USDA
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RESOURCE UPDATE FS-58

Forests of Rhode Island, 2014

This report provides an overview of forest resources in Rhode Island based on an inventory conducted by the U.S. Forest Service, Forest Inventory and Analysis (FIA) program of the Northern Research Station. Estimates are based on field data collected using the FIA annualized sample design. Results are for the measurement years 2009-2014 with comparisons made to 2005-2009[1] (see footnote on bottom of page 2). Forest resource measurements were taken on 124 plots with about 20 percent of the plots measured each year. Estimates will be updated and published annually.

For core tables and more information, including definitions and technical details, please refer to the inventory citations on page 4 of this report or visit http://fia.fs.fed.us.

Overview

As of 2014, Rhode Island has an estimated 367,900 acres of forest land (Table 1). The forest land area has not substantially changed since 2009. The estimated number of live trees on Rhode Island's forest land in 2014 is 172 million containing a total aboveground biomass of 25 million tons. The estimated volume of trees, ≥ 5 inch diameter at breast height, is 882 million ft^3. The estimated annual net growth of these trees is 21 million ft^3/yr with annual mortality, harvest removals, and other removals, such as land clearing, equal to 25, 3, and 2 percent of the annual growth, respectively.

Table 1.—Rhode Island forest statistics, 2005-2009 and 2009-2014

	2009 Estimate	Sampling error (percent)	2014 Estimate	Sampling error (percent)	Change since 2009 (percent)
Forest Land					
Area (thousand acres)	350.2	4.1	367.9	3.6	5.1
Number of live trees ≥1 in diameter (million trees)	180.7	8.0	171.5	7.8	-5.1
Live tree aboveground biomass (thousand oven-dry tons)	22,530.5	5.3	25,033.4	4.9	11.1
Net volume live trees ≥5 in diameter (million ft^3)	793.7	6.0	881.6	5.4	11.1
Net growth live trees ≥5 in (thousand ft^3/yr)	16,072.1	17.3	20,562.6	17.2	27.9
Annual mortality of live trees ≥5 in (thousand ft^3/yr)	5,066.9	24.5	5,133.7	19.2	1.3
Annual harvest removals of live trees ≥5 in (thousand ft^3/yr)	1,072.8	69.3	704.3	51.6	-34.3
Annual other removals of live trees ≥5 in (thousand ft^3/yr)	3,438.1	86.1	480.6	66.8	-86.0
Timberland					
Area (thousand acres)	338.2	4.4	353.7	4.0	4.6
Number of live trees ≥1 in diameter (million trees)	175.3	8.3	167.1	8.1	-4.7
Live tree aboveground biomass (thousand oven-dry tons)	21,897.5	5.6	24,188.0	5.2	10.5
Net volume live trees ≥5 in diameter (million ft^3)	774.4	6.3	854.9	5.6	10.4
Net volume of growing stock trees (million ft^3)	711.6	6.8	753.8	6.4	5.9
Net growth live trees ≥5 in (thousand ft^3/yr)	15,194.0	17.8	17,440.8	14.1	14.8
Annual mortality of live trees ≥5 in (thousand ft^3/yr)	3,883.1	27.1	2,952.8	22.9	-24.0
Annual harvest removals of live trees ≥5 in (thousand ft^3/yr)	955.7	69.1	592.9	53.3	-38.0
Annual other removals of live trees ≥5 in (thousand ft^3/yr)	2,310.6	82.2	1,520.5	75.9	-34.2

Forest Area

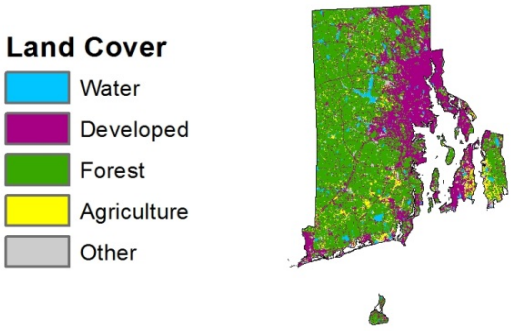

Figure 1.—Forest and other land cover, Rhode Island, 2011.
Source: National Land Cover Database (Jin et al. 2013).

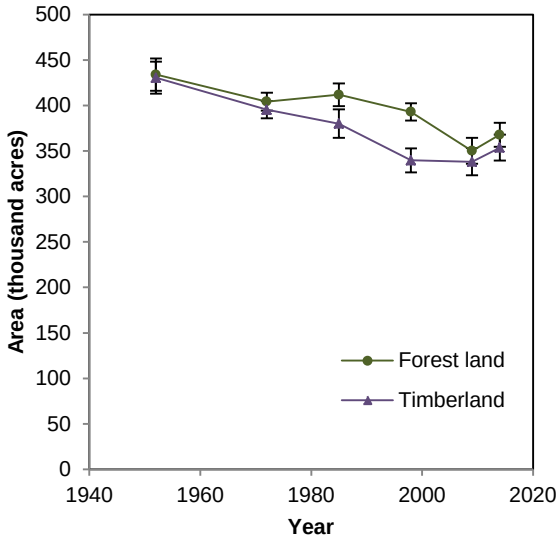

Figure 2.—Area of forest land and timberland, Rhode Island, 1952-2014.

Note: Sampling errors and error bars shown in the tables and figures in this report represent 68 percent confidence intervals for the estimated values.

An estimated 56 percent of the land area of Rhode Island meets the FIA definition of forest land. This forest land is not evenly distributed across the State (Fig. 1). The distribution is largely determined by development patterns and, to a lesser extent, arable lands—if left alone, most land in the State would naturally revert to forest. Areas surrounding Providence and along the coast have the lowest occurrences of forest land.

The area of forest land in Rhode Island has decreased from an estimated 434,000 acres of in 1952, the first year FIA started collecting data in the State, to an estimated 367,900 acres in 2014, the nominal year of the most recent inventory results (Fig. 2). The general decrease from the earliest estimates is presumably due to increased development. The forest land estimates in 2009 and 2014 are not substantially different, but FIA will continue to monitor this trend to see if the recession or other factors may be allowing increased reversion of nonforest land to forest land.

There have been relatively few stand replacing events over the past few decades and this has resulted in the percentage of the forest land that is in the largest stand size class[2] steadily increasing (Fig. 3). This has important implications for forest resilience (i.e., the ability of the forests to withstand severe weather events or insect infestations), wildlife habitat, and other ecological functions.

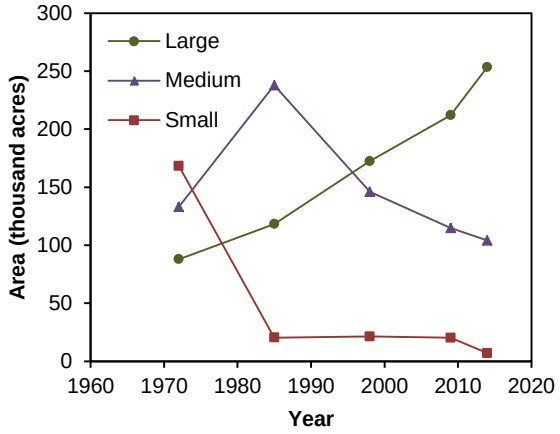

Figure 3.—Area of timberland by stand-size class[2], Rhode Island, 1972-2014.

[1]One-fifth of the plots were measured annually from 1999 thru 2013 resulting in a complete set of samples for every 5 years of data collection. In 2014, this 5-year cycle was changed to 7 years, wherein 1/7th of the plots are measured annually. The complete set of plots will be retained. All inventory estimates (both current and change) will continue to be based on the most recent measurements and remeasurements taken on these plots.

[2]Small: dominated by trees less than 5.0 inches diameter at breast height (d.b.h.); Medium: dominated by trees 5.0 to 8.9 inches d.b.h. for softwoods and 5.0 to 10.9 inches d.b.h. for hardwoods; Large: dominated by trees ≥9.0 inches for softwoods and 11.0 inches d.b.h. for hardwoods.

Forest Composition

There are many different ways to characterize the composition of forests, three are presented here: forest-type groups, volume, and numbers of stems. Each provides a somewhat different view of the resource and there are many other potential metrics that can be examined.

Forest-type groups are amalgamations of forest types which are calculated based on the plurality of trees within the plot/condition. In Rhode Island, the oak/hickory forest-type group is by far the most common forest type group, representing 62 percent of the State's forest land (Fig. 4). 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.

The forests of Rhode Island contain a wide variety of tree species, with 45 species observed on the FIA plots inventoried between 2009 and 2014. In terms of total volume (Table 2) and number of trees (Fig. 5), red maple is the most common tree in the State. This species accounts for an estimated 22 percent of the volume and 27 percent of the number of trees. Rankings of the next most common species vary substantially depending on whether volume or number of trees are examined, but includes eastern white pine and a number of oak and birch species. Collectively, the ten most common tree species account for 90 percent of the volume of live trees and 85 percent of the number of trees in the State.

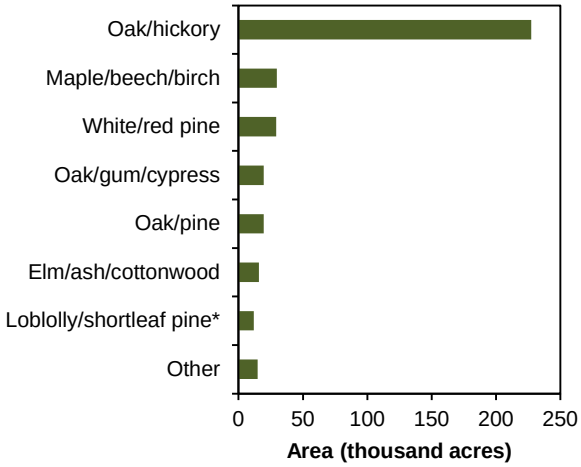

Figure 4.—Area of forest land by forest-type group, Rhode Island, 2009-2014. *Represented by the pitch pine forest type in Rhode Island.

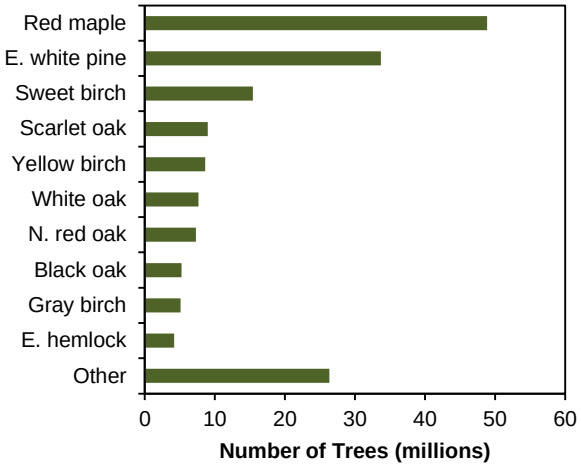

Figure 5.—Number of trees ≥1 in diameter by species, Rhode Island, 2009-2014.

Table 2.—Top 10 trees species by volume estimates, Rhode Island, 2009-2014

Rank	Species	Volume of live trees on forest land (million ft³)	Sampling error (%)	Change since 2009 (%)	Volume of sawtimber trees on timberland (million board ft)	Sampling error (%)	Change since 2009 (%)
1	Red maple	195.2	10.6	1.6	314.1	19.2	-13.4
2	Eastern white pine	165.8	20.3	22.1	742.3	21.7	24.1
3	Northern red oak	120.6	17.4	25.2	453.6	20.6	38.3
4	Scarlet oak	90.2	15.7	14.6	220.9	18.5	21.6
5	Black oak	83.8	18.6	-6.2	292.5	21.0	-4.6
6	White oak	72.8	14.5	37.1	235.7	19.6	33.5
7	Pitch pine	21.2	47.5	12.2	77.1	52.4	14.9
8	Sweet birch	17.5	28.2	-13.8	10.4	46.7	-60.6
9	Blackgum	15.4	33.5	36.3	47.8	44.1	48.0
10	Eastern hemlock	14.4	42.4	33.3	43	51.4	33.1
	Other softwoods	1.4	44.6	--	1.1	89.1	--
	Other hardwoods	83.4	13.1	--	166.5	18.6	--
	All species	881.6	5.4	11.1	2,604.9	8.4	13.1

Emerald Ash Borer and the Ash Resource in Rhode Island

Photo by Leah Bauer, U.S. Forest Service, Bugwood.org.

The emerald ash borer (*Agrilus planipennis*; EAB) has not yet been identified in Rhode Island, but it has been identified in neighboring States. Native to Asia, this wood-boring beetle is a pest of ash and all major ash species are susceptible regardless of size or vigor (Poland and McCullough 2006). Tree mortality is rapid, occurring within 1 to 4 years depending on tree size and beetle intensity. It has recently been found to also colonize white fringetree (*Chionanthus virginicus*), a native tree of the southern United States (Cipollini 2015).

White ash (*Fraxinus americana*) is the dominant ash species in Rhode Island. There are an estimated 1.0 million white ash trees (≥1-inch d.b.h.) that account for 10.5 million ft^3 of volume in the forests of Rhode Island. The highest ash densities are in the west-central part of the State (Fig. 6). White ash annual mortality is currently at 1.5 percent across the State and this percentage may increase as EAB becomes more established. There are also many ash trees in non-forest areas, such as street and yard trees, that will be impacted by EAB.

EAB has caused extensive ash mortality throughout the northeastern United States and represents a significant threat to Rhode Island's ash resource. Continued monitoring will help to identify the long-term impacts of EAB. Information about EAB identification, current status, steps to prevent further spread (including not moving firewood), and potential treatments can be found at: www.emeraldashborer.info.

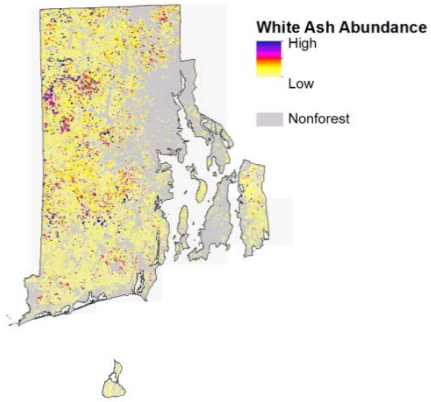

Figure 6.—Relative abundance of white ash in Rhode Island.

Literature Cited

Bechtold, W.A.; Patterson, P.L., eds. 2005. **The enhanced Forest Inventory and Analysis program: national sampling design and estimation procedures**. Gen. Tech. Rep. SRS-80. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station. 85 p.

Cipollini, D. 2015. White fringetree as a novel larval host for emerald ash borer. Journal of Economic Entomology. 108(1): 370-375.

Jin, S.; Yang, L.; Danielson, P.; Homer, C.; Fry, J.; Xian, G. 2013. A comprehensive change detection method for updating the National Land Cover Database to circa 2011. **Remote Sensing of Environment.** 132:159-175.

O'Connell, B.M.; LaPoint, E.B.; Turner, J.A.; Ridley, T.; Boyer, D.; Wilson, A.M.; Waddell, K.L.; Pugh, S.A.; Conkling, B.L. 2013. **The Forest Inventory and Analysis database: database description and users manual version 5.16 for Phase 2.** Washington, DC: U.S. Department of Agriculture, Forest Service. 564 p.

Poland, T.M.; McCullough, D.G. 2006. **Emerald ash borer: invasion of the urban forest and the threat to North America's ash resource.** Journal of Forestry. 104(3): 118-124.

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Contact Information
Brett J. Butler, Research Forester
USDA Forest Service, Northern Research Station
160 Holdsworth Way
Amherst, MA 01002
Ph: 413-545-1387 / Fax: 413-545-1860
bbutler01@fs.fed.us
Northern FIA: http://nrs.fs.fed.us/fia/
National FIA: http://fia.fs.fed.us

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