USDA
United States Department of Agriculture

RESOURCE UPDATE FS-55

Forests of New Hampshire, 2014

This publication provides an overview of forest resources in New Hampshire based on inventories conducted by the U.S. Forest Service, Forest Inventory and Analysis (FIA) program of the Northern Research Station. For annual inventory years 2002-2013, the sample length was equal to 5 years. Beginning in 2014, the cycle length was changed to 7 years. For the 2014 inventory, estimates for current variables such as area, volume, and biomass are based on 1,090 plot samples collected from 2009-2014. Change variables, such as net growth, removals, and mortality, are based on 892 samples collected in 2004-2009 and resampled in 2009-2014. Estimates from earlier annual and periodic inventories are shown for comparison. See Bechtold and Patterson (2005) and O'Connell et al. (2013) for definitions and technical details.

Overview

Currently, New Hampshire is home to nearly 4.8 million acres of forest land (Table 1). Since the 1997 inventory, the estimate of forest land has been relatively stable . However, the volume and biomass of trees has risen (Table 1; Morin et al. 2011). Average annual net growth, mortality, and removals have higher sampling errors, indicating higher uncertainty in trend estimates; however, the latest inventory shows a notable 8.5 percent decrease in average annual mortality on forest land (Table 1).

Note that net volume is defined as gross volume in cubic feet less deductions for rot, roughness, and poor form from a 1-foot stump to a minimum 4.0-inch top diameter. Biomass is defined as the aboveground weight of wood and bark in live trees 1.0 inch diameter and larger from the ground to the tip of the tree, excluding all foliage.

Table 1.—New Hampshire forest statistics, 2014 and 2012. Volumes are for trees 5-inch and larger in diameter. Number of trees and biomass are for trees 1-inch and larger in diameter. Sampling errors and error bars shown in tables and figures in this report represent 68 percent confidence intervals.

	2014 Estimate	Sampling error (percent)	2012 Estimate	Sampling error (percent)	Change since 2012 (percent)
Forest Land					
Area (thousand acres)	4,765	0.9	4,833	1	-1.4
Number of live trees (million trees)	4,222	2.4	4,270	2.6	-1.1
Aboveground biomass of live trees (thousand oven-dry tons)	286,539	1.6	285,084	1.8	0.5
Net volume of live trees (million ft^3)	11,039	1.8	11,023	1.9	0.1
Annual net growth of live trees (thousand ft^3/yr)	206,147	4.8	197,914	5	4.2
Annual mortality of trees (thousand ft^3/yr)	107,133	5.7	117,106	5.4	-8.5
Annual harvest removals of live trees (thousand ft^3/yr)	123,842	12	125,451	11.9	-1.3
Timberland					
Area (thousand acres)	4,495	1.1	4,545	1.2	-1.1
Number of live trees (million trees)	3,880	2.7	3,929	2.9	-1.2
Aboveground biomass of live trees (thousand oven-dry tons)	271,181	1.8	269,661	2	0.6
Net volume of live trees (million ft^3)	10,432	2	10,411	2.1	0.2
Net volume of growing stock trees (million ft^3)	9,443	2.1	9,581	2.2	-1.4
Annual net growth of growing stock trees (thousand ft^3/yr)	195,114	4.1	190,556	4	2.4
Annual mortality of growing stock trees (thousand ft^3/yr)	73,641	6.3	79,189	5.9	-7
Annual harvest removals of growing stock trees (thousand ft^3/yr)	101,773	12.3	105,184	12.1	-3.2

Forest Area

Although New Hampshire's current area of forest land has been relatively stable since the late 1990s, there has been a gradual decline in forest area since 2012 that has resulted in a 1 percent decrease (Table 1). Timberland accounts for 94 percent of this forest land or 4.5 million acres. Slightly less than 5 percent of forest land is reserved from timber production and less than 1 percent is other forest land identified as not being able to meet minimum productivity standards. New Hampshire's total area is 5.8 million acres (excludes census water, e.g., Lake Winnipesaukee).

Even though the State is still heavily forested, urbanization is putting increasing pressure on the forest resources of New Hampshire. The wildland–urban interface (WUI) refers to the zone of transition between unoccupied land and human development. Here we use a house density greater than 15.5 houses per square mile as the threshold for the wildland-urban interface (Radeloff et al. 2005, Figs. 1, 2, 3).

Figures 1 through 3 illustrate how much forest land was affected by house densities greater than 15.5 houses per square mile. The proportion of forest area in the WUI ranges from 9 percent in Coos County to 82 percent in Rockingham County (Fig. 1). Most importantly, the area in the 15.5 houses per square mile and higher categories increased substantially across much of the State between 2000 and 2010 (Fig. 2). The proportion of forest land area in the WUI increased by 4 percent within the State and in nearly all counties between 2000 and 2010 (Fig. 3). The largest increase was in Hillsborough County (9 percent). By contrast, increase in forest land area in the WUI was 1 percent or less in Coos, Carroll, and Cheshire Counties.

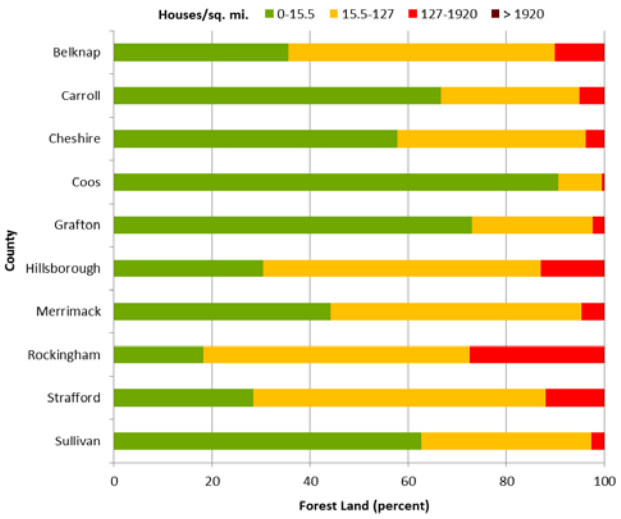

Figure 1.—Distribution of forest land by county and house density class, New Hampshire 2010.

Forest that is intermixed with houses is increasingly likely to be experiencing pressures from recreation, invasive plant species, and other local human effects. Additionally, among many others, forest health, sustainability, and management opportunities are affected by changes in the fragmentation of forests and urbanization.

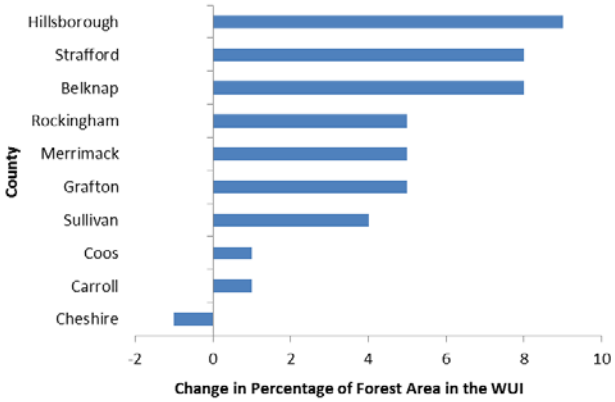

Figure 2.—Change in the percentage of forest land in the WUI, New Hampshire, 2000 to 2010.

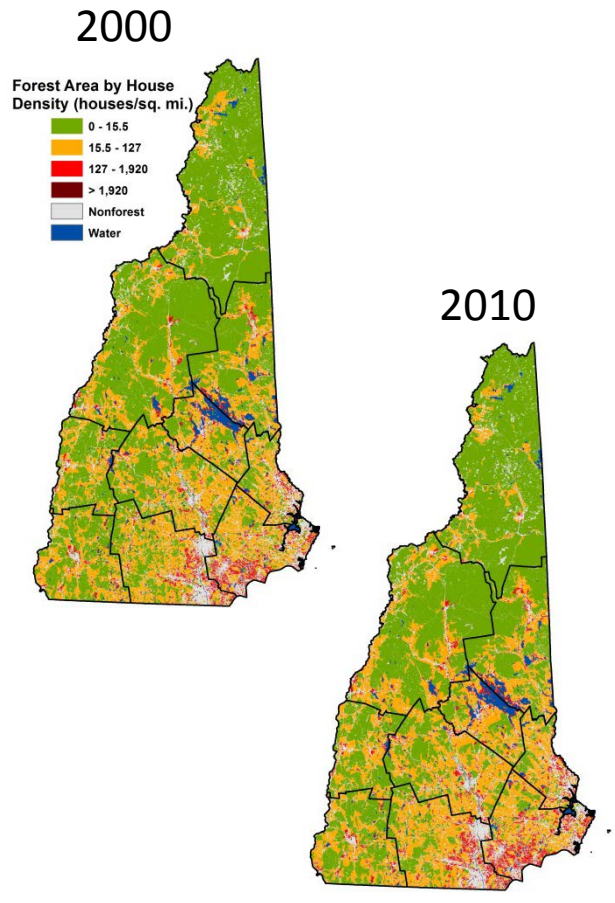

Figure 3.—Distribution of forest land by house density classes, New Hampshire, 2000 and 2010.

Volume, Biomass, and Trends

Increases in volume, biomass, and number of large-diameter trees have accompanied the increase in area large-diameter stands in New Hampshire despite a slight decrease in overall forest land area.

There are approximately 927 million live trees (at least 5-inch diameter) on forest land accounting for approximately 11 billion ft^3 of volume and 287 million oven-dry tons of aboveground biomass. Volume increased 0.1 percent and biomass increased by 0.5 percent since the 2012 inventory (Table 2).

Contributing to this increase, notable gains in volume were observed for red spruce (*Picea rubens*) and sugar maple (*Acer saccharum*) at 6 and 5 percent, respectively. By contrast, paper birch (*Betula papyrifera*) and balsam fir (*Abies balsamea*) decreased by greater than 3 percent (Fig. 4).

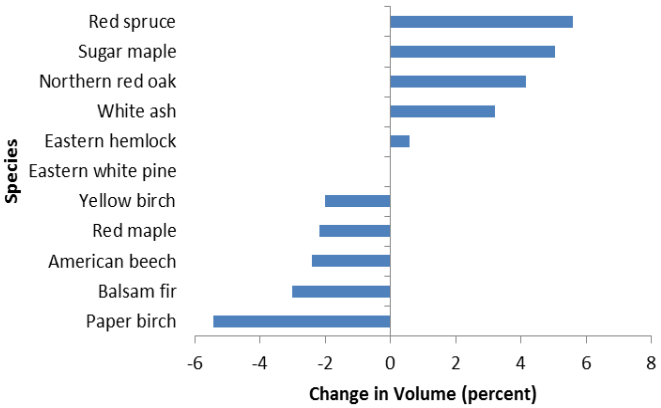

Figure 4.—Percent change in inventory volume by species, New Hampshire, 2012 to 2014.

The growth-to-harvest removal ratio (G:R) for all species across the State is 1.7:1, but this ratio varies substantially by species. Northern red oak (*Quercus rubra*) and eastern hemlock (*Tsuga canadensis*) have G:R ratios above 4:1. By contrast, sugar maple, American beech (*Fagus americana*), and paper birch have G:R ratios below 1.5:1.

Beaver Brook Falls State Wayside Area. Photo by Jennifer Weimer, NH Division of Forests and Lands, used with permission.

Table 2.—Number, net volume, oven-dry biomass, net growth, mortality, and harvest removals of live trees on forest land, New Hampshire, 2014 (selected prominent species)

Species	Trees[a] (million trees)	Net volume[a] (million ft^3)	Aboveground biomass[b] (thousand tons)	Net growth[a] (thousand ft^3/yr)	Mortality[a] (thousand ft^3/yr)	Harvest removals[a] (thousand ft^3/yr)
Red maple	171	1,652	42,708	27,484	13,634	17,921
Eastern hemock	100	1,171	21,706	30,958	1,639	7,526
Balsam fir	95	509	7,645	16,308	10,312	7,036
Eastern white pine	82	2,187	37,400	47,333	12,105	28,833
Red spruce	69	591	9,575	13,427	1,894	6,033
Sugar maple	66	885	26,737	17,920	3,325	14,894
Northern red oak	64	1,221	38,796	34,303	4,785	6,710
Yellow birch	59	633	18,590	6,688	8,163	3,880
American beech	59	512	15,065	4,815	8,921	5,839
Paper birch	58	482	12,542	-8,682	15,951	3,447
White ash	24	335	9,675	7,568	1,939	4,860

[a]At least 5-inch diameter trees. [b]At least 1-inch diameter trees.

Urbanization and Fragmentation of Forest Land

We adapted a spatial integrity index (SII) developed by Kapos et al. (2000) for the Global Forest Resources Assessment that integrates three important facets of fragmentation that affect some aspect of forest ecosystem functioning—patch size, local forest density, and patch connectivity to core forest areas—to create a single resulting metric for comparison. In the SII calculation, core forest is defined by patch size and local forest density within a defined local neighborhood area. An unconnected forest fragment is defined by its patch size, local forest density, and distance to a core forest area. The spatial integrity of all other forest lands are then scaled into the low, medium, and high categories between the core forest and unconnected fragment categories. Note that the forest land estimates in this section were calculated from the SII maps not the FIA plots.

Ninety-five percent of New Hampshire's forest land meets the criteria for high integrity and much of it meets the criteria for core forest (Fig. 5). High forest integrity dominates across nearly all of the State. In fact, Rockingham and Strafford are the only counties where more than 20 percent of forest area is not in the core forest or high integrity category.

The health and sustainability of forest land are affected in many areas by high levels of fragmentation and the close proximity of urban development and roads. These impacts can affect the ability of forest land to provide the products and ecosystem services that people need. Core and high integrity forest areas may be looked upon as areas to focus conservation activities in order to protect them from fragmentation and urbanization.

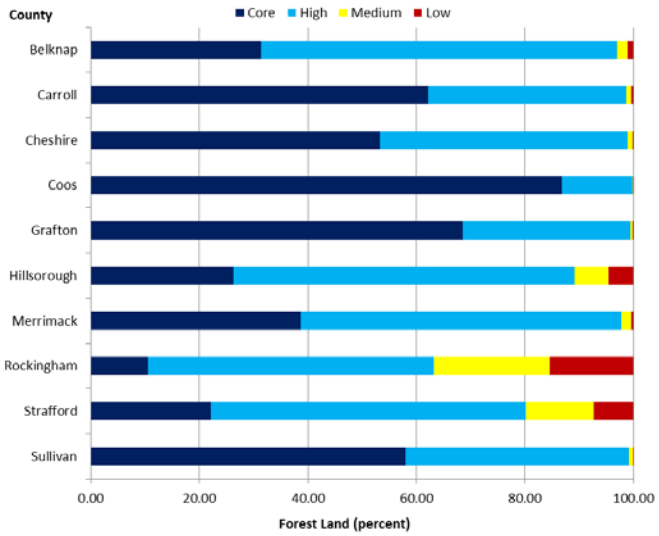

Figure 5.—Percentage of forest land by county and Spatial Integrity Index (SII) class.

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How to Cite This Publication
Morin, Randall S.; Riemann, R. 2015.
Forests of New Hampshire, 2014.
Resource Update FS-55. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 4 p.

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