



# Forests of Maine, 2014

This publication provides an overview of the forest resources in Maine based upon inventories conducted by the U.S. Forest Service, Forest Inventory and Analysis (FIA) program of the Northern Research Station. Information about the national and regional FIA program is available online at <http://fia.fs.fed.us>. Since 1999, FIA has implemented an annual inventory measuring data on 20 percent of sample plots each year. For the 2014 inventory, estimates for current variables, such as area, volume, and biomass, are based on 3,169 plots inventoried from 2010-2014. Change variables, such as net growth, removals, and mortality, are based on 3,094 samples collected in 2005-2009 and resampled in 2010-2014. There are additional tables available online (<http://www.nrs.fs.fed.us/fia/data-tools/state-reports/ME/default.asp>). Estimates from earlier annual and periodic inventories are shown for comparison.

See Bechtold and Patterson (2005) and O’Connell et al. (2014) for definitions and technical details.

## Overview

Maine contains more than 17.5 million acres of forest land (Table 1). The acreage of forest land has been quite stable since 1960, currently covering more than 89 percent of the total land area (Ferguson and Longwood 1960). There are more than 24 billion live trees greater than 1 inch in diameter.

Aboveground biomass of all live trees has increased since 2009. Over the same period, the average annual volume for tree growth has increased 25 percent and tree mortality has decreased 14 percent. Tree harvest levels decreased 11 percent since 2009 (McCaskill and McWilliams 2011).

**Table 1.—Maine forest statistics, 2014 and 2009. Volumes are for 5-inch and larger diameter trees. Number of trees and biomass are for 1-inch and larger diameter trees. Sampling errors and error bars shown in tables and figures in this report represent 68-percent confidence intervals.**

	2014 Estimate	Sampling error (percent)	2009 Estimate	Sampling error (percent)	Change since 2009 (percent)
<b>Forest Land</b>					
Area (thousand acres)	17,546	0.4	17,660	0.4	-0.6
Number of live trees (million trees)	24,288	1.5	23,679	1.5	2.6
Aboveground biomass of live trees (thousand oven-dry tons)	694,696	0.9	665,331	1.0	4.4
Net volume of live trees (million ft <sup>3</sup> )	26,389	1.2	25,419	1.2	3.8
Annual net growth of live trees (thousand ft <sup>3</sup> /yr)	782,462	2	625,827	2.3	25.0
Mortality of live trees (thousand ft <sup>3</sup> /yr)	284,423	3.3	331,909	2.9	-14.3
Annual harvest removals of live trees (thousand ft <sup>3</sup> /yr)	554,130	5.4	624,239	5.3	-11.2
Annual other removals of live trees (thousand ft <sup>3</sup> /yr)	7,014	34.3	4,225	65.7	66.0
<b>Timberland</b>					
Area (thousand acres)	16,931	0.5	17,032	0.5	-0.6
Number of live trees (million trees)	23,512	1.5	22,907	1.6	2.6
Aboveground biomass of live trees (thousand oven-dry tons)	669,870	1	642,354	1.0	4.3
Net volume of live trees (million ft <sup>3</sup> )	25,352	1.2	24,481	1.2	3.6
Net volume of growing stock trees (million ft <sup>3</sup> )	23,414	1.3	22,947	1.3	2.0
Annual net growth of live trees (thousand ft <sup>3</sup> /yr)	725,052	1.8	586,013	2.0	23.7
Annual mortality of growing stock trees (thousand ft <sup>3</sup> /yr)	221,300	3.6	249,706	3.2	-11.4
Annual harvest removals of growing stock trees (thousand ft <sup>3</sup> /yr)	487,976	5.4	549,249	5.3	-11.2
Annual other removals of growing stock trees (thousand ft <sup>3</sup> /yr)	14,708	47.8	4,679	53.0	214.3



# Forest Area

Maine’s forest land area has been very stable since 1960 (Fig. 1). Commercial timberland makes up 97 percent of the forest land area. Public ownership including some reserved lands have remained below 8 percent of the total forested area (Fig. 2). The stand-size classes for the timberland area at the state-level have come into balance since the spruce budworm salvage operations of the 1980s and 1990s (Fig. 3). By type, the area of timberland in the white/red/jack pine forest-type group continues to be dominated with large diameter-sized trees (Fig. 4).

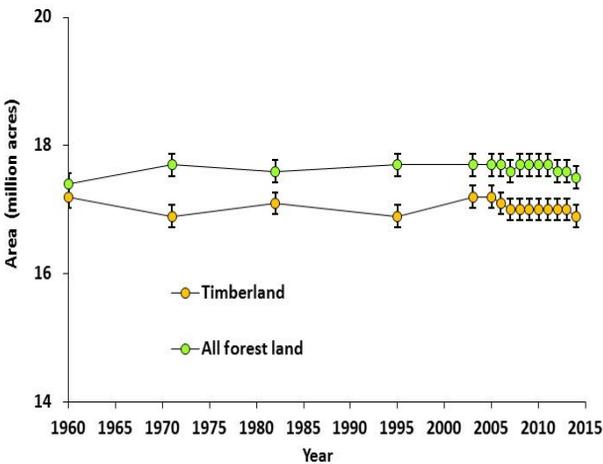


Figure 1.—Forest land and timberland by year, Maine.

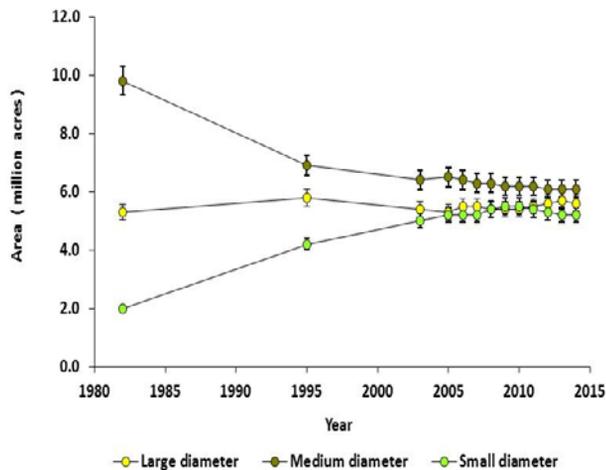


Figure 3.—Timberland by stand-size class and survey year, Maine.

Only 44,000 acres (4 percent) within the pine group are considered small diameter stands. In the largest group, maple/beech/yellow birch forests, 25 percent of the timberland area are considered small diameter-sized stands.

On the other hand, the area of large diameter-sized aspen/white birch stands are less than 15 percent of the total area for this forest-type group. The intensely managed spruce/fir forest-type group contains a higher percentage in smaller diameter stands. Small diameter stands make up 40 percent of the total area, while medium diameter-sized stands and large diameter-sized stands contain 32 and 28 percent, respectively.

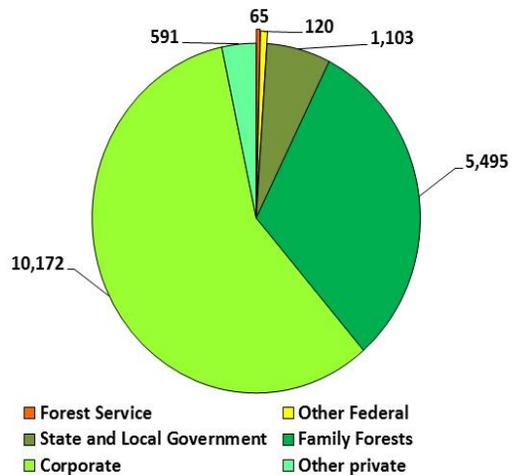


Figure 2.—Major ownership groups on forest land (thousand acres), Maine, 2014.

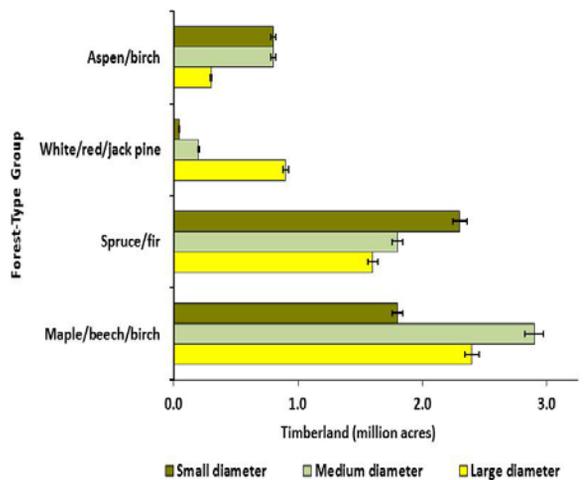


Figure 4.—Timberland by stand-size class for the major forest-type groups in acres, Maine, 2014.

## Volume, Biomass, and Trends

Maine contains more than 26 billion cubic feet of wood within its forests, an increase of 3.8 percent since 2009. This wood volume is almost evenly split between softwood (55 percent) and hardwood (45 percent) tree species. Even though more of the biomass is found in the hardwood species (58 percent), more of the annual growth is found in the softwood species (57 percent). The annual mortality rate is also heavily weighted to softwood species (62 percent), while harvest levels are more evenly split between the softwoods and hardwoods, 49 percent and 51 percent respectively.

There are major differences between individual species which are highlighted in Table 2. Eastern white pine, eastern hemlock, and northern white-cedar have greater than 40 percent of their live trees (greater than 5.0 inches d.b.h.) in saw log-sized trees.

In contrast, less than 10 percent of the paper birch, American beech, and balsam-fir tree numbers are saw log-sized trees. Red maple and red spruce have the highest live tree volumes, while eastern white pine has the highest saw log volumes within the state of Maine.

Red maple followed by a distant balsam-fir contain the most biomass, while northern red oak and American beech contain the least for the major 11 species.

Statewide, the overall net growth rate as percent of standing volume is 3.0 percent. The species with the

highest growth rates are balsam fir (5.0 percent), northern red oak (4.3 percent), and eastern white pine (3.5 percent); species with the lowest net growth rates are sugar maple (1.9 percent), paper birch (1.3 percent), and northern white-cedar (0.6 percent).

The species with the highest mortality as percent of gross growth are northern white-cedar (60.9 percent) and paper birch (59.7 percent) while the lowest mortality rates found in eastern hemlock (6.6 percent) and northern red oak (4.1 percent).

The interacting effects of growth rates and harvesting on net volume can be calculated over a 5-year cycle from the annual inventory data:

$$V_c = \frac{5(G-H)}{V_n}$$

where  $V_c$  is the volume change,  $G$  is annual net growth,  $H$  is annual harvest removals, and  $V_n$  is ending net volume. The largest accruals (gains in volume) are observed with balsam fir (14.1 percent), northern red oak (12.4 percent), and eastern white pine (10.0 percent). By contrast, the largest depletions (losses in volume) are observed in American beech (-6.1 percent), paper birch (-4.9 percent), and sugar maple (-4.6 percent).

**Table 2.—Number of 5-inch and larger diameter trees, live tree volume, saw log volume, oven-dry biomass, net growth, mortality, and harvest removals of live trees on forest land, by major species, Maine 2014.**

Species	Live trees ≥ 5.0 d.b.h. (million trees)	Net volume live trees (million ft <sup>3</sup> )	Net volume sawlog trees (million bd. ft.)	Aboveground biomass (thousand tons)	Net growth (thousand ft <sup>3</sup> /yr)	Net Mortality (thousand ft <sup>3</sup> /yr)	Harvest Removals (thousand ft <sup>3</sup> /yr)
Red maple	426	3,247	4,827	105,820	94,598	24,684	67,127
Red spruce	367	3,160	7,840	62,147	93,978	22,968	88,130
Eastern white pine	178	2,974	10,601	53,881	104,095	16,972	45,112
Balsam fir	592	2,552	2,752	72,272	128,549	67,117	56,403
Northern white-cedar	298	2,209	4,703	34,485	13,040	20,353	13,029
Eastern hemlock	175	2,003	5,638	39,358	67,474	4,751	46,493
Sugar maple	150	1,999	5,355	65,609	37,769	18,107	56,156
Yellow birch	162	1,655	3,485	56,694	48,009	12,501	34,687
Paper birch	179	1,118	1,078	39,759	14,663	21,776	25,566
Northern red oak	71	936	2,611	31,348	40,271	1,741	17,036
American beech	136	854	923	32,038	24,237	18,189	34,764
Other softwood species	210	1,511	3,315	31,638	39,446	24,126	19,957
Other hardwood species	258	3,026	5,113	69,647	79,199	31,138	49,670
<b>All species</b>	<b>3,202</b>	<b>26,389</b>	<b>57,318</b>	<b>694,696</b>	<b>782,462</b>	<b>284,423</b>	<b>554,130</b>

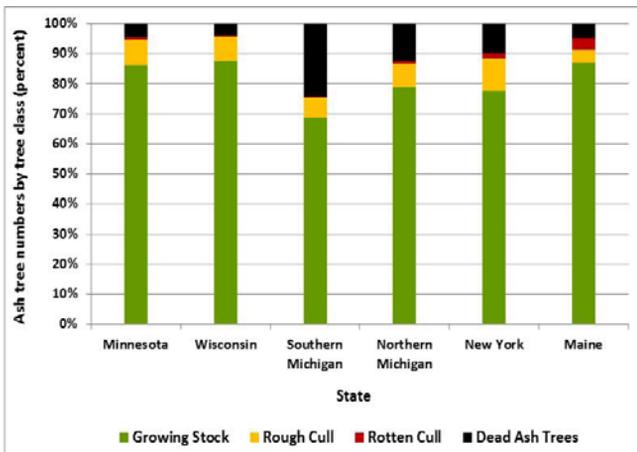
## Are There Differences in the Condition of Ash Trees within the Northern Forests ?

Ash trees (*Fraxinus ssp.*) are being impacted by the emerald ash borer (EAB) across the eastern United States (Knight et al. 2011).

Since Maine is dominated by northern forest types and has no detected presence of EAB, it can be used as a reference site for evaluating similar northern states where EAB has been detected. In particular, are ash trees located within these northern forests of the region affected differently than more southerly distributed ash trees?

The condition of ash trees within spruce/fir, aspen/white birch, and maple/beech/yellow birch forest-type groups were compared with ash tree conditions from more southerly forest types within each state to see if there are any differences in mortality or defect due to latitude or species composition.

There were no significant differences in the proportions of dead, rotten or rough cull, and healthy ash trees between



**Figure 5.—The number of ash trees by tree class and State, as a percent of the State totals, 2014.**

those found within the northern forests and those located within other forests (Fig. 5). Southern Maine forest data indicated an increase in rot.

In Michigan there was a greater proportion of dead ash trees (27.4 percent) in the southern forest types compared to ash tree conditions in Michigan's northern forest types (Fig. 5). Could these results be an indication of what is to occur as the insect spreads?

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### How to Cite This Publication

McCaskill, George L. 2015.

#### **Forests of Maine, 2014.**

Resource Update FS-52. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 4 p.

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