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North East *State* Foresters Association



I. Introduction

The trees and forests have been a pivotal resource for Rhode Island since the first European settlers built their homes. Trees and forests have played an important role in Rhode Island's history. Tall ships built from the vast forests exported new world resources out Narragansett Bay to Europe and returned with more settlers for the new world. The wooden water wheels at Slater Mill here in Rhode Island started the industrial revolution. Often overshadowed by Narragansett Bay, the vast forests of Rhode Island provided the early settlers with many essentials. Later, the forests were almost completely denuded by the charcoal industry fueled by the ever increasing population. Today forests are back and cover nearly fifty five percent of Rhode Island's land area.

“The Economic Importance of Rhode Island's Forest Based Economy” provides a brief summary of this valued asset. This summary outlines the hard numbers in dollars, but Rhode Island's forests offer far more than that. In the past few decades benefits from trees and forests have taken on new values, cleaning air and water, reducing storm water runoff, climate mitigation and carbon sequestration just to mention a few.

As one of the most densely populated states and with an estimated seventy-two percent of Rhode Island's forests being privately owned, maintaining a forest based industry is difficult, but not impossible. Surveys have shown that thirty-one percent of these private forest land-owners have had commercial harvesting activity on their land. These harvesting operations produce a range of products from veneer logs taken to mills in Vermont and Canada and saw-logs sawn in local mills, to wood chips being burned for fuel in schools.

Rhode Island's forests and trees face multiple threats from land conversion, fires, invasive insects and plants - all threatening to reduce this valuable asset. Rhode Island has taken steps in planning to conserve working forest lands, protect forests and trees from harm, and enhance public benefits from trees and forests. I hope this publication will enlighten readers to the value of this important Rhode Island treasure.

Thank you,
Bruce B. Payton, Rhode Island State Forester



**Bruce B. Payton,
Rhode Island State Forester**

Acknowledgements: Funding for this report was provided by the North East State Foresters Association through a grant provided by the USDA Forest Service, State and Private Forestry



II. Executive Summary

- Forest area and species – **Rhode Island’s forests cover 367,372 acres of land or 55% of the State land area and have largely been at this level since the 1980s. Oak, hickory, northern hardwood and white pine forests make up over 63% of the forest cover.**
- Forest ownership – **Rhode Island’s forests continue to be largely privately owned by individuals/families and business who together own over 72% of the forest.** The state owns approximately 16% of the forests and local government owns 12%.
- Forest inventory, growth vs. harvest – The forests of Rhode Island continue to add to the inventory of tree volume as net growth significantly exceeds harvest annually. **Currently, Rhode Island’s forests grow 17.7 million cubic feet (553,000 tons) per year while approximately 2.8 million cubic feet of timber is harvested annually.** Rhode Island’s standing forest contains 566.4 million cubic feet (17.7 million tons) of timber 5 inches in diameter or larger.
- Value of forest industry economic sectors (see table below) – **The annual Gross State Output of Rhode Island’s forest products industry totals nearly \$ 710 million while the forest-based recreation economy generates approximately \$375 million annually.** Approximately 3,325 workers are employed in the forest products, maple and Christmas tree sectors while another 1,500 jobs are found in the sectors that include and support the forest recreation economy.

| | millions of \$ | jobs |
|---|----------------|--------------|
| Forestry & logging | 2 | 100 |
| Wood products manufacturing | 162 | 660 |
| Furniture and related product manufacturing | 204 | 1,300 |
| Paper manufacturing | 313 | 1,200 |
| Wood energy | 24 | 25 |
| Christmas trees and maple syrup | 5 | 40 |
| Total Forest Products | 710 | 3,325 |
| Forest Recreation sales | 375 | 1,500 |
| Total \$ | 1,085 | 4,825 |

Sources: Sources for the table above can be found throughout this document.

Note on economic multipliers – This report does not use economic multipliers for the forest products industry data though the forest recreation data is derived from a multiplier-like data source. Economic multipliers account for the ripple effect that economic activity in a particular industry causes through the economy. Using economic multipliers usually increases the value of employment, payroll gross domestic product, or sales by 1.4-1.6 times their non-economic multiplier value.



- Economic output and number of jobs in the forest products sector have been reduced since peaks in the early 2000s. This has mirrored similar trends in other manufacturing sectors in the U.S. as more and more manufacturing has moved to other parts of the world.



This report is the first of its kind for Rhode Island and is similar to a series of reports that have been published for Maine, New York, New Hampshire and Vermont by the North East *State* Foresters Association since the early 1990s. Its purpose is to capture the economic value of the forest-based economy of the State and provide analyses of trends for key economic indicators. The sectors covered in this report include forestry and logging, related trucking, wood products manufacturing, wood furniture and related products manufacturing, pulp and paper manufacturing, wood energy, and the forest-based recreational economy that includes camping, hiking, hunting, downhill skiing, cross-country skiing, snowmobiling, fall foliage viewing, and wildlife viewing.

Data for this report come from federal, state and private sources. For a full list sources, please see citations at the end of this report.

We would like to thank the many people who assisted with the development of this report including Bruce Payton and Thomas Abbott of the Rhode Island Division of Forest Environment.



III. The Forest Resource

Forest Area

At 55% forest cover, Rhode Island is the seven-teenth most forested state in the country. The northeast U.S. is the most forested area of the country in terms of percentage of land in forests. Of the 367,372 forested acres in Rhode Island, 353,242 acres, or over 96%, are considered “timberland,” meaning these lands are capable of producing repeated timber crops.

A long-term forestland acreage trend analysis coordinated by the Harvard Forest shows that Rhode Island’s forested area is about a third less than when Europeans first arrived in North America (See Figure 1). It is estimated that in the year 1600 forests covered 630,000 acres compared to today’s 367,372. Rhode Island’s forests have grown back after reaching a low of 222,000 acres in 1850. Since a recent peak from the 1940s to 1960s, forest acreage declined approximately 80,000 acres (largely due to conversion to non-forest land developed uses) but has leveled off in recent years.

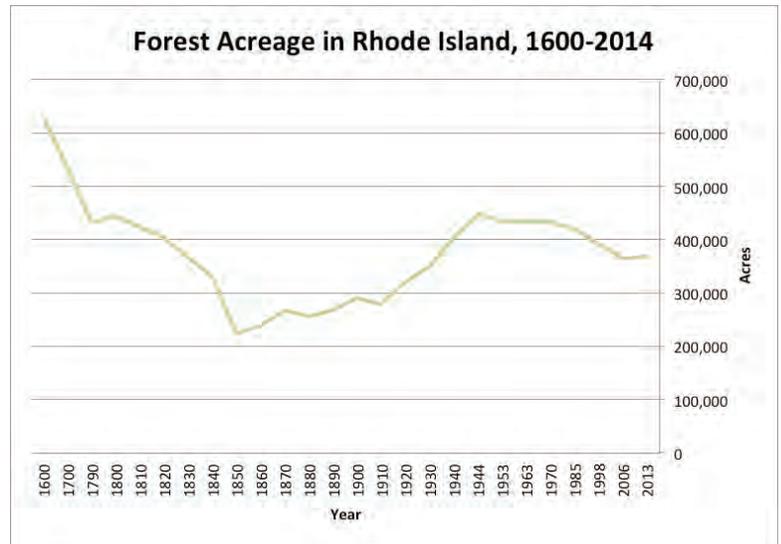
Forest Ownership

The individual/family forest owner sector continues to dominate the ownership of Rhode Island’s forests. Just under 72% of Rhode Island’s forests, or 264,000 acres, are owned by individuals or families (Figure 2). The State of Rhode Island owns just under 16% or approximately 61,000 acres of the State’s forest. Cities, towns and counties own approximately 12% of the forests or approximately 43,000 acres.

Forest Types

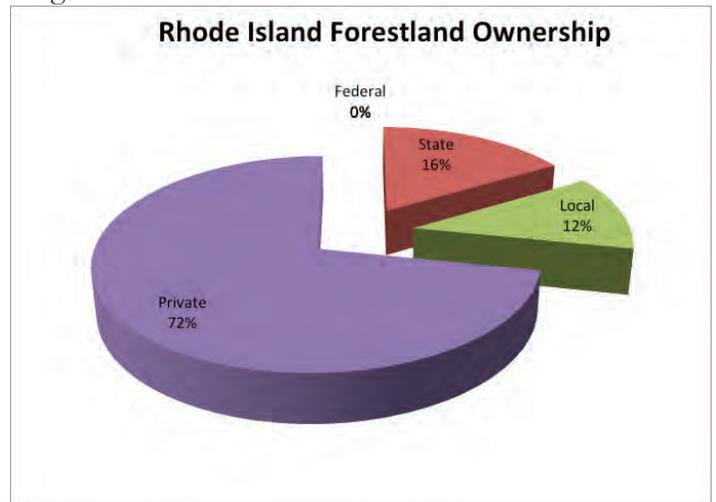
In Rhode Island, the oak/hickory forest-type group is by far the most common forest type group, representing 62% of the State’s forest land. In Rhode Island, this group is indeed dominated by oaks, northern red, scarlet, black, and white oaks in particular, but it also includes substantial amounts of red maple and other species. Red maple is not only the State tree but is the most common tree in the State. This species accounts for an estimated 22 percent of the volume and 28 percent of the number of trees.

Figure 1



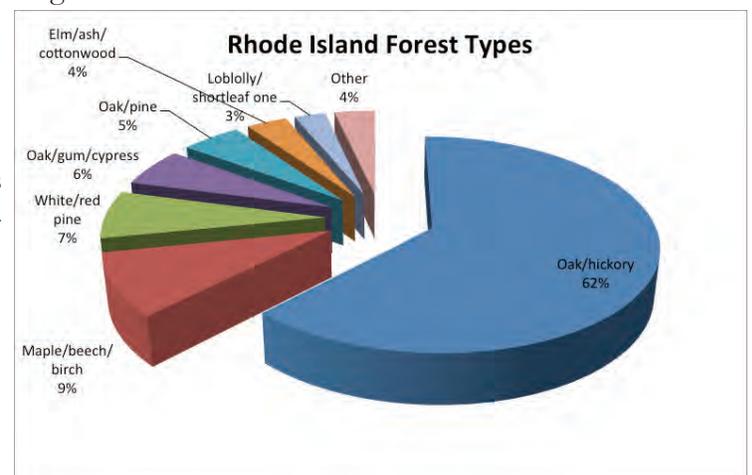
Source: Harvard Forest – multiple data sources

Figure 2



Source: USDA Forest Service, Forest Inventory and Analysis & private data

Figure 3



Source: USDA Forest Service, Forest Inventory and Analysis



Timber Volumes

To understand the volume of wood growing in the forests of Rhode Island, it is most useful to look at inventory trends over time rather than just current volumes. Growth, mortality, harvest levels and loss of forest to non-forest uses determine the overall changes over time. At gross volume levels, Figure 4 shows that standing volume of timber in Rhode Island increased approximately 108% from 1985 to 2013. Standing volume is over 17.7 million tons of wood in trees 5 inches and larger.

From a timber value perspective, it is important to know what is occurring over time with the sawtimber component of the timber inventory in Rhode Island since sawtimber products are generally much more valuable than lower quality logs (pulpwood, firewood and logs used for wood energy chips). In Figure 5, we see that the volume of sawtimber trees also increased from 1985 to 2013, in this case, by nearly 215%.

Figure 4

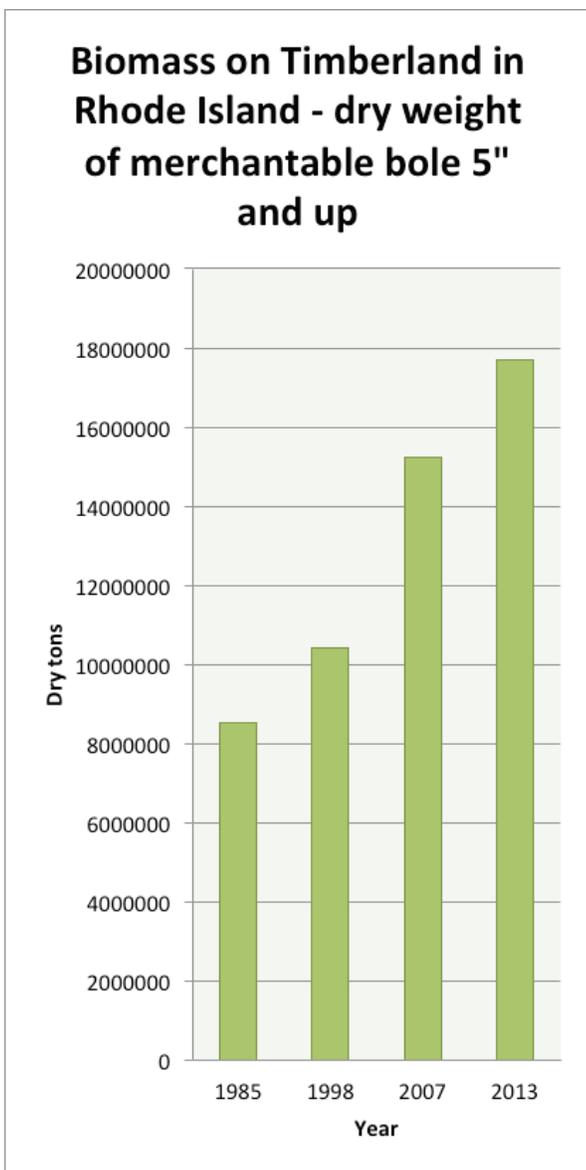
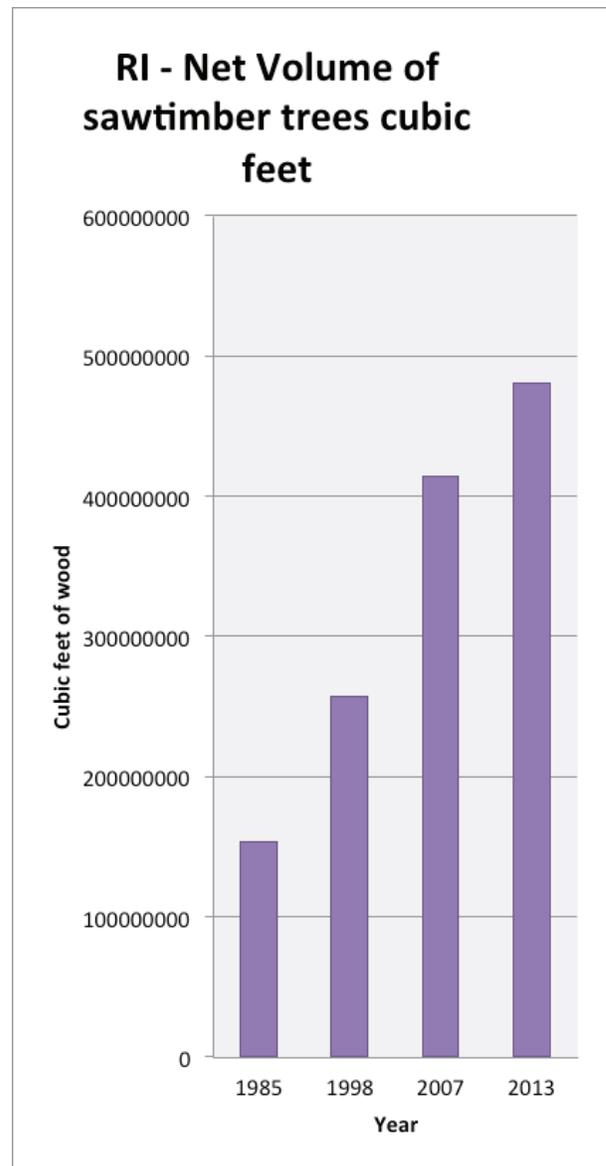


Figure 5



Source: USDA Forest Service, Forest Inventory and Analysis



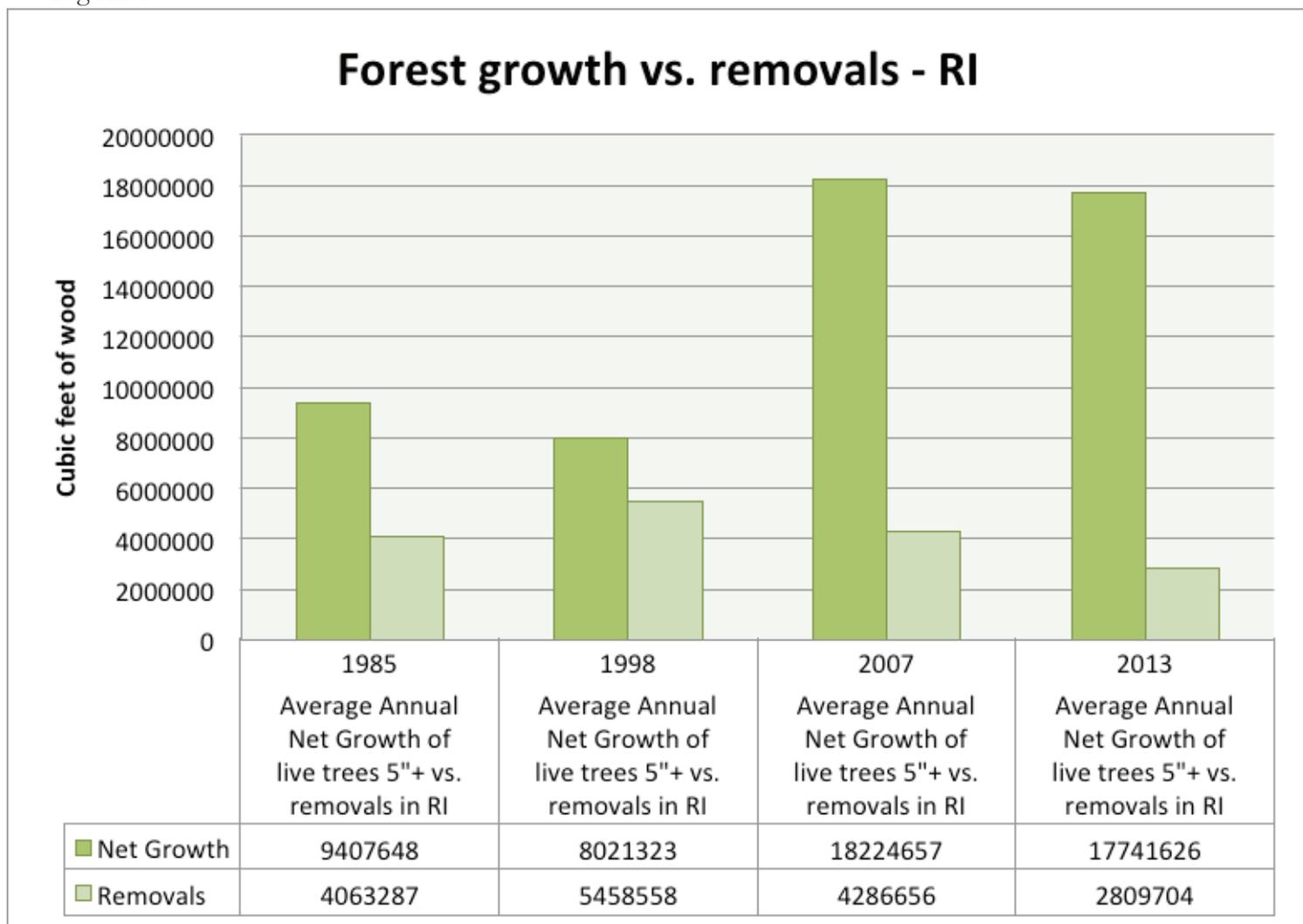
Sustainability - Growth, Mortality and Removals from Rhode Island's Forests

In terms of volume and value, Rhode Island's forest inventory is increasing. To understand this better, we need to look at growth, mortality and tree removals. The USDA Forest Service's Forest Inventory and Analysis (FIA), from which much of the data discussed so far in this report is derived, is the best source for understanding growth, mortality and removals. The FIA data set is derived from a series of fixed, on-the-ground plots that are re-measured, roughly every five years. Each on-the-ground plot represents approximately six-thousand acres and has

been providing forest data continuously for over 50 years.

In Figure 6, the current FIA data shows that in Rhode Island forests, annual net growth is 17.7 million cubic feet (553,125 tons) per year. At the same time, approximately 2.8 million cubic feet of timber is harvested annually. The difference between the net growth and harvests – 14.9 million cubic feet (465,625 tons) – is the annual extra growth that accounts for the increasing inventory of trees in Rhode Island.

Figure 6



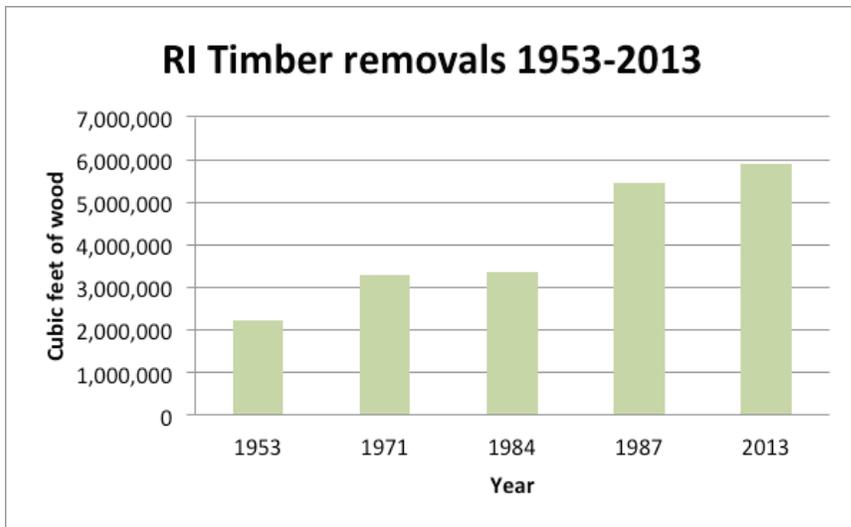
Source: USDA Forest Service, Forest Inventory and Analysis



The difference between forest net growth and harvests is a key measurement for understanding the sustainability of the use of the forest. There are other aspects of forest management, including the factors summarized in a-c below, that further add to understanding the status of forest sustainability in a state.

Timber removal levels over time, from historical data of the USDA Forest Service indicate significant fluctuations in timber harvesting in Rhode Island since the 1950s (Figure 7). An important note in this discussion is that the higher levels of harvesting shown in recent years are, most likely in large part, a result of land clearing for development during development booms in the State. These kinds of harvests, for which no accurate records exist, are one-time or “terminal” harvest that results in land changing into a non-forested state.

Figure 7



Source: USDA Forest Service, *Forest Inventory and Analysis*



The Economic Importance of Rhode Islands Forest-Based Economy

a. Certified forestland – In Rhode Island, there are over 37,000 acres certified to the American Tree Farm System and 1,740 acres to the Forest Stewardship Council’s standard. In addition to the sustainable harvest levels discussed above, the voluntary standards of the Tree Farm Program and FSC cover a full range of requirements covering forestry, ecological, economic, and social issues.

b. Best Management Practices for Water Quality Protection – The biggest impact to forests, aside from their conversion to a non-forest use, is forest harvesting activities. Truck roads, skidder trails, and the presence of heavy equipment are integral to the forest harvesting operations. Water quality degradation and soil erosion can result if proper procedures are not followed. Rhode Island, along with virtually all forested states in the country, has had in place for many years voluntary Best Management Practices for Forestry, commonly called best management practices or BMPs. Use of BMPs on forestry operations has become integrated into most forest operations in the last several decades. The culture in the forest industry has changed in that regard – it is simply no longer acceptable to negatively affect water quality or soils in forest operations.

c. Use of professionally trained foresters and loggers – The use of professional foresters and loggers is integral to assuring sustainable harvesting operations. Unlike its neighboring states, foresters and timber harvesters (loggers) are not required to be certified or licensed to operate in Rhode Island. There are other designations and certifications for foresters and loggers that help assure sound forestry practices on the ground. For instance, most foresters are members of the Society of American Foresters – the national professional organization for foresters – and they may also be Certified by SAF, requiring a certain level of training and expertise. Similar designations are available for loggers as well.



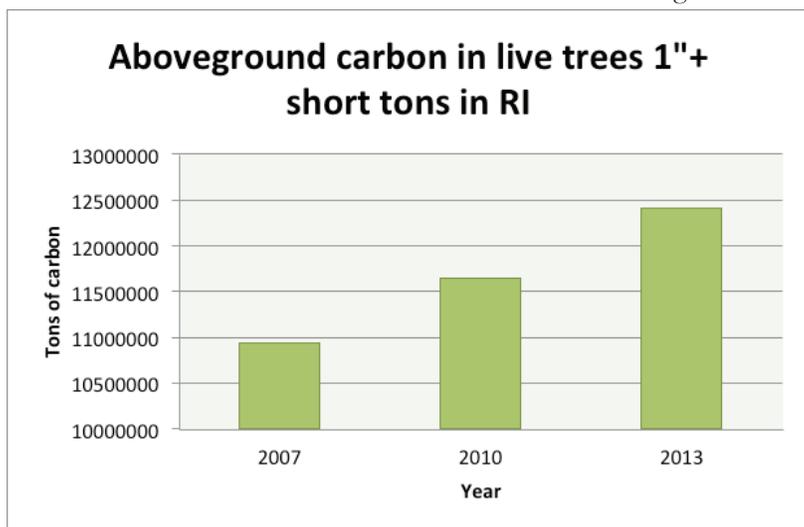
Carbon in Rhode Island's Forest

It is well known that trees and forests are an important element of the Earth's carbon equation. Science has shown that carbon dioxide levels are increasing, in part due to emissions associated with human use of fossil fuels in industry and transportation. Most scientists believe that this increase in carbon dioxide and other "greenhouse gases" is the key reason why planetary temperatures, on average, are on the rise. Forests naturally take carbon dioxide out of the atmosphere by the process of photosynthesis, and the by-product emitted to the atmosphere is the oxygen that we breathe.

The result of this natural phenomenon is that as forests grow, and if their inventory of wood increases over time, they act as a positive carbon sink where atmospheric carbon dioxide is sequestered as carbon in the wood of the tree. Forests with increasing volumes and carbon mass can provide a positive benefit in the greenhouse gas equation.

According to FIA data, the carbon in the above-ground portion of trees one-inch in diameter or more has increased in Rhode Island over 13% from 2007 to 2013.

Figure 8



Source: USDA Forest Service, Forest Inventory and Analysis

Forest Health

The effects of climate change on the forests of Rhode Island remain uncertain. This phenomenon may even increase forest growth, but we simply do not know enough to suggest long-term effects on the trees directly from climate change. There are other significant factors affecting forest health including insect pests and competition from non-native invasive species.

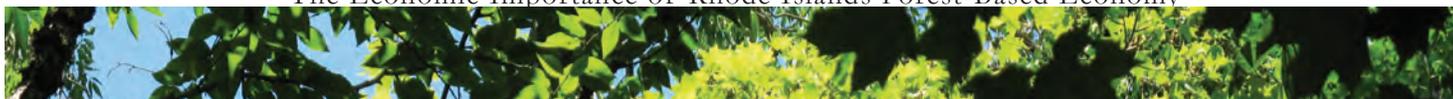


Asian longhorned beetle

Photo: USDA

The three insects of greatest concern today are hemlock woolly adelgid, emerald ash borer and Asian longhorned beetle. At the moment, the Asian longhorned beetle has officially been eradicated from the Boston area and is still in the Worcester, MA area and heroic efforts, at great cost, have been employed to eradicate it but is still of major concern to the State. This insect has not been detected yet in Rhode Island. Hemlock woolly adelgid is found throughout Rhode Island with many large stands of hemlock being totally killed causing areas of high fine woody debris and fire hazards. Emerald ash borer, though not yet detected in Rhode Island, has been found in Connecticut and Massachusetts, where statewide quarantines exist for the insect. The emerald ash borer is likely spreading.

Lastly, invasive plants, such as autumn olive, buckthorn, Japanese knotweed, bittersweet and garlic mustard, among others, all appear to be growing in area and reach. As these invaders become more established, forest trees are being affected and in some cases are crowded out by these invasive plants. Climate change and related temperature increases may stimulate growth of valuable trees but it also allows invasive plants to get established and grow faster as well.



IV. Forest-Based Economy – current status and trends

The forest-based economy of Rhode Island, one of the oldest industry sectors in the State, includes forest products and forest-based recreation.

Forest products manufacturing includes the forestry, logging, and trucking components in which management, harvesting, and transportation move the raw material from the forest to various markets for processing. From there, primary products are manufactured into solid wood products in sawmills, out-of-state veneer mills, and engineered wood product mills such as oriented strand board plants or particle board manufacturers though neither of these industries is found in Rhode Island at this time. These primary products are then used by secondary manufacturers in making finished goods such as furniture, moldings, and turned wood products. Although there are no longer wood pulp mills in Rhode Island, there are paper manufacturing plants that obtain pulp material from out-of-state pulp mills – some of which are in the northeast U.S. region. Some of the timber harvested in Rhode Island forests goes to these pulp mills.

Lastly, the growing wood energy sector includes large wood-fired power plants (though none exist in Rhode Island at this time but 20 are operating in the New England/New York region), medium to small sized commercial facilities using wood chips or pellets to create heat and/or electricity, and, at the residential level, homeowners that heat their homes with firewood or wood pellets. Wood from Rhode Island trees provides raw material for this growing sector in the region.

Forest-based recreation is a large and growing part of the economy throughout the northeast. Tens of thousands of people enjoy Rhode Island's forests for camping, hiking, hunting, downhill skiing, cross-country skiing, snowmobiling, wildlife viewing, and fall foliage viewing.

It must be noted that some of the data included in the next sections are from 2014 but most are from 2013 or 2012. Activity and output in the forest products manufacturing sector has seen a big upturn in 2013-14 as the country comes out of the recession and the economy recovers. The data below does not necessarily show this.



The Economic Importance of Rhode Islands Forest-Based Economy



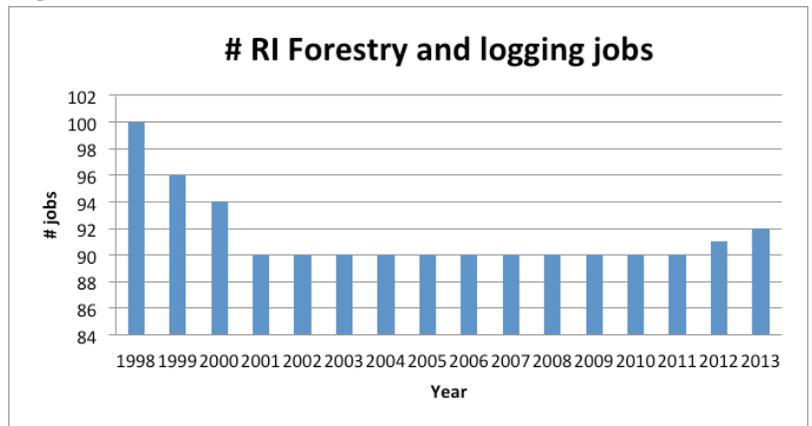
Forestry and logging

The forestry and logging sectors of the economy move logs, pulpwood, firewood, or chips from the forest to their primary manufacturing market. Employment in this sector is estimated at just under 100 jobs, about as high as it has been in recent years (see Figure 9). Payroll for forestry and logging in Rhode Island exceeds \$1.2 million annually (Figure 10) and has stayed relatively level since 2001

The value of shipments (sales) of the forestry and logging sectors in Rhode Island is approximately \$ 2.0 million (Figure 11). This statistic has stayed steady in recent years.

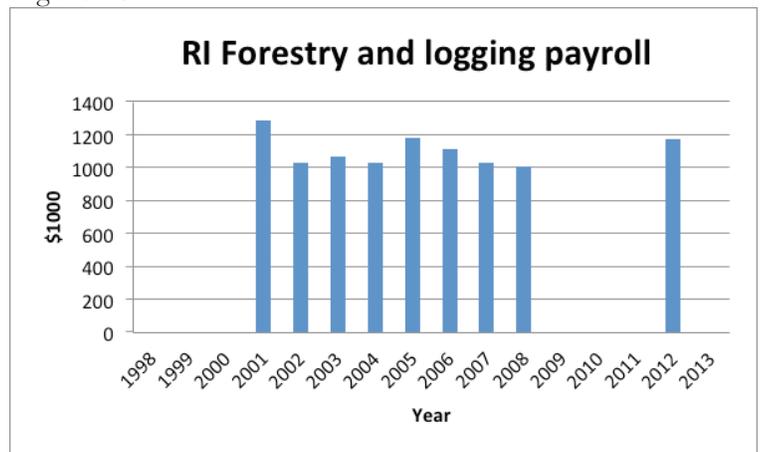
GDP – Gross Domestic Product includes value added, which is equal to its gross output minus its intermediate purchases from domestic industries or from foreign sources.

Figure 9



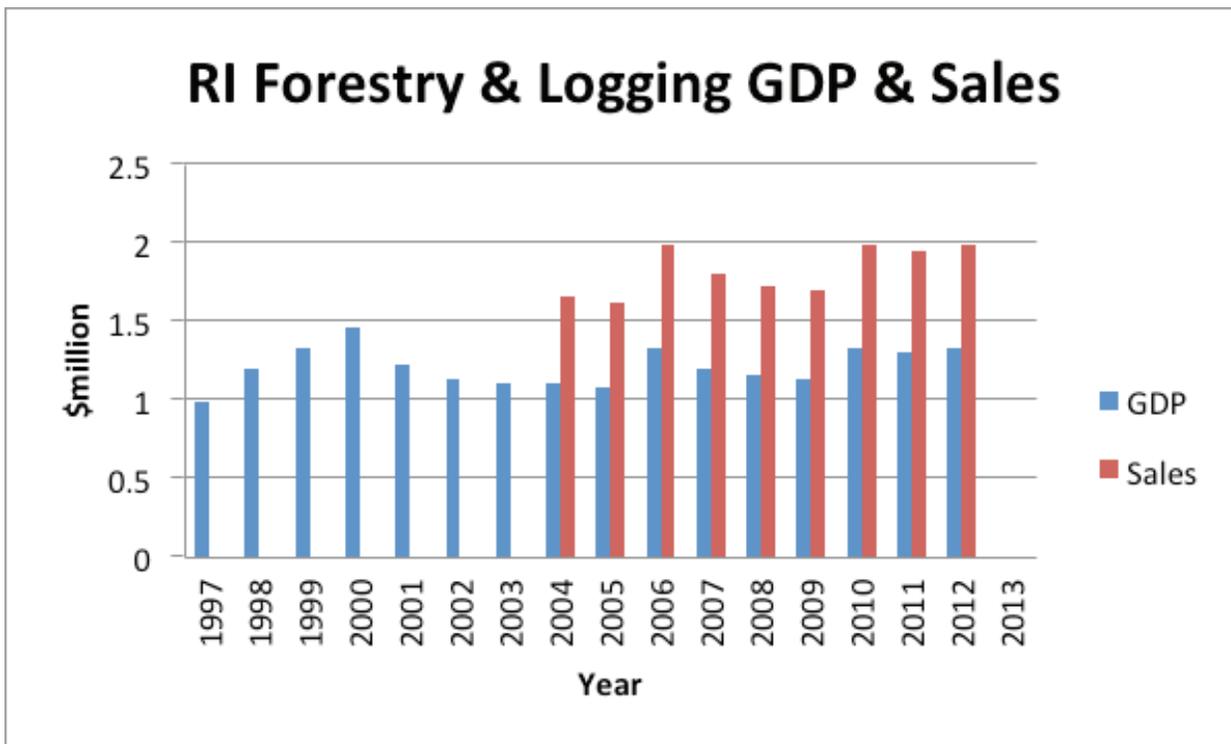
Source: U.S. Department of Commerce – Bureau of Economic Analysis

Figure 10



Source: U.S. Department of Commerce – Bureau of Economic Analysis

Figure 11



Source: U.S. Dept. of Commerce – Bureau of Economic Analysis & Census of Manufactures

The Economic Importance of Rhode Islands Forest-Based Economy



Primary manufacturing – wood products

Makers of lumber and related activities employ 660 workers, which is down from a high of approximately 1,000 in the year 2000. Worker productivity has been increasing in this sector as mills automate and institute better manufacturing processes.

Lastly, annual economic output, in the form of sales for the wood products sector is approximately \$ 162 million in Rhode Island.

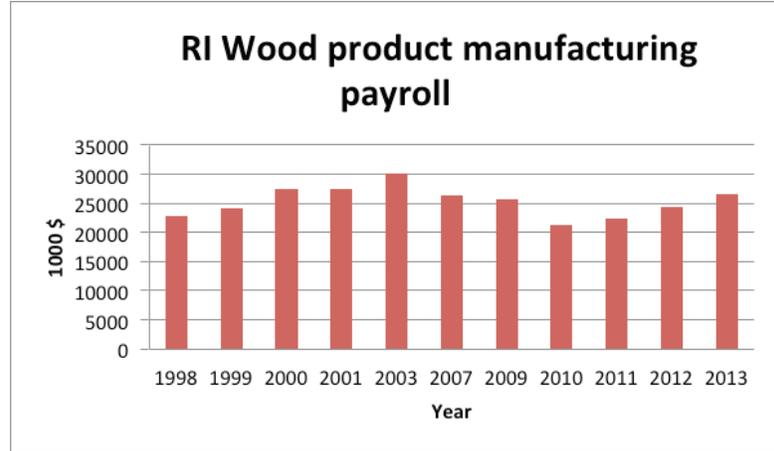
Figure 12



Source: U.S. Dept. of Commerce – Bureau of Economic Analysis

Payroll in the wood products sector is approximately \$ 25 million annually. As seen in Figure 13, payroll has decreased since a high of \$ 30 million in 2003.

Figure 13



Source: U.S. Dept. of Commerce – Bureau of Economic Analysis

This 2013 statistic for this sector peaked in 2013 for recent years data going back to 2005.

Figure 14



Source: U.S. Dept. of Commerce – Bureau of Economic Analysis & Census of Manufactures

The Economic Importance of Rhode Islands Forest-Based Economy



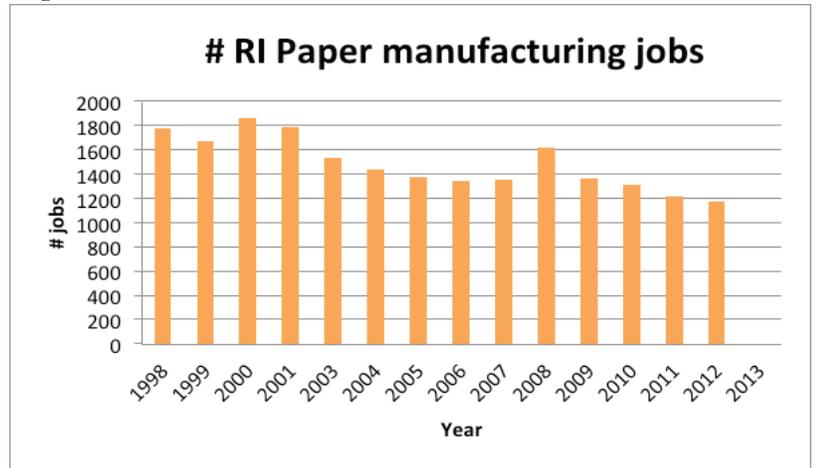
Pulp and paper

Rhode Island has no pulp mills but it has paper manufacturing facilities that use pulp as raw material from pulp mills in the region (and elsewhere). As a result, we believe there is a sufficiently direct connection with forests and forestry in the state to include economic information here. The paper making facilities in Rhode Island employ just under 1,200 workers (Figure 15), down from approximately 1,800 in 2000. Payroll in the paper sector is approximately \$ 61 million annually. Payroll has decreased since a high of \$68 million in 2008.

While there are no pulp mills in Rhode Island, the logging infrastructure annually still harvests pulpwood for pulp mills in New York, Pennsylvania and Maine.

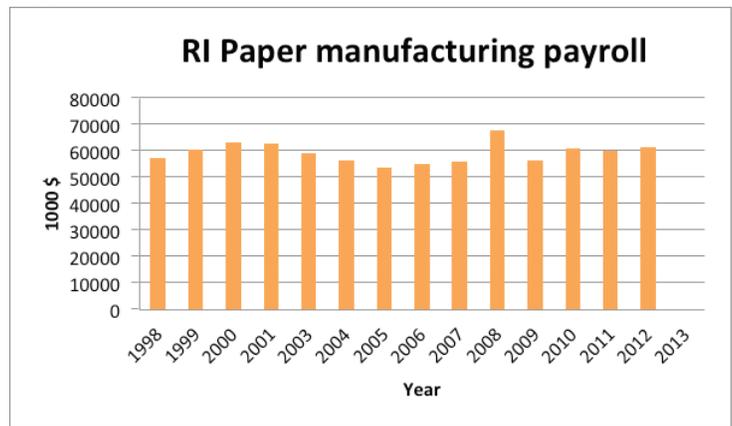
Annual economic output for this sector, in the form of sales, is approximately \$ 313 million in Rhode Island (Figure 17).

Figure 15



Source: U.S. Dept. of Commerce – Bureau of Economic Analysis

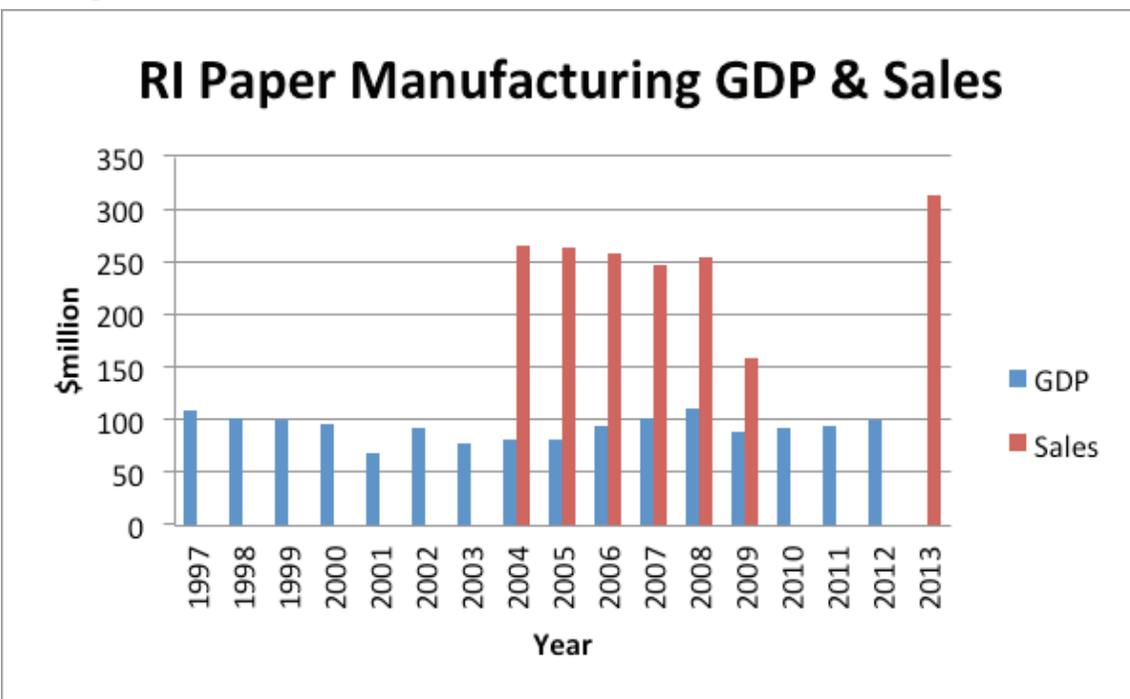
Figure 16



Source: U.S. Dept. of Commerce – Bureau of Economic Analysis &

Rhode Island Department of Labor

Figure 17



Source: U.S. Dept. of Commerce – Bureau of Economic Analysis & Census of Manufactures

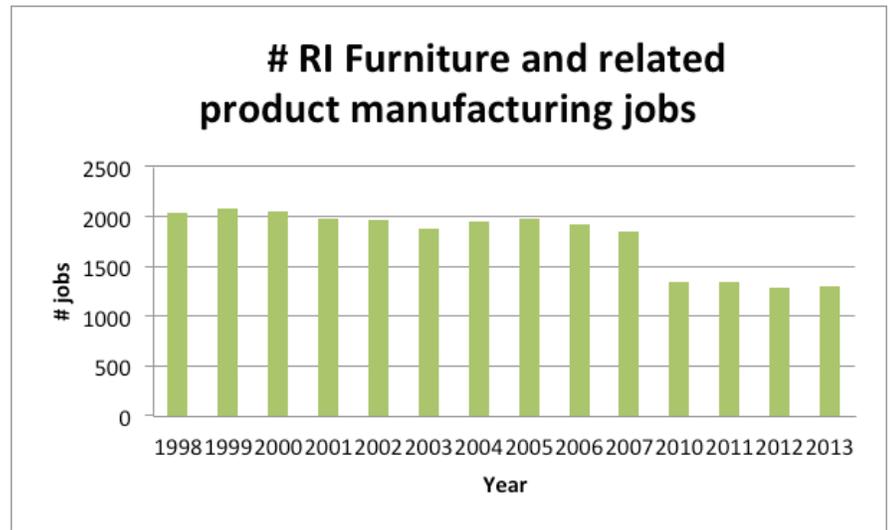
The Economic Importance of Rhode Islands Forest-Based Economy



Secondary manufacturing (furniture and related) – wood products

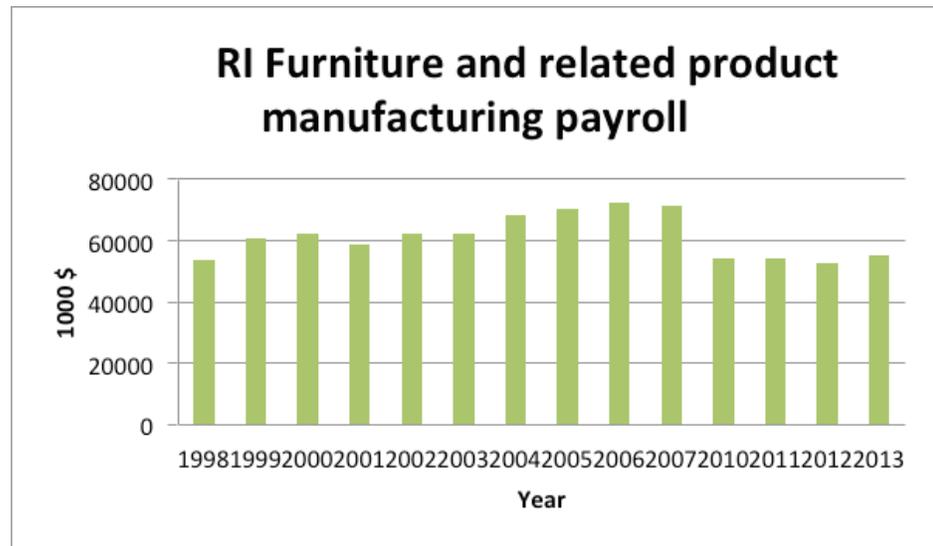
In the secondary wood products manufacturing sector – furniture, cabinetry, flooring, moldings, turnings and all production where the primary solid wood products are transformed into final or parts for final consumer products – Rhode Island employs over 1,300 (Figure 18), which is down from a high of approximately 2,100 in 1999. The secondary wood products sector payroll in Rhode Island is approximately \$55 million annually. It has decreased since a high of \$71 million in 2006 but has been steady in the last several years. Lastly, annual economic output, in the form of sales for the secondary wood products sector, is approximately \$ 204 million in Rhode Island (Figure 20).

Figure 18



Source: U.S. Dept. of Commerce – Bureau of Economic Analysis

Figure 19



Source: U.S. Dept. of Commerce – Bureau of Economic Analysis & Rhode Island Department of Labor

Figure 20



Source: U.S. Dept. of Commerce – Bureau of Economic Analysis & Census of Manufactures

The Economic Importance of Rhode Islands Forest-Based Economy



Wood Energy

Wood energy has gained increased attention at the national level and in the northeast in recent years. Many Rhode Island homes use wood as a primary or supplemental form of heating, and community-scale biomass applications, such as heating schools with wood boilers, have begun to take hold. Rhode Island has nearly 10 commercial/institutional building owners that use wood fuel as their heating source and more are exploring this option as an alternative to fossil heating fuels.

At the residential level, according to the U.S. Census Bureau’s American Community Survey in 2012, Rhode Island experienced a 160% increase in the number of homes heating with wood as its main heating source from 2005-2012 (Figure 21). The survey indicated that over 7,266 homes, or 2%, use wood to heat – either firewood or pellets.

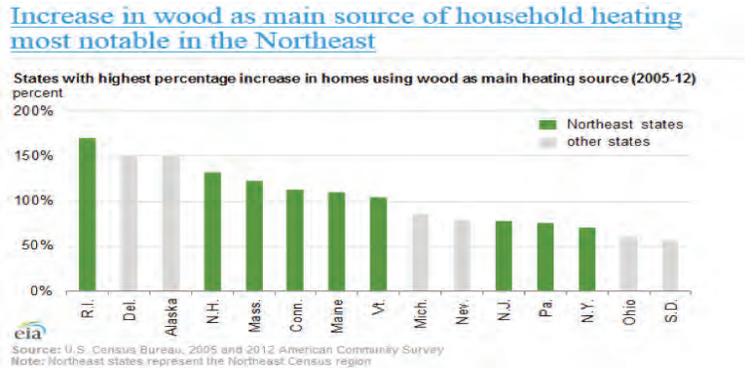
From state and other sources, annual wood fuel use – among residential, medium scale (businesses, schools etc) and large scale users – is estimated to be 135,000 cords each year in Rhode Island for heating and electricity generation (in other states) purposes.

With respect to industrial scale wood energy, though Rhode Island does not have a wood-fueled electricity generating facility, one exists in Connecticut and Rhode Island and over a dozen more can be found in northern New England. Some of these plants receive wood chips from Rhode Island tree tops and low quality trees as fuel.

Wood biomass is a locally sourced fuel, and unlike most other energy sources used in Rhode Island – benefits the local economy through jobs in the harvesting, processing, and use of wood. Switching to biomass from fossil fuels often results in emissions reductions, depending upon the application and the fuel being replaced or offset. Biomass fuel is made from low-grade wood that is generally not suited for higher value markets and products. Markets for low-grade wood provide landowners and land managers options and opportunities for practicing forestry. In many applica-

tions, biomass is cost competitive, and can provide consumers with an opportunity to save money, use a renewable fuel, and support the local economy. In today’s economy, homeowners who switch from using fuel oil to wood pellets can save up to 25% on their heating fuel bill. When fuel oil prices were higher in 2013 (and likely to be again in the future), the savings were approximately 50%.

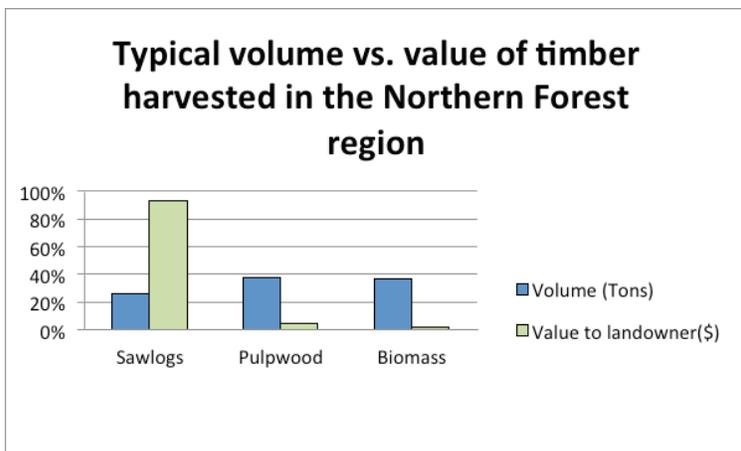
Figure 21



People sometimes question whether wood use for energy can be sustainable in Rhode Island. Overall, as shown in Figure 6, Rhode Island is harvesting far less than the forest is growing, which allows for the inventory of trees to increase over time. The value to the forest landowner from harvesting trees for wood energy is very low relative to other products such as sawlogs that go to a mill to be processed into boards. Figure 22 shows that the economics of wood energy products make it unattractive for landowners to harvest only biomass since its value is too low. Today, a typical forest landowner in the northeastern U.S. will receive only \$1-2 per ton of biomass chips harvested or \$10-15 per cord of firewood. Nor do loggers profit much from selling biomass. A logging company most often harvests a full suite of products – from sawlogs to pulpwood to firewood and biomass chips – allowing them to cover their costs and make a small profit on the overall harvest. Typically, they cannot survive on harvesting biomass chips alone. Landowners harvest lower value products to improve the quality of the remaining trees in order to reap larger returns in the future when the higher value trees grow to maturity.

Regardless of the kind of harvest, loggers have adopted best management practices to protect water quality, and foresters in Rhode Island help ensure the sustainability of the harvesting of Rhode Island forest lands.

Figure 22



Source: From typical harvest volumes and values in northeast U.S. states – state data

Most of the energy wood harvested in Rhode Island stays in Rhode Island or in the immediate region. The value of the wood, which is low relative to its volume and weight, usually makes it cost prohibitive to ship very far from where it is harvested. Some wood pellet mills in the southern U.S. are exporting pellets to Europe, but that is not occurring yet in the northeast U.S. and may not since there is strong local demand for pellets.

Christmas trees and maple syrup

The Christmas tree and maple syrup industries are small but well-recognized as important to the local economy in Rhode Island. In 2014, the wholesale and retail sale of maple syrup and related products in Rhode Island totaled over \$ 270,000 while Christmas tree sales were approximately \$754,000. It is estimated that there are over 25 establishments in the maple syrup sector and another 30 in the Christmas tree sector in Rhode Island.



Conclusion on Forest Products Economy

The forest products trend data shown elsewhere in this report clearly show a smaller, more efficient forest products industry exists today compared to 15 or 20 years ago just as the other manufacturing sectors in our U.S. economy have changed during this period. Despite that, there is still a forest products economy in Rhode Island. During that time period and beyond, the volume of timber removals from Rhode Island’s forest has fluctuated greatly and has risen from just over 2 million cubic in 1953 to nearly 6 million cubic feet in 2013 (Figure 7). This increase is, in part, due to a maturing forest. In 1953, reports show a young forest with average diameter in the 5-8 inch range. Rhode Island’s forest of today have an average diameter in the sawlog size range – over 10 inches and since growth far outpaces removals, the volume and size of the trees in the State continue to grow.



Forest-based Recreation/ Tourism

Despite its high population density, forests dominate Rhode Island’s landscape. Thus, a large percentage of recreation and tourism activities in Rhode Island are linked to the forest. Still, it is challenging to estimate the specific contribution made by the forest environment to recreation and tourism expenditures. Some activities take place primarily in the forest environment, including camping, hiking, hunting, downhill skiing, cross-country skiing, snowmobiling, fall foliage viewing, and wildlife viewing. In this analysis, we assume that 75% of the value of these activities is directly attributable to the existence of forests of Rhode Island. For fall foliage viewing, we assume a percentage of 100%. The method used for the forest recreation sector in the federal agency research used for this section (USDA Forest Service and U.S. Fish & Wildlife Service) is a multiplier-like approach so that a dollar spent on forest-based recreation in Rhode Island ripples through the economy of jobs and income to many support industries to recreation.

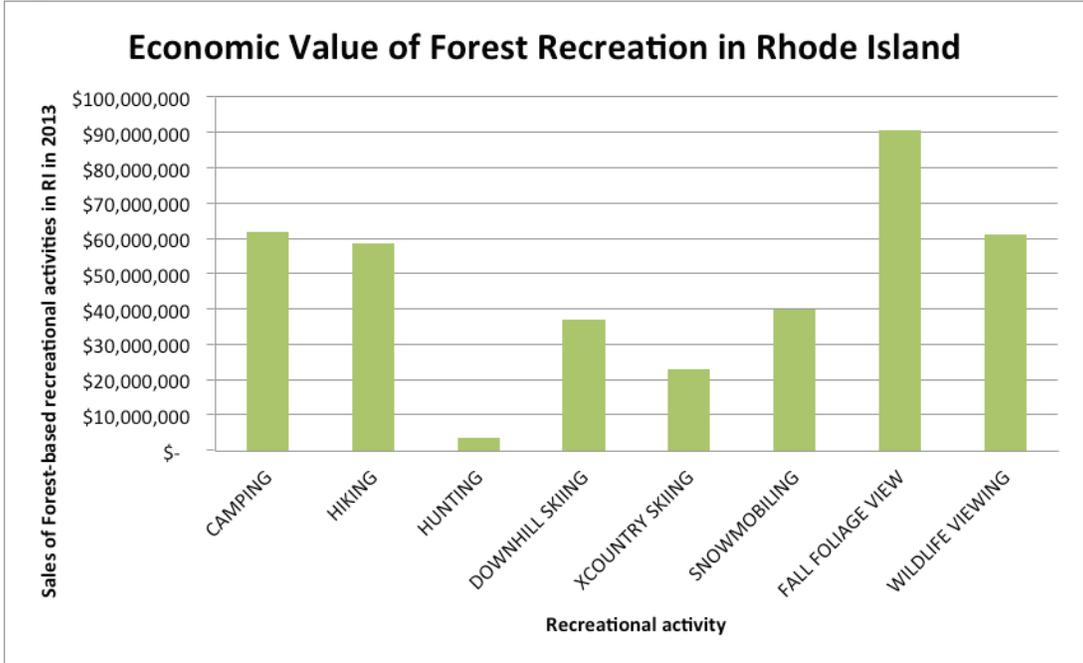


The key data source for the economic value of forest recreation is the National Survey on Recreation and the Environment from the USDA Forest Service. Additionally, we have used results from the new National Survey of Fishing, Hunting, and Wildlife-Associated Recreation conducted most recently in 2011 by the U.S. Fish and Wildlife Service of the federal Department of Interior. These data have been updated to 2013 using the Consumer Price Index.

The forest-based recreational activities listed above contribute \$ 375 million in sales annually to the Rhode Island economy. These are distributed among purchases at food and beverage stores, service stations, lodging places, eating and drinking establishments, and a host of other retail trade or service sectors. Fall foliage viewing is the largest contributor with 25% of the total sales, and is followed by, in order, camping, hiking, wildlife viewing, snowmobiling and downhill skiing (Figure 23).

About 1,500 people are employed in forest-based recreation and tourism sectors with payrolls of \$37 million annually.

Figure 23



Sources: Multiple sources including National Survey on Recreation and the Environment from the USDA Forest Service and National Survey of Fishing, Hunting, and Wildlife-Associated Recreation. Analysis by Dr. Hugh Canham

The Economic Importance of Rhode Islands Forest-Based Economy



Value of Ecosystem Services

The purpose of this publication is to show the economic value of the forest-related economy in Rhode Island. The data provided shows those parts of the goods and services provided by Rhode Island's forests that can be measured and, generally, have a monetary value placed on it within the economy. Other goods and services from Rhode Island's forests are not so readily measured in dollars and cents, especially the natural assets sometimes referred to as "ecosystem services". Forest ecosystems are ecological life-support systems that provide a full suite of goods and services that are vital to human health and livelihood. They include wildlife habitat and biological diversity, clean air, clean water and watershed services, scenic landscapes, and carbon storage, which we discuss briefly but on which we did not place a monetary value.

Carbon in forests and, more accurately, a tree's ability to sequester carbon from carbon dioxide in the air into wood through photosynthesis, is now taking on monetary value for some forest owners through the California greenhouse gas regulatory process. Prices being paid in 2013-14 range from \$10 to \$12 per ton of carbon sequestered but prices in this infant market can fluctuate widely. A rough average of carbon being sequestered in Rhode Island's forest that can be monetized in these new markets is likely between 0.5 ton and 1.5 tons of carbon per acre per year, depending on the age, forest type and stocking of the forest, among other factors. Though modest, it may be the start of converting valuable ecosystem services to market-based assets. Regardless, ecosystem services not yet monetized should be considered a valuable part of the forest-based economy in Rhode Island.



The Economic Importance of Rhode Islands Forest-Based Economy



Rhode Island Division of Forest Environment

The Rhode Island Division of Forest Environment can be reached at 401-222-2445.

The Forest Environment Program manages over 40,000 acres of state-owned rural forestland. It coordinates a statewide forest fire protection plan, provides forest fire protection on state lands, assists rural volunteer fire departments, and develops forest and wildlife management plans for private landowners who choose to manage their property in ways that will protect these resources on their land. The Program promotes public understanding of environmental conservation, enforces Department rules and regulations on DEM lands, and assists the federal government in providing landowner assistance programs.

Moreover, additional Program mandates are: to monitor and recommend controls for insects and disease, to work with communities promoting urban tree health, to license arborists, and to certify forest land under the state's Farm, Forest and Open Space Act.

Major functions carried out by the Program include: Operation & Maintenance of 40,000 acres (6% of the state's land area), Forest Fire Control, Law Enforcement, Forest Management, Insect & Disease Management, Forest Health Monitoring, Landowner Assistance Programs, Urban and Community Forestry Program, Conservation Education Program, Forest Legacy Acquisition Program, Timber Sales, Arborist Licensing - Tree Warden, and Recreation Management. The National Association of State Foresters, a non-profit organization that is made up of the individuals who head the state forestry agencies in the U.S, periodically reviews information about the state agencies that oversee forestry in their respective state. The most recent report on this topic is "NASF State Forestry Statistics Benchmarks - Fiscal Year 2012" and can be found at <http://www.stateforesters.org> website under publications.

Issues with potential to affect the future forest-based economy in Rhode Island

There are a number of issues that could affect the future forest-based economy in Rhode Island.

- Land removed from active management – If significant acreages of forestland are removed from the working forest, those acres may still provide the backdrop for the forest recreation/tourism part of the economy but will no longer also provide the raw material for the forest products manufacturing sectors of the economy. This can also occur when forest land is fragmented by development.
- Climate change – In the short-term, slightly longer growing seasons resulting from shortened winters and slightly warmer temperatures, given all other things being equal, may increase the growth of Rhode Island's trees and provide for slightly longer warm weather periods each year for recreation in the woods. Shortened winters may have negative effects on that portion of the recreation economy. This phenomenon may benefit parts of the forest-based economy. Should climate change also result in increased forest pest problems and reduce overall annual rainfall (or result in other changes), the perceived benefits could be offset. Over the long-term, any positive effects from climate change could disappear should temperature increases and climate changes not modify over time.
- Loss of markets – For the forest products sector from the woods to the mill, robust market opportunities are extremely important. The trend data shown in this report depicts a smaller overall forest products manufacturing industry than 20 years ago with trends suggesting continued contraction. The positive sign is that the industry is producing more product per worker than ever before and diversifying markets which are located within and near Rhode Island in the northeast region. The wood energy sector continues to grow, particularly for thermal installations in homes, schools etc.
- Loss of tree species – As with the changes brought on in the forest economy when American chestnut dropped out of the forest due to the chestnut blight in the 20th century, new pathogens and invasives may do the same for species like ash and hemlock, with unknown effects.
- Reduced federal and state support for forestry assistance programs – Certain forest activities, chiefly forest management by the tens of thousands of private forest owners in Rhode Island, have been subsidized, in part, by the federal government in the form of cost-share payments for management plans and a variety of forest management activities. The Rhode Island Division of Forest Environment staffing levels are also being affected by state budget issues as with other sectors. It is expected, in these times of reducing federal budgets in discretionary spending, that cost-share opportunities for forest stewardship will dwindle, resulting in less forest improvement work on the ground for that subset of the forest owner population that has taken advantage of the financial assistance.
- Federal and state tax and other policies – Business owners in the forest products and forest recreation sectors in Rhode Island have long said that stable public policies are important for business. Changing policies, however well-meaning they might be, make for a challenging business environment.
- Cost of travel – A large portion of the forest-based recreation economy in Rhode Island is based on individuals traveling from other locations and within to visit Rhode Island and enjoy the beauty of this heavily forested state. The price of transportation fuels is a key factor in whether tourists decide to travel to Rhode Island. Recent drops in transportation fuels will have positive effects on forest recreation spending. As transportation fuels increase in the future – as they no doubt will, recreation in the forest, at least for visitors from elsewhere, may be reduced.

The Economic Importance of Rhode Islands Forest-Based Economy



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This booklet is part of a series on the economic importance and value of forest-based manufacturing and forest-related recreation and tourism sectors in the northeastern states of Maine, New Hampshire, Vermont, New York, Massachusetts, Connecticut and Rhode Island produced by the North East *State* Foresters Association (NEFA). Past reports can be viewed at www.nefainfo.org.



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