develop a cross-sectoral plan for the state. Implementing a state-wide program to assess green infrastructure assets and plan future investment will improve planning efforts and ensure the long-term viability of natural resource-based industry.

Reducing Stakeholder Conflict

As described in our paper, the North Woods landscape draws differing stakeholders whose interests and objectives often conflict. It is important that policy initiatives and future decisions be reflective of these constituent objectives and public opinion overall. As identified in our paper, recreational access is an important and politically charged issue in Maine, one that often competes with conservation interests, especially within the North Woods. While these actors often take different approaches, there is clearly a common ground between them; recreationists and conservationists both lobby for large tracts of open space. However, current contentions between recreation and conservation interests in the state have challenged this objective.

We recommend that forums be held frequently to allow stakeholders to communicate and identify cooperative solutions to land use objectives. These actors should collaborate on key initiatives that will benefit both parties, such as resource-based tourism, and lobby the State as a unified voice when appropriate. Likewise, to ensure that public opinion is taken into consideration, public hearings should remain a critical component of LURC’s regulatory decision-making process. LURC zoning can also be an effective tool to address incompatibilities in stakeholder objectives.

LURC Zoning

LURC zoning is an important policy tool that could be used more effectively to guide land use within the jurisdiction. Currently, zoning is being challenged by the Plum Creek proposal (Case Study 3.4), and could be vulnerable to further contestations. General Management Zones, which currently account for 70% of LURC territory, allow for and encourage multiple use and do not impose significant restrictions on land use. Sub-districts such as the Highly Productive (M-HP) and Natural Character Management Zones (M-NC) should be implemented to help further specify land use objectives within the jurisdiction and limit potential conversion to other uses. LURC should also use Development Zones to consolidate development efforts and to guide appropriate community growth that complements existing local economies, such as that of Greenville. Conservation offsets for development, like the 91,000-acre Balance Easement in the Plum Creek proposal, are an important means of balancing development and maintaining conservation objectives as growth in the unorganized territory continues.
Defining Easements

There is a heavy reliance on conservation easements to protect open space and working forest in the unorganized territory. Given their importance as a conservation tool, we suggest that a management body be established to oversee and catalogue easements and conservation efforts throughout the state. Working forest easements are an important policy tool to maintain working lands and the natural resource industries they support.

Many conservation easements do not have stipulations to protect biodiversity, and instead maintain land use status quo at the expense of biodiversity interests. Ambiguity regarding easement stipulations poses a liability to conservation efforts in the unorganized territory. We suggest that LURC or the State provide easement guidelines to define and identify appropriate conditions, particularly in the case of conservation offsets for development in LURC territory.

Increase Land for Maine’s Future Program Funding

The Land for Maine’s Future (LMF) Program is the State’s most important publicly funded mechanism to protect working forestland. Successful bond initiatives in the past have demonstrated widespread public support for the LMF program. Given its success as a tool for acquisition, protection, and public access, it is critical that the program receive more consistent funding. Current funding levels have been insufficient to meet the demand for public access, easements, and land acquisition. We suggest that funding increase for the program to enhance State-led conservation efforts and effectively compete with rival land use interests. The Maine Forest Service as well as the Governor’s Steering Committee on Maine’s Natural Resource-based Industry advocate for an increase in LMF funding for the acquisition of working forest easements and protection of ecological assets.

Taxation

Taxation schemes such as TGTL and the Farm and Open Space Tax Law serve as positive incentives to support Maine’s working landscape. The State should maximize the leverage capacity of such incentives to help promote land uses that complement the Commission’s vision for the jurisdiction. Penalties for withdrawing land from working forest status should be increased to act as a disincentive against conversion.

Biodiversity Concerns

Both old growth forests and early successional habitats should be maintained throughout the landscape in the unorganized territory. Given their economic appeal, old growth forests need to be actively shielded from market pressures by providing tax or other incentives to landowners to allow these areas to persist. Clear cuts provide open canopies to allow regeneration of early successional habitat necessary for species like the Canada lynx. Because of this, clear cutting should be managed with input from the Department of Inland Fisheries and Wildlife in order to maintain this habitat type. Protection zoning can also be applied by LURC as an effective regulatory tool to uphold conservation interests in these areas.

Capitalize on Sustainable Marketing Opportunities

Maine has an opportunity to take advantage of its reputation for sustainable management to distinguish the state’s forest products industry in the global market. Maine can further capitalize on the growing global demand for sustainable forest products by remaining a leader in
forest certification and by promoting environmental initiatives to protect forest resources. In order to maintain and possibly increase forest productivity in the unorganized territory, it is critical that LURC adopts an effective regulatory approach to help maximize sustainable outputs\(^5\). Incentives for forest certification would be an effective means of encouraging sustainable business practices that complement the Commission’s vision for the jurisdiction.

**Specify CLUP Language**

LURC is charged with planning for future growth within its jurisdiction. The Goals and Policies of the Commission, as defined in Comprehensive Land Use Plan (CLUP), mirror our vision for the unorganized territory. Future development pressures on the North Woods pose a significant threat to biodiversity through the parcelization and permanent conversion of working forests and habitat. We recommend that LURC development policies be more explicitly defined to guide sustainable growth without compromising principle values and land uses. The CLUP should be established as a more concrete framework for management and decision-making in the unorganized territory to be used when confronted with proposals for development and protection. This provides consistent decisions throughout the changing nature of the Commission and provides unyielding policy through wavering political times.
20. Jackson, E. Maine Land Use Regulation Commission (Data via email, October 26, 2007).
The State of Environmental Attitudes

Anna Barnwell and Kristina Shiroka

Executive Summary

The State of Environmental Attitudes in Maine is the fourth chapter of the report The State of Maine’s Environment 2007. This chapter focused on Maine’s residents and their relationships with the environment. Report authors designed and conducted a survey of 51 random Maine residents. The survey consisted of eleven questions which addressed ecological, economic, and recreational values of the environment; economic reliance on natural resources; recreation in the outdoors; and also the Plum Creek proposal. Survey data were analyzed statistically and the results were compared to published research. We found that respondents were equally distributed among ecological, recreational, and economic value of Maine’s forests and wildlife, however, recreational benefits were valued slightly more for both forests and wildlife. We found that respondents who did not hunt or fish were less likely to have an opinion about land use regulations, implying recreation is important for education and understanding. Respondents were also relatively equally distributed between opposing, supporting, being undecided, and not knowing about Plum Creek Timber Company’s most recent proposal. Finally, respondents who perceived their community as not being reliant on natural resources were more likely to oppose the Plum Creek Proposal.

In conclusion we found that respondents were invested in their communities and State as a whole. Although they were concerned about environmental issues, this did not take away from concerns about Maine’s economy and tradition of recreation. We also found that although Maine is shifting towards a service based economy, we believe natural resources will always be a part of Maine’s identity both economically and recreationally. Finally, we recommend that a survey such as this could be useful when developing future environmental policy. In addition, surveys provide opportunities to educate people on environmental issues.

Introduction

As demonstrated by the previous chapters, it is clear that Maine is changing. The last few decades have brought a shift in Maine’s energy profile, land use patterns, and resource access. These changes are all intricately tied to the growing concern for the environment that is happening not only in Maine, but nationally. In this chapter, we assess how the people of Maine currently view their environment – what they value most about it, how they feel about changes occurring in Maine, and whether these opinions are specific to Mainers.

Maine has a number of unique attributes. Known for its natural beauty, it has more coastline (3,478 miles) than the entire length of eastern North America. As described in Chapter 3, it contains the largest tract of undeveloped land east of the Mississippi. These vast and diverse ecosystems not only define the unique character of the State, they provide the State with natural resources vital to its economy. They also provide endless recreational opportunities, both for
Maine’s residents and the millions of tourists who visit each year. It is for this reason that in 1988 the official State slogan became “Maine, the way life should be”.3 This idealized description of the State still applies today, and the people of Maine often choose to live here, even if they know they might make more money elsewhere.3

Many of the changes occurring in Maine are in response to some difficult challenges that have arisen from a changing economy and the decreasing availability of natural resources. Because these natural resources are so abundant in Maine, there is a strong need for policies and practices that will protect them in the long term. The lack of urban areas in many parts of the State combined with relatively low economic development statewide, may contribute to Maine’s status as the poorest state in New England. For example, over the 1990s, payrolls decreased by 16% (adjusting for inflation).4

With its forests and fisheries, Maine’s natural resources have always been its primary source of income, and further exploitation of these resources has been the easiest and quickest solution to Maine’s economic problems in the short run.4 As resource availability decreases, however, many Mainers are beginning to realize that the solution may not be so simple. For example, as mentioned in Chapter 3, “Resource Access in Northern Maine,” forest cover is decreasing in Maine, as 5,000 to 10,000 acres of forest land are converted annually for development.

Natural resources such as these are limited. Alan Caron, the founder and president of nonprofit citizens’ organization GrowSmart Maine urges Mainers to ask themselves: “How can we grow without wrecking the place?”3 This balance has proven difficult to attain. Maine’s economy has begun to shift from natural resource-based industry to service and knowledge-based industry, but this transition has brought on an economic struggle, especially for rural Maine which experienced increased unemployment rates from 2000 to 2005.5

Everyone in Maine, both the general public and policymakers, must understand the complexity, sensitivity, and finiteness of the environment in order to develop and adhere to new practices that support sustainability. Such new practices are being developed and implemented today – many timber companies go through a costly sustainable forest certification process, fishing regulations have tightened immensely in response to collapsed fisheries, and many companies must comply with strict waste discharge regulations. Moving towards sustainable practices, however, has been a long process. Maine is undeniably at a turning point in its views on economic development, the environment, and how they intersect: as stated by Richard Barringer in Changing Maine, “Maine has been at a cross-roads for 40 years.”6 The question we strive to answer is, how have these changes influenced the environmental attitudes of Maine’s residents?

We describe the methods used to create, execute, and analyze a survey of a random sample of Maine’s people. The survey was geared towards gaining a better understanding of the opinions of Mainers with respect to their environment. The most interesting and significant trends found in our analysis of the results are addressed in the discussion. We conclude with a reflection of how our findings may reflect the priorities and values of Mainers with respect to their environment.
Historical Identity of Mainers and Demographic Composition

When Maine was first settled, the land was used primarily for the purpose of the agricultural and timber industries. With the opening of the western United States, however, Maine’s population declined as people migrated towards richer agricultural lands and opportunities. By the 1870s tourism seemed like the most feasible way to capitalize upon what Maine still had to offer: natural beauty and cultural character (see Chapter 2, Land Use Development and Planning). Timber companies and paper mills remained a large part of Maine’s economy. Wealthy people from further South came North looking for an escape from their urban and recently industrialized lives. In this way, the tendency to characterize and stereotype Maine and its inhabitants began by the turn of the century. It was the railroad companies that first named Maine “Vacationland” in an effort to bring people to the state. The tourism movement started the long-lasting tradition of romanticizing Maine as what it was to the people visiting it – beautiful seacoast and wildlife scenery. This included the conception of the people of Maine as well. The authenticity of Maine was exaggerated by the concept of who belonged and who did not. Publicity for travel companies described Maine as classless, rural, and simple from the start and the idea hasn’t really left today’s tourism industry of Maine. Maine’s was recently changed from “Vacationland” to the “way life should be.” The head marketing company which designed the slogan described it as “Welcome to the way life should be. The place where you can reestablish your life’s course, where you can set your own boundaries… America’s got only one Maine—the classic seashore, the perfect lakes and mountains, the peaceful moments of uncommon serenity, the folks who live here… This is what it is all about. Maine is simply the way life should be.” The idea of Maine as being a tranquil escape is enhanced by the presence of the people who live there, but who may not necessarily live the romanticized life.

It is difficult to understand who “Mainers” are when the identity is often times objectified by tourism and visitors. Maine’s seasonal residents often do not see the impoverished, tough side of life in Maine that, in reality, is a part of the State’s identity. The conflicted identity of a Mainer has been further intensified by the influx of newcomers to the State. We found in our research, including conversations with paper mill executives and public officials that the contrast between the newcomer (or “from-away”) resident and the native “Mainer” is often seen as an important factor in a number of State issues. In reality, Maine consists of a diverse and complex population that is often not acknowledged.

One example of this population complexity is discussed in the 1989 report The Commission on Maine’s Future conducted by the state government, which relied on a psychographic survey called “The People of Maine.” This is the most current government-supported survey on Maine’s people we could find. The survey questioned close to 800 Maine residents on various issues facing Maine in 1989 and the future. Analysis of the survey resulted in nine categories of the people of Maine (Table 4.20). Although these colorful categories are from 1989, they are useful to consider when we look at the range of thought and diversity that exists in Maine. Although these categories were created prior to the increase in migrants from other states over the last 18 years, it is relevant that such sentiments existed towards the newcomers during this time. Thus, the categories should be considered as evidence that it is not always as easy as it seems to categorize the people of Maine.
### Table 4.20 Categories from "The People of Maine" from 1989

<table>
<thead>
<tr>
<th>Category</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surburbanites</td>
<td>19</td>
</tr>
<tr>
<td>Traditionalists</td>
<td>18</td>
</tr>
<tr>
<td>Yankees</td>
<td>16</td>
</tr>
<tr>
<td>Bystanders</td>
<td>14</td>
</tr>
<tr>
<td>Milltowners</td>
<td>11</td>
</tr>
<tr>
<td>Post-Hippiies</td>
<td>7</td>
</tr>
<tr>
<td>Young Urbanites</td>
<td>6</td>
</tr>
<tr>
<td>Activists</td>
<td>5</td>
</tr>
<tr>
<td>Expatriates</td>
<td>3</td>
</tr>
</tbody>
</table>

Evan Richert, a former director of the Maine State Planning Office, also alluded to the complexity of categorizing Mainer in one group and new-comers as another. In a survey conducted on differing attitudes of in-migrants and native Mainers towards development on Route 1, Richert noted that “where there are differences, they frequently are a matter of degree rather than a matter of opposition."

In addition to looking at how perceptions of the people of Maine are socially constructed, there are some basic demographic trends that have been seen in Maine during the past decades worth taking note of. The national trend of the aging baby-boomers has led Maine to be an “old state”. In fact, Maine is the second oldest state in the country. Declining numbers in births after the baby boom have resulted in a decrease in the age 35 and under workforce. According to the Maine Department of Labor, this age group decreased 12% while the workforce over the age of 35 increased by 67%.

Another characteristic of Maine is that racial and ethnic diversity is limited. Maine’s population is 97% white, 0.5% African-American, 0.7% Hispanic; and 0.5% are Asian. In 2000, 1 of 3 Americans was a minority, but in Maine this ratio is closer to 1 in 29. This is largely due to the fact that Maine has never had large employment centers, which have traditionally attracted immigrants to urban cities elsewhere in the country. Maine is relatively far away from debarkation cities, and although 1 in 9 Americans are immigrants, in Maine it is 1 in 35. The absence of minorities is seen by many as being a barrier to economic development. In the U.S. today, ethnically diverse companies and cities are more valued and sought after. Also, one of Maine’s demographic trends for several decades has been the emigration of young people out of the State. Studies show that one reason for this is that the pluralistic culture of urban centers elsewhere provide for the job opportunities and diversity that many youth seek.

As was mentioned in the introduction, one of the most prevalent demographic trends of recent years has been the increase in net migration to Maine. Between 1960 and 2000, eight of Maine’s 16 counties have grown in population, especially in the southern counties of York and Cumberland (in fact, over half of the growth has occurred in these two counties). Between 2000 and 2005 the median home price in Southern and Mid-Coast Maine increased by 56%. These changes are drastic when compared to Aroostook, Piscataquis, Penobscot, and Washington counties of northern Maine which have all experienced out migration. Out migration has been occurring since the mid 19th century, however, it has been exaggerated by the influx of wealth to the State in some regions, while other regions have struggled.
Goals and Objectives

The goal of our study was to use a survey instrument to explore how Maine’s people perceive the growing tension between the need for economic growth and the need to preserve the quality of the environment, and to more fully understand why Maine residents may have these perceptions. We sought to determine how aware Maine residents are of environmental issues, how they feel about them, and how this might shape the future of Maine’s environmental regulations. Our objectives were to explore answers to the following questions.

- Why do respondents value the environment? Is it primarily for economic, recreational, or ecological reasons?
- Are respondents familiar with Maine’s land use and land access regulations? If so, do they think these regulations are fair?
- How many respondents possess a Maine hunting or fishing license? Does possession of a license affect the way the environment is valued?
- If a respondent was born in Maine, does this affect the way he or she values the environment?
- Do respondents see themselves and their local economy as being dependent on natural resources?
- How do respondents feel about Plum Creek Timber Company’s proposal to re-zone the Moosehead Lake region? Do these answers correspond with environmental values?

Methodology

We chose to develop a survey targeting the residents of Maine because they are the people most invested in and impacted by Maine’s environment. The survey was designed to gauge the average resident’s attitude towards their environment and several issues of contention in the State. Our five minute survey, conduct over the phone or in-person, consisted of ten questions. The survey questions were developed by first determining the information that we wanted to acquire (see Goals and Objectives) and then creating questions that would give us this information. For phone and in-person surveying it is recommended that either “Yes/No” or scaled questions used. We used both of these (Table 4.21). In order to make sure that the survey questions were clear, we conducted several pre-tests with classmates and other local colleagues who provided feedback as to how to make the survey compliment the project.

When approached or called, respondents were met by a friendly greeting and introduction to the survey. We used the greeting: “Hi, I am a college student from Waterville, Maine and am conducting a survey for a class research project. Do you have five minutes to answer some questions on Maine?” Surveying in-person was more successful than surveying over the phone. Approximately 100 people were called, and 50 people were surveyed in person. We surveyed a total of 51 people; 20 by phone and 31 in-person. We had a 20% participation rate by phone, while for in-person surveys we had a 60% participation rate.

We wanted a sample size varied in age, gender, and geographic location. We were not able to ensure evenly distributed age groups because we felt that asking the participant’s age on
the phone might result in a lower participation rate. Gender was determined over the phone or in person. An equal distribution of gender was maintained resulting in 49% male and 51% female respondents. Our project’s objectives made maintaining geographic diversity within our sample important. In-person respondents were found in several venues: grocery store parking lots, local cafes, street sidewalks, gas stations, and book stores in the communities along Interstate 95 corridor. These towns include Augusta, Oakland, Fairfield, Bangor, and Waterville. Due to transportation limitations there were regions that we were not able to visit. Our phone survey was focused on counties that were not visited. Phone respondents were selected by randomly choosing home phone numbers from both online and hard-copy phonebooks. Phone surveys were conducted in the afternoon between 4pm-5pm on Sundays, and evenings between 5pm-7:30pm on weekdays. Most in-person data were gathered during the day on weekends.

Survey results were analyzed using SPSS. All figures were created in SPSS, including figures for which a statistical association was found. To test the significance of our results, for each survey questioned we used a Chi-Square test. The significance of relationships between dependent and independent variables was tested using the Goodman Kruskal tau test.

![Map of Surveyed Communities](image)

Figure 4.49 Map of Surveyed Communities
Table 4.21 "Environmental Attitudes in Maine" Sample Survey

<table>
<thead>
<tr>
<th>Survey Question</th>
<th>Answer Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community, Age, Gender:</td>
<td></td>
</tr>
<tr>
<td>1. How many years have you lived in Maine?</td>
<td>Years</td>
</tr>
<tr>
<td>2. Do you consider yourself to be a Mainer?</td>
<td>YES/NO</td>
</tr>
<tr>
<td>3. How many times in the last year have you visited a state or national park Maine?</td>
<td>#</td>
</tr>
<tr>
<td>4. On a scale of 1 to 3 (1 being not reliant at all, 3 being very reliant) how reliant is your profession on natural resources?</td>
<td>1. Not at all reliant 2. Somewhat reliant 3. Very reliant</td>
</tr>
<tr>
<td>5. On a scale of 1 to 3 (1 being not reliant at all, 3 being very reliant) how reliant do YOU perceive your community’s economy is on natural resources?</td>
<td>1. Not at all reliant 2. Somewhat reliant 3. Very reliant</td>
</tr>
<tr>
<td>6. Maine’s forests provide many different benefits. Which of the following benefits is the most important for YOU?</td>
<td>a) Economic value b) Ecological value c) Recreational value</td>
</tr>
<tr>
<td>7. Are you a licensed Maine hunter or fisherman?</td>
<td>YES/NO/PAST</td>
</tr>
<tr>
<td>8. Maine’s wildlife (such as fish, moose, bear, lobster, birds) can be valued for many reasons. Which of the following benefits is the most important for YOU?</td>
<td>a) Economic b) Ecological c) Recreational</td>
</tr>
<tr>
<td>9. In your opinion, how are Maine’s land use and land access regulations fair, unfair, or you do not know?</td>
<td>• FAIR • UNFAIR • Don’t know</td>
</tr>
<tr>
<td>10. On a scale of 1 to 3 (1 being not reliant at all, 3 being very reliant) how reliant on tourism is your community’s economy?</td>
<td>1. Not at all reliant 2. Somewhat reliant 3. Very reliant</td>
</tr>
<tr>
<td>11. As you may know, Plum Creek Timber has asked the Land Use Regulatory Commission to rezone land near Moosehead Lake for development. On a scale of 1 (very opposed) to 5 (very supportive), how do you feel about this proposal?</td>
<td>1. Very opposed 2. Somewhat opposed 3. Neutral 4. Somewhat supportive 5. Very supportive</td>
</tr>
</tbody>
</table>

**Results**

Responses to the two questions about preferred benefit of Maine’s forests and wildlife yielded similar results – about 30% of people chose either “economic” or “ecological” benefit for both questions, and about 40% chose “recreational” for both questions (Table 4.22 items 6 and 8). Of our respondents 41.2% possessed a fishing license, 58.8% either did not have a hunting/fishing license, or have had one in the past. Over two thirds (68.6%) of respondents felt that Maine’s land use and access regulations were fair, 9.8% felt that they were unfair, and 21.6% did not know enough to comment. As for opinions on the Plum Creek development plan, a little over a third (35.3%) opposed it, 17.6% supported it, about a quarter (21.6%) were undecided, and nearly a quarter (25.5%) did not know enough to comment.
### Table 4.22 Comprehensive Survey Results

<table>
<thead>
<tr>
<th>Number of Surveyed Respondents</th>
<th>51</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chi-Squared p-value</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Number of Surveyed Respondents</strong></td>
<td>51</td>
<td>100%</td>
</tr>
<tr>
<td><strong>Number</strong></td>
<td><strong>Percent of total</strong></td>
<td><strong>Chi-Squared p-value</strong></td>
</tr>
<tr>
<td>1. Years lived in Maine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-10</td>
<td>11</td>
<td>21.6%</td>
</tr>
<tr>
<td>11-20</td>
<td>9</td>
<td>17.6%</td>
</tr>
<tr>
<td>21 and above</td>
<td>31</td>
<td>60.8%</td>
</tr>
<tr>
<td>2. Considers self to be Mainer</td>
<td>Yes</td>
<td>42</td>
</tr>
<tr>
<td>No</td>
<td>9</td>
<td>17.6%</td>
</tr>
<tr>
<td>0</td>
<td>13</td>
<td>25.5%</td>
</tr>
<tr>
<td>1-5</td>
<td>25</td>
<td>49%</td>
</tr>
<tr>
<td>6 and above</td>
<td>13</td>
<td>25.5%</td>
</tr>
<tr>
<td>4. Considers profession to rely on natural resources</td>
<td>Not at all reliant</td>
<td>32</td>
</tr>
<tr>
<td>Somewhat reliant</td>
<td>7</td>
<td>13.7%</td>
</tr>
<tr>
<td>Very reliant</td>
<td>9</td>
<td>17.6%</td>
</tr>
<tr>
<td>5. Considers community’s economy to rely on natural resources</td>
<td>Not at all reliant</td>
<td>5</td>
</tr>
<tr>
<td>Somewhat reliant</td>
<td>22</td>
<td>43.1%</td>
</tr>
<tr>
<td>Very reliant</td>
<td>24</td>
<td>47.1%</td>
</tr>
<tr>
<td>6. Most important benefit/value of Maine’s forests</td>
<td>Economic</td>
<td>15</td>
</tr>
<tr>
<td>Ecological</td>
<td>15</td>
<td>29.4%</td>
</tr>
<tr>
<td>Recreational</td>
<td>21</td>
<td>41.2%</td>
</tr>
<tr>
<td>7. Possesses hunting and/or fishing license</td>
<td>Yes</td>
<td>21</td>
</tr>
<tr>
<td>No</td>
<td>30</td>
<td>58.8%</td>
</tr>
<tr>
<td>8. Most important benefit/value of Maine’s wildlife</td>
<td>Economic</td>
<td>15</td>
</tr>
<tr>
<td>Ecological</td>
<td>17</td>
<td>33.3%</td>
</tr>
<tr>
<td>Recreational</td>
<td>19</td>
<td>37.3%</td>
</tr>
<tr>
<td>9. Fairness of Maine’s land use and access regulations</td>
<td>Fair</td>
<td>35</td>
</tr>
<tr>
<td>Unfair</td>
<td>5</td>
<td>9.8%</td>
</tr>
<tr>
<td>Don’t know</td>
<td>11</td>
<td>21.6%</td>
</tr>
<tr>
<td>10. Support or oppose Plum Creek's development plan</td>
<td>Opposed</td>
<td>18</td>
</tr>
<tr>
<td>Undecided</td>
<td>11</td>
<td>21.6%</td>
</tr>
<tr>
<td>Supportive</td>
<td>9</td>
<td>17.6%</td>
</tr>
<tr>
<td>Don’t know</td>
<td>13</td>
<td>25.5%</td>
</tr>
</tbody>
</table>
Only 9.8% of our survey respondents felt that their local economy was not at all reliant on natural resources, while 43.1% of respondents felt that their local economy was somewhat reliant on natural resources, and 47.1% of participants felt that their local economy was very reliant on natural resources (Figure 4.50). These differences were statistically significant (Chi-Squared p= 0.002).

The majority of respondents (62.7%) felt that their profession was not at all reliant on natural resources; only 13.7% of participants felt that their profession was somewhat reliant on natural resources, and 17.6% of participants felt that their profession was very reliant on natural resources (Figure 4.51). Our respondents were significantly more likely to think that their profession was not at all reliant on natural resources, but their local economy was very reliant on natural resources (Chi-Squared p=0.000).
The possession of a hunting or fishing license was a predictor of perceived fairness of land use regulations (Figure 4.52). Of participants with a hunting and/or fishing license 76.2% thought that land use and access regulations were fair, which is significantly more than the 19.0% who thought they were unfair, and the 4.8% who did not know enough to answer. Of participants with no hunting and/or fishing license 63.3% thought that land use and land access regulations were fair, significantly more than the 3.3% who thought they were unfair, and the 33.3% who did not know enough to answer (Goodman and Kruskal tau p= 0.019).

Some of our results were not statistically significant. This may have been due to our small sample size. Regardless, we found several interesting trends in these data that we would expect to find even in a much larger sample size.
Being born in Maine or being “from away” was an explanatory variable for valuing Maine’s Forests (Figure 4.53). About 50% of “from away” respondents felt that recreational values of Maine’s forests were most important. Answers of Mainers were more evenly distributed.

![Figure 4.54 Community Reliance on Natural Resources and Opinion of Plum Creek Proposal](image)

The respondents’ community’s economic reliance on natural resources was an explanatory variable for opinions of the Plum Creek Proposal (Figure 4.54). Most of the respondents (80%) who were opposed to the Plum Creek proposal thought that their local economy was not at all reliant on natural resources. Answers of respondents who chose “somewhat reliant” or “very reliant” were more evenly dispersed.
Case Study 4.1 Plum Creek: Oppose? Support? Or, What are you talking about?

Portland consulting firm Critical Insights completed a survey in 2005 and 2006 gauging support and understanding for the Plum Creek Timber Company’s development proposal. The survey determined that while in the fall of 2005 41% of the respondents opposed the plan, 50% of respondents in the fall of 2006 opposed the plan. Our survey, taken in the fall of 2007, determined that 35% of survey participants opposed the plan. It is important to point out that opposition was the most popular option among our respondents. However, it is equally important to point out that in the spring of 2006, 17% Critical Insight respondents had not heard about the Plum Creek development plan.

In our survey we also found that 25% of respondents did not know enough to comment on the proposal. This reflects an educational and awareness gap that is not being filled if a person either opposes or supports. For an issue that is this important to Maine, a higher rate of understanding should be maintained. It is also worth discussing that even for respondents who were able to answer the question, comments were frequently noted about the lack of transparency on both the Plum Creek side and the side of opposition. One potential solution for this is for the governing agencies to become more invested in making sure that Mainers know about this proposal and the reasons for its importance. In general, although our respondents did seem to be fairly aware of the issues that we asked about, it was also clear that unless the respondent had a specific investment with utilization of natural resources, their understanding of regulations and issues may be less than the average respondent (See hunting and fishing licenses and opinion of the land use and access regulations).

Discussion

Maine’s economy has shifted away from manufacturing and natural resource reliance towards consumer and business services. This has been a challenge to Maine’s workforce both because of the loss in employment and the change in traditional economic sectors. It was not long ago that the timber industry was the most prevalent economic force in Maine. Until the 1970s and 1980s it seemed like this industry would flourish infinitely. The transition away from natural resources has occurred quickly in a historical context and it is likely that residents of Maine have not had time to adequately adjust to these changes. In 1950, blue collar jobs accounted for 60% of the Maine workforce, but in 2002 these jobs accounted for one quarter of the workforce; in this same amount of time service jobs increased by 200 percent.

In our survey, the shift away from natural resource based industries was addressed by questions regarding the perception of local reliance on natural resources and individual
professional reliance on natural resources. Close to half of respondents said that they perceived their economy to be very reliant on natural resources. When respondents were asked whether their personal profession was reliant on a natural resource economy, only 17.6% perceived their profession to be very reliant.

There are several potential explanations for this. One is that our sample simply reflected a larger amount of people living in communities which are natural resource dependent, but whose professions were not natural resource reliant.

The results show that 90.2% of respondents thought that their communities are reliant in some way on a natural resource based economy, while economic trends from the Brookings Institution and the State government’s Division of Labor show that, in fact, communities are becoming less reliant on natural resources. Although the economy is shifting away from natural resources and towards a service-based economy, our respondents still see Maine as a state that is primarily economically reliant on natural resources.

In the 1989 survey “The People of Maine” conducted by The Commission on Maine’s Future analysis showed that 49% of survey respondents believed that natural preservation could take priority over finding quality jobs. A quarter of respondents disagreed and thought that jobs rank over natural conditions. In a State conducted 1979 survey, asking the same question yielded the opposite response. In Commission on Maine’s Future this point is addressed by considering that the Maine economy differed drastically in 1979 and 1989. 1988 was a year of prosperity for Maine. The report presents the State’s economy as an indicator for how people will prioritize environmental issues. For the time being, Mainers’ perception of the economy does not seem to be an optimistic one. A study done by Critical Insights, a private consulting group of Portland, reported that as of spring 2007 only 9% of Maine’s people think that the economy is better off now than one year ago, and that 37% of Maine believed that the economy will actually worsen within the next year.

Overall, results suggest that our respondents perceived their local economies to be more reliant on natural resources than recent trends on Maine have shown to be true through other research. The natural resource based economy that is now in decline in Maine may still the economy perceived by our respondents. Where most respondents perceived their local economies to be very reliant on natural resources, the majority of respondents perceived their personal professions as not reliant on natural resources.

Economic development in Maine is coupled in this discussion with the issue of resource access and recreational activities which we found to be the most prevalent issue on the minds of our respondents (Table 4.22). The right to public resource access in Maine is not only important culturally, it is also mandated by law. If property is not posted, it is open for public use. This is usually accompanied with a sense of entitlement to the land as a common property resource, when in fact it is largely privately owned. In the past decade property ownership has changed drastically, placing the unspoken agreement between Maine’s people and the previous land owners (such as paper companies) at risk. The change in property ownership threatens many Maine residents’ access to these recreational lands to the north, while resource access in the south is prevented by land which is converted from rural to suburban areas (see the sections on Resource Access and Land Use and Planning in this paper).

While resource access in Maine has been undergoing transition in the past few decades, the type of recreation for which access is important has also been changing. Maine’s history of recreational use of these lands varies from snowmobile and ATV trail riding, to hunting and fishing, to hiking, skiing, and camping. National trends suggest, however, that some of these
activities have been decreasing in popularity, namely hunting and fishing. Hunting and fishing as recreation has decreased, and this cultural shift parallels the reduced access to lands previously enjoyed by hunters and fishermen/women. This, in addition to the changes in access, can infringe upon old traditions. One old time Maine hunter was quoted in a recent article on these changes by saying:

It is easy to simplify and say that it’s the L.L. Bean crowd, the yuppie crowd, or the Volvo crowd, or whatever. But basically what you are talking about is a whole generation of people, including my kids, who are not into the exploitation of wildlife. They don’t know about it.

Recreational activities beyond hunting and fishing, however, are also threatened by issues of resource access. In our survey, the ability of Maine’s government to control resource access in Maine was addressed by asking respondents whether they thought land use and access regulations were fair, unfair or they did not know. A relatively high percent (68.6%) of the respondents felt that the regulations were fair (Table 4.22). Our hypothesis was that the people who thought regulations were fair would also be respondents who did not hunt or fish. Surprisingly, whether or not respondents considered regulations to be fair did not predict owning a hunting or fishing license. However, respondents who did not know about land use and access regulations were less likely to own a hunting or fishing license than those who did hunt or fish. This likely implies that possession of a hunting or fishing license influenced the respondent’s knowledge of regulations. This suggests that, unless a respondent has had a specific experience with recreational use of the land, knowing about land use and access regulations may not be as likely. Overall, results suggest that that our respondents perceived their local economies to be more reliant on natural resources than recent trends on Maine have shown to be true through other research. The natural resource based economy that is now in decline in Maine may still the economy perceived by our respondents. Where most respondents perceived their local economies to be very reliant on natural resources, the majority of respondents perceived their personal professions as not reliant on natural resources.

Hunting, as well as other outdoor recreational activities, are valued highly by many Maine residents. The high percentage of “from away” respondents who valued recreational aspects of Maine’s forests above ecological and economic aspects may indicate that forest-related recreation (skiing, camping, hiking, and motorized recreation) could be part of the reason newcomers chose to move to Maine. As mentioned in the Background Information section, half of the statewide population increase between 1960 and 2000 occurred in York and Cumberland counties, the two wealthiest counties in the State. Between 2000 and 2005, the median home price in southern Maine (where York and Cumberland counties are located) increased by 56%. This also plays to the common perception of “two Maines,” northern and southern, where northern Maine is much poorer and under-developed, while southern Maine is more urbanized and progressive. This idea is supported by the influx of wealthier non-Mainers to southern Maine – if southern Maine has a much higher percentage of wealthy non-Mainers, a discrepancy between ideologies between north and south can be expected.

Most of the respondents (80%) who were opposed to the Plum Creek proposal thought that their local economy was not at all reliant on natural resources (Figure 4.54). This may demonstrate an inability of people whose communities are not dependent on natural resources to understand that other communities are in fact very dependent on natural resources. They may
feel that the Moosehead Lake region needs to be left pristine, and fail to recognize that appropriate development and forest harvesting may be necessary for residents of the Moosehead region to bring revenue to the community. Such development might include constructing attractive lodging to bring in tourists, organizing forest-related recreation, and harvesting timber. Residents of a town whose economy is not reliant on natural resources may lack a full appreciation for the economic benefits of forests and other natural resources.

**Conclusion**

Our goal was to gain a better understanding of Mainers and their relationship with the environment. After speaking with such a diverse group of people, we believe that we have gained a better understanding of what it means to be a Mainer. We noticed several trends.

Mainers are invested in their communities and state

In carrying out our survey, we noted that most people surveyed seemed to be very familiar with the concepts that we presented. People often answered questions quickly and with conviction, indicating that they had already given considerable thought to the issues we asked them about. Many respondents were engaged and often enthusiastic to explain why the question meant something to them. For example, one man complained about people with large tracts of land posting it and letting only their friends hunt on it. An elderly woman, in explaining her appreciation for nature, described a deer standing on its hind legs to eat an apple from the tree outside her window the week before. Many, when answering our question about Plum Creek, became very excited and launched into a passionate discussion of the difficulty of the situation and the needs of the local residents. This demonstrates a sense of investment in the community and issues they face. This investment is also evidenced by our relatively high response rate, especially for in-person surveys. While some respondents seemed skeptical when first approached, most agreed and seemed excited to do the survey when told that we would be asking them about Maine.

Mainers are concerned and aware of environmental and economic issues

Earlier in the chapter, we discussed the pessimistic views of many Maine residents towards the economy. This may be the reason for many respondents’ lack of prioritization of the environment in Maine. In our survey, fewer respondents chose the ecological benefit of Maine’s forests and wildlife than they did recreational and economic benefits. Based on these results, we believe that had we asked a similar question to the one in the 1989 Commission on Maine’s Environment survey about whether quality jobs or nature preservation were most important, it is likely that our survey’s respondents would have placed jobs ahead of the environment.
As Maine shifts towards a service-based economy its natural resources remain a large part of its identity

Although it was clear that the economy is of concern of many to our respondents, recreational value of Maine’s environment was the most prevalent among our respondents. It is clear, at least from our respondents, that recreational access to land should be maintained because of its importance to the public. This was also evidenced by the enthusiasm that we encountered when addressing the question concerning the fairness of Maine’s land use regulations. The most common source of conflict arose from the posting phenomenon which inspired frustration in people across a number of different towns in Maine (see Chapter 3).

Although Maine has moved away from being completely reliant on natural resources due to an increased understanding that this will not be possible to do so indefinitely, the fact remains that most Maine residents identify closely with some aspect of natural resources. Almost half of our respondents (41.2%) possessed a hunting and/or fishing license, much more than the national average (about 5% of Americans hunt)\textsuperscript{15}. Other forms of outdoor recreation are also very important to many Maine residents, and this was evidenced in our survey, both by the data and by the enthusiasm of participants when discussing these issues with us. The “recreational” preferred value of the environment in our survey questions was the most popular option (as opposed to “ecological” and “economic”), and if Maine residents feel that their right to resource access, particularly for recreational reasons, is being threatened, they have been known to strongly oppose whatever is threatening this right (see Chapter 3). Although this has sometimes led to opposition of conservation projects (see Case Study 4.1), it has also led to opposition of development projects (such as the Plum Creek proposal, see Case Study 4.2). The importance of recreation and resource access to Maine residents will likely continue to be a big factor in the preservation of Maine’s environment.

In assessing future development, a survey like ours can inform policy creation

In our research, we only found five surveys that have been done on attitudes of Maine residents towards environmentally-related issues in the past 30 years. If used as an official indicator of the attitudes of all Maine residents, a survey should have a larger sample size and the questions should be more precisely formulated to avoid confusion and bias. This would be possible if sufficient government resources were allocated to the effort. Policymakers should have such data available when formulating new policy so that the finished product can somewhat reflect the concerns and desires of those who will have to adhere to the policy.

Surveys not only provide useful information to policymakers, but also serve a double purpose of making the public more aware of issues while they are conducted. Participants are forced to think about their opinions regarding important issues and realize that their opinion matters.
Works Cited

The State of Maine’s Environment 2007: Conclusions

As a result of our research we came up with several conclusions. We suggest that Use of liquid natural gas as a transition fuel while Maine continues to expand its use of renewable resources and continues enforcement of efficiency programs will likely cut down on the State’s carbon dioxide emissions. Implementation of creative programs, like Transferable Development Rights programs, that do not require additional involvement of the State government can address issues in land use policy without further straining State resources. In the Unorganized Territory, strengthening current planning policy through the Land Use Regulation Commission and increased conservation efforts will mitigate some of the environmental impacts of current land use trends. Throughout Maine, more frequent use of surveys to understand public opinion will augment the success of environmental and planning policy.

In addition, some of the trends explored in this paper reflect statewide trends that are applicable to two or more chapter topics. Specifically, strengthening and enlarging of the Land Use Regulation Commission may be necessary. Much of the land suitable for development of wind power resources is situated in the Unorganized Territory, and while LURC has been able to address the current plans under discussion, the scope of future plans may be too large for the small regulatory body to handle. Trends in land ownership and parcelization in the UT are threatening Maine’s traditional public recreational access rights to private land, which is something that Mainers feel very strongly about. LURC’s current planning policy in this area does not reflect the opinion of the public, which is an important disconnect that needs to be addressed. The current trends of sprawl in the incorporated municipalities of southern Maine may soon spread into the UT, especially if project like Plum Creeks’ development plan are passed. LURC does not have sufficient resources to handle development like that found in the incorporated municipalities, and the current policies must be updated if they are to adequately regulate growth in the future.

In the southern half of the state, large-scale state planning and small-scale local planning do not take important factors like biological and economic zones into account when forming policies. Regional planning around realistic boundaries such as these would allow for planning policies to address environmental and economic concerns more efficiently, without the use of other programs. With state planning policy that encompasses economic and environmental concerns at once with growth concerns, the divide between conservation and development interests could be bridged more easily. Mainers feel strongly about both the environment and economic concerns, and both areas need to be addressed directly by an organized and cohesive regulatory body to avoid further conflicts in the future.
Acknowledgements

We would like to thank the many people who helped us to develop this report. We spoke with numerous experts in our fields of study, all of whom provided excellent insight on our topics. Also, Colby faculty and staff helped us immensely to design and produce this report. Thanks to Caitlin Dufraine (‘09) for helping to compile the final version of this report. We would especially like to thank our professor, Philip Nyhus, for his unparalleled dedication to our class throughout the semester.

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