



Forests of New Hampshire, 2016

Overview

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 2016 inventory, estimates for current variables such as area, volume, and biomass are based on 1,164 samples (1,052 forested) collected from 2011-2016. Change variables, such as net growth, removals, and mortality, are based on 893 samples (787 forested) collected in 2004-2010 and resampled in 2011-2016. Estimates from earlier annual and periodic inventories are shown for comparison. See Bechtold and Patterson (2005), Gormanson et al. (2017), and O’Connell et al. (2013) for definitions and technical details.

Currently, New Hampshire is home to nearly 4.8 million acres of forest land (Table 1) which make its land approximately 83 percent forested. 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. 2015). Average annual net growth, mortality, and removals have higher sampling errors, indicating higher uncertainty in trend estimates. A 4-year remeasurement period is presented for the estimates in Table 1 because 2012 was the first complete cycle available for growth, removals, and mortality.

Note: 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, 2016 and 2012. Volumes are for trees 5 inches 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.

	2016 Estimate	Sampling error (percent)	2012 Estimate	Sampling error (percent)	Change since 2012 (percent)
Forest Land					
Area (thousand acres)	4,753	0.9	4,833	1.0	-1.7
Number of live trees (million trees)	4,295	2.4	4,270	2.6	0.6
Aboveground biomass of live trees (thousand oven-dry tons)	290,571	1.6	285,084	1.8	1.9
Net volume of live trees (million ft ³)	11,178	1.8	11,023	1.9	1.4
Annual net growth of live trees (thousand ft ³ /yr)	204,185	4.3	197,914	5.0	3.2
Annual mortality of trees (thousand ft ³ /yr)	104,937	5.8	117,106	5.4	-10.4
Annual harvest removals of live trees (thousand ft ³ /yr)	112,904	12.8	125,451	11.9	-10
Timberland					
Area (thousand acres)	4,469	1.1	4,524	1.2	-1.2
Number of live trees (million trees)	3,948	2.7	3,914	2.9	0.9
Aboveground biomass of live trees (thousand oven-dry tons)	274,527	1.8	268,962	2.0	2.1
Net volume of live trees (million ft ³)	10,546	2.0	10,388	2.1	1.5
Net volume of growing stock trees (million ft ³)	9,481	2.1	9,561	2.2	-0.8
Annual net growth of growing stock trees (thousand ft ³ /yr)	191,414	4.0	190,372	4.0	0.5
Annual mortality of growing stock trees (thousand ft ³ /yr)	70,856	6.4	79,189	5.9	-10.5
Annual harvest removals of growing stock trees (thousand ft ³ /yr)	94,864	12.9	105,184	12.1	-9.8



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 1.7 percent decrease (Table 1; Fig. 1). Most of this decrease occurred in southern New Hampshire. Timberland accounts for 94 percent of the State’s forest land or 4.5 million acres. Slightly less than 6 percent of forest land is reserved from timber production or unproductive. New Hampshire’s total land area is 5.8 million acres (excluding census water, e.g., Lake Winnepesaukee).

The northern unit of New Hampshire has a larger area of and proportion of forest land when compared to the southern units (Fig. 2). The northern unit also has more than double the proportion of forest land in public ownership (39 percent) when compared with the southern unit (15 percent).

Maple/beech/birch is the dominant forest-type group, covering 52 percent of the forest land (Fig. 3). In fact, the maple/beech/birch type group makes up over 50 percent of the forest land area in all but the five southern most counties.

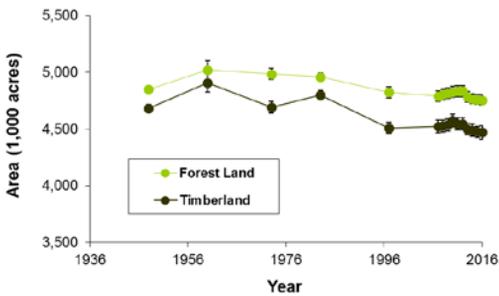


Figure 1.—Forest land and timberland by year, New Hampshire.

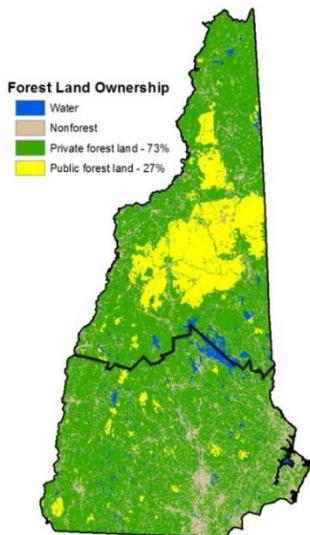


Figure 2.—FIA unit boundaries (black line) and area of forest/nonforest with forest identified by major ownership group, New Hampshire, 2013.

White/red pine and spruce/fir are the most abundant softwood forest-type groups. Together they account for 21 percent of the forest land in the State.

The forest-type groups that are more widely distributed in the southern unit (e.g., oak/pine, oak/hickory, and white/red pine) have generally higher proportions of private ownership. Statewide, families and individuals, corporations, and other private entities own the majority of forest land (50, 17, and 5 percent, respectively). The State of New Hampshire, federal government, and local public entities own the remainder (4, 18, and 5 percent, respectively).

New Hampshire’s forests have been maturing as illustrated in the distribution of timberland by stand-size classes (Fig. 4). Since the 1960 inventory, the acreage of large-diameter stands has been increasing. Until the 1997 inventory, the acreage in small-diameter stands was declining and has since been stable. The acreage of medium-diameter stands has been declining since the 1960 inventory.

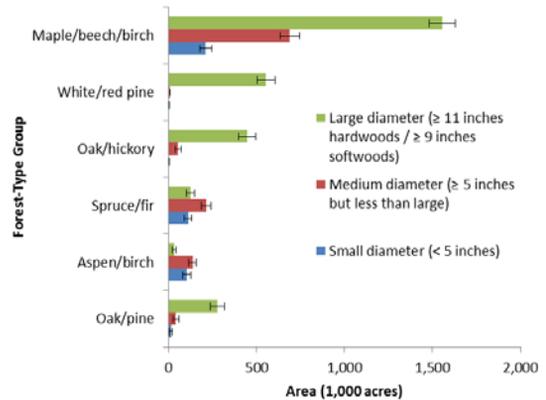


Figure 3.—Forest land by stand-size class (based on small, medium, and large trees) for top six forest-type groups by acres, New Hampshire, 2016.

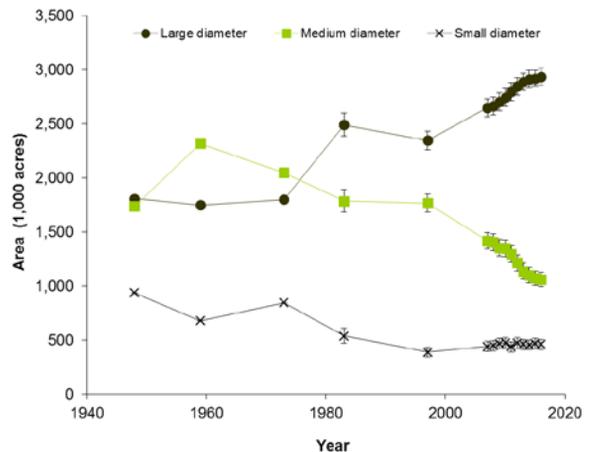


Figure 4.—Timberland by stand-size class and year, New Hampshire.

Volume, Biomass, and Trends

Red maple (*Acer rubrum*) continues to be the most numerous tree in New Hampshire, but eastern white pine (*Pinus strobus*) dominates in terms of volume (Table 2). However, both of those species have relatively low net growth-to-harvest removals ratios (Fig. 5). A ratio of 1:1 would indicate that the amount of volume added annually is equal to that which was harvested. Sugar maple (*Acer saccharum*) and American beech (*Fagus grandifolia*) both have net growth-to-harvest removal ratios of 1:1 or less, and the ratio for paper birch (*Betula papyrifera*) is negative. By contrast, eastern hemlock (*Tsuga canadensis*), northern red oak (*Quercus rubra*), balsam fir (*Abies balsamea*), and red spruce (*Picea rubens*) all have net growth-to-harvest removal ratios above 3:1.



Peeling paper birch bark, Photo by Randall Morin, U.S. Forest Service.

The low-grade wood market has declined in recent years. This is mostly due to decreased demand for paper, which has resulted in the closure of many paper mills. In fact, New Hampshire no longer has any operating pulp mills.

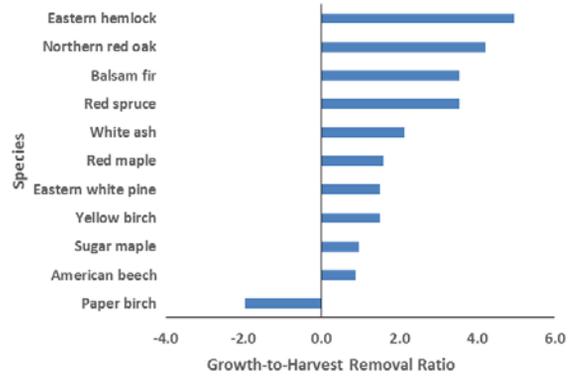


Figure 5.—Growth-to-harvest removal ratio by species, New Hampshire, 2016.

In the absence of low-grade wood markets, sound forest management may suffer because there is no incentive for landowners to do stand improvement thinning operations or to remove low-grade wood from mature stands.

However, the supply of low-grade wood is plentiful. Tree grade indicates the quality of all live, growing-stock, sawtimber-size trees. The 2016 data show that there are approximately 1.6 billion cubic feet of the gradable wood volume in the forests of New Hampshire that does not meet the criteria to be tree grade 1 through 3 (hereafter referred to as low-grade wood). The proportion of low-grade volume has declined slightly since 2007 (Fig. 6).

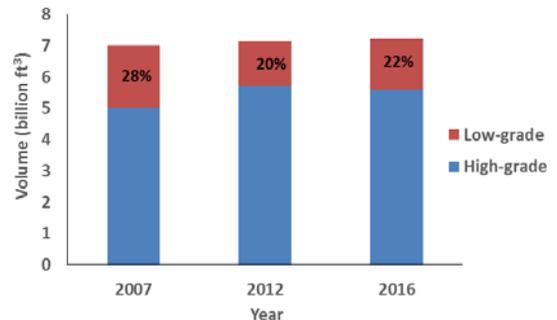


Figure 6.—High- and low-grade volume on forest land by year, New Hampshire.

Table 2.—Number, net volume, oven-dry biomass, net growth, mortality, and harvest removals of live trees on forest land, New Hampshire, 2016, for 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	1,660	42,961	26,635	14,559	16,714
Eastern hemlock	99	1,177	21,831	30,050	2,217	6,050
Balsam fir	98	522	7,839	17,801	9,964	5,006
Eastern white pine	77	2,175	37,828	41,111	10,960	27,045
Red spruce	73	642	10,397	14,401	1,871	4,062
Sugar maple	65	864	26,170	17,623	3,072	18,086
Northern red oak	64	1,266	40,225	35,547	3,779	8,420
Yellow birch	61	655	19,239	8,365	7,372	5,513
American beech	61	518	15,307	7,124	8,547	8,047
Paper birch	56	466	12,124	-6,328	13,854	3,229
White ash	25	351	10,114	7,161	2,317	3,345

^aAt least 5-inch diameter trees. ^bAt least 1-inch diameter trees.

Low-Grade Volume Assessment

Low-grade biomass makes up over 22 percent of all gradable wood volume in New Hampshire, but this proportion varies slightly by county (Fig. 7). Most of the counties with above average proportions of low-grade volume are in southern New Hampshire – Rockingham, Sullivan, and Belknap. Carroll is the only county in northern New Hampshire with proportion of low-grade wood volume higher than the State average.

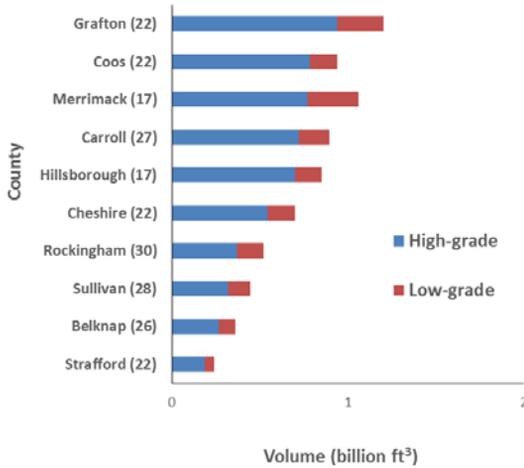


Figure 7.—High- and low-grade biomass by county, New Hampshire, 2016 (proportion of volume in low-grade wood in parentheses).

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In terms of absolute low-grade biomass, eastern white pine, American beech, and red maple dominate with 706, 196, and 194 million cubic feet, respectively. However, American beech contains by far the largest proportion in low-grade wood at 92 percent due to the defects and decay caused by beech bark disease. Eastern white pine and quaking aspen (*Populus tremuloides*) also have over 35 percent of total volume in low-grade wood (Fig. 8).

Low-grade wood can be left on site to provide wildlife habitat and break down into the soil. However, new markets for low-grade wood could improve management practices and forest health.

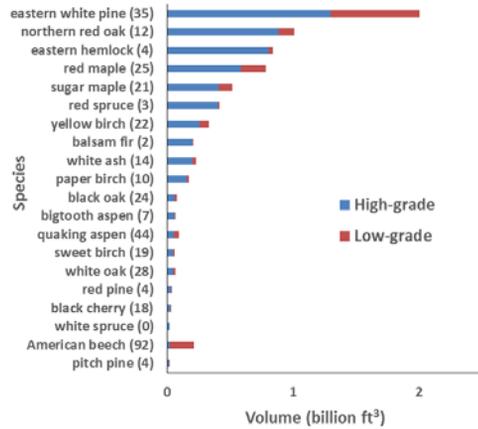


Figure 8.—High- and low-grade biomass by species, New Hampshire, 2016. The proportion of volume in low-grade wood in parentheses.



Post-thinning operation, Photo by New Hampshire Division of Forest and Lands, used with permission.

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