The Forests of Rhode Island

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The Forests of Rhode Island

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FRONT COVER: View from Wickaboxet Rock, Wickaboxet Wildlife Management Area.
BACK COVER: Sunset over Bowdish Reservoir, George Washington Management Area.

PREFACE

In his first annual report to the Rhode Island General Assembly in 1907, Jesse B. Mowry, Rhode Island's first State Forester, penned the following:

> It is a fact well known to most of you that the timber which once covered our hillsides, ameliorating our climate, beautifying the landscape, protecting the watersheds, and constituting one of the most valuable natural resources of the state, has now nearly all disappeared before the woodsman's axe. It follows, therefore, that the protection and rapid growth of the succession of sprout and seedlings is a problem of interest and importance to the people.

These statements mirror earlier statements from Bernard Fernow, Chief of the U.S. Division of Forestry (now known as the USDA Forest Service) who in 1887 noted:

> Forests in the strict sense of the word can hardly be said to exist in this state (Rhode Island), although 24 percent is reported covered with wood, mostly coppice and white pine and pitch pine, which here and there may be said to rise to the dignity of forests.

These words imply that forest sustainability was not in the hearts and minds of the citizens. It would take a government effort focused on improving the forest condition, to bring about change. Mowry was a true visionary, setting the stage for forestry efforts through the 20th century. He understood the value of forests and how those forests connect to other critical resources. Mowry wanted to change public attitudes and rehabilitate the landscape.

Now, at the turn of the 21st century, Mowry would be impressed. The state has maintained an active forestry effort which he pioneered, and, through the 20th century, his seminal ideas have born fruit. Forest land in Rhode Island covers 59 percent of the land and has matured beyond a point thought possible by early foresters. The volume of wood in the Rhode Island forest has increased almost eightfold over the past 50. Equally important is the return of forest-dwelling animals that disappeared from the landscape centuries ago. Deer, coyote, fisher, beaver, wild turkey, and even bears are now found throughout the state.

While this report highlights a success story, it also emphasizes a need to continue forestry efforts. As in earlier times, we stand to lose our forests as pressures of urban sprawl and unchecked development surpass the pioneers' efforts to clear the landscape for agriculture. Unlike the agrarian landscapes of the past, shopping malls, suburban neighborhoods, and highways will not provide opportunity for forest regeneration. Consequently, forestry interests must work towards improving the planning scenarios within communities and fostering business opportunities through sustainable forestry activities. We need to forge new cooperative partnerships in future decades if we wish to maintain our healthy forest capital.

Mowry also had strong opinions on "cooperation." As he was closing out his career, Mowry wrote in 1924 :

> Cooperation has become a favorite catchword so incessantly stressed these days that one is led to inquire where in the boundless maze of sociological therapy the limitations of its worth may be set.

He entrusts to the reader the following philosophy that today is the most critical tool for forestry organizations:

> It is desirable for various interested organizations to assist the forestry department, particularly in the wide distribution of the most useful information on forestry, so far as different organizations can work together without too much friction and duplication. Their efforts, in order to be guided in right directions, should be correlated under the leadership of the forestry department.

We need to maintain our focus on the forests of this state now more than ever. We need to enlist true partners and work cooperatively to manage, sustain, and wisely use this critical resource.

Thomas A. Dupree, State Forester
Rhode Island Department of Environmental Management
Division of Forest Environment

EXECUTIVE SUMMARY

- This report summarizes a 1998 inventory of the forests resources of Rhode Island.

- In 1998, forests covered 393,000 acres, or 59 percent, of the land in Rhode Island. This is a decrease from 1985 when there were 411,800 acres of forest. Historically, the forest cover has ranged from more than 90 percent prior to European colonization to around 25 percent at the height of agriculture in the mid-1800s.

- Since the 1960s, Rhode Island has been losing forest area. The only exception is that the area of urban forest land has been increasing. Not only has the area of forest land been decreasing, but the forest that remains is fragmented, or increasingly being divided into unconnected blocks. In addition to the land becoming more fragmented, the 75 percent of the forest land that is privately owned is becoming increasingly parcelized. The average parcel of forest land decreased from 26 acres per private landowner in 1973 to 13 acres in 1993.

- The major forest type in Rhode Island is oak/hickory. The next most common forest types are maple/ash, maple/birch, and oak/pine. The 10 most common trees in that state are red maple, eastern white pine, scarlet oak, white oak, northern red oak, yellow birch, black oak, sweet birch, black gum, and black cherry.

- The area of the oak/hickory forest type has been diminishing during the past 25 years as the areas of maple/birch and oak/pine have been expanding. At the same time, the forests lack structural and compositional diversity with most of the forest in the state being around 60 years old. In the past, natural disturbances and forest management have fostered diversity.

- Native insects and diseases are a normal part of healthy forests, but the introduction of foreign insects and diseases can have devastating effects on forests. During the past 100 years, the forests of Rhode Island have been impacted by gypsy moth, chestnut blight, Dutch elm disease, and more recently, hemlock woolly adelgid.

- The forests provide important benefits to Rhode Island citizens. Rural and urban residents appreciate the scenery that forests provide. Although forests provide important benefits like recreational opportunities and wildlife habitat, one of the most important roles is the supply of clean and copious water. The forests also supply timber products, firewood, and non-timber forest products, such as witch hazel and floral greenery.

- At the turn of the 21st century, the greatest threat to sustaining healthy forests in Rhode Island is the expansion of urban and suburban areas. In the coming years, the role of forests in protecting water supplies, as places to recreate, and as components of urban environments will be increasingly important. Education of the public and landowners and sound forest management are keys to sustaining the forest. To ease the expense of forest management, it is important that markets exist for timber and nontimber products.

INTRODUCTION

Forests cover 3 out of every 5 acres of Rhode Island. These lands provide citizens with scenic backdrops for recreation and homes, a clean and perpetual supply of water, wildlife habitat, fuelwood, and timber and nontimber forest products.

But these forests are always changing! Spend a day in a Rhode Island forest and different sights and sounds will greet you at night, dawn, day, and dusk. The effects of the seasons emerge after watching the forests for a year – leaves bloom and decay and birds and other woodland creatures come and go. Observe the forest for a decade and trees will grow, trees will die, and maybe the forest will change altogether.

Understanding the changing nature of Rhode Island forests requires timely and unbiased information about this important resource. To fulfill this need for information, the USDA Forest Service initiated the Forest Inventory and Analysis program to systematically inventory forests throughout the United States. In 1998, the Forest Service's Northeastern Research Station in cooperation with the Rhode Island Department of Environmental Management, Division of Forest Environment, completed an inventory of Rhode Island forests. This report summarizes the findings of this and previous inventories conducted in the state and examines the underlying factors of the major changes.

The Forest Service could not count every tree in Rhode Island. Instead, it used a scientifically designed sampling method. First, aerial photographs for the state were studied. On these photos a grid of more than 2,000 points was overlaid. For each point, land use and, if forested, size of trees were determined. From this information, a sample of 103 plots representative of all of the state's forested areas was selected for measurement by field crews. More than 80 percent of these plots were remeasured from the previous survey conducted in 1985. By remeasuring plots, data were obtained on the growth of individual trees. Some plots were first established in 1952 and were measured for the fourth time during this inventory. Field crews collected information on the number, size, and species of trees, as well as other forest attributes. From the data, estimates were made of the forest resource – its condition, health, and changes over time.

Red maple (fall colors)
Acer rubrum

Red maple is Rhode Island's state tree

Forest Inventory and Analysis personnel collecting field data.

Eastern White Pine
Pinus strobus

The History of Rhode Island Forests

When the first people arrived in Rhode Island more than 10,000 years ago, they encountered a climate that was much colder than today and a landscape that had recently been covered by massive sheets of ice. The forests that developed subsequent to these conditions resembled the spruce and fir forests that now occupy northern New England and southern Canada. As the climate warmed, the forests slowly evolved into what we see today. The changing forests have influenced the people who live in and nearby it, and in turn, the people have influenced the changes of the forest.

The Native Americans of Rhode Island – the Narragansett and Wampanoag and parts of the Nipmuc, Pequot, and Niantic tribes – were mobile people who followed the bounties of the land and water through the seasons. During the spring and summer months, they frequented the shores of the bays and rivers catching fish and shellfish. The forests were their homes beginning with the hunting of game in the fall through the lean winter months. Along with a source of game, forests also provided foodstuffs such as acorns and chestnuts, raw materials for canoes and houses, and fuelwood to stave off the cold and to cook.

These people intentionally changed the forests by using fire to both enhance and clear the forest. Ground fires were set as often as twice a year to clear underbrush and facilitate hunting and travel. This practice resulted in the park-like forests encountered by the early European colonists. To clear land for planting maize, beans, and squash, fire also was used to girdle trees. In the shadows of these standing dead trees or snags, crops were planted until the soil lost its fertility. Then the land would be abandoned and the sequence would be repeated elsewhere.

Beginning in the 17th century, Roger Williams and other European descendents began to colonize Rhode Island. The religiously tolerant early settlers lived in harmony with the Native Americans, and until King Philip's War, the Native Americans in Rhode Island were spared many of the travesties inflicted on other tribes. But one set of

Stone Walls

It is difficult to walk in a Rhode Island forest without encountering a stone wall. These walls are relics of the state's agricultural past. For centuries, farmers used the stones unearthed while plowing their fields to build walls to keep animals out. Under the open-pasture system that existed, it was the responsibility of the farmer to protect his or her crops from both wild and domestic animals. Today, these abandoned fences are often in disrepair, but their abundance is a testament to the ability of a forest to reclaim abandoned farm land.

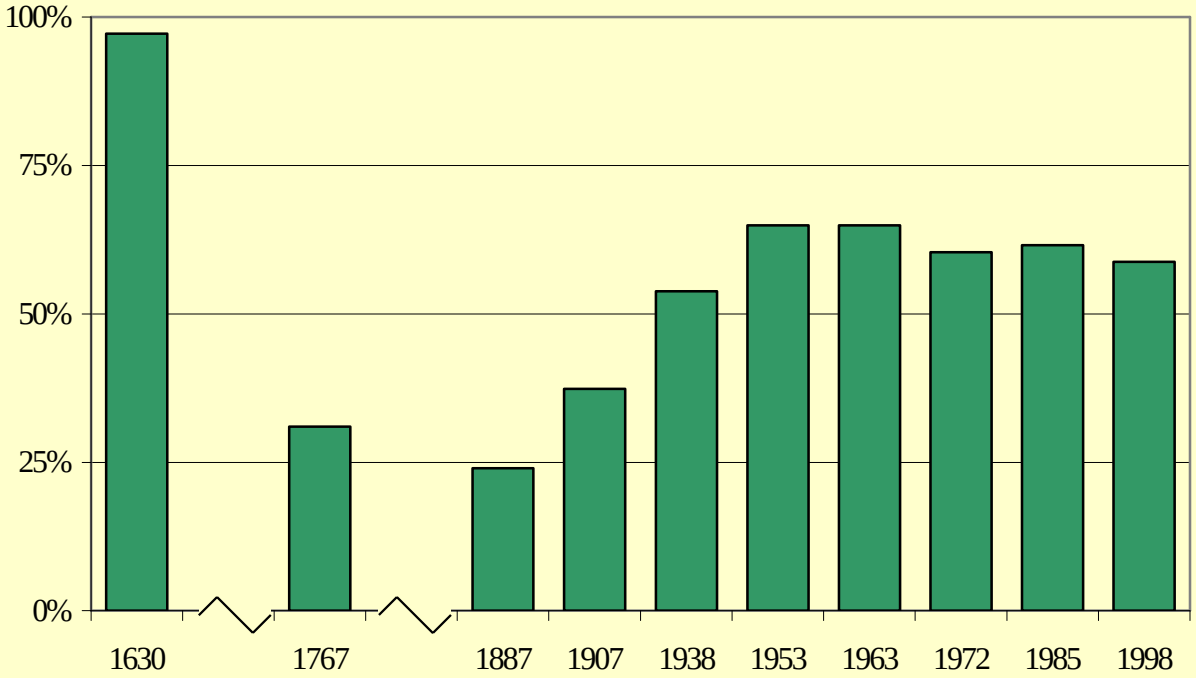


Figure 1. Percentage of land that was forested in Rhode Island in 1630, 1767, and betweer 1887 and 1998.

travesties that could not be avoided by goodwill was the diseases of European origins that devastated many Native American villages, often killing 80 to 90 percent of the inhabitants.

The early colonists lived similarly to the Native Americans – relying heavily on fish for sustenance, growing the same crops, and depending on the forest for shelter and warmth. One major difference was that the Native Americans were mobile while the colonists followed the European tradition of settling on a fixed parcel of land and assigning to individuals exclusive rights to use that land and all its bounties. The more intensive land use by the colonist resulted in more forest area being cleared and brought under cultivation with much of the remaining forest used as pasture and as a supply of fuelwood and building supplies.

The Native Americans' winter villages were determined by, among other things, the availability of firewood. Colonists and their descendents lived in fixed locations and had to continually venture further for the necessities that the forest provided. Close to farms and villages selective harvesting practices modified the forest with oak, chestnut, and hickory trees preferentially harvested. The forest dwindled to about a quarter of the state's area prior to the Industrial Revolution just as another important forest function became apparent – water. Rhode Island's streams and rivers began to silt up resulting in the rivers alternating between flooding and running dry. Some species of wildlife began to disappear with few deer remaining by the mid-1800s.

The Industrial Revolution brought significant changes to all New England: people migrated to the cities, food was increasingly imported from the Midwest, and relationships with the land were profoundly changed. As the farms were abandoned, the forests began to grow again. In 1938, a destructive hurricane was followed by widespread forest fires destroying many of the trees in these "old-field" forests. The forests that regrew compromise much of what we see today. But these forests are very different than those observed by the first colonists. Due to selective harvesting practices, invasions of forests diseases and pests, and changes in forest fire practices, important components of the presettlement forest have changed or disappeared.

Selected Native American Words for Forest Foodstuffs

Wenomeneash	Grapes
Wompimineash	Chestnuts
Anauchemineash	Acorns
Wusswaaquatomineug	Walnuts
Sasaunckapamuck	Sassafras
Qussuckomineanug	Cherry
Wuttahimneash	Strawberries
Wuchipoquameneash	Barbary
Sautaash	Currants

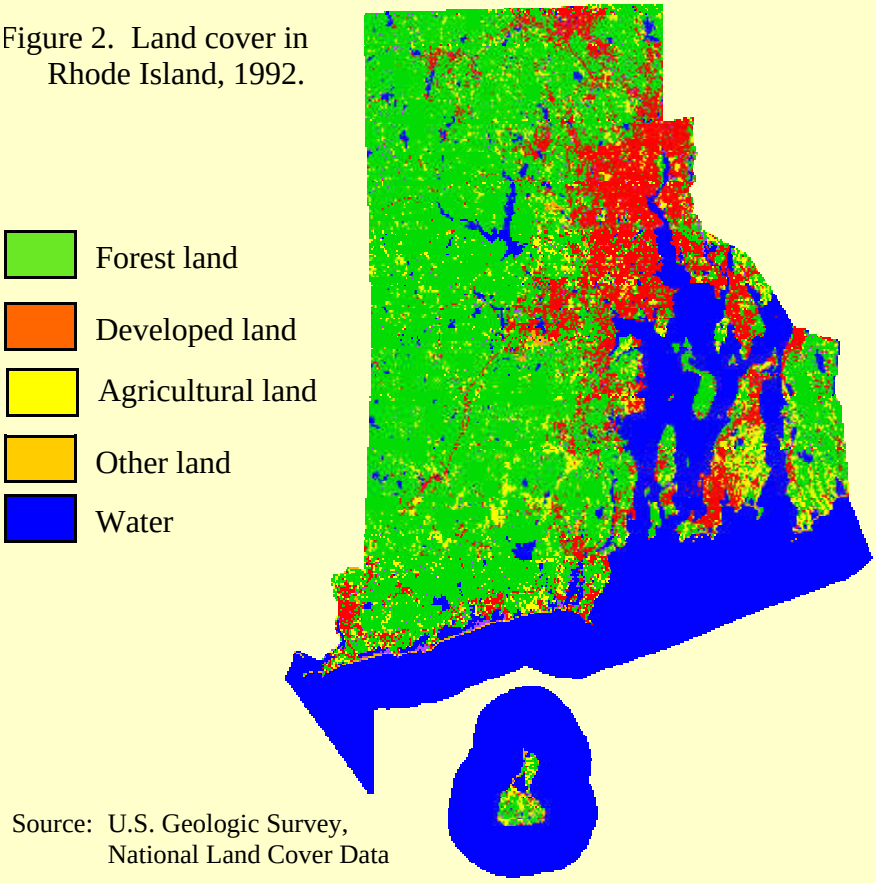
Source: A Key into the Language c America by Roger Williams (164: published by the Rhode Island an Providence Plantations Tercente nary Committee, Inc., Providence.

Mountain laurel
Kalmia latifolia

LAND USE

During the past 300 years, forest has covered between 90 and 25 percent of the land in Rhode Island (Fig. 1). The maximum forest coverage occurred prior to European colonization and the minimum corresponded with the height of agriculture in the state. Between the mid-1800s and mid-1900s, *forest land** reestablished to cover about 65 percent of the state's land. But since the 1960s, forest land has been slowly decreasing. Forests now cover 393,000 acres or 59 percent of the land in the state (Fig. 2). Forests are being lost to urban, suburban, and commercial land uses at an average rate of 6 acres per day. Most of these acres will never become forested again unlike the agricultural fields that were abandoned a century ago.

Figure 2. Land cover in Rhode Island, 1992.



Source: U.S. Geologic Survey, National Land Cover Data

The fragmenting forest

Between 1990 and 2000, the population of Rhode Island increased 4½ percent. Population growth means more land being used for residential and urban purposes. There is much concern about the effects of this urban expansion on forest land. Forest *fragmentation*—the division of contiguous or adjoining forest land into smaller or more complex patches—is a growing concern because it has the potential to change local water cycles, reduce critical wildlife habitat, increase disturbances, and foster the invasion of exotic plant species.

In Rhode Island, areas of contiguous forest land, or forest patches, vary greatly in size and shape (Fig. 3A). The largest forest patches are concentrated along the western edge of the state and correspond to state-owned forest and wildlife management areas. Kent County in west-central Rhode Island has the greatest percentage of forest cover, more than 62 percent. These forests are also the least fragmented forests in the state. These large, contiguous, nonfragmented forest patches provide unique habitat for many animals and plants.

Nonforest land and smaller forest patches predominate in the area surrounding Providence and bordering Narragansett Bay, Block Island Sound, and Rhode Island Sound. The area around Bristol and Barrington has the least forest cover, with nearly 40 percent of the land in residential uses and a population density of more than 2,000 people per square mile. Forests in the eastern shore area, Bristol and Newport Counties, occur in relatively small patches, with much of the forest in patches of 2½ acres or less. Small forest patches have less interior forest habitat and may increase the forest's susceptibility to certain diseases and the spread of invasive,

* Words in italics are defined in the

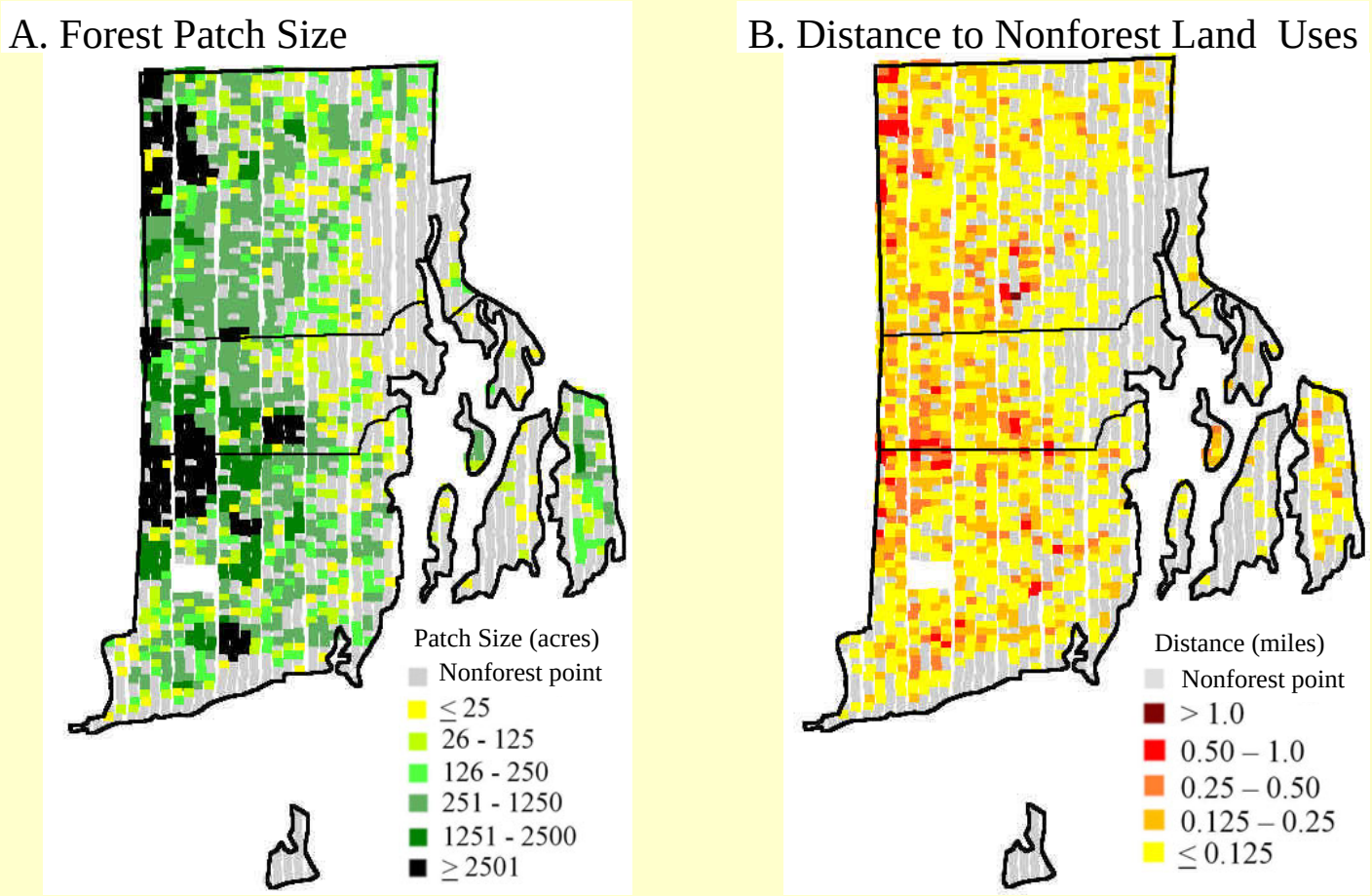


Figure 3. To assess forest fragmentation in Rhode Island, fragmentation statistics were measured at more than 2,000 points using aerial photographs. Two statistics that were measured at each point were (A) the size of the forest patch and (B) the distance to the nearest nonforest land use.

exotic plants.

The majority of forest land is within a quarter-mile of some other land use (Fig. 3B). This is true especially in Bristol County where most of the forest is within an eighth of a mile of another land use. The potential effects of this adjacent nonforest land on forest composition and structure depends, in part, on the type of land use encountered at the forest/nonforest interface.

Residential land was the most common land use found adjacent to forest areas and agriculture was the second most common. Urban and agricultural lands can influence bordering forest patches in different ways. The shape and abruptness of the forest/nonforest interface often is related to the type of adjacent land use. Seed dispersal by animals and wind, and local climate and moisture dynamics, may be affected by the nonforest land uses surrounding a forest patch. These and other factors affect the *forest composition* and *forest structure* of the patch. Studies have shown that forests in urban areas are less diverse, have lower tree densities, and greater proportions of non-native plant species than similar forests in rural and agricultural areas. Research is currently under way to better define the relationship between land use, forest fragmentation, and forest structure and health.

Clearing forest for a house lot in northwestern Rhode Island

Flowering dogwood
Cornus florida

WHO OWNS THE FOREST?

The major changes that are currently affecting Rhode Island forests are the result of people. It is people who decide where to clear land for houses and people who intentionally or unintentionally decide to allow land to revert to forest. If people were not present in Rhode Island, almost all of the state would be forested. But there are people here – more than 1 million people and growing.

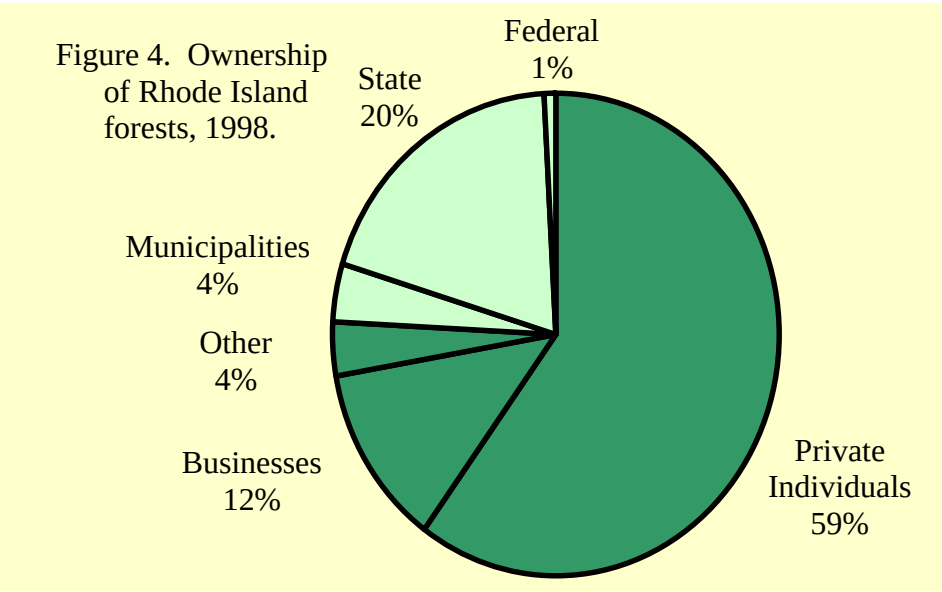


Figure 4. Ownership of Rhode Island forests, 1998.

Forest ownerships in Rhode Island range from the large public landholders, such as the State which controls more than 75,000 acres of forest land, to individuals with an acre of forest as part of their home lot (Fig. 4). The Rhode Island Department of Environmental Management manages most of the state-owned forest through the Forest Environment and Fish and Wildlife divisions. Watershed protection, wildlife habitat, and recreational opportunities are all important objectives of the State's land management. County and municipal governments own many small- to medium-sized forest parcels operated mainly as public water supply watersheds and parks. The small amount of federally owned forest land is wildlife refuges managed by the U.S. Fish and Wildlife Service .

Private forest land owners

Three out of every four acres of forest in Rhode Island are privately owned. There are about 27,000 private forest owners in the state (Table 1) ranging from individuals with 1-acre home lots to conservation groups that own thousands of acres.

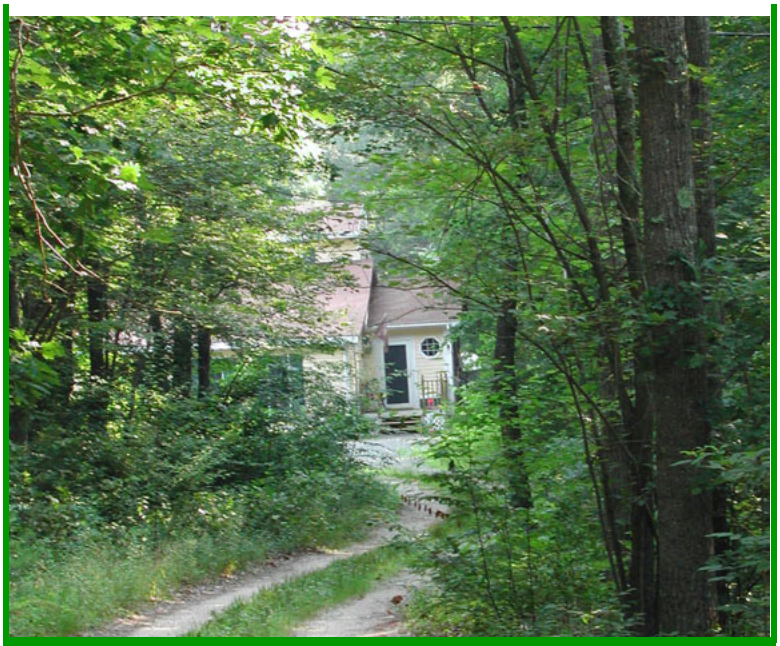
Between 1973 and 1993, the number of private owners in Rhode Island nearly doubled while the area that these people owned decreased. The average area owned decreased from 26 to 13 acres per owner. Holdings of less than 10 acres exhibited the greatest increase in number. Although the average size of forest holding in the state is decreasing, there are some landowners – primarily land trusts and conservation groups – that are acquiring larger tracts. Based on what has happening over the past couple of decades, medium-sized land holdings, between 20 and 200 acres, are most vulnerable to being lost.

Table 1. Number of private forest land owners and area of forest land owned in Rhode Island.

Size of Forest Land Holding (Acres)	Number of Owners	Area (Acres)
1-9	20,900	47,000
10-19	2,100	31,000
20-49	2,500	79,000
50-99	400	23,000
100-199	500	63,000
200-499	300	63,000
500+	< 50	32,000
Total	26,700	338,000

These trends of *parcelization*—more small parcels of land—and consolidation—more large parcels of land— are caused by pressures from a growing population.

Smaller forest parcels are being created, in part, because of increasing population densities, escalating land values and development pressure, and high property and inheritance taxes. Initiated in 1968, Rhode Island's "Farm, Forest, and Open Space Act" was passed to help private landowners retain their forest, farm, or other open space by taxing the land according to its current use instead of its "highest and best use" as is common under many property tax systems.

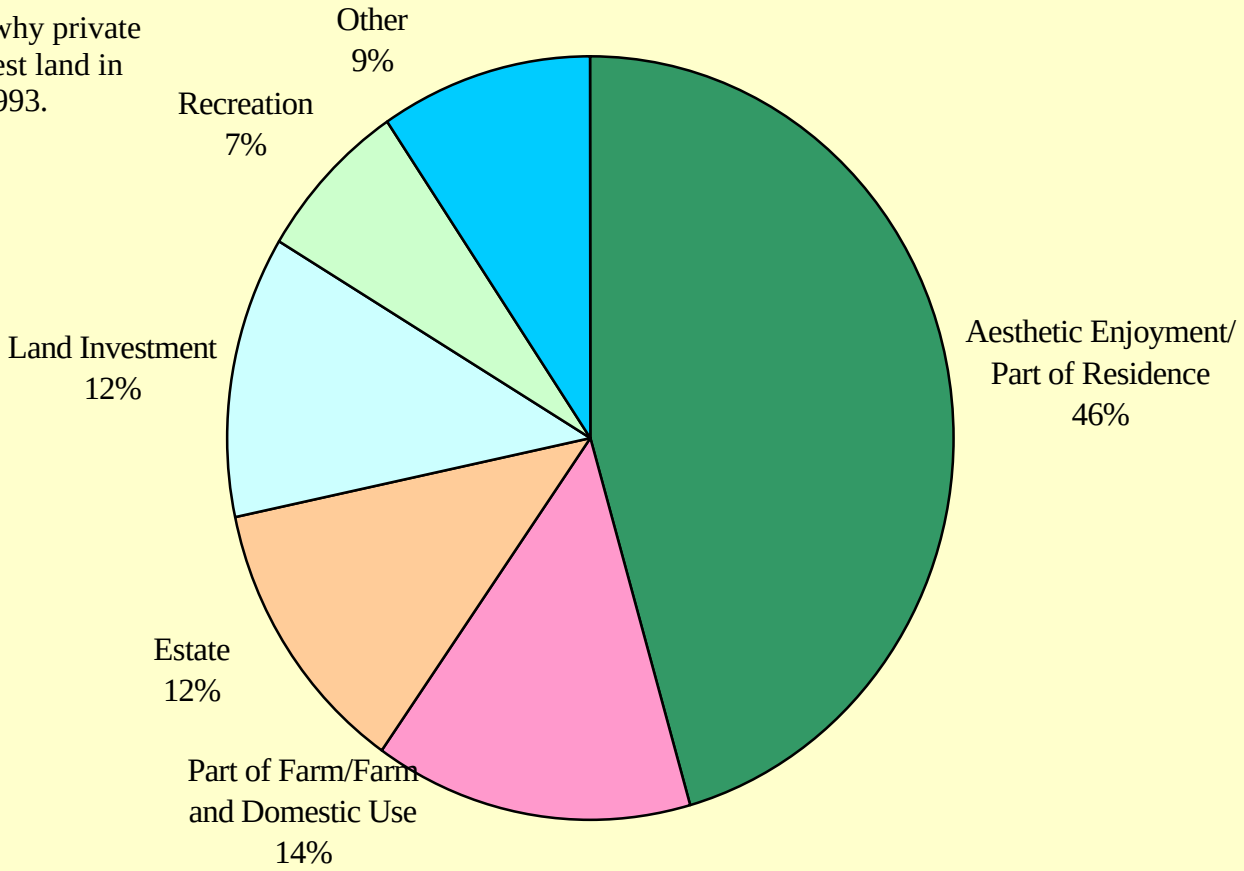


The home and property of a typical forest owner in Rhode Island

Reasons for forest ownership

A 1993 landowner survey found that the main reasons for private ownership of forests are that the forest is a part of the owner's residence and for them to enjoy the beauty that forests afford (Fig. 5). Other common reasons given for owning forest land are: to supply firewood or other products for the owner's farm or home; the forest occupies an unused part of their farm; the forest is a part of the family's estate; is owned as a land investment; or provides recreational activities for the owner, family, and friends. Owners of parcels of 10 acres or less commonly report that they own forests for two reasons: the forest is part of their residence, and for aesthetic enjoyment. Owners who cite other reasons for owning forests typically own parcels of 50 acres or more.

Figure 5. Reasons why private owners own forest land in Rhode Island, 1993.



Northern red oak
Quercus rubra

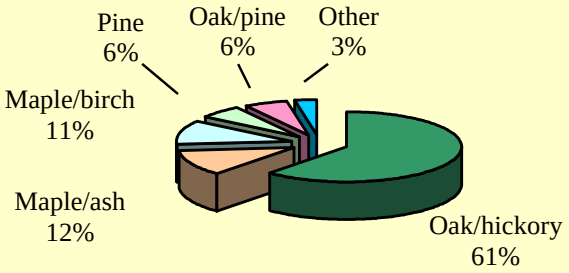
THE FOREST LAND

One common characteristic that helps describe the forest is the distribution of *forest types*. The forests of Rhode Island contain a remarkable variety of these forest types. The forest type distribution is determined by how well the species are suited to particular site conditions and past disturbances.

Site conditions include soil type, water availability and drainage, terrain, and competition from other plants. Conditions also vary by the numbers and types of animals present. Animals can be both beneficial and detrimental to tree growth. When deer, mice, and squirrels browse seedlings or eat seeds, it is detrimental. But when animals disperse the seeds to new locations, it is beneficial. Disturbance is caused by natural events and human activity and can include wind storms, fire, insect outbreaks, harvesting, and land clearing. These and other factors acting over time have shaped Rhode Island's forests.

Of the 393,000 acres of forest land, 61 percent is classified as oak/hickory forest type. Other forest types, by order of abundance, are: maple/ash, maple/birch, pine, and oak/pine (Fig. 6). All other forest-type groups account for 3 percent of Rhode Island's forest land.

Figure 6. Distribution of forest types in Rhode Island.



The oak/hickory forest type is dominated by northern red, white, and other oaks, and red maple. This forest type is the most common forest type throughout the state and is most dominant in the northern portion of the state. Here, oak/hickory forests account for 68 percent of the area, while maple/birch account for 19 percent – the highest proportion of this forest type in the state.

Most of the pine forest type, which is comprised mainly of eastern white pine, is found in the southern part of the state. This region also has the highest concentration of the maple/ash forest type.

The central part of Rhode Island is the transitional zone between the oak-dominated forests of the north and the pine-dominated forests of the south. Going from north to south, the abundance of oak/hickory forest types decreases and the abundance of pine forest types increase. The transitional forest type, oak/pine, is found in greatest abundance in the central part of the state.

Oak-pine forest in central Rhode Island

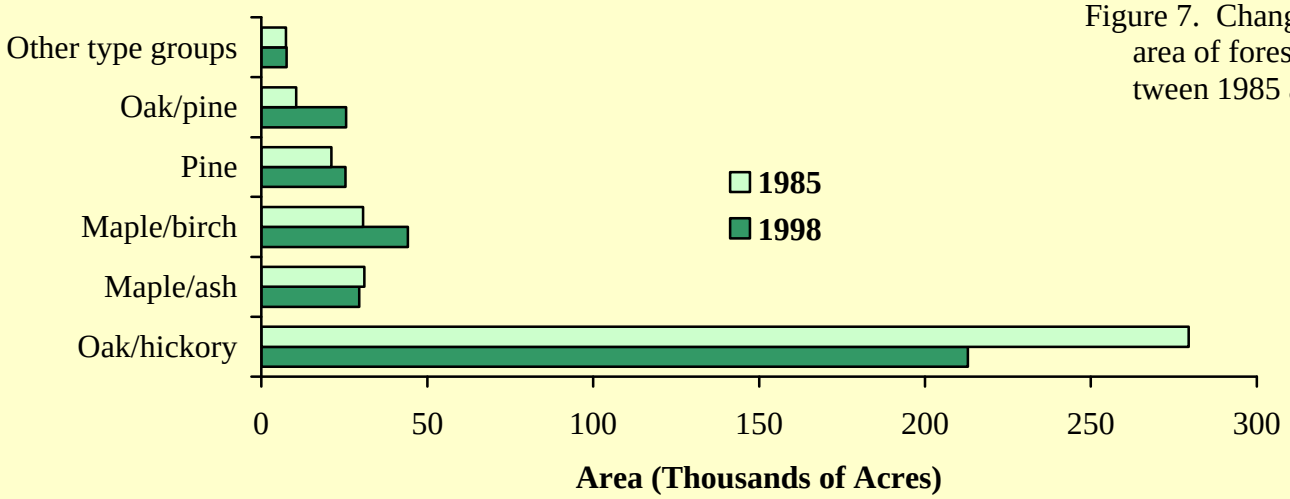


Figure 7. Changes in the area of forest types between 1985 and 1998.

Changes in forest productivity

Another way to categorize forests is by productivity, or how much wood a forest can grow. *Timberland* and noncommercial forest land are two categories that are commonly used. Timberland is forest land that is capable of producing commercial crops of timber and can be used to compare difference between inventories. Noncommercial forest land includes reserved forest land, unproductive forests, and urban forests.

In Rhode Island, timberland accounts for 86 percent of all the state's forest land. In 1972, there were 372,000 acres of timberland. That increased to 380,000 acres by 1985, but by 1998 had declined to 340,000 acres. In almost a quarter century, the amount of timberland had decreased by 32,000 acres.

Quaking aspen regenerating following the removal of red pines that were infested by red pine scales.

Changes in forest type groups

The composition of the timberland in the state has shifted dramatically (Fig. 7). The oak/hickory forest type has entered a period of decline. Between 1985 and 1998, the area of timberland classified as oak/hickory forest type decreased from 73 to 63 percent.

Though some oak/hickory forest has been lost to development, a significant portion has transitioned to the maple/birch and oak/pine forest types. Maple/birch increased from 3 percent of the timberland in 1972, to 8 percent in 1985 to 13 percent in 1998. Red maple and yellow birch dominate this forest type, but oaks—especially white oak—also are important components.

The areas of both oak/pine and pine forests are apparently increasing. Some of this increase has been due to the death of many oak trees in the state during the 1980s following gypsy moth infestaitons. The openings created by the dead oak trees allowed pines to accelerate their growth and become a more visible component of the forest. Also high grading (see sidebar) has favored the conversion of oak/hickory forests to oak/pine forests.

High Grading

High grading occurs when a timber harvest removes the highest quality trees in a forest. This is detrimental because the trees that are left behind are of poor quality and it could take decades to reverse the damage done. High grading can be avoided or, if it has already occurred, corrected through proper forest management and consultation with a professional forester.

White oak
Quercus alba

FOREST COMPOSITION

Rhode Island's forests are interwoven by a rich tapestry of biological diversity. This diversity supplies food and shelter for not only forest-dwelling wildlife, but also wildlife that inhabit the forest-dependent aquatic systems. Diversity provides the invaluable edge characteristics that exist between forest and other land uses.

Species richness is evident in the number of different species encountered. The forest inventory identified 51 different tree species (listed on page 24). Eastern white pine is the most common *softwood* tree species followed by eastern hemlock and pitch pine. Rhode Island's forests are flush with a variety of *hardwood* tree species that bring richness to the forest landscape, the most common of which is red maple (Fig. 9). The abundance of other hardwood species follows distantly, but if all oaks were combined, they would follow a close second.

Eastern white pine

The highest concentrations of eastern white pine can be found growing in the south-central part of the state (Fig. 8). It grows best on the deep, well drained sandy soils where competition from hardwoods is limited. Eastern white pine has played a prominent role in the conversion of abandoned agricultural fields to forests. It is often one of the first trees to occupy old fields. Though tree growth is relatively slow in the first few years, eastern white pine can grow more than 3 ft a year after they are well established. Left undisturbed, an eastern white pine tree can live for more than 200 years and grow to more than 3 ft in diameter.

After farm abandonment and the 1938 hurricane, many eastern white pine has flourished. Between 1985 and 1998, the volume of eastern white pine increased by 61 percent.

Red maple

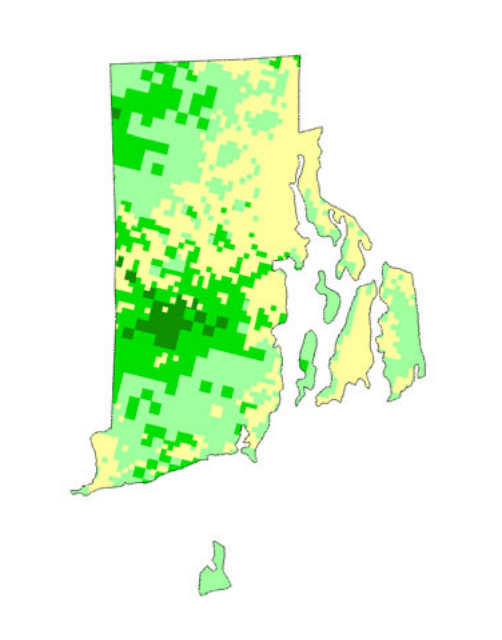
Red maple is an appropriate state tree for Rhode Island since it is found so commonly throughout the state. The light weight, wind-dispersed seeds of this tree make it well suited for occupying newly abandoned lands or other places where there is little competition from other trees. Though red maple will grow across a wide range of sites, it is most prolific in swampy areas where it can form pure stands.

Red maple seeds provide a source of food for wildlife and its vibrant fall colors are enjoyed by Rhode Island residents and visitors alike, but the growth form and wood properties of red maple make it less desirable for forest products. Cutting practices that once removed more valuable species and left the less-valued red maple behind helped its volume increases more than any other factor. The volume of red maple increased 4 percent between 1985 and 1998.

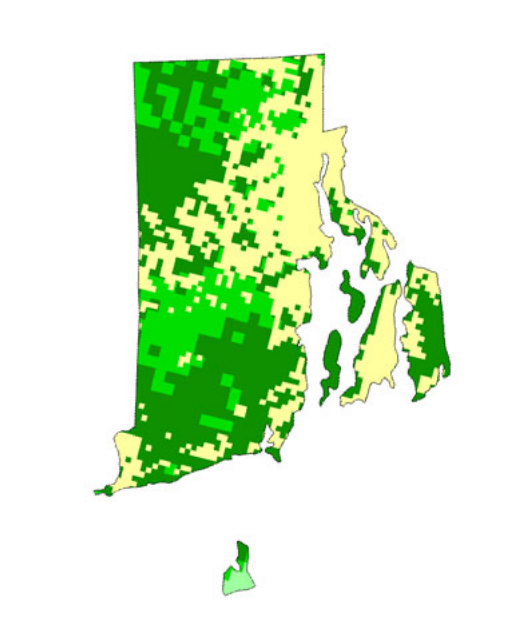
Continued on page 14

Aerial view of forest abutting Block Island Sound

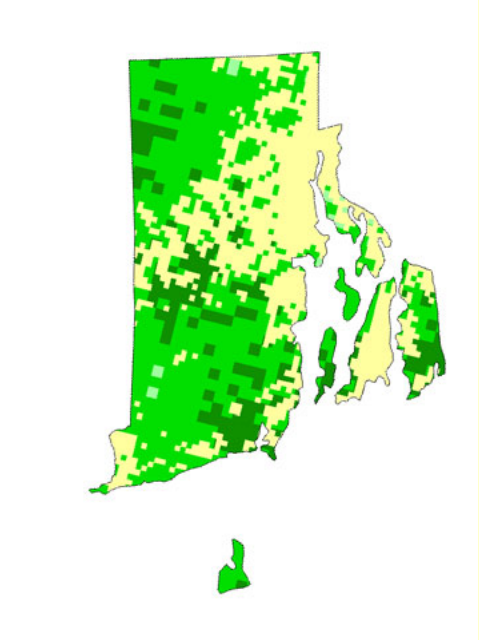
Figure 8. Relative importance of five common tree species across Rhode Island.



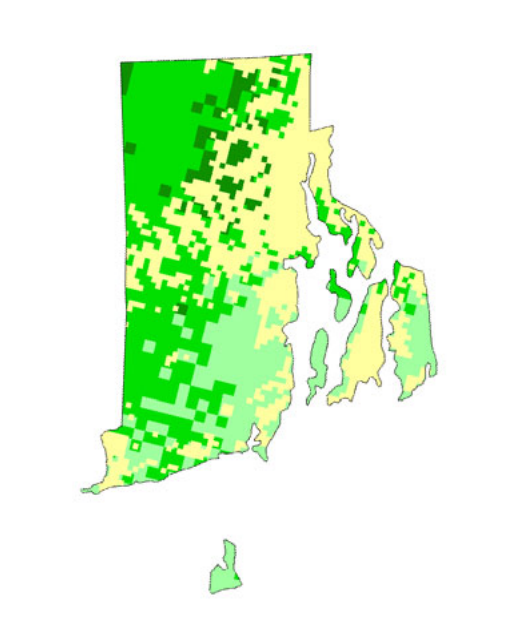
Eastern White Pine



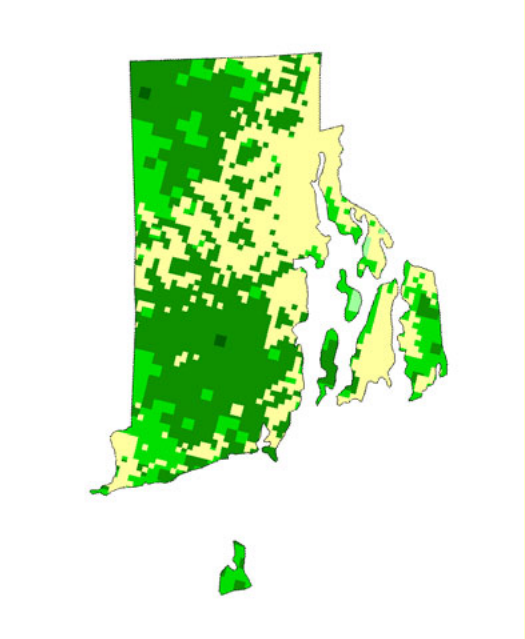
Red Maple



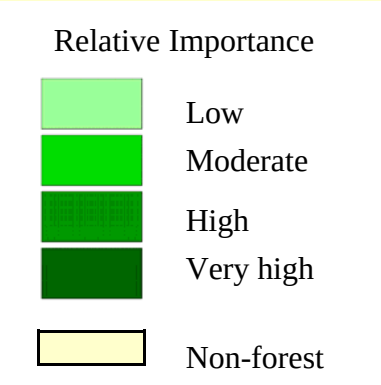
White Oak



Northern red oak



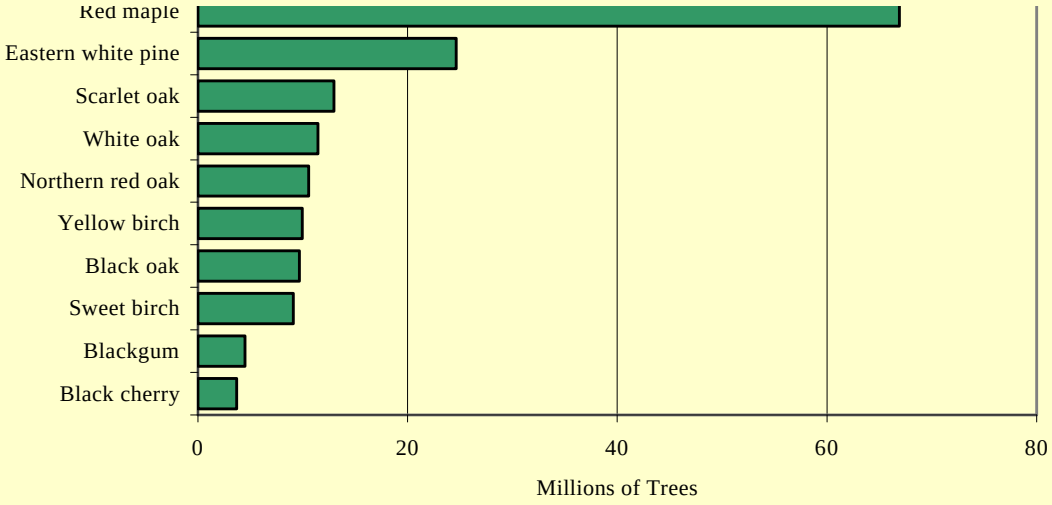
Other oaks



How were these maps created?

The 103 forested plots that were inventoried were used as known data. We predicted values at unknown locations using information found at these known locations. For example, an unknown area near a group of plots with large amounts of red maple probably has high amounts of red maple as well. Using this principle, we made predictions at every location on the map. The values are actually relative importance, or the percentage of a *stand's* basal area that is composed of that species. The categories used are low (less than 5 percent of a stand's basal area), moderate (5-19 percent), high (20-49 percent), and very high (50 percent or greater).

Figure 9. Number of trees, 5 in or greater diameter at breast height, of the ten most common tree species in Rhode Island.



FOREST COMPOSTION (CONTINUED)

Northern red oak

Since northern red oak and eastern white pine are commonly found growing together in Rhode Island, their distributions are similar (Fig. 8). Northern red oak is a major component of the oak/hickory forest type that dominates the state and is also an associate of the expanding maple/birch forest type.

Northern red oak is highly prized by the furniture and other forest product industries for its rich grain and durability. The best stands of northern red oak are found in northwestern Rhode Island on moist soils. After 25 to 50 years, northern red oaks start to produce acorns, that along with the acorns of other oaks, are an important food source for many wildlife species. Though these trees can live beneath other trees, they need full sunlight to thrive and reach maturity. In addition to reproducing by acorns, oaks commonly reproduce through stump sprouting where the trees have been cut or otherwise damaged.

White oak

Some of the oldest and largest trees in Rhode Island are white oaks. These trees can be found as relics in the forest indicating an abandoned pasture or homestead and are common in the woodlots of the larger estates. White oak also is found as part of the current forest throughout most of the state. There is a decreasing number of white oaks in the smaller size classes and usually, this species forms only a minor component of Rhode Island forests.

White oak grows well throughout Rhode Island, especially on moist, well drained sites. These trees also are valuable for the high quality wood and as a food source. In the past, white oaks have been particularly affected by the gypsy moths that have sporadically reached epidemic levels.

Other oaks

Scarlet oak, black oak, and chestnut oak are also found throughout much of Rhode Island. Other oak species, such as swamp white oak, are present in Rhode Island, but seldom encountered.

As with most oaks, these other oaks need a lot of light to establish and reach maturity. The exception is scarlet oak, which is somewhat more shade tolerant than other oaks. Scarlet oak, along with white oak, is one of the most common trees on Rhode Island's upland, well drained soils. Black oak tends to grow on moister sites. The abundance of these oaks has remained relatively stable.

FOREST STRUCTURE

Forest structure refers to the physical attributes of a forest, such as the size and spacing of the trees. Structure is significant because it influences many of the characteristics that are important to people, plants, and wildlife. A forest of widely spaced trees of similar size appears and functions very differently than a forest of small trees that are packed tightly together, even if the species present are similar.

Aging forests

One factor greatly affecting both the structure and composition of Rhode Island forests is that the forests are getting older. As a result of low harvesting levels and few disturbances, the average forest age class increased from 40 to 60 years between 1998 and the previous forest inventory. Now more than half of the forest is in the 60-year age class.

The tendency for the forests to be concentrated in a single age class limits forest diversity. Younger forests, which represented a significant portion of the compositional diversity across the landscape are disappearing. This lack of diversity increases the forests susceptibility to catastrophic damage and limits wildlife diversity.

Forest volume

In the absence of disturbances, wood will continue to accumulate in forests. The volume of wood in Rhode Island forests has increased by 11 percent since 1985 and 45 percent since 1972. Currently there are nearly 500 million cubic feet of wood in the forest that are now or will be suitable for commercial uses. Barring any large-scale disturbances, the volume of wood will continue to increase until the forests become "overmature" and the volume stabilizes.

The total resource

Another approach to measuring the amount of wood in the forests is to include the trunks, roots, branches, and leaves of all trees and other woody plants—biomass. The total weight of forest biomass is useful in considering a forest's ability to store carbon to potentially offset fossil fuel emissions and help mitigate global climate change. In 1998, Rhode Island forests contained almost 25 million dry tons of trees and shrubs and the forests have the potential to produce much more.

Black birch
Betula lenta

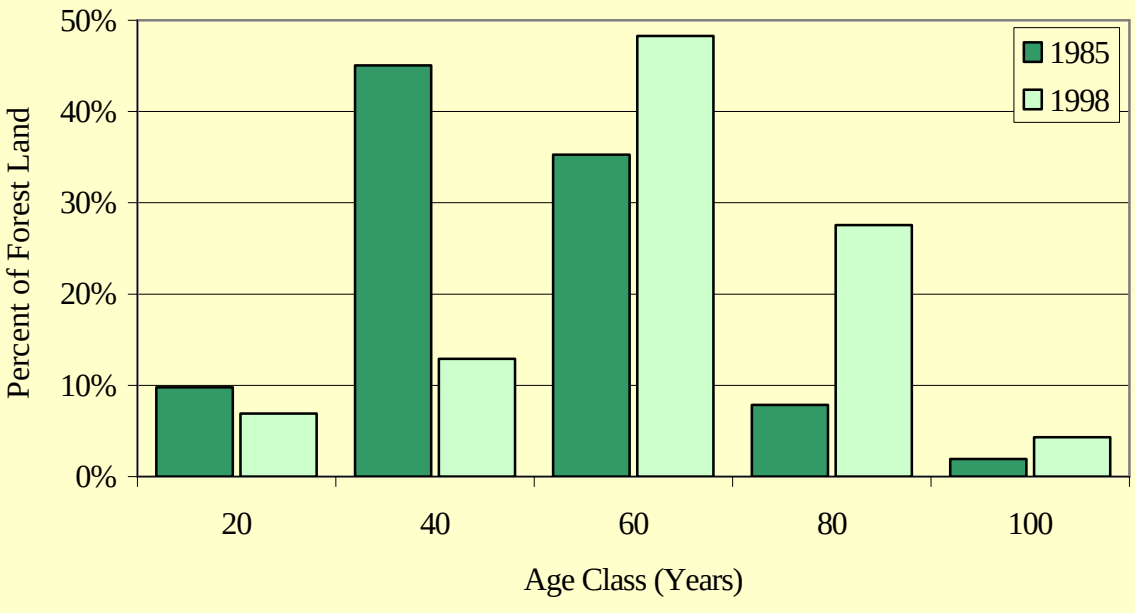


Figure 10. Age distribution of Rhode Island forests

Sassafras
Sassafras albidum

FOREST HEALTH

A healthy forest is not necessarily one without stresses. Rhode Island forests have been and continue to be challenged by an array of diseases, insect pests, and other factors, but the ability of the forests to overcome these challenges has been well demonstrated. That is not to say that the forest has not been altered over time. Except for the influence of humans, it has been the invasive agents (non-native insects and diseases) that have had the most widespread impacts on the forest resource of the state.

After its introduction into the United States in 1869, the gypsy moth arrived in Rhode Island in 1901 and is now well established. Periodic outbreaks have caused thousands of acres of defoliation leading to large losses of growth and extensive tree mortality. White oaks seem particularly vulnerable to mortality. But abundant high quality trees continue to grow here. As one tree dies or becomes less vigorous, other trees take advantage of new opportunities. The extensive oak mortality of the early 1980s is at least partially responsible for observed increases in eastern white pine.

During the past two decades, outbreaks of gypsy moths have been less frequent and less widespread. In 2001, about 8,000 acres were defoliated by gypsy moths in Rhode Island. But before the caterpillars could mature, they were almost entirely wiped out by an infection from a fungus, *Entomophaga maimaiga*, that has become established within much of the gypsy moth's range. A disease complex that includes a virus and the aforementioned fungus appears to be providing an effective, if not complete, measure of control. With these pathogens in place, the gypsy moth may have a future more akin to a native insect than a conquering invader.

The same cannot be said for the chestnut blight. This disease effectively eliminated the American chestnut in Rhode Island and the nation in the early 1900s. Prior to the blight, American chestnut was a dominant species in the state and was highly prized for construction and furniture making. Its growth was rapid, its wood durable, and its nuts were an important food source for people and wildlife. In recent years, there has been progress developing a variety of American chestnut that is resistant to the blight.

More recently, the hemlock woolly adelgid is causing widespread mortality to Rhode Island's eastern hemlock trees. Initially identified in 1924 as an insect native to Asia, the adelgid was discovered in southern Rhode Island in 1985 and within 10 years established itself throughout the state. Chemical spraying is an effective treatment, but is not practical in forests that contain extensive areas of hemlocks. There is currently promising research on a biological control agent, but extensive mortality has taken place and more hemlocks will be lost before a solution can take effect.

Gypsy moth

Hemlock woolly adelgid
egg masses

The USDA's Forest Health Monitoring (FHM) program was established to monitor the long-term status and trends in the health of forest ecosystems. It is a national program implemented with the cooperation of individual states. Rhode Island has participated in the program since it began in 1990. Measurements have been taken annually and include a wide set of indicators that reflect forest conditions. Three of these measures are tree damage, crown dieback, and crown transparency.

Between 1998 and 2001, measurements were made on eight FHM plots in Rhode Island and adjacent portions of Connecticut and Massachusetts. These adjacent plots were included because the forest conditions were similar to those found in Rhode Island and the increased number of plots allowed for a greater accuracy in interpreting the results.

Dutch elm disease, butternut canker, dogwood anthracnose, beech bark disease, red pine scale, other pathogens, and a host of insect pests are common in the forest, but the forest continues to survive and thrive. However, stress is cumulative. Times of stress from environmental conditions, such as drought, tend to exacerbate the effects of insects and pathogens resulting in measurable damages.

Insects, disease, fire, wind, ice, and other destructive agents have all contributed to tree mortality in Rhode Island. But generally, the primary species of Rhode Island's forests are healthy with the exception of eastern hemlock. Some methods for assessing forest health include tree damage, crown dieback, and crown transparency (see box at the top of this page).

Tree damage

Tree damage is one of the simpler indicators of forest health. Causes of tree damage in Rhode Island include wind, insects, diseases, and other plants such as vines.

More than 80 percent of forest trees in Rhode Island show no signs of damage. The species that showed the greatest damage were red maple and white ash. Sixty percent of the damage observed was due to decay with most other damage being either broken tops or vines.

Crown dieback

Crown dieback occurs in the upper and outer portions of a tree and represents recent branch mortality, which begins at the tip of a branch and proceeds toward the trunk. Low dieback ratings are considered to be an indicator of good health because the tree has been able to support foliage and growth in the outer portions of its crown. Very few trees measured in Rhode Island had significant crown dieback. Dieback ratings were low on 84 percent of the trees, moderate on 15 percent, and high on 1 percent.

Crown transparency

Transparency measures the amount of light that passes through a tree's crown. A low transparency rating means that light was seen through less than 30 percent of the crown and indicates a healthy tree. Transparency ratings were low on 92 percent of all trees in the state.

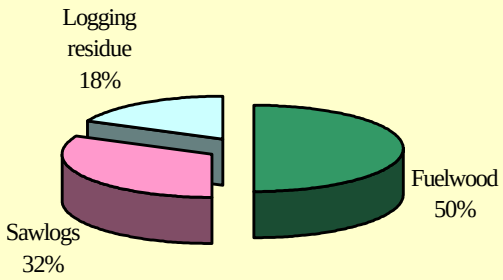
An eastern white pine killed by an unidentified agent

Blueberry
Vaccinium sp.

FOREST PRODUCTS

Rhode Island forests provide many products, from logs that will be cut into lumber, to berries that are eaten as fast as they are collected. From an economic standpoint, traditional forest products provide the most to Rhode Island's economy, but firewood and non-timber forest products have very high values for some people.

Figure 11. Use of trees harvested in Rhode Island



'True up the old water mill, hoist the gate, and saw up a little clear stuff. Why is the brook that runs the wheel smaller than it used to be?"
Jesse B. Mowry, preface to "Forestation in Rhode Island", 1917

Timber products

In colonial Rhode Island, timber products included white pine for ship masts, clapboards, and shingles, and oak for casks, barrels, and building material. Many of these products were exported to Europe and the West Indies. Heavy timber harvesting soon took its toll on the forests and local timber shortages began to appear.

Lumber production in Rhode Island peaked around the turn of the 20th century with 33 sawmills operating. Soon after, the forest industry began to decline because of a lack of suitable trees and timber production shifting to the Lake States and the southern United States. By 1984, there were 16 mills operating in Rhode Island that produced primarily hardwood pallets, using almost four times as much hardwood as softwood.

Today when trees are harvested, the high-quality lower trunk is used for lumber, while the upper stem, large branches, small trees, and undesirable species are used for lower value-added products and fuelwood. Parts of the tree that can't be used and have no markets remain in the woods. Sawlogs account for about a third of the volume of trees that are harvested in Rhode Island (Fig. 11). Fuelwood accounts for half of the harvest and the rest is logging residue that is left in the forests.

Sawlogs remain the primary industrial use of wood harvested in Rhode Island. Lumber produced from the Rhode Island's oaks are highly valued and is the basis for more than half of Rhode Island's timber-harvesting activities. By the mid-1980s, almost seven million *board feet*—a board foot is equal to a piece of wood 1 ft by 1 ft square by 1 in thick—of sawlogs were being harvested every year. Almost all of the hardwood sawlogs were harvested from oak species. The volume harvested from the primary softwood species – eastern white pine – reached more than two million board feet per year.

Rhode Island forests have the potential to contribute a much greater amount of wood to the market than is currently being realized. As a result of the forests maturing, there is an abundance of larger trees that, if a buyer is found, would

A skidder hauling a tree. Once the tree reachs the landing it will be bucked (cut to length) and then hauled to the mill.

Rhode Island's Forest Industries

Primary processing industries
- Logging
- Sawmill and Planer mills

Secondary processing industries
- Yacht building
- Lobster traps
- Butcher blocks
- Pallets
- Cabinetry
- Homes

Source: Wood Industry Directory, Southern New England Forest Consortium, Inc.

command a premium price. Fragmentation and parcelization has affected the ability to conduct timber harvests.

The volume of wood in Rhode Island forests increased by 11 percent between 1985 and 1998. The quality of the hardwood resource is high while the quality of the softwoods is much lower. Within the hardwoods, northern red oak has the greatest volume of high value wood in the state. Although timber harvests of high quality eastern white pine in Rhode Island are selling for very good prices, the majority of softwoods are of poor to moderate quality. Insects, such as white pine weevil and hemlock woolly adelgid, are one reason for the poor quality of the softwoods. Although red maple is common in the state, its growth characteristics and wood quality make it undesirable for most commercial uses.

Wood pallets ready to be shipped.

Fuelwood

Fuelwood is a leading forest product in Rhode Island. The oil embargo of the 1970s and the desire for self-sufficiency by many Rhode Island residents resulted in an increase in residential fuelwood use. While it is not at the levels that it once was, fuelwood remains a significant use today.

Many households in Rhode Island are still dependant, to some extent, on wood for fuel. In 1995, there were more than 126,000 *cords* of wood—a cord is a stack of split wood 4 ft tall by 4 ft wide by 8 ft long—used for fuelwood, nearly all of which came from hardwood species. About three-fourths of this wood, came from trees not suitable for commercial use because they were dead, decaying, or poorly formed.

Fuelwood still provides the principal heating source for some Rhode Islander's homes

Nontimber forest products

There is an increasing interest in the collection and cultivation of nontimber forest products in Rhode Island and throughout the country. The development of an alternative forest products economy can provide revenue for forest landowners and help people keep their land. Landowner interest in edible and medicinal products, as well as floral industry products, has begun to develop into economic activities that are consistent with a rural character and lifestyle. Currently, witchhazel, ginseng, maple syrup, mushrooms, and floral greenery are cultivated and harvested in Rhode Island. The growth and enhancement of businesses based on non-timber forest products can meet changing landowner and community needs and provide money to help landowners maintain healthy, sustainable forests.

There is an increasing interest among private landowners in non-timber forest products such as witch hazel.

Sugar maple
Acer saccharum

FOREST AMENITIES

Most Rhode Islanders get financial gains from their forest lands only when they sell their property. But forests generate many benefits that cannot be quantified in terms of dollars and cents. From purifying the air and water, to providing a place for recreation and a setting for residential properties, the forests are vital to the health, welfare, and well-being of the people of Rhode Island.

"The returns from forestry are too obvious for discussion. The beauty and glory of the earth as the home of man depends upon the forest. It is the business of forestry to develop and perpetuate the forest that it shall serve forever in the highest degree the manifold interests of humanity."
- Jesse B. Mowry, 1913

Water and climate

The most important role forests play is in the regulation of climate and water cycles. Over the course of millennia, trees and other green plants have changed the atmosphere. Through photosynthesis, trees combine carbon dioxide and water using the sun's energy to produce sugars. These sugars form the base of the food chain. A byproduct of photosynthesis is oxygen; without photosynthesis there would be too little oxygen for us to breath. Trees also help control the temperature of the atmosphere by removing carbon dioxide a greenhouse gas that helps trap warmth in the atmosphere. Many environmentalists are looking at forests to help offset our carbon dioxide emissions and mitigate global warming.

Forests are vital for clean, dependable flows of water. More than 600,000 Rhode Island residents depend on reservoirs for their water supply with the remainder of the residents relying on wells. The reservoirs are surrounded by forest because the reservoir managers know the importance of forests for maintaining water quality. By allowing water to slowly infiltrate into the ground, clean water enters streams and aquifers and is then available for extraction by homeowners and businesses. Once forests are removed, rain can cause soil erosion that depletes soil fertility, and muddies streams and ponds, thus decreasing water quality.

Recreation

From the shores to the rolling hills, forests create and help frame the beautiful landscape that Rhode Islanders have come to expect. The people of Rhode Island have a long history of recreating in the forests.

The first Rhode Islanders hunted and fished in the forests to provide sustenance for themselves and their families. Hunting and fishing are still common pastimes, but are now done more for pleasure than out of necessity. There are many acres of public and private lands in the state that are used primarily for hunting and fishing.

But there are a plethora of other activities that Rhode Islanders pursue in the woods. Many miles of trails and forest roads are used by hikers and horseback riders. And nearly every Rhode Islander has appreciated the beauty of the forest during the first flush of green in the spring or the explosion of color in the fall.

Pulaski Pond, George Washington Management Area

WILDLIFE

Many species of wildlife depend on forested habitats for their survival. From white-tailed deer to migratory warblers, Rhode Island's forests are home to a wide diversity of wildlife . The streams and ponds that the forests protect are critical to many species, as well as a home to an equally diverse group of aquatic wildlife. The diversity and abundance of all of this wildlife changes as the distribution, composition, and structure of the forests change. The major trends that are affecting wildlife are the maturing/aging of the forest resource, a proliferation of poor quality *edge habitat*, and a lack of young forests.

As a result of these conditions, the number and variety of wildlife species currently found in Rhode Island has been changing in unanticipated ways. It is increasingly common to find animals that were once considered unthinkable here, including moose, black bears, and fishers. Many of these animals are transient visitors, but their sightings are becoming increasingly common.

In addition to wildlife that are naturally immigrating into the state, wildlife biologists are introducing other species. Reintroduction of once native species, such as wild turkey, has proved very successful because these animals are well suited to the habitats that Rhode Island has to offer. But attempts to introduce some species, particularly game birds like ring-necked pheasant, have been less successful. The limited area of agricultural fields and other grasslands in which to feed and breed and an abundance of predators have been the main reasons why game birds have not been able to establish self-sustaining populations.

The aging and maturation of our forests in the past 10-20 years has resulted in a forest that is relatively uniform in composition and structure. One advantage of the mature forest is the large amount of mast—nuts and fruit—produced by some of the more common Rhode Island trees, such as the oaks. But mast production varies greatly from year to year and wildlife can not live by mast alone. In addition, mature forests provide more snags—standing dead trees—and fallen trees that provide habitat for cavity-nesting animals and other animals that need dead wood.

The proliferation of edge habitat – the interface between different habitat types or age classes – between forest and nonforest land uses has helped a limited number of wildlife species proliferate. In particular, species such as white-tailed deer and wild turkey are able to exploit these habitats and their numbers have increased dramatically over the last 100 years.

Though there is now an abundance of forest/nonforest edge habitat, there is a general lack of high quality edge habitat that will significantly increase wildlife diversity. To increase wildlife diversity, we need a greater diversity of habitat types and age classes.

A young white-tailed deer or fawn

Managing Forests for Wildlife

As the diversity of the forest increases, usually the diversity of the wildlif increases. The absence of large-scale disturbances - such as fires, hurricanes, an timber harvests - means forest diversity will be lowered because of a lack of youn forests and meadows. The continuing maturation of the forest and the lack of re generating forest will continue to favor wildlife, such as white-tailed deer and rac coons, and does little for other wildlife, such as bluebirds and cedar waxwings.

Today, only a small percentage of the Rhode Island forest is actively managed, an of this amount, lesser still is managed specifically to provide wildlife habita Through their use of fire, Native Americans were the first to intentionally influenc the composition and structure Rhode Island forests. Widespread use of fire as means of forest management would not be tolerated today. But with sound, proac tive management that may include prescribed burns and timber harvesting, Rhod Island forests can yield a rich diversity of habitat beneficial not only for wildlif but also beneficial for watershed protection, aesthetics, and a full range of timbe and nontimber forest products.

Urban forest and other land uses in southeastern Rhode Island

URBAN FORESTS

Rhode Island is one of the most urbanized states in the United States. *Urban forests*—trees and associated plants and animals in and around cities and towns—provide one of the few direct links between urban residents and nature. Trees not only provide mental solace, but they also physically enhance cities and towns by lowering summer temperatures and helping to clean the air and water.

Urban forest land is the only category of forest land to have actually increased in recent years from 1 percent of the forest land base in 1985 and to 5 percent in 1998. Urban forests differ from rural forests because growth and development of trees are limited by city structures rather than natural forest processes. Urban forestry involves the growth, management, and care of trees of these forests.

Until recently, a plan for urban forestry was viewed as unnecessary. Up until about 30 years ago, the majority of Rhode Islanders lived tightly packed together in the major industrial cities of the state. The cities of Rhode Island's past, while gritty, were also green. But hurricanes and Dutch Elm disease changed the look of the cities by killing many stately trees. Another phenomenon changing urban forests was the countless numbers of yard trees being cut to provide space for off-street parking, garages, patios, pools, decks, and other manifestations of our rising affluence. Street widening and utility projects caused further tree loss.

Coincidently, as the trees were disappearing from our cities, so were the people. Development surged outward from the state's urban centers into surrounding suburbs and small villages, also impacting community tree resources. Today, low-density residential development continues to proliferate in rural areas throughout the state. Trees continue to be cut and land cleared to accommodate fleeing urbanites seeking home sites in rural, wooded settings, often unaware that their individual location decisions risk the very environmental features and rural charm that lured them there.

The Rhode Island Urban and Community Forest Plan

In 1999 the Rhode Island Department of Environmental Management, Division of Forest Environment, and the Rhode Island Tree Council established the Rhode Island Urban and Community forest plan. The aim of this plan is to improve urban and community forest resources by influencing decisionmaking processes. The plan does not mandate any particular action, but rather seeks to foster recognition and offer options and tools. An underlying assumption of this is that, with careful planning, quality designs, proper management, and prudent investment, urban and community forests can be maintained and improved without negatively impacting economic growth.

To guarantee that vibrant and productive urban and community forests are a component of Rhode Island's future landscape, and to maximize the benefits that urban and community forests provide as green infrastructure, the State will seek to stabilize overall forest cover at or near the present level, and gradually improve the urban forests. Other recommendations are:

- Seek a higher profile for the protection and management of urban and community forest resources in public and private community planning, development, capital investment, and infrastructure management decisions
- Increase public awareness of the benefits provided by urban forests
- Protect trees of environmental and cultural importance through educational and/or legal means
- Monitor the status of Rhode Island's urban and community forest resources
- Encourage new development that respects forest resources as vital elements of the community and properly integrates trees to create high-quality living and working environments
- Maximize the impact of tree planting using trees appropriate to site conditions—"the right tree for the right place"
- Encourage a high level of maintenance of community green infrastructure through adopted standards and adequate funding
- Involve the public and the private sector in efforts to plant and maintain community tree resources, including public trees

THE FUTURE

During the 20th century, mankind has witnessed the birth of a new land ethic born from a landscape devastated by forest exploitation. We also have witnessed the power and resilience of nature as the landscape healed and forests again became our sanctuary. What will the future bring and how will Rhode Island's forests fair in the decades ahead?

We are confident that forests in the public sector will continue to grow. Land trusts, non-profit organizations, and governments have been actively pursuing protection strategies that will stretch well into the 21st century. Conservation easements will allow lands to remain in private ownership and protect critical habitats while providing a mechanism for continued forest use. While total forest cover will shrink because of the pressures of fragmentation and parcelization, there should be a significant pool of willing landowners who will protect and manage private forests. The percentage of publicly owned forest will increase, but government cannot and should not own it all. Today 75 percent of the forested landscape is in private hands and the sheer number of decisionmakers allow for a rich diversity of management styles. We need to educate these landowners.

Industry needs to continue to adapt and we predict they will. Smaller lot sizes mean industry must use smaller, environmentally friendly equipment. Alternative nontimber forest products will gain in popularity.

The forest will continue to slowly convert to eastern white pine in southern Rhode Island where soils are sandy while northern Rhode Island should continue to see a thriving hardwood forest. Within the next two decades, the trees planted by the Civilian Conservation Corps prior to World War II will be gone and almost all of Rhode Island's forest will be the result of natural regeneration. Average volume per acre will continue to climb and standing volume should exceed 2 billion board feet by 2020.

Forest fires will play a minor role in the Rhode Island landscape; however, a drought period that coincides with the spring fire season could prove especially problematic. Rhode Island's older forest will tend to burn less as long as it stays healthy. Human development within the forest will result in an increased risk of fire starts although those fires should stay small.

First and foremost, the forest will be our playground. People will continue to use our forested landscape for recreational purposes and the public's primary interest will be vested in specific uses enjoyed by the recreating public.

Attention to the urban forest will accelerate our understanding of how trees benefit society. Programs designed to build, maintain, and enhance the urban forest will grow as will community commitments to protect the urban-suburban forests. A regard for trees as a valued element of the urban infrastructure will grow, resulting in a better managed resource that will improve the aesthetics and livability of our cities and towns.

Insect and disease problems will continue to impact our forests. Hemlock might disappear and insects associated with southern climates might play important roles in changing our forests. The forest health monitoring and management strategies will adapt to the challenges that will include invasive, non-native pests, dramatic weather events, and political and social change.

The public value of forest management will grow as our society continues to learn and understand the integral role our forest lands play in the protection of our water resources. The forest’s intrinsic tie to abundant clean water will lead to greater protection, preservation, and management of forest tracts. It is in forest management that options for future generations are preserved while present goals and needs are met.

In the future, Ralph Waldo Emerson's words should still ring true: “In the woods we return to reason and faith.”

GLOSSARY

Board foot—equal to a piece of wood 1 ft by 1 ft square by 1 in thick
Cord—a stack of split wood 4 ft tall by 4 ft wide by 8 ft long
Edge habitat—the interface between two types of land uses, such as forest and nonforest, or age classes
Hardwoods—a group of tree species that are generally broad-leaved and deciduous
Forest land—land that is at least 1 acre in size and is at least 10 percent stocked with trees or that formerly had such tree cover and is not currently developed for a nonforest use
Forest composition—the number and diversity of tree species within a forest
Forest structure—the physical attributes of a forest
Forest type—a classification of forest land based upon the dominant trees in a stand
Fragmentation—the division of contiguous or adjoining forestland into smaller or more complex patches
Parcelization—the division of forest land owned by a single ownership into parcels owned by more than one ownership
Softwoods—a group of tree species that are generally evergreen and have needle shaped leaves
Stand—a group of forest trees growing on forest land
Timberland—forest land capable of growing trees that can be used for forest products
Urban forest—trees and associated plants and animals in and around cities and towns

RHODE ISLAND TREES - COMMON AND SCIENTIFIC NAMES

Softwoods (Conifers)

Eastern redcedar	*Juniperus virginiana*
Tamarack	*Larix laricina*
Red pine	*Pinus resinosa*
Pitch pine	*Pinus rigida*
Eastern white pine	*Pinus strobus*
Scotch pine	*Pinus sylvestris*
Eastern hemlock	*Tsuga canadensis*

Hardwoods (Deciduous trees)

Red maple	*Acer rubrum*
Sugar maple	*Acer saccharum*
Serviceberry	*Amelanchier sp.*
Yellow birch	*Betula alleghaniensis*
Sweet birch	*Betula lenta*
Paper birch	*Betula papyrifera*
Gray birch	*Betula populifolia*
American hornbeam	*Carpinus caroliniana*
Bitternut hickory	*Carya cordiformis*
Pignut hickory	*Carya glabra*
Shagbark hickory	*Carya ovata*
Flowering dogwood	*Cornus florida*
American beech	*Fagus grandifolia*
White ash	*Fraxinus americana*
Black ash	*Fraxinus nigra*
Green ash	*Fraxinus pennsylvanica*
Black walnut	*Juglans nigra*
Yellow-poplar	*Liriodendron tulipifera*
Apple	*Malus sp.*
Blackgum	*Nyssa sylvatica*
Eastern hophornbeam	*Ostrya virginiana*
Eastern cottonwood	*Populus deltoides*
Bigtooth aspen	*Populus grandidentata*
Black cherry	*Prunus serotina*
White oak	*Quercus alba*
Swamp white oak	*Quercus bicolor*
Scarlet oak	*Quercus coccinea*
Chestnut oak	*Quercus prinus*
Northern red oak	*Quercus rubra*
Black oak	*Quercus velutina*
Black locust	*Robinia psuedoacacia*
Willow	*Salix sp.*
Sassafras	*Sassafras albidum*
American elm	*Ulmus americana*
Slippery elm	*Ulmus rubra*

WANT MORE INFORMATION?

On the internet

State of Rhode Island	
Department of Environmental Management	http://www.state.ri.us/dem/
USDA Forest Service	
Northeastern Research Station FIA	http://www.fs.fed.us/ne/
State and Private Forestry	http://www.na.fs.fed.us/
Southern New England Forest Consortium	http://www.snefci.org/
Rhode Island Forest Conservators Organization	http://www.rifco.org
Rhode Island Tree Council	http://www.ritree.org

Rhode Island forest statistics publications

- Forest Statistics for Rhode Island: 1985 and 1998 by Carol L. Alerich (2000), published by U.S. Department of Agriculture, Forest Service, Northeastern Research Station, Resource Bulletin NE-149.
- Forest Statistics for Rhode Island-1972 and 1985 by D. R. Dickson and Carol L. McAfee (1988), published by U.S. Department of Agriculture, Forest Service, Northeastern Research Station, Resource Bulletin NE-104.
- Forest Statistics for Rhode Island by John R. Peters and T. M. Bowers (1977), published by U.S. Department of Agriculture, Forest Service, Northeastern Research Station, Resource Bulletin NE-49.
- FIA Photointerpretation in Southern New England: A Tool to Determine Forest Fragmentation and Proximity to Human Development by Rachel Reimann and Kathy Tilman (1999), published by U.S. Department of Agriculture, Forest Service, Northeastern Research Station, Research Paper NE-709.
- Private forest-land owners of the Northern United States, 1994 by Thomas Birch (1996), published by U. S. Department of Agriculture, Forest Service, Northeastern Research Station, Resource Bulletin NE-136.

Other books that may be of interest

- Working with your woodland: A landowner's guide by M. Beattie, C. Thompson and L. Levine (1993), published by the University of New England Press.
- A Sierra Club Naturalist's Guide to Southern New England by Neil Jorgensen (1978), published by Sierra Club Books.
- New England Wildlife: Management of Forested Habitats by Richard M. DeGraff and others (1992), published by the U.S. Department of Agriculture, Forest Service, Northeastern Research Station., General Technical Report NE-144
- Changes in the Land: Indians, Colonists, and the Ecology of New England by William Cronon (1983), published by Hill and Wang.
- Reading the Forested Landscape: A Natural History of New England by T. Wessels (1997), published by Countryman Press.

STILL HAVE QUESTIONS?

Please contact:

USDA Forest Service
Forest Inventory and Analysis
11 Campus Boulevard, Suite 200
Newtown Square, Pennsylvania 19073
(610) 557-4075

or

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Division of Forest Environment
1037 Hartford Pike
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