

Forest Service

**Northeastern
Research Station**

NE-INF-141-01



The Granite State's Forests: Trends in the Resource



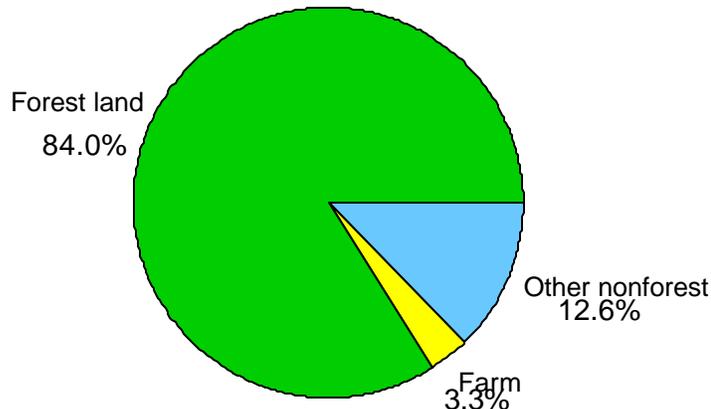
NEW HAMPSHIRE'S FORESTS

The USDA Forest Service conducts continuing forest inventories of all states to obtain up-to-date information about the forest resources of the Nation. In 1997, the Forest Service in cooperation with the New Hampshire Division of Forests and Lands completed a new inventory of New Hampshire. Previous inventories were conducted in 1948, 1960, 1973, and 1983. Following data collection for the 1997 inventory, a devastating ice storm struck New England. To account for losses to this storm, field plots were revisited and new measurements taken in areas that incurred heavy damage. The many significant changes in New Hampshire's forests during the last inventory period are highlighted here.

AREA OF FOREST LAND DECREASES

The Granite State is the second most forested state in the Nation (trailing only Maine). Forests occupy 84 percent, or 4.8 million acres, of the landscape. The area of forest land has declined by 134,500 acres (3 percent) since 1983 and is now about the same as in 1948. Three-fourths of the decline occurred in the southern part of the state, where rapid commercial and residential development has extended into previously forested areas. In the past, additions to forest land resulting from abandoned farm land reverting to forest more than offset losses due to development. Reversion of farm land has continued through the most recent survey period, but gains from abandoned farms have been less than losses to development. As with forest land, farm land in New Hampshire is being lost to development.

AREA BY LAND USE, 1997



Forest land is an important contributor to the quality of life enjoyed by all New Hampshire citizens. Forests provide wood and other forest products, watershed protection, wildlife habitat and biodiversity, recreation, fall color, and much, more. Stewardship of forest resources will ensure these benefits now and in the future.

Forest land is categorized by the Forest Service as timberland or noncommercial. Categorizing forest land is helpful in understanding resource availability and planning forest management. Timberland, traditionally referred to as commercial forest land, is physically capable of growing timber crops and is potentially available for harvesting. These lands support New Hampshire's wood products industry. Ninety-three percent of forest land, more than 4.5 million acres, is classified as timberland. The most recent inventory revealed that timberland area has decreased by 290,700 acres. More than half of this decrease resulted from the reclassification of timberland into a noncommercial forest use. Noncommercial forest land includes reserved forest lands, unproductive forests, and urban forests. Management for timber on these lands is administratively restricted or economically impractical. Examples include designated wilderness areas on the White Mountain National Forest, mountaintops with very thin soils, and forests in urban areas. The area of noncommercial forest land has increased to 315,200 acres. Most noncommercial forest land is in public ownership.

FOREST LAND AREA TRENDS

(Thousands of acres at each inventory)

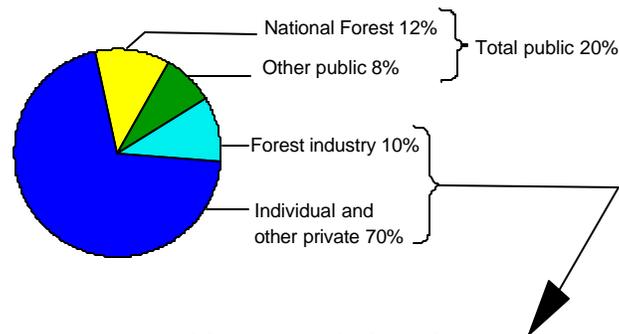
	Inventory date				
	1948	1960	1973	1983	1997
Timberland	4,682	4,907	4,692	4,799	4,509
Noncommercial forest land	166	112	293	159	315
Total forest land	4,848	5,019	4,985	4,958	4,824
Percent forested	83.9%	87.0%	86.2%	86.7%	84.0%
Estimated total land area*	5,775	5,769	5,781	5,740	5,740

***Estimates of the total land area have changed because of new measurement techniques and refinements in the classification of small bodies of water.**

WHO OWNS NEW HAMPSHIRE'S TIMBERLAND?

New Hampshire's private forest-land owners are a diverse group of approximately 83,700 individuals and enterprises; they control 80 percent of New Hampshire's timberland. This is divided between forest industry and nonindustrial private owners. State, federal, and other public owners hold the remaining 20 percent. The acreage owned by forest industry has dropped by nearly a third since 1983. Much of this land has gone into public ownership, which has increased by 218,400 acres. Although large in number, owners with small holdings account for a small portion of the timberland. About a third of the nonindustrial private forest-land owners have fewer than 10 acres; they own only 2.3 percent of the timberland. These small holdings are primarily sites for houses. The number of acres owned strongly influences a landowner's motives and management activities. As timberland becomes fragmented into smaller holdings it is less likely that owners will manage these forests for timber products. The negative effects of fragmentation are a growing concern across the country.

TIMBERLAND OWNERSHIP IN NEW HAMPSHIRE



PRIVATE TIMBERLAND
BY SIZE CLASS OF OWNER, 1993

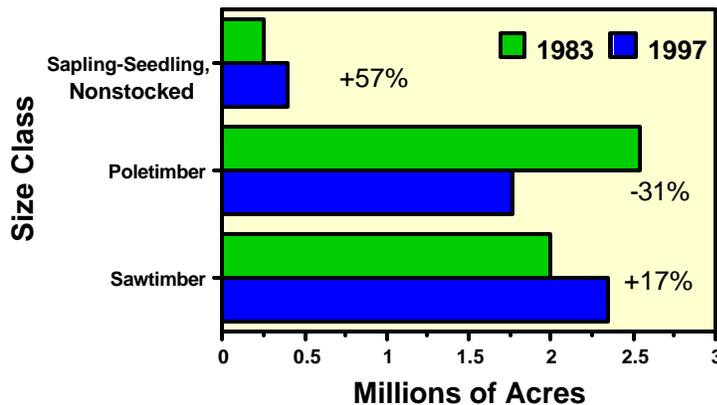
Acres Owned (size class)	Number of owners	Total Acres in class
1-9	28,900	102,200
10-49	32,900	483,300
50-99	14,900	827,500
100-499	5,900	1,042,500
500-999	600	319,000
1,000+	500	847,600
All size classes	83,700	3,622,000

MORE SAWTIMBER-SIZE STANDS INDICATE A MATURING FOREST

Timberland is classified by the size of trees growing on it. Sawtimber stands, which are dominated by large trees suitable for sawlogs, have increased in acreage while poletimber-size stands have declined. This is good news not only for the lumber industry but also for many wildlife species. Poletimber-size trees are not sufficiently mature to produce large amounts of nuts and seeds, and their dense, closed overstory can inhibit the growth of understory vegetation. Stands of large trees generally have more attributes that benefit wildlife. These include an understory with herbaceous plants and shrubs that provides food and cover, cavities for nesting, bark flaps for feeding sites, and larger dead trees, both standing and on the forest floor.

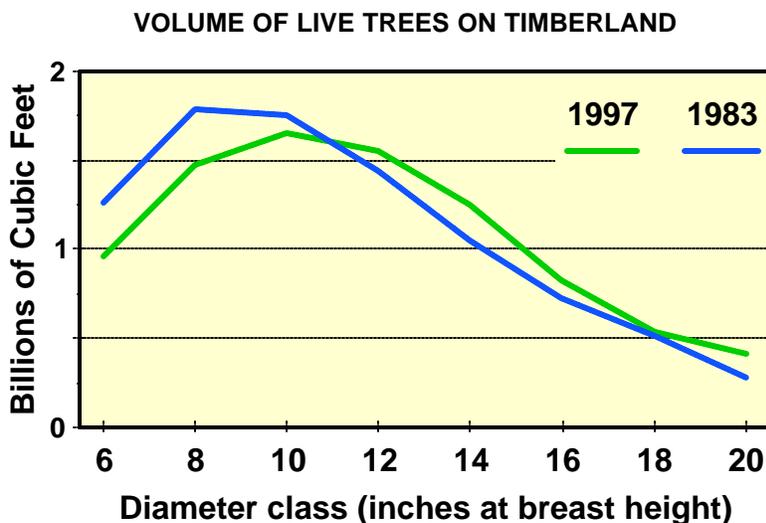
The area in sapling/seedling and nonstocked stands accounts for only 9 percent of the timberland. These stands typically support pioneer tree species along with herbaceous plants and shrubs that provide unique nesting and feeding habitats for wildlife. A forest with all stand-size classes provides diverse habitats for wildlife, an even flow of forest products, and may be more resistant to insect and disease than other forests.

TIMBERLAND AREA BY STAND-SIZE CLASS AND PERCENT CHANGE, 1983-97



THE VOLUME OF TREES HAS CONTINUED TO INCREASE

The volume of live trees has been increasing since the first inventory of New Hampshire. Average volume on timberland has more than doubled since 1948, from 973 to 2,114 cubic feet per acre. However, the rate of increase has slowed. The 1997 inventory recorded an increase in volume of only 2.1 percent since 1983. All of this increase occurred in southern New Hampshire, where volume increased by 8 percent. Volume in northern New Hampshire decreased by 3.6 percent. Increases in volume were also distributed unevenly across diameter classes, concentrated on larger trees. The volume of trees in smaller diameter classes decreased while increases occurred in all diameter classes above 10 inches.

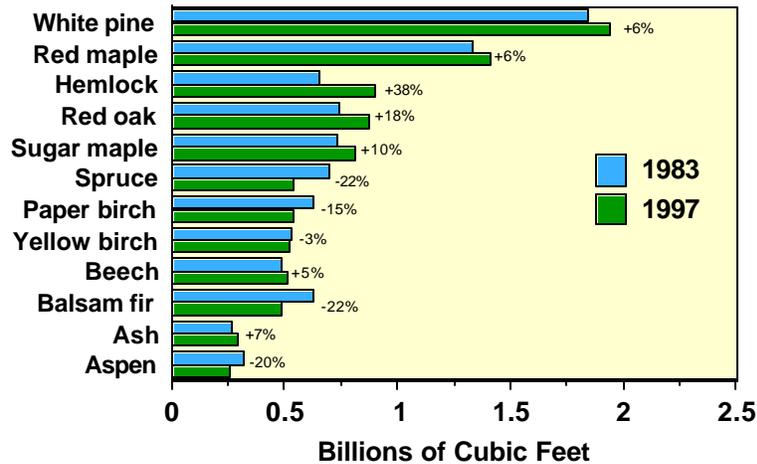


SPECIES COMPOSITION OF THE FOREST IS CHANGING

Apart from the constant struggle among individual forest trees for light, water and space, timber harvesting and other management activities influence species composition. The 1997 inventory identified nearly 50 different tree species; though most of these are uncommon. The 12 most common species or species groups (see chart) account for 95 percent of the total volume. White pine leads all other species in volume, followed by red maple. Hemlock had the largest gain in volume since 1983, increasing by 38 percent. The top 12 species have remained the same since the last inventory, though in term of volume, hemlock moved ahead of red oak, spruce, and sugar maple and now ranks third.

VOLUME OF LIVE TREES ON TIMBERLAND TOP TWELVE SPECIES

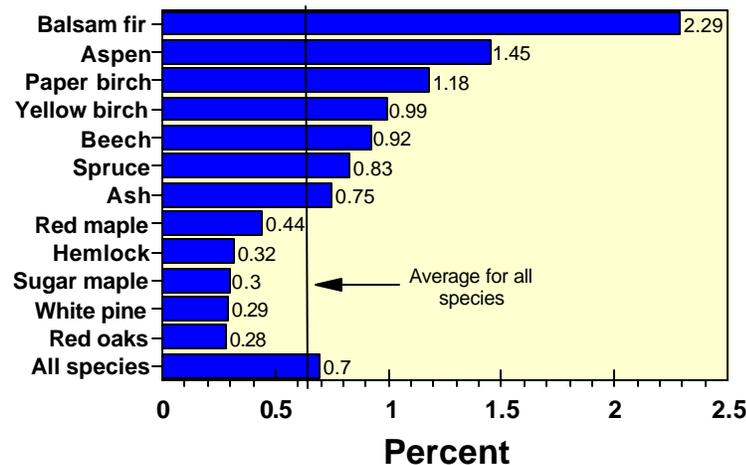
(Volume increased by 2.1 percent for all species)



MORTALITY

Fire, wind, ice, insects, disease, and other causes contribute to tree mortality. Between 1983 and 1997, annual mortality averaged 64.4 million cubic feet, or 0.7 percent of the inventory volume. During the same period, the annual mortality rate in Vermont was 0.8 percent. Balsam fir suffered the highest mortality, dying at an average rate of 2.3 percent per year. Aspen, paper birch, yellow birch, beech, and spruce also had above-average mortality rates. The high mortality of balsam fir and spruce is attributed to an outbreak of spruce budworm from 1974 to 1984. Salvage harvesting of dying spruce and fir probably spared these species even higher mortality. Beech bark disease has infected trees across New England and New York, causing high mortality of beech throughout the region. High mortality of paper birch and aspen is consistent with changes that occur naturally as forests mature. These relatively short-lived species decline gradually as stands mature. The ice storm in the winter of 1998 also increased mortality rates for many species, and many trees that sustained heavy damage probably will die in the near future.

AVERAGE ANNUAL MORTALITY AS A PERCENT OF LIVE VOLUME



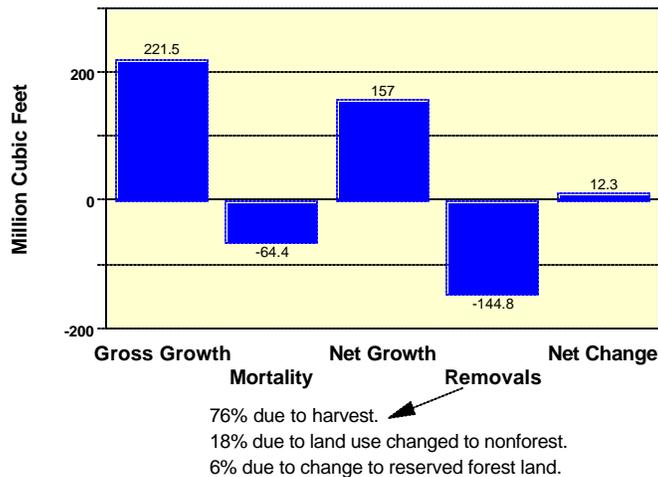
GROWTH HAS NARROW LEAD OVER REMOVALS

On an annual basis, net growth of trees was 157 million cubic feet while removals totaled 144.8 million cubic feet. Seventy-six percent of removals are attributed to harvesting, 18 percent to the conversion of forests to nonforest uses, and 6 percent to forest land reclassified to the reserved or other noncommercial forest land category. Statewide, the surplus of growth over removals yields an annual net increase of 12.3 million cubic feet, a yearly increase of 0.1 percent. The growth of trees has exceeded harvesting since the first inventory in 1948. In the recent inventory, removals exceeded net growth in northern New Hampshire while growth outpaced removals in the southern part of the state. High removals of balsam fir and spruce combined with losses from mortality resulted in these species having large decreases in volume. Eighty-four percent of spruce and fir volume grows in the northern New Hampshire.

COMPONENTS OF CHANGE IN GROWING STOCK

Gross Growth-Mortality = Net Growth

Net Growth-Removals = Net Change



The ratio of net growth to removals has averaged 1.1: 1 over the past decade. That is, 1.1 times as much wood was grown as was cut or otherwise removed. Growth-to-removals ratios differ among species. Species with the most favorable ratios are hemlock, ash, sugar maple, red maple, and white pine. Ratios of less than 1:1 occur when removals exceed growth. Paper birch had the most unfavorable growth-to-removals ratio, followed by balsam fir.

**AVERAGE ANNUAL NET GROWTH AND
REMOVALS, 1983-1997***

Top 12 species	Net growth (Million cubic feet)	Removals (Million cubic feet)	Ratio of growth to removals
White pine	42.7	34.6	1.2 : 1
Red maple	26.1	19.8	1.3 : 1
Hemlock	18.0	7.8	2.3 : 1
Red oak	15.5	12.6	1.2 : 1
Sugar maple	18.3	11.2	1.6 : 1
Spruce	7.5	8.8	0.8 : 1
Paper birch	0.5	9.6	0.05 : 1
Yellow birch	4.1	6.2	0.7 : 1
Beech	4.9	8.7	0.6 : 1
Balsam fir	5.3	12.2	0.4 : 1
Ash	5.2	2.6	2.0 : 1
Aspen	2.9	4.1	0.7 : 1
State total	157.0	144.8	1.1 : 1

* Estimates of growth and removals are made from only remeasured plots. These estimates can differ from volume change estimates that are made using all plots.

**For more information call: Forest Inventory & Analysis (610) 557-4051
or write: USDA Forest Service, FIA Unit, 11 Campus Boulevard, Suite 200
Newtown Square, PA 19073-3294.**

**Or call: State of New Hampshire, Department of Resources and Economic
Development, Division of Forests and Lands, P.O. Box 1856, Concord, New
Hampshire 03302-1856, (603) 271-2629.**

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