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Forest Statistics for Massachusetts: 1985 and 1998

Carol L. Alerich

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Abstract

A statistical report on the fourth forest inventory of Massachusetts conducted in 1997-98 by the Forest Inventory and Analysis Unit of the Northeastern Research Station. Statistics for forest area, numbers of trees, wildlife habitat, tree biomass, timber volume, growth, and change are displayed at the state and, where appropriate, the county level. The current inventory indicates that there are approximately 5.7 billion cubic feet of growing-stock volume on 2.6 million acres of timberland in Massachusetts.

Acknowledgment

The Forest Inventory and Analysis Unit thanks the landowners of Massachusetts and the Massachusetts Department of Environmental Management for their cooperation and assistance during this inventory.

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Foreword

The fourth inventory of Massachusetts was directed by John R. Peters, Project Leader of the Forest Inventory and Analysis Unit. David J. Alerich supervised the data-collection phase of the inventory. He was assisted by Edward A. Doane, Robert E. Ilgenfritz, Brian M. LaPoint, Richard A. McCullough, Jason W. Morrison, Lucretia B. Stewart, Kathryn M. Tillman, and Scott H. Tepke. The members of the data-collection field staff in Massachusetts were:

Michael A. Baer	Allison M. Bush	William P. Groth	James P. Morin
Joseph P. Barsky	Thomas M. Byron	Mary M. Honer	Steven J. Schacht
Karl J. Benner	Amy L. Calehuff	Keith G. Kanoti	Jerome S. Scott
Gabriel Bolton	Shane A. Carter	Elizabeth A. LaPoint	Mark R. Snodgrass
Erik J. Brischler	Paul F. Catanzaro	Michael J. Lingley	Scott A. Stockhaus
Christopher W. Brown	James D. Donaldson	Jeffrey A. Martin	Jeffrey B. Tilley
Lynn D. Brown	Matthew P. Gallucci	Kristin D. McCarthy	

Thomas S. Frieswyk supervised information-management activities. Carol L. Alerich applied FINSYS (Forest Inventory SYStem), a generalized data-processing system, ORACLE SQLPlus, and SAS to process and analyze the information provided by the field crews, and produced summary tables of estimates and errors for the state and counties. Kathryn M. Tillman produced the summary information of the quality control data for this report. Richard L. Goren and Michael J. Kazimer performed data entry services. Vickie M. Sharon was responsible for administrative and secretarial services. She was assisted by Karen Y. Chenery.

Mr. Warren E. Archey, Mr. William H. Rivers, and other members of the Massachusetts Department of Environmental Management; Dr. David B. Kittredge, Jr. of The University of Massachusetts; and Dr. Alan A. Lucier of the National Council of the Paper Industry for Air and Stream Improvement, Inc. (NCASI) assisted in reviewing this document for accuracy. Mr. Rivers also collected and compiled data on public ownership.

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Carol L. Alerich, Forester

**Forest Inventory and Analysis Unit
Northeastern Research Station
USDA Forest Service
Newtown Square, PA**

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Highlights

Forest-Land Area

The 3.1 million acres of forest land in the Commonwealth of Massachusetts cover 62 percent of the state's total land area (5 million acres). Timberland, the largest component of forest land, totals 2.6 million acres and makes up 84 percent of the forest land, and 52 percent of the total land area. This is a decrease from 1985, when timberland acres totaled 2.9 million acres, or 90 percent of the forest land, and 58 percent of the total area.

Figure 1. Area by land class, Massachusetts, 1998 (Source: Table 1).

As expected, the eastern, more urban counties showed a drop in forest land, while the western part of the state showed a slight increase since 1985. Across the state, there was a 3-percent drop in forest land since 1985, when forest land covered 64 percent of the area.

Unit	1985	1998	Percent change
Western Massachusetts	1,317	1,348	+ 2.3
Worcester	688	634	- 7.9
Eastern Massachusetts	1,219	1,144	- 6.1
State total	3,224	3,126	- 3.0

Figure 2. Area (in thousand acres) of forest land and percent change, Massachusetts, 1985 and 1998 (Source: Table 48).

Timberland

When forest type is classified using relative stand density to calculate stocking (a new nationally developed standard procedure for all FIA projects—see **Comparison Between Inventories** section), the northern hardwoods type group is the most common in Massachusetts. Characterized by sugar maple, beech, yellow birch, and black cherry, this type group makes up 39 percent (1.0 million acres) of the timberland area. Oak/hickory forests

cover 28 percent (0.7 million acres); white/red pine, 17 percent (0.4 million acres); oak/pine, 8 percent (0.2 million acres), and elm/ash/red maple, 5 percent (0.1 million acres). Other type groups combined contribute less than 100,000 acres.

Figure 3. Timberland by forest-type group (based on relative density), Massachusetts, 1998 (Source: Table 4).

When forest type is determined using basal area to calculate stocking (the procedure used in 1985), the three major forest type groups are more equally represented. The northern hardwoods type group makes up 29 percent (0.8 million acres) of the timberland area. White/red pine forests cover 28 percent (0.7 million acres); oak/hickory, 26 percent (0.7 million acres); oak/pine, 9 percent (0.2 million acres), and elm/ash/red maple, 5 percent (0.1 million acres). Other type groups contribute less than 100,000 acres.

Figure 4. Timberland by forest-type group (based on basal area), Massachusetts, 1998 (Source: Table 6).

When stand size is determined using relative density as a factor, sawtimber stands (those in which the stocking of live sawtimber trees makes up the majority) are found on 67 percent of the timberland, or 1.8 million acres. Poletimber stands cover 28 percent (0.7 million acres), and sapling and seedling stands account for 5 percent (0.1 million acres). In 1985, stand sizes were distributed more evenly across the sawtimber and poletimber stands. Sawtimber stands covered 1.2 million acres (41 percent), while poletimber stands accounted for 1.5

million acres (51 percent). Sapling and seedling stands accounted for 0.2 million acres, or 8 percent. Poletimber stands showed a 51-percent drop while sawtimber stands increased by 48 percent.

Figure 5. Area of timberland (in million acres) by stand-size class (based on relative density), Massachusetts, 1985 and 1998 (Source: Tables 3 and 4).

When stand size is classified using basal area to determine stocking, sawtimber stands are found on 73 percent of the timberland, or 1.9 million acres. Poletimber stands cover 23 percent (0.6 million acres), sapling and seedling stands, 4 percent (0.1 million acres). In 1985, sawtimber stands covered 1.6 million acres (55 percent), poletimber stands, 1.1 million acres (39 percent), and sapling and seedling stands accounted for 0.2 million acres, or 6 percent. Poletimber stands showed a 47-percent drop while sawtimber stands increased by 18 percent.

Figure 6. Area of timberland (in million acres) by stand-size class (based on basal area), Massachusetts, 1985 and 1998 (Source: Tables 5 and 6).

Numbers of Trees

There are 1.5 billion live trees 1.0 inch or larger in diameter at breast height (d.b.h.) on Massachusetts' timberland, or 584 trees per acre. Of these, .5 billion (194 trees per acre) are at least 5.0 inches in d.b.h. Red maple is the most common tree species in Massachusetts, accounting for 21 percent of all saplings and 24 percent of the live trees 5.0

inches and larger in d.b.h. Eastern hemlock is the second most common tree species, with 10 percent of the saplings and 12 percent of the live trees at least 5.0 inches in diameter. White pine rounds out the top three overall, with 8 percent of the saplings and 14 percent of the live trees 5.0 inches and larger in d.b.h.

Growing-stock trees make up 91 percent of live trees 5.0 inches and larger in d.b.h. Red maple is the most common of the trees in this category, with 23 percent of the growing-stock trees. White pine makes up 15 percent of the total. Hemlock is third, with 12 percent of all growing-stock trees.

There has been a negligible change in the total number of growing-stock trees since 1985. However, since the timberland acreage is down, the number of growing-stock trees per acre is up, from 159 to 176 trees per acre.

In growing-stock trees 5.0 to 10.9 inches in d.b.h., there has been a decrease of 7 percent versus an increase of 28 percent in trees that are 11.0 inches and larger in diameter.

Figure 7. Number of growing-stock trees (in million trees) on timberland by diameter group, Massachusetts, 1985 and 1998 (Source: Tables 22 and 23).

Growing-Stock Volume

The volume of growing-stock trees in Massachusetts is 5.7 billion cubic feet, or 2,174 cubic feet per acre. This is a 17-percent increase since 1985 when the volume totaled 4.9 billion feet, or 1,686 cubic feet per acre. White pine is the leading species in growing-stock volume, with 1.3 billion cubic feet, or 24 percent of the total. Red maple growing-stock trees contribute 18 percent of the total volume, or 1.0 billion cubic feet. Northern red oak ranks third with 11 percent of the total (0.6 billion cubic

feet). There has been no change in the ranking of the top three species since 1985.

Figure 8. Net volume of growing-stock trees (in million cubic feet) on timberland, top five species, Massachusetts, 1985 and 1998 (Source: Tables 33 and 34).

Sawtimber Volume

With an average of 6,282 board feet per acre, there are 16.5 billion board feet of sawtimber volume in Massachusetts. In 1985, the volume was 12.4 billion board feet, or 4,252 board feet per acre; sawtimber volume has increased by 34 percent since the last inventory. As with growing-stock volume, white pine is the top species with 5.6 billion board feet, or 34 percent of the total. Red maple has 13 percent (2.1 billion board feet) of the total sawtimber volume. Rounding out the top three sawtimber volume species is northern red oak with 12 percent.

Figure 9. Net volume of sawtimber trees (in billion board feet) on timberland, top five species, Massachusetts, 1985 and 1998 (Source: Tables 36 and 37).

Growth and Removals

Since the last inventory, the average annual net growth of growing stock on timberland is 97.5 million cubic feet, or 37 cubic feet per acre per year. This represents 1.7 percent of the current inventory. Average annual removals of growing stock total 53.9 million cubic feet, or 20 cubic feet per acre per year. Net change is positive over the period since the last inventory, with an average annual net change of 43.5 million cubic feet.

Rates of growth to removals of growing-stock volume vary with tree species. Red maple is growing 2.5 times faster than it is being removed, either by harvest or by land-use change, while northern red oak, the species with the highest amount of total growing-stock removals, has a growth to removals ratio of 0.8.

Average annual net growth of sawtimber on timberland is 388.4 million board feet, or 148 board feet per acre per year. The rate of growth to removals of sawtimber volume is 2.9. Annual removals are 132.3 million board feet per year, or 50 board feet per acre annually. Removals combined with growth yielded a positive annual change in board-foot volume of 256.1 million board feet.

For all major species there was a positive change in board-foot volume, with white pine showing the largest annual increase at 67.8 million board feet and a growth-to-removals ratio of 2.6. Northern red oak, with a growth-to-removals ratio of 1.7, showed an annual increase of 20.2 million board feet.

Species	Growing stock	Sawtimber
White pine	1.9	2.6
Red maple	2.5	6.5
Northern red oak	0.8	1.7
Hemlock	11.8	14.9
Other red oaks	0.9	1.8

Figure 10. Growth-to-removals ratios of growing-stock and sawtimber volume on timberland, top five species, Massachusetts, 1984-1997 (Source: Tables 40 and 41).

Introduction

Under the authority of the McSweeney-McNary Forest Research Act of 1928 and subsequent acts, including the Renewable Resources Planning Act of 1974 and the Renewable Resources Research Act of 1978, the USDA Forest Service conducts periodic inventories of all states to provide up-to-date information on the forest resources of the Nation. The initial inventory of Massachusetts' forest resources was conducted in 1953-54, the second was completed in 1971, and the third was carried out in 1984. This report presents forest-resource data from the fourth inventory, which was conducted in 1997-98. This inventory was a cooperative effort of the Northeastern Research Station, the Massachusetts Department of Environmental Management, and the landowners of Massachusetts.

The Forest Inventory and Analysis Unit (FIA) of the Northeastern Research Station conducted the inventory on all lands, developed the resource tables, and prepared this report.

The sampling procedure used during the current inventory included the use of aerial photography, the remeasurement of a sample of ground plots established in earlier inventories, and the establishment of new ground plots. For Massachusetts, this procedure required the photointerpretation and classification of 18,132 new photo points and 567 previously sampled ground plot locations into land-use and cubic-foot volume classes. Then, 541 ground plots from the previous inventory were remeasured and 257 new ground plots were established. Of the total 798 plots, 497 were forested at plot center. The data collected were summarized using the FINSYS computer system developed at the Northeastern Research Station.

The forest area, numbers of trees, wildlife habitat, biomass, timber volume, growth, and change statistics in this report summarize the information collected by the field staff. Other information or additional summaries may be developed. For information about these, contact the **Forest Inventory and Analysis Unit, USDA Forest Service, 11 Campus Boulevard, Suite 200, Newtown Square, PA 19073 (Telephone: 610-557-4075; Fax: 610-557-4200; Web site: www.fs.fed.us/ne/fia).**

The three eastern Research Stations have agreed to include a set of 25 core tables in each of their state resource bulletins. The format of any of these tables will be identical for all 37 states in the Stations' territories. Rather than being grouped as a set, these core tables have been interspersed throughout this publication according to their level of data or content. The index in this report includes both a list of tables in this publication and the corresponding core-table number.

Reliability of the Estimates

The data in this report were based on a carefully designed sample of forest conditions throughout Massachusetts. However, because the field crews did not measure every tree or every acre in the state, the data are estimates. The reliability of the estimating procedure can be judged by two important statistical measures: accuracy and precision. Statistically, accuracy refers to the success of estimating the true value; precision refers to the clustering of sample values about their own averages or to the variation among repeated samples. We are interested primarily in the accuracy of the inventory, but in most cases we can only measure its precision.

Although accuracy cannot be measured exactly, it can be checked. Preliminary tables are sent to other agencies and to outside experts familiar with the forest conditions in Massachusetts. If questions arise, the data are reviewed and reanalyzed to resolve differences. Great care is taken to minimize sources of procedural error through careful training of both field and office personnel, frequent inspection of field and office work, and application of the most reliable inventory methods.

Because of the care exercised in the inventory process, estimates of precision afford a reasonable measure of the inventory's adequacy. The precision of each estimate is described by its sampling error. Sampling errors are given with several tables in this report. The others are available upon request.

Here is an example of how the sampling error is used to indicate reliability. The estimate of timberland for Massachusetts is 2,631,300 acres. The associated sampling error is 2.0

percent, or 52,600 acres. This means that if there are no errors in the procedure, we are 68 percent confident that the true number of acres is between 2,578,700 and 2,683,900 acres, or $2,631,300 \pm 52,600$ (one standard deviation). Similarly, we are 95 percent confident that the true number of acres is within $\pm 105,200$ acres (two standard deviations). County estimates are less precise. In Massachusetts, for example, while the sampling error for timberland at the state level is 2.0 percent, the sampling error for Middlesex County is 11.8 percent. In general, as the size of the sample decreases, the sampling error, expressed as a percentage of the estimate, increases. A high amount of variance within a county increases the sampling error.

For many of the tables in this report, both the last column and last row are labeled "SE." These figures are the sampling errors of the column and row totals. The last sampling error given (SE) is for the table total. To calculate the approximate sampling error (SE_{ij}) for a table cell (ij), use the following formula (**this formula is reliable only for estimating sampling errors of individual cells in AREA tables**):

$$SE_{ij} = 1/P_{ij}((P_{ij}(1 - P_{ij}))/n)^{1/2}$$

where:

n = total number of sample plots of a population

P_{ij} = A_{ij} / A

A_{ij} = cell estimate

A = total land area of a population

ij = row(i) and column(j)

Any estimate with a sampling error of 50 percent or more is not significantly different from zero, and estimates with errors of 25 to 50 percent are suspect. Therefore, any estimates with errors exceeding 25 percent should be used with caution.

Comparison Between Inventories

To evaluate the condition of the forest resource, it is useful to compare the current estimates with those from the previous inventory. However, as a result of ongoing efforts to improve the efficiency of the inventory, we have made several changes in procedures and definitions since 1985. Because these changes make inappropriate the direct comparison of some of the current estimates with those published by Dickson and McAfee (1988), users should use caution when comparing the data in this report with those in the 1985 report. In this report, several tables containing 1985 data are provided to allow comparisons. The changes in methods and definitions follow.

Forest Inventory uses Bureau of Census estimates of total land area in a state or county as the basis for estimating land area by various classes. For the 1985 report (1988), 1980 Bureau of Census data were used; in 1998, 1990 data were available. Between 1980 and 1990, the Bureau of Census changed its estimating procedures: it now can identify as inland water streams that are more than 200 feet wide and bodies of water 4.5 acres and larger in area. Previously, the minimum width for streams was 660 feet and the minimum area for bodies of water was 40 acres. This procedure results in a reduction in total land area. For comparison of land area between inventories, 1985 estimates of land area by class were recalculated using 1990 total land-area values from the Bureau of Census.

Stocking is a quantitative expression of live-tree stand density that can be expressed in absolute terms, such as basal area per acre, volume per acre, or number of trees per acre; or in relative terms, such as a percentage of a previously defined standard.¹ For the 1985 inventory statistics, the stocking value of a tree was calculated using the basal area of the tree as a percent of 75 square feet per acre, which is the basal-area standard for full use of the site.²

¹ Arner, Stanford L. and others. **National algorithms for determining stocking class, stand size class, and forest type for Forest Inventory and Analysis plots.** In preparation.

² U.S. Department of Agriculture, Forest Service. 1967. **Forest survey handbook.** For. Serv. Handb. 4809.11. On file at Northeastern Research Station, Forest Inventory and Analysis, Newtown Square, PA.

Basal-area stocking may well describe current timber volume, but it is inadequate to describe stand composition in a multiresource inventory in that it neither adequately measures present site utilization nor describes small-diameter stands. For the statistics in this publication, stocking is calculated using relative density, which represents site occupancy based on normal yield tables. Basal area is diameter-dependent only; whereas relative density reflects species composition, stage of development, and the social position of the trees present. A relative measure of stand density is a useful tool for interpreting findings of extensive inventories, such as those performed by FIA, in which a wide variety of stands are sampled. A procedure using relative density to calculate stocking was developed and accepted as a standard to be used by all FIA projects in the country.

Stand size is a classification (sapling/seedling, poletimber, sawtimber, or nonstocked) of forest land based on the size of the trees that dominate an area, and forest type is a classification of forest land based on the species found in the area. Both stand size and forest type are calculated based on stocking of all live trees, and, therefore, are affected by the change in the procedure to calculate stocking. To allow comparisons, this report includes several 1985 area tables showing estimates of area of timberland by stand-size class and forest type and forest-type group that are calculated based on relative density. There also are tables that show estimates of timberland area by forest type and stand size for both 1985 and 1998, where stocking is based on the basal area of all live trees.

Ninety-five percent of the plots that were visited during the 1985 inventory, either as remeasurement or as new plots, were remeasured in 1997-98. The estimates of average annual net growth and change are derived from this set of data. These estimates afford an opportunity to look at change in overall volume from occasion to occasion with the same sample of plots. The estimates showing 1985 information are from the plots that were selected at that occasion to produce an estimate of the current area and volume. These data have been used in current procedures to recalculate estimates of area and volume at the 1985

occasion so that comparisons can be made with the current information. Although the data set from which estimates of growth and change are derived contains a portion of the plots from which the 1985 recalculated estimates were calculated, they are different data sets designed to produce different types of estimates. Inconsistencies in trends for certain species may result when the annual change tables are compared with the total change between the 1985 and 1998 tables.

To improve data consistency at the national level, a standard plot design is being used by all Forest Inventory projects in the country. The new plot design, a cluster of four 24-foot-radius points covering a 1/6-acre area, was established at all selected plot locations, both new and previously measured. Field crews recorded different conditions on the plots if certain attributes (land use, forest type, stand origin, stand size, tree density, and/or owner) differed than those at plot center. They "mapped" these conditions by recording information that described the boundaries of the conditions. This mapping procedure is designed to reduce bias in the estimates. In previous inventories, a ground plot was established wholly within the land class (forest or nonforest) that the plot was chosen to represent. The condition (e.g. privately owned northern hardwoods sawtimber timberland) that was found at plot center was used to classify the entire plot.

On all selected remeasured plot locations, a subsample of the trees that were recorded in the past were reconciled, and growth and removals estimates were calculated using these data. Condition mapping was ignored for calculations of estimates of change since this procedure was not used at the previous occasion.

Definitions of Terms

Acceptable tree. (a) Live sawtimber trees that do not qualify as preferred trees but are not cull trees. (b) Live poletimber trees that prospectively will not qualify as preferred trees, but are not now or prospectively cull trees.

Accretion. The estimated net growth on growing-stock trees that were measured during the previous inventory (divided by the number of

growing seasons between surveys to produce average annual accretion). It does not include the growth on trees that were cut during the period, nor those trees that died.

Apical meristem. The point on a tree where stem elongation and growth occur.

Azimuth. The horizontal direction as sighted from subplot center to the center of the base of the tree. Recorded to the nearest degree on all trees 1.0+ inches d.b.h.

Basal-area class. A classification of forest land based on basal area (cross-sectional area of a tree stem at breast height in square feet per acre) of all live trees of all sizes.

Board foot. A unit of lumber measurement 1 foot long, 1 foot wide, and 1 inch thick, or its equivalent. International ¼ inch rule is used as the USDA Forest Service standard log rule in the eastern United States.

Board-foot cull. The volume within the sawlog length of the tree that cannot be used as lumber because of rot, sweep, crook, excessive limbs, and other defects.

Board-foot soundness. The amount of board-foot cull that is sound, expressed as a percentage.

Board-foot stand-volume class. A classification of forest land based on net board-foot volume of sawtimber trees per acre.

Bog/Marsh/Swamp. Land that has less than 10.0 percent stocking with live trees and which characteristically supports low, generally herbaceous or shrubby vegetation, and which is intermittently covered with water during all seasons; includes tidal areas that are covered with brackish water during high tides.

Bole length. The length of a tree stem from a 1 foot stump to a 1) four-inch top diameter outside bark (d.o.b.); 2) where the central stem terminates by branching before reaching four inches d.o.b.; 3) point of a break on broken-off trees. Recorded to the nearest whole foot on all live and sound dead poletimber and sawtimber trees.

Christmas tree plantation. Forest land sufficiently productive to qualify as timberland but is exclusively used for Christmas tree production.

Commercial species. Tree species currently or prospectively suitable for industrial wood products; excludes species of typically small size, poor form, or inferior quality, such as hawthorn and sumac.

Condition. A classification of a land area based on land use, forest type, stand origin, and stand size (see definitions).

Corporate-owned lands. Lands owned by private corporations, partnerships, trusts, or clubs other than forest industry or farmers.

County and municipal lands. Lands owned by counties and local public agencies or municipalities or leased to them for 50 years or more.

Cropland. Land that currently supports agricultural crops including silage and feed grains, bare farm fields resulting from cultivation or harvest, and maintained orchards.

Crown class. An indicator of the status of the tree in relation to other trees in the stand.

Crown ratio. The percentage of the total tree height that supports a full, live crown.

Cubic-foot cull. The volume within the bole length of the tree that is not suitable for products because of rot, decay, large limbs, forks, sweep, crook, embedded wire, and other defects.

Cubic-foot soundness. The amount of cubic-foot cull that is sound, expressed as a percentage.

Cubic-foot stand-volume class. A classification of forest land based on net cubic-foot volume of either all live trees per acre or growing-stock trees per acre.

Cull decrement. The net volume of rough or rotten trees in the previous inventory that are classified as growing-stock trees in current inventory (divided by the number of growing seasons between surveys to produce average annual cull decrement).

Cull tree. A rough tree or a rotten tree.

Cull increment. The net volume of growing-stock trees in the previous inventory that are classified as rough or rotten trees in the current inventory (divided by the number of growing seasons between surveys to produce average annual cull increment).

Damage, general. An agent that is serious enough to cause the reduction of tree class, significantly deter growth of the tree, or prevent it from producing marketable products within the next ten years.

Damage, special. An indication of the presence, to any extent, of an agent.

Diameter at breast height (d.b.h.). The diameter outside bark of a standing tree measured at 4-1/2 feet above the ground.

Dry ton. A unit of measure of dry weight equivalent to 2,000 pounds or 907.1848 kilograms.

Dry ton stand-volume class. A classification of forest land based on net dry weight of the aboveground components of all live trees per unit area; usually expressed in dry tons per acre.

Dry weight. The weight of wood and bark as it would be if it had been oven-dried; usually expressed in pounds or tons.

Farmer-owned lands. Lands owned by farm operators, whether part of the farmstead or not; excludes land leased by farm operators from nonfarm owners.

Federal lands. Lands (other than National Forests) administered by Federal agencies.

Forest industry lands. Lands owned by companies or individuals that operate primary wood-using plants.

Forest land. Land that is at least 10 percent stocked with trees of any size, or that formerly had such tree cover and is not currently developed for a nonforest use. The minimum area for classification of forest land is one acre. The components that make up forest land are timberland and all noncommercial forest land (see definitions).

Forest type. A classification of forest land based on the species that form a plurality of live-tree stocking.

Forest-type group. A classification of forest land based on the species forming a plurality of live-tree stocking. A combination of forest types that share closely associated species or site requirements are combined into the following major forest-type groups (the descriptions apply to this report):

a. White/red pine. Forests in which eastern white pine, red pine, or eastern hemlock, singly or in combination, make up the plurality of the stocking; common associates include red maple, oak, sugar maple, and aspen.

b. Spruce/fir. Forests in which red, white, black, or Norway spruces, balsam fir, northern white-cedar, tamarack, or planted larch, singly or in combination, make up a plurality of the stocking; common associates include white pine, red maple, yellow birch, and aspens.

c. Hard pine (also called loblolly/shortleaf pine). Forests in which eastern redcedar or pitch pine, singly or in combination, make up a plurality of the stocking; common associates include white pine, paper birch, sugar maple, and basswood.

d. Oak/pine. Forests in which hardwoods (usually hickory or upland oaks) make up a plurality of the stocking and in which pines or eastern redcedar contribute 25 to 50 percent of the stocking.

e. Oak/hickory. Forests in which upland oaks, hickory, yellow-poplar, black locust, sweetgum, or red maple (when associated with central hardwoods), singly or in combination, make up a plurality of the stocking and in which pines or eastern redcedar make up less than 25 percent of the stocking; common associates include white ash, sugar maple, and hemlock.

f. Oak/gum/cypress. Bottomland forests in which tupelo, blackgum, sweetgum, oaks, or southern cypress, singly or in combination, make up a plurality of the stocking and in which pines make up less than 25 percent of the stocking; common associates include cottonwood, willow, ash, elm, hackberry, and maple.

g. Elm/ash/red maple (also called elm/ash/cottonwood). Forests in which elm, willow, cottonwood, or red maple (when growing on wet sites), singly or in combination, make up a plurality of the stocking; common associates include white ash, sugar maple, aspens, and oaks.

h. Northern hardwoods (also called maple/beech/birch). Forests in which sugar maple, beech, yellow birch, black cherry, or red maple (when associated with northern hardwoods), singly or in combination, make up a plurality of the stocking; common associates include white ash, eastern hemlock, basswood, aspens, and red oak.

i. Aspen/birch. Forests in which aspen, paper birch, or gray birch, singly or in combination, make up a plurality of the stocking; common associates include red maple, white pine, red oaks, and white ash.

Gross growth. The sum of accretion and ingrowth.

Growing-stock trees. Live trees of commercial species classified as sawtimber, poletimber, saplings, or seedlings; that is, all live trees of commercial species except rough and rotten trees.

Growing-stock volume. Net volume, in cubic feet, of growing-stock trees 5.0 inches d.b.h. and larger from a 1-foot stump to a minimum 4.0-inch top diameter outside bark of the central stem, or to the point where the central stem breaks into limbs. Net volume equals gross volume less deduction for cull.

Hard hardwoods. Hardwood species with an average specific gravity of greater than 0.50.

Hardwoods. Dicotyledonous trees, usually broad-leaved and deciduous.

Harvested cropland. All lands from which crops were harvested or hay was cut; all land in orchards, citrus groves, vineyards, and nursery and greenhouse products.

Horizontal distance. The measure of length on a horizontal plane from subplot center to the center of the base of the tree. Recorded to the nearest .1 foot on all trees 1.0+ inches d.b.h.

Idle farmland. Former cropland or pasture that has not been tended for within the last 2 years and has less than 10 percent stocking with live trees (established seedlings or larger trees), regardless of species.

Improved/maintained pasture. Land that is currently used and maintained for grazing (not including grazed cropland).

Individual-owned lands. Lands owned by private individuals that do not own a farm, wood-processing plant, or corporation.

Industrial and commercial lands. Supply yards, parking lots, factories, etc.

Ingrowth. The estimated net volume of growing-stock trees that became 5.0 inches d.b.h. or larger during the period between inventories (divided by the number of growing seasons between surveys to produce average annual ingrowth). Also, the estimated net volume of growing-stock trees 5.0 inches d.b.h. and larger that are growing on land that was reclassified from noncommercial forest land or nonforest land to timberland.

International 1/4-inch rule. A log rule or formula for estimating the board-foot volume of logs. The mathematical formula is:

$$(0.22D^2 - 0.71D)(0.904762)$$

for 4-foot sections, where D=diameter inside bark at the small end of the log section. This rule is used as the USDA Forest Service standard log rule in the Eastern United States.

Land area. (a) Bureau of Census: The area of dry land and land temporarily or partly covered by water, such as marshes, swamps, and river flood plains; streams, sloughs, estuaries, and canals less than 200 feet wide; and lakes, reservoirs, and ponds less than 4.5 acres in area. (b) Forest Inventory and Analysis: same as (a) except that the minimum width of streams, etc. is 120 feet, and the minimum size of lakes, etc. is 1 acre.

Land use. A classification of land that indicates the primary use at the time of inventory. Major categories are forest land and nonforest land (see definitions).

Merchantability class. An indicator of the relative amounts of sound and unsound cull in a tree. Based on board-foot cull for sawtimber-sized trees and on cubic-foot cull for poletimber-sized trees.

Merchantable stem. The main stem of the tree between a 1-foot stump height and a 4-inch top diameter (outside the bark), including the wood and bark.

Mining and waste land. Surface mining, gravel pits, dumps.

Mortality. The estimated net volume of growing-stock trees at the previous inventory that died from natural causes before the current inventory (divided by the number of growing seasons between surveys to produce average annual mortality).

Multi-family house. House or building sheltering multiple families and immediately adjacent managed land.

National Forest lands. Federal lands legally designated as National Forests or purchase units and other lands administered as part of the National Forest System by the USDA Forest Service.

Net change. The difference between the current and previous inventory estimates of growing-stock volume (divided by the number of growing seasons between surveys to produce average annual net change). Components of net change are ingrowth plus accretion, minus mortality, minus cull increment, plus cull decrement, minus removals.

Net dry weight. The dry weight of woody material less the weight of all unsound (rotten) material.

Net growth. The change, resulting from natural causes, in growing-stock volume during the period between surveys (divided by the number of growing seasons to produce average annual net growth). Components of net growth are ingrowth plus accretion, minus mortality, minus cull increment, plus cull decrement.

Noncensus water. Streams/rivers between 120 feet and 200 feet in width, and bodies of water between 1 and 4.5 acres in size. The Bureau of the Census classifies such water as land.

Noncommercial forest land. Reserved productive forest land, Christmas tree plantations, other forest land, and other reserved forest land (see definitions).

Noncommercial species. Tree species of typically small size, poor form, or inferior quality that normally do not develop into trees suitable for industrial wood products.

Nonforest land. Land that has never supported forests, or land formerly forested but now in nonforest use such as cropland, pasture, idle farmland, other farmland, single- and multi-family

housing, bogs/marshes/swamps, rights-of-way, industrial or commercial sites, or noncensus water.

Nonsalvable dead tree. A dead tree with most or all of its bark missing that is at least 5.0 inches d.b.h. and is at least 4.5 feet tall.

Nonstocked area. A stand-size class of forest land that is less than 10 percent stocked with live trees of any size.

Other cropland. Includes cropland used for cover crops and soil improvement (legumes).

Other farmland. All nonforest land on a farm excluding cropland, pasture, and idle farmland; includes farm lanes, stock pens, and farmsteads.

Other forest land. Forest land that is incapable of producing 20 cubic feet per acre per year of industrial wood under natural conditions, because of adverse site conditions (formerly known as unproductive forest land).

Other reserved forest land. Forest land that is incapable of producing 20 cubic feet per acre per year of industrial wood under natural conditions, because of adverse site conditions, and is protected through statute or administrative designation.

Ownership class. A classification of forest land based on ownership and nature of business or control of decisionmaking for the land. It encompasses all types of legal entities having ownership interest in the land, whether public or private.

Pasture. Includes any pasture land other than cropland and woodland pasture. It can include lands that have had lime fertilizer or seed applied, or that had been improved by irrigation, drainage, or control of weeds and brush.

Poletimber stand. A stand-size class of forest land that is at least 10 percent stocked with live trees with half or more of such stocking in poletimber or sawtimber trees or both, and in which the stocking of poletimber exceeds that of sawtimber.

Poletimber tree. A live tree of commercial species meeting regional specifications of soundness and form and at least 5.0 inches in d.b.h., but smaller than a sawtimber tree.

Preferred tree. A high-quality tree, from a lumber viewpoint, that would be favored in cultural operations. General characteristics include grade 1 butt log (if sawtimber size), good form, good vigor, and freedom from serious damage.

Recreation site. Parks, campgrounds, playing fields, tracks, etc.

Relative stand density. A stocking classification procedure that reflects species, stage of development, and the characteristics of the trees present in a stand.

Removals. The net growing-stock volume harvested or killed in logging, cultural operations (such as timber stand improvement) or land clearing, and the net growing-stock volume neither harvested nor killed but growing on land that was reclassified from timberland to noncommercial forest land or nonforest land during the period between surveys. This volume is divided by the number of growing seasons to produce average annual removals.

Reserved productive forest land. Forest land sufficiently productive to qualify as timberland but withdrawn from timber utilization through statute or administrative designation.

Rights-of-way. Highways, pipelines, powerlines, canals.

Rotten tree. A live tree of commercial species that does not contain at least one 12-foot sawlog or two noncontiguous sawlogs, each 8 feet or longer, now or prospectively, and does not meet regional specifications for freedom from defect primarily because of rot; that is, more than 50 percent of the cull volume in the tree is rotten.

Rough tree. (a) The same as a rotten tree except that a rough tree does not meet regional specifications for freedom from defect primarily because of roughness or poor form; also (b) a live tree of noncommercial species.

Salvable dead tree. A tree at least 5.0 inches d.b.h. that has died recently and still has intact bark; may be standing, fallen, windthrown, knocked down, or broken off.

Sampling error. A measure of the reliability of an estimate, expressed as a percentage of the estimate. The sampling errors given in this report correspond to one standard error and are

calculated as the square root of the variance, divided by the estimate, and multiplied by 100. Indicated in statistical tables as "SE".

Sapling. All live trees 1.0 through 4.9 inches d.b.h.

Sapling/seedling stand. A stand-size class of forest land that is at least 10 percent stocked with live trees with half or more of such stocking in saplings or seedlings or both.

Sawlog. A log meeting regional standards of diameter, length, and freedom from defect, including a minimum 8-foot length and a minimum top diameter inside bark of 6 inches for softwoods and 8 inches for hardwoods. (See specifications under Tree-Grade Classification.)

Sawlog length (portion). The length of a tree stem from a 1 foot stump to a 1) point above which no physical log, whether or not merchantable, can be produced because of excessive limbs, forks or crooks; 2) minimum sawlog top; 3) point of a break on broken-off trees. Recorded to the nearest whole foot on all live and sound dead sawtimber trees.

Sawlog top. The point on the bole of a sawtimber tree above which a sawlog cannot be produced. The minimum sawlog top is 7.0 inches diameter outside bark (d.o.b.) for softwoods and 9.0 inches d.o.b. for hardwoods.

Sawtimber stand. A stand-size class of forest land that is at least 10 percent stocked with live trees with half or more of such stocking in poletimber or sawtimber trees or both, and in which the stocking of sawtimber is at least equal to that of poletimber.

Sawtimber tree. A live tree of commercial species at least 9.0 inches d.b.h. for softwoods or 11.0 inches for hardwoods, containing at least one 12-foot sawlog or two noncontiguous 8-foot sawlogs, and meeting regional specifications for freedom from defect.

Sawtimber volume. Net volume in board feet, by the International 1/4-inch rule, of sawlogs in sawtimber trees. Net volume equals gross volume less deductions for rot, sweep, and other defects that affect use for lumber.

SE. See Sampling error.

Seedling. A live tree less than 1.0 inch d.b.h. and at least 1 foot tall.

Single-family house. House sheltering one family and immediately adjacent managed land.

Snag. Standing dead tree with most or all of its bark missing that is at least 5.0 inches d.b.h. and at least 4.5 feet tall (does not include salvable dead).

Soft hardwoods. Hardwood species with an average specific gravity of 0.50 or less.

Softwoods. Coniferous trees, usually evergreen and having needles or scalelike leaves.

Sound cull. Defects that are due to form: sweep, crook, limbs, and forks.

Species. A class of individuals having common attributes and designated by a common name.

Stand. A group of forest trees growing on forest land.

Stand origin. An indication of how the measured stand originated: 100 percent natural, 100 percent artificial, or a combination of both.

Stand-size class. A classification of forest land based on the size class (that is, seedlings, saplings, poletimber, or sawtimber) of the stocking of all live trees in the area.

Standard cord. A unit of measure for stacked bolts of wood, encompassing 128 cubic feet of wood, bark, and air space. Fuelwood cord estimates can be derived from cubic-foot estimates of growing stock by applying an average factor of 80 cubic feet of solid wood per cord. For pulpwood, a conversion of 85 cubic feet of solid wood per cord is used because pulpwood is more uniform.

State lands. Lands owned by the state or leased to the state for 50 years or more.

Stocking. The degree of occupancy of land by trees relative to the growth potential utilized by a site. It is expressed as a percent of the "normal" value presented in yield tables and stocking guides. Two categories of stocking are used in this report: all live trees and growing-stock trees. The relationships between the classes and the percentage of the stocking standard are: nonstocked (0 to 9); poorly stocked (10 to 34); moderately stocked (35 to 59); fully stocked (60 to 100); and overstocked (greater than 100).

Strip mine. Area devoid of vegetation due to current or recent general excavation.

Stump. The main stem of a tree from ground level to 1 foot above ground level, including the wood and bark.

Timberland. Forest land producing or capable of producing crops of industrial wood (more than 20 cubic feet per acre per year) and not withdrawn from timber utilization (formerly known as commercial forest land).

Timber products. Roundwood (round timber) products and manufacturing plant by-products harvested from growing-stock trees on timberland; from other sources, such as cull trees, salvable dead trees, limbs, tops, and saplings; and from trees on noncommercial forest and nonforest lands.

Timber removals. The growing-stock or sawtimber volume of trees removed from the inventory for roundwood products, plus logging residues, volume destroyed during land clearing, and volume of standing trees on land that was reclassified from timberland to noncommercial forest land.

Top. The wood and bark of a tree above the merchantable height (or above the point on the stem 4.0 inches in diameter outside bark); generally includes the uppermost stem, branches, and twigs of the tree, but not the foliage.

Total length. The length of a tree stem from a 1 foot stump to the apical meristem. Recorded to the nearest whole foot on all live and dead poletimber and sawtimber trees.

Tract/multiple family housing. Multiple individual residential units or attached units (e.g., apartment buildings and condominiums) and immediately adjacent managed land.

Transportation right-of-way. Land associated with highways and railroads.

Tree class. A classification of the quality or condition of trees for sawlog production. Tree class for sawtimber trees is based on their current condition. Tree class for poletimber trees is a prospective determination--a forecast of their potential quality when they reach sawtimber size (11.0 inches d.b.h. for hardwoods, 9.0 inches d.b.h. for softwoods).

Tree condition. A classification for all live and dead trees 5.0+ inches d.b.h. that indicates the status of the top of the tree, whether broken or intact.

Tree grade. A classification of sawtimber quality based on guidelines for tree grades for hardwoods, white pine, and southern pine. (Note: Red pine was graded using the guidelines for southern pine. All specifications are shown under Tree-Grade Classification.)

Tree history. A classification for all trees 5.0+ inches d.b.h., either currently or previously, that indicates the status of the tree (accretion, ingrowth, mortality, removals).

Trees. Woody plants that have well-developed stems and that usually are more than 12 feet tall at maturity.

Unproductive forest land. See Other forest land.

Upper-stem portion. That part of the main stem or fork of a sawtimber tree above the sawlog top to a diameter of 4.0 inches outside bark, or to the point where the main stem or fork breaks into limbs.

Urban forest land. Forest land sufficiently productive to qualify as timberland that is completely surrounded by or nearly surrounded by urban development (not parks), whether commercial, industrial, or residential.

Utility right-of-way. Land associated with pipeline or electric transmission lines; identified only if vegetative cover differs from adjacent land use.

References

- Dickson, David R.; McAfee, Carol L. 1988. **Forest statistics for Massachusetts—1972 and 1985.** Resour. Bull. NE-106. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station. 112 p.
- Lund, H. Gyde (ed.) 1998. **IUFRO guidelines for designing multipurpose resource inventories: a project of IUFRO Research Group 4.02.02.** IUFRO World Series, Vol. 8. Vienna, Austria: International Union of Forest Research Organizations. 216 p.
- Peters, John R.; Bowers, Theresa M. 1977. **Forest statistics for Massachusetts.** Resour. Bull. NE-48. Upper Darby, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station. 43 p.
- Scott, Charles T. 1979. **Northeastern forest survey board-foot volume equations.** Res. Note NE-271. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station. 3 p.
- Scott, Charles T. 1981. **Northeastern forest survey revised cubic-foot volume equations.** Res. Note NE-304. Broomall, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station. 3 p.
- Wharton, Eric H.; Griffith, Douglas M. 1998. **Estimating total forest biomass in Maine, 1995.** Resour. Bull. NE-142. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station. 50 p.

Species Groups of Massachusetts (as encountered on field plots)

Species Group	Scientific Name	Common Name
Spruce/fir	<i>Abies balsamea</i>	balsam fir
	<i>Picea glauca</i>	white spruce
	<i>Picea mariana</i>	black spruce
	<i>Picea rubens</i>	red spruce
Red pine	<i>Pinus resinosa</i>	red pine
Pitch pine	<i>Pinus rigida</i>	pitch pine
White pine	<i>Pinus strobus</i>	eastern white pine
Hemlock	<i>Tsuga canadensis</i>	eastern hemlock
Other softwoods	<i>Chamaecyparis thyoides</i>	Atlantic white-cedar
	<i>Juniperus virginiana</i>	eastern redcedar
	<i>Larix laricina</i>	tamarack (native)
	<i>Pinus sylvestris</i>	Scotch pine
	<i>Thuja occidentalis</i>	northern white-cedar
Red maple	<i>Acer rubrum</i>	red maple
Sugar maple	<i>Acer saccharum</i>	sugar maple
Yellow birch	<i>Betula alleghaniensis</i>	yellow birch
Sweet birch	<i>Betula lenta</i>	sweet birch
Paper birch	<i>Betula papyrifera</i>	paper birch
Hickory	<i>Carya sp.</i>	hickory
	<i>Carya cordiformis</i>	bitternut hickory
	<i>Carya glabra</i>	pignut hickory
	<i>Carya laciniosa</i>	shellbark hickory
	<i>Carya ovata</i>	shagbark hickory
Beech	<i>Fagus grandifolia</i>	American beech
White ash	<i>Fraxinus americana</i>	white ash
Aspen	<i>Populus deltoides</i>	eastern cottonwood
	<i>Populus grandidentata</i>	bigtooth aspen
	<i>Populus tremuloides</i>	quaking aspen
Black cherry	<i>Prunus serotina</i>	black cherry
White oak	<i>Quercus alba</i>	white oak
Northern red oak	<i>Quercus rubra</i>	northern red oak
Other red oaks	<i>Quercus coccinea</i>	scarlet oak
	<i>Quercus ellipsoidalis</i>	northern pin oak
	<i>Quercus velutina</i>	black oak

Species Groups of Massachusetts (continued)

Species Group	Scientific Name	Common Name
Elm	<i>Ulmus</i> sp.	elm
	<i>Ulmus americana</i>	American elm
	<i>Ulmus rubra</i>	slippery elm
Other hardwoods	<i>Acer</i> sp.	maple
	<i>Acer negundo</i>	boxelder
	<i>Acer pensylvanicum</i>	striped maple
	<i>Acer platanoides</i>	Norway maple
	<i>Acer saccharinum</i>	silver maple
	<i>Acer spicatum</i>	mountain maple
	<i>Amelanchier</i> sp.	serviceberry
	<i>Betula</i> sp.	birch
	<i>Betula nigra</i>	river birch
	<i>Betula populifolia</i>	gray birch
	<i>Carpinus caroliniana</i>	American hornbeam
	<i>Castanea dentata</i>	American chestnut
	<i>Catalpa</i> sp.	catalpa
	<i>Cercis canadensis</i>	eastern redbud
	<i>Cornus florida</i>	flowering dogwood
	<i>Crataegus</i> sp.	hawthorn
	<i>Fraxinus nigra</i>	black ash
	<i>Fraxinus pennsylvanica</i>	green ash
	<i>Gleditsia triacanthos</i>	honeylocust
	<i>Ilex opaca</i>	American holly
	<i>Juglans cinerea</i>	butternut
	<i>Liquidambar styraciflua</i>	sweetgum
	<i>Liriodendron tulipifera</i>	yellow-poplar
	<i>Malus</i> sp.	apple
	<i>Morus rubra</i>	red mulberry
	<i>Nyssa sylvatica</i>	blackgum
	<i>Ostrya virginiana</i>	eastern hophornbeam
	<i>Platanus occidentalis</i>	sycamore
	<i>Prunus pensylvanica</i>	pin cherry
	<i>Prunus virginiana</i>	chokecherry
	<i>Quercus</i> sp.	oak
	<i>Quercus bicolor</i>	swamp white oak
	<i>Quercus ilicifolia</i>	bear oak, scrub oak
	<i>Quercus macrocarpa</i>	bur oak
	<i>Quercus michauxii</i>	swamp chestnut oak
	<i>Quercus prinus</i>	chestnut oak
	<i>Robinia pseudoacacia</i>	black locust
	<i>Salix</i> sp.	willow
	<i>Salix nigra</i>	black willow
	<i>Sassafras albidum</i>	sassafras
	<i>Sorbus americana</i>	American mountain-ash
	<i>Tilia americana</i>	American basswood
		unknown or not listed tree

Tree Species of Massachusetts (as encountered on field plots)

Scientific Name ***	Common Name(s)	Occurrence**	SE
Softwoods			
<i>Abies balsamea</i> (L.) Mill.	balsam fir	r	44
<i>Chamaecyparis thyoides</i> (L.) B.S.P.	Atlantic white-cedar		71
<i>Juniperus virginiana</i> L.	eastern redcedar	r	38
<i>Larix laricina</i> (Du Roi) K. Koch	tamarack (native)		100
<i>Picea glauca</i> (Moench) Voss	white spruce		100
<i>Picea rubens</i> Sarg.	red spruce	c	25
<i>Pinus resinosa</i> Ait.	red pine		56
<i>Pinus rigida</i> Mill.	pitch pine	c	16
<i>Pinus strobus</i> L.	eastern white pine	vc	7
<i>Pinus sylvestris</i> L.	Scotch pine		71
<i>Tsuga canadensis</i> (L.) Carr.	eastern hemlock	vc	9
Hardwoods			
<i>Acer negundo</i> L. *	boxelder		100
<i>Acer pensylvanicum</i> L. *	striped maple		56
<i>Acer platanoides</i> L.	Norway maple		85
<i>Acer rubrum</i> L.	red maple	vc	4
<i>Acer saccharinum</i> L.	silver maple		53
<i>Acer saccharum</i> Marsh.	sugar maple	c	10
<i>Acer spicatum</i> Lam. *	mountain maple		59
<i>Amelanchier</i> sp. Medic. *	serviceberry	r	40
<i>Betula alleghaniensis</i> Britton	yellow birch	c	9
<i>Betula lenta</i> L.	sweet birch	c	11
<i>Betula papyrifera</i> Marsh.	paper birch	c	11
<i>Betula populifolia</i> Marsh. *	gray birch	r	23
<i>Carpinus caroliniana</i> Walt. *	American hornbeam	r	43
<i>Carya</i> sp. Nutt.	hickory		71
<i>Carya cordiformis</i> (Wangenh.) K. Koch	bitternut hickory	r	35
<i>Carya glabra</i> (Mill.) Sweet	pignut hickory	c	18
<i>Carya laciniosa</i> (Michx. f.) Loud.	shellbark hickory		74
<i>Carya ovata</i> (Mill.) K. Koch	shagbark hickory	r	26
<i>Castanea dentata</i> (Marsh.) Borkh. *	American chestnut		71
<i>Cercis canadensis</i> L. *	eastern redbud		100
<i>Crataegus</i> sp. L. *	hawthorn		100
<i>Fagus grandifolia</i> Ehrh.	American beech	c	11
<i>Fraxinus americana</i> L.	white ash	c	11
<i>Fraxinus nigra</i> Marsh.	black ash		52
<i>Fraxinus pennsylvanica</i> Marsh.	green ash	r	43
<i>Ilex opaca</i> Ait.	American holly		71
<i>Juglans cinerea</i> L.	butternut		100
<i>Liriodendron tulipifera</i> L.	yellow-poplar		75
<i>Malus</i> sp. Mill. *	apple	r	27
<i>Morus rubra</i> L. *	red mulberry		100
<i>Nyssa sylvatica</i> Marsh.	blackgum	r	21

Tree Species of Massachusetts (continued)

Scientific Name ***	Common Name(s)	Occurrence**	SE
<i>Ostrya virginiana</i> (Mill.) K. Koch *	eastern hophornbeam	r	23
<i>Platanus occidentalis</i> L.	sycamore		100
<i>Populus deltoides</i> Bartr. ex Marsh.	eastern cottonwood		57
<i>Populus grandidentata</i> Michx.	bigtooth aspen	c	26
<i>Populus tremuloides</i> Michx.	quaking aspen	r	25
<i>Prunus pensylvanica</i> L. f. *	pin cherry	r	35
<i>Prunus serotina</i> Ehrh.	black cherry	c	11
<i>Prunus virginiana</i> L. *	chokecherry	vr	47
<i>Quercus</i> sp. L. *	oak		100
<i>Quercus alba</i> L.	white oak	c	9
<i>Quercus bicolor</i> Willd.	swamp white oak		86
<i>Quercus coccinea</i> Muenchh.	scarlet oak	c	14
<i>Quercus ellipsoidalis</i> E. J. Hill	northern pin oak		100
<i>Quercus macrocarpa</i> Michx.	bur oak		100
<i>Quercus michauxii</i> Nutt.	swamp chestnut oak		100
<i>Quercus prinus</i> L.	chestnut oak	r	45
<i>Quercus rubra</i> L.	northern red oak	vc	8
<i>Quercus velutina</i> Lam.	black oak	c	9
<i>Robinia pseudoacacia</i> L.	black locust		55
<i>Salix</i> sp. L. *	willow		71
<i>Salix nigra</i> Marsh.	black willow		56
<i>Sassafras albidum</i> (Nutt.) Nees *	sassafras	r	47
<i>Sorbus americana</i> Marsh. *	American mountain-ash		100
<i>Tilia americana</i> L.	American basswood	r	46
<i>Ulmus americana</i> L.	American elm	r	21
<i>Ulmus rubra</i> Muhl.	slippery elm		73
*	unknown or not listed tree		72

*** Names according to: Little, Elbert L., Jr. 1979. Checklist of United States Trees (native and naturalized). Agric. Handb. 541. Washington, DC: U.S Department of Agriculture. 375 p.

** Occurrence is based on the proportion of the species among all live trees 5.0 inches d.b.h. or larger encountered on forest survey field plots: vr = very rare (<0.05%), r = rare (0.05 to 0.49%), c = common (0.5 to 4.9%), and vc = very common (>5.0%).

* Noncommercial species.

Tree-Grade Classification

HARDWOOD TREE GRADES

GRADING FACTOR	TREE GRADE 1	TREE GRADE 2	TREE GRADE 3
Length of grading zone (feet)	Butt 16	Butt 16	Butt 16
Length of grading section ^a (feet)	Best 12	Best 12	Best 12
Minimum DBH (inches)	16 ^b	13	11
Minimum Diameter inside bark at top of grading section (inches)	13 ^b 16 20 ^c	11 ^c 12	8
Clear cuttings on 3rd best face ^d			
minimum length (feet)	7 5 3	3 3	2
number on face (maximum)	2	2 3	unlimited
yield in face length (minimum)	5/6	4/6	3/6
Cull deduction, including crook and sweep but excluding shake, maximum within grading section (%)	9	9 ^e	50

^a Whenever a 14- or 16-foot section of the butt 16-foot log is better than the best 12-foot section, the grade of the longer section will become the grade of the tree. This longer section, when used, is the basis for determining the grading factors, such as diameter and cull deduction.

^b In basswood and ash, diameter inside bark at the top of the grading section may be 12 inches and DBH may be 15 inches.

^c Grade 2 trees can be 10 inches diameter inside bark at the top of the grading section if otherwise meeting surface requirements for small grade 1's.

^d A clear cutting is a portion of a face free of defects, extending the width of the face. A face is one-fourth of the surface of the grading section as divided lengthwise.

^e Fifteen percent crook and sweep, or 40 percent total cull deduction are permitted in grade 2 if size and surface of grading section qualify as grade 1. If rot shortens the required clear cuttings to the extent of dropping the butt log to grade 2, do not drop the tree's grade to 3 unless the cull deduction for rot is greater than 40 percent.

Tree-Grade Classification (continued)

TIE AND TIMBER GRADE

GRADE FACTORS	SPECIFICATIONS
Position in tree	Butts and uppers
Scaling Diameter (inches)	8 inches d.i.b. and larger
Length, without trim (feet)	12 feet and larger
Clear cuttings	no requirements: not graded on cutting basis
Maximum sweep allowance	One-fourth d.i.b. of small end for half logs, and one-half d.i.b. for logs sixteen feet long
Sound surface defects permitted Single knots	Any number, if none has an average collar ^a diameter that is more than one third of the log diameter at the point of occurrence
Sound surface defects permitted Whorled knots	Any number, provided the sum of the collar diameters does not exceed one third the log diameter at the point of occurrence
Sound surface defects permitted Knots	Any number not exceeding knot specifications, if they do not extend more than 3 inches into the contained tie or timber
Unsound surface defects permitted ^b	Any number and size if they do not extend into contained tie or timber. If they extend into the contained tie or timber, they shall not exceed size, number, and depth of limits for sound defects.

^a Knot collar is the average of the vertical and horizontal diameters of the limb, or knot swelling, as measured flush with the surface of the log.

^b Interior defects are not visible in standing trees. They are considered in grading cut logs. No interior defects are permitted except one shake not more than one-third the width of the contained tie or timber, and one split not more than 5 inches long.

Tree-Grade Classification (continued)

EASTERN WHITE PINE TREE GRADE SPECIFICATIONS

GRADING FACTOR	TREE GRADE 1	TREE GRADE 2	TREE GRADE 3	TREE GRADE 4
(1) Minimum DBH (inches)	9	9	9	9
(2) Maximum weevil injury in butt 16 ft section (number)	None	None	2 injuries	No limit
(3) Minimum face requirements on butt 16 ft section	Two full length or four 50% length good faces ¹ (In addition, knots on balance of faces shall not exceed size limitations for grade 2 sections)	NO GOOD FACES REQUIRED. Maximum diameter of knots on three best faces: SOUND RED KNOTS not to exceed 1/6 of scaling dia. or 3 inch maximum ² DEAD OR BLACK KNOTS , including overgrown knots, not to exceed 1/12 scaling dia. and 1-1/2 inch max.	NO GOOD FACES REQUIRED. Maximum diameter of knots on three best faces: SOUND RED KNOTS not to exceed 1/3 of scaling diameter or 5 inch maximum ² DEAD OR BLACK KNOTS , including overgrown knots, not to exceed 1/6 scaling dia. and 2-1/2 inch max.	Includes all trees not qualifying for grade 3 or better and judged to have at least 1/3 of their gross volume in sound wood suitable for manufacture into standard lumber
(4) Maximum sweep or crook in butt 16 ft section (percent)	20	30	40	No limit
(5) Maximum total scaling deduction in butt 16 ft. section (percent)	50	50	50	No limit

After the tentative grade of the section is established from face examination, the section will be reduced one grade whenever the following defects are evident:

CONKS, PUNK KNOTS, AND PINE BORER DAMAGE ON THE SURFACE OF THE SECTION³
 Degrade one grade if present on one face. Degrade two grades if present on two faces. Degrade three grades if present on three or four faces.

(7) If the final grade of the grading section is 1, 2, or 3, examine the tree for weevil injuries in the merchantable stem *above* 16 ft. If the total apparent weevil injuries exceed three, degrade the tree one grade below the section grade³. Otherwise the tree grade equals the final section grade.

¹ Trees under 16 inches DBH require four full length good faces.

² Scaling diameter is estimated at the top of the 16-foot grading section.

³ No tree will be designated below Grade 4 unless net tree scale is less than one-third of gross tree scale.

Tree-Grade Classification (continued)

SOUTHERN PINE TREE GRADES

Grade 1 - trees with 3 or 4 clear faces on the 16-foot grading section.

Grade 2 - trees with 1 or 2 clear faces on the 16-foot grading section.

Grade 3 - trees with no clear faces on the 16-foot grading section.

After the tentative grade is established, the tree will be reduced one grade for each of the following:

(1) **Sweep.** Degrade any tentative Grade 1 or 2 tree one grade if sweep in the lower 12 feet of the grading section amounts to 3 or more inches and equals or exceeds one-fourth the diameter at breast height.

(2) **Heart rot.** Degrade any tentative Grade 1 or 2 tree one grade if conks, punk knots, or other evidence of advanced heart rot is found anywhere on the tree stem.

NOTE: No tree can be degraded below Grade 3, provided the total scaling deductions for sweep and/or rot do not exceed two-thirds the gross scale of the tree. Trees with total scaling deductions in excess of two-thirds are classified as cull.

A face is one-fourth the circumference of the 16-foot grading section and extends the full length of the grading section. Clear faces are those free from knots measuring more than 1/2 inch in diameter, overgrown knots of any size, and holes more than 1/4 inch in diameter. Faces may be rotated, if necessary, to obtain the maximum number of clear faces on the grading section.

One-log trees are graded by using the Southern Pine Log Grades. This is recommended because the entire merchantable volume of the tree is contained in the graded section. The log grading system gives a more accurate prediction of the lumber grade-yields for such trees than would the tree grading system.

SPRUCE, FIR, CEDAR, TAMARACK, AND HEMLOCK LOGS

Minimum Merchantability Specifications for Grade One Logs				
D.I.B. ¹	LENGTH ²	TOTAL DEDUCTION	SWEEP PERMITTED	OTHER REQUIREMENTS
6" - 12"	12' - 16' in 2 foot multiples	50 %	25 %	Sound knots not over 2" in diameter permitted. Shake permitted up to 20 % of gross scale if not combined with other serious defect.
13"+	12' - 16' in 2 foot multiples	50 %	25 %	Sound knots not over 3" in diameter permitted. Shake permitted up to 20 % of gross scale if not combined with other serious defect.

¹ ...at small end of log.

² ...without trim.

TREE GRADE 5 (ALL SPECIES)

Any tree which does not make tree grade 1,2, or 3 (or 4) but is still a merchantable tree.

Field Plot Data Quality Standards

A quality assurance (QA) program is performed to ensure that a final product will meet the desired level of accuracy and precision. Quality control (QC) procedures are specific actions within the quality assurance program that are designed to maintain data quality within an acceptable range. There are three basic aspects of any QA program: error prevention, assessment and appraisal, and correction. Error prevention is achieved by developing standardized methods, establishing measurement quality objectives and data quality standards, and applying calibration techniques and training. Assessment and appraisal is accomplished by performing audits, debriefings and field personnel feedback, data validation and verification, and a remeasurement program for QC data collection. The purpose of correction, the last aspect of the quality assurance program, is to use all of the information from the prevention and assessment and appraisal components to make improvements, where needed, in the measurement system.

Our periodic resource inventories are designed to satisfy specified precision objectives. Much of our resource information comes from a statistically sound but very small sample of actual ground conditions that were selected to satisfy the precision objectives. While there is no guarantee that the data are completely error-free, it is obvious that field errors must be kept to a minimum. Establishing and adhering to a quality assurance (QA) program can accomplish this objective. By setting standards and monitoring fieldwork, we can detect and correct, prevent, or eliminate the repetition of most errors.

After the initial training period, periodic inspections are made of every crew's fieldwork by field supervisors. The number of errors detected will partially determine frequency of inspections. All instances of error are analyzed and discussed with the crew concerned. Supervisors monitor progress and goals, and minimum acceptable performance levels are adjusted

as conditions warrant. In addition, a percentage of all plots are subjected to a second measurement as part of the quality control program.

Tolerance levels are set depending on the type of data item. When an item is obtained by measurements that can be repeated with uniform results by several individuals, close tolerance limits that define acceptable data are set. Some items require subjective evaluation; the breadth of the tolerance limits depends on the degree of subjectivity. When an item requires a mutually exclusive answer, crews are expected to complete the item as best they can, based on their training, instructions received, and evidence on the plot, with zero tolerance for error.

Quality Control Remeasurement Program

The following procedures were followed to obtain the QC tree data results.

Sample Size

- * Four percent random sample of all plots in state is selected.

Data Collection

- * Crew 1 visits a plot.
- * The plot is identified as QC by field supervisor.
- * Crew 2 visits the same plot.

Compilation

- * Trees from both data sets (Crew 1 and 2) are extracted from forested subplots.
- * Trees are matched between sets based on the following criteria:
 - 1) Tree numbers for all remeasure trees.
 - 2) Distance, azimuth, and species for all new or ingrowth trees.

Comparison

- * Tolerance limits from state field instructions are used to compare the tree data between Crew 1 and Crew 2.
- * Four tree data item classes are grouped prior to applying tolerance.

- 1) Six condition classes are reduced to three: live, dead, or snag.
- 2) Six tree grades are reduced to four: merchantable, tie & timber, cull, and dead.
- 3) Six tree classes are reduced to five: preferred and acceptable, rough, rotten, dead, and snag.

- 4) Three merchantability classes are reduced to two: sound and unsound.

- * Values are either within tolerance (1x) or exceed tolerance (2x, 3x, or 4x).

Results

Tree data items are presented as:

- * Percentage of data within tolerance limits, and
- * Number of times data exceeded tolerance limits.

Southern New England QA Tree Data Results from 124 Subplots*

Tree data item	Tolerance	Percentage of data within tolerance				Number of times data exceeded tolerance				Records
		@ 1x	@ 2x	@ 3x	@ 4x	@ 1x	@ 2x	@ 3x	@ 4x	
Species	No tolerance	95%				81				1,566
Trees (missed)	No tolerance	98%				(33)				1,566
Horizontal distance	± .2 feet	77%	90%	94%		360	150	99		1,566
Azimuth	± 2 degrees	73%	91%	96%		425	135	64		1,566
Tree history	No tolerance	93%				48				731
Diameter	± .1 inch	93%	95%	96%		92	60	50		1,268
Ecotype	No tolerance	95%				59				1,108
Condition	No tolerance**	95%				62				1,268
Tree grade	No tolerance**	83%				48				284
Saw length	± 4 feet	46%	68%	85%	93%	152	92	43	19	284
Bole length	± 4 feet	56%	81%	91%	96%	420	181	87	34	962
Total length	± 10 feet	85%	98%	98%		158	23	18		1,063
Board foot cull	± 10%	76%	89%	93%	95%	69	32	19	15	284
Board foot soundness	± 1 class	93%	94%	95%	96%	21	17	14	12	284
Cubic foot cull	± 10%	86%	95%	98%	99%	139	49	19	10	962
Cubic foot soundness	± 1 class	90%	91%	92%	93%	98	83	74	67	962
Crown ratio	± 1 class	87%	97%			124	29			962
Crown class	No tolerance	68%				304				962
General damage	Variable tolerance	96%				36				962
Special damage	Variable tolerance	92%				146				1,924
Tree class	No tolerance**	89%				137				1,268
Merchantability class	No tolerance**	93%				82				1,159

* Because of the small number of samples, Connecticut, Massachusetts, and Rhode Island data cannot be reported individually. 34 plots visited with forest land

** Item codes have been grouped for comparison

Metric Equivalents

1 acre = 4,046.86 square meters
1 acre = 0.404686 hectares
1,000 acres = 404.686 hectares
1,000,000 acres = 404,686 hectares
1 board foot = 0.00348 cubic meters
1 board foot = 3,480 cubic centimeters
1,000 board feet = 3.48 cubic meters
1,000,000 board feet = 3,480 cubic meters
1 cubic foot = 0.028317 cubic meters
1,000 cubic feet = 28.317 cubic meters
1,000,000 cubic feet = 28,317 cubic meters
1 cord (wood, bark, and air space) = 3.6246 cubic meters
1 cord (solid wood, pulpwood) = 2.4069 cubic meters
1 cord (solid wood, other than pulpwood) = 2.2654 cubic meters
1,000 cords (pulpwood) = 2,406.9 cubic meters
1,000 cords (other products) = 2,265.4 cubic meters
1 inch = 2.54 centimeters or 0.0254 meters
1 foot = 30.48 centimeters or 0.3048 meters
1 mile = 1.609 kilometers
1 square foot = 929.03 square centimeters
1 square foot = 0.0929 square meters
1 square foot per acre basal area = 0.229568 square meters per hectare
1 cubic foot per acre = 0.0699 cubic meters per hectare
1 ton = 907.1848 kilograms
1,000 tons = 907.1848 metric tons
Breast height = 1.4 meters above ground level

Although 1,000 board feet are theoretically equivalent to 2.36 cubic meters, this is true only when a board foot is actually a piece of wood with a volume 1/12 of a cubic foot. The International 1/4-inch log rule is used by the USDA Forest Service in the East to estimate the product potential in board feet. The reliability of the estimate obtained by conversion will vary with the size of the log measure. The conversion given here, 3.48 cubic meters, is based on the cubic volume of a log 16 feet long and 15 inches in diameter inside bark (d.i.b.) at the small end. This conversion could be used for average comparisons when accuracy of 10 percent is acceptable. Because the board foot unit is not a true measure of wood volume and because products other than dimension lumber are becoming important, this unit may eventually be phased out and replaced by the cubic meter.

Index to Tables

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STATE TABLES

Area by land class, Massachusetts, 1985 and 1998

1985

1998

Table 1.--Land area by land class, Massachusetts, 1985 and 1998^a(In thousands of acres)^b

Land class	1985	Percent of total	SE	1998	Percent of total	SE
Timberland	2,912.3	58.1	1.8	2,631.3	52.5	2.0
Noncommercial forest land:						
Reserved productive	39.6	.8	45.1	95.7	1.9	23.7
Urban forest land	167.8	3.3	23.6	242.1	4.8	12.9
Other forest land ^c	93.8	1.9	24.0	126.5	2.5	19.8
Christmas tree plantation	.0	.0	.0	.2	.0	100.0
Reserved other forest land	10.8	.2	63.7	30.5	.6	43.9
Total noncommercial forest land	312.0	6.2	15.2	494.9	9.9	9.1
Total forest land	3,224.3	64.3	1.5	3,126.2	62.3	1.4
Nonforest land:						
Cropland	151.8	3.0	24.4	160.9	3.2	16.7
Pasture	132.6	2.6	28.3	73.3	1.5	25.3
Other	1,507.7	30.1	4.5	1,655.9	33.0	3.0
Total nonforest land	1,792.1	35.7	2.7	1,890.1	37.7	2.3
Total land area ^d	5,016.3	100.0	.0	5,016.3	100.0	.0

^a In this and other tables, a zero indicates that the data are negligible or the condition was not encountered in the sample. A dash indicates that the condition is not possible under current Forest Service definitions.

^b Rows and columns in all tables may not sum due to rounding.

^c "Other forest land" formerly known as unproductive forest land.

^d Source: 1990 United States Department of Commerce, Bureau of Census.

Table 2.--Area of all forest land by land class and forest-type group, Massachusetts, 1998

(In thousands of acres)

Land class	Forest-type group										All groups	SE
	White/red pine	Spruce/fir	Hard pine	Oak/pine	Oak/hickory	Oak/gum/cypress	Elm/ash/red maple	Northern hardwoods	Aspen/birch			
Timberland	440.0	1.5	29.0	205.4	734.7	3.3	123.6	1,038.2	55.6	2,631.3		2.0
Noncommercial forest land:												
Reserved productive	7.9	.0	6.5	19.6	31.6	.0	9.0	21.1	.0	95.7		23.7
Urban forest land	25.6	.0	12.4	22.1	111.6	.0	23.5	31.3	15.5	242.1		12.9
Other forest land	4.2	6.3	6.1	9.1	29.2	6.1	32.2	27.0	6.3	126.5		19.8
Christmas tree plantations	.2	.0	.0	.0	.0	.0	.0	.0	.0	.2		100.0
Reserved other forest land	.0	.0	13.1	5.1	6.4	.0	.0	6.0	.0	30.5		43.9
Total noncommercial ...	37.8	6.3	38.1	55.9	178.8	6.1	64.7	85.4	21.8	494.9		9.1
Total forest land	477.8	7.9	67.1	261.3	913.5	9.3	188.3	1,123.6	77.4	3,126.2		1.4

Area of forest land by forest-type group*, Massachusetts, 1998

* stocking based on relative density

Table 3.--**Area of timberland by forest type, forest-type group, and stand-size class, Massachusetts, 1985

(In thousands of acres)

Forest type	Stand-size class				All classes	SE
	Saw-timber	Pole-timber	Sapling and seedling	Non-stocked		
White pine	209.6	25.0	10.1	.0	244.6	17.7
White pine/hemlock	62.6	6.9	.0	.0	69.5	34.7
Hemlock	93.6	27.4	.0	.0	121.0	25.3
Scotch pine	7.8	.0	.0	.0	7.8	100.0
White/red pine group	373.5	59.2	10.1	.0	442.9	12.7
Red spruce	8.2	4.6	.0	.0	12.9	73.4
Red spruce/balsam fir	.0	13.7	.0	.0	13.7	100.0
Spruce/fir group	8.2	18.3	.0	.0	26.5	62.6
Pitch pine	32.2	39.7	.0	.0	71.9	32.9
Hard pine group	32.2	39.7	.0	.0	71.9	32.9
Wh. pine/no. red oak/wh. ash	37.0	30.8	.0	.0	67.8	34.6
Eastern redcedar/hardwood	.0	11.4	.0	.0	11.4	100.0
Other oak/pine	.0	38.4	9.5	.0	47.9	44.1
Oak/pine group	37.0	80.6	9.5	.0	127.1	26.2
Post, black, or bear oak	.0	97.5	44.5	.0	142.0	24.9
Chestnut oak	.0	6.9	.0	.0	6.9	100.0
White oak/red oak/hickory	44.7	19.8	.0	.0	64.5	36.3
White oak	.0	25.0	12.0	.0	36.9	45.2
Northern red oak	86.3	163.0	9.5	.0	258.8	17.8
Scarlet oak	7.7	55.0	7.4	.0	70.1	34.6
Red maple/central hardwoods	13.3	47.2	.0	.0	60.5	39.2
Mixed central hardwoods	134.5	246.8	8.7	.0	390.0	13.7
Oak/hickory group	286.5	661.2	82.1	.0	1,029.7	7.4
Atlantic white cedar	.0	10.2	.0	.0	10.2	100.0
Oak/gum/cypress group	.0	10.2	.0	.0	10.2	100.0
Black ash/Amer. elm/red maple	7.8	27.9	.0	.0	35.7	51.0
Red maple(lowland)	6.0	50.1	.0	.0	56.1	34.3
Red maple(upland)	18.5	6.9	.0	.0	25.4	58.7
Cottonwood	.0	.0	9.0	.0	9.0	100.0
Elm/ash/red maple group	32.3	84.9	9.0	.0	126.1	24.9
Sugar maple/beech/yellow birch	186.0	161.3	11.3	.0	358.5	13.9
Black cherry	.0	8.7	.0	.0	8.7	100.0
Red maple/northern hardwoods	108.1	269.8	8.7	.0	386.5	14.3
Pin cherry/reverting field	.0	.0	44.8	.0	44.8	50.9
Mixed northern hardwoods	103.2	89.4	36.3	.0	228.8	18.9
Northern hardwoods group	397.2	529.1	101.1	.0	1,027.4	7.0
Aspen	15.9	12.3	.0	.0	28.2	54.1
Paper birch	.0	10.9	.0	.0	10.9	81.9
Gray birch	.0	.0	11.3	.0	11.3	100.0
Aspen/birch group	15.9	23.2	11.3	.0	50.4	41.6
All forest types	1,182.9	1,506.4	223.0	.0	2,912.3	1.8
SE	6.8	5.7	19.1	.0	1.8	

Table 4.--Area of timberland by forest type, forest-type group, and stand-size class, Massachusetts, 1998

(In thousands of acres)

Forest type	Stand-size class				All classes	SE
	Saw-timber	Pole-timber	Sapling and seedling	Non-stocked		
Red pine	1.6	1.9	.0	.0	3.5	70.9
White pine	221.9	5.6	12.0	.0	239.5	14.0
White pine/hemlock	42.7	.9	.0	.0	43.6	37.2
Hemlock	147.0	.0	.0	.0	147.0	19.1
Scotch pine	6.4	.0	.0	.0	6.4	100.0
White/red pine group	419.7	8.3	12.0	.0	440.0	10.3
Red spruce	.0	1.5	.0	.0	1.5	100.0
Spruce/fir group	.0	1.5	.0	.0	1.5	100.0
Eastern redcedar	.0	3.3	.0	.0	3.3	100.0
Pitch pine	.0	19.3	6.4	.0	25.7	46.0
Hard pine group	.0	22.6	6.4	.0	29.0	42.3
Wh. pine/no. red oak/wh. ash	101.9	34.9	3.9	.0	140.8	19.7
Other oak/pine	14.2	44.1	6.4	.0	64.7	28.0
Oak/pine group	116.1	79.0	10.3	.0	205.4	15.9
Post, black, or bear oak	19.9	22.2	6.4	.0	48.4	32.9
White oak/red oak/hickory	40.2	32.6	.0	.0	72.8	27.8
Northern red oak	128.8	25.1	.0	.0	153.9	18.9
Black locust	.0	3.7	.0	.0	3.7	100.0
Hawthorn/reverting field	.0	.0	1.3	.0	1.3	100.0
Scarlet oak	24.3	26.4	6.1	.0	56.7	31.5
Red maple/central hardwoods	26.4	18.2	6.1	.0	50.7	33.9
Mixed central hardwoods	239.0	90.1	18.1	.0	347.2	12.0
Oak/hickory group	478.6	218.1	38.0	.0	734.7	7.6
Atlantic white cedar	.0	3.3	.0	.0	3.3	100.0
Oak/gum/cypress group	.0	3.3	.0	.0	3.3	100.0
Black ash/Amer. elm/red maple	6.4	14.2	.0	.0	20.6	52.4
Red maple(lowland)	36.1	27.5	.0	.0	63.6	29.0
Red maple(upland)	12.1	15.4	.0	.0	27.5	42.5
River birch/sycamore	.0	.0	4.4	.0	4.4	100.0
Cottonwood	6.3	.0	.0	.0	6.3	100.0
Willow	1.2	.0	.0	.0	1.2	100.0
Elm/ash/red maple group	62.0	57.2	4.4	.0	123.6	20.2
Sugar maple/beech/yellow birch	245.6	111.1	13.2	.0	369.9	10.8
Black cherry	6.3	8.0	.0	.0	14.3	63.8
Red maple/northern hardwoods	170.4	136.1	16.4	.0	322.9	12.0
Pin cherry/reverting field	3.0	6.5	14.6	.0	24.1	47.3
Mixed northern hardwoods	232.1	59.1	15.8	.0	307.0	12.3
Northern hardwoods group	657.5	320.6	60.0	.0	1,038.2	5.4
Aspen	15.9	19.1	9.5	.0	44.5	34.6
Paper birch	4.8	6.3	.0	.0	11.1	62.4
Aspen/birch group	20.7	25.4	9.5	.0	55.6	30.1
All forest types	1,754.6	736.1	140.6	.0	2,631.3	2.0
SE	3.5	7.7	18.0	.0	2.0	

Area of timberland by forest-type group*, Massachusetts, 1985 and 1998

1985

1998

* stocking based on relative density

Area of timberland by stand-size class*, Massachusetts, 1985 and 1998

1985

1998

* stocking based on relative density

Table 5.--**Area of timberland by forest type, forest-type group, and stand-size class (stocking based on basal area), Massachusetts, 1985

(In thousands of acres)

Forest type	Stand-size class				All classes	SE
	Saw-timber	Pole-timber	Sapling and seedling	Non-stocked		
White pine	435.1	72.9	35.4	.0	543.4	11.8
White pine/hemlock	46.8	14.8	.0	.0	61.6	33.4
Hemlock	105.7	6.5	.0	.0	112.2	25.6
Scotch pine	7.8	.0	.0	.0	7.8	100.0
White/red pine group	595.4	94.2	35.4	.0	725.0	9.7
Red spruce	14.7	30.8	.0	.0	45.6	47.9
Spruce/fir group	14.7	30.8	.0	.0	45.6	47.9
Pitch pine	32.2	50.4	20.9	.0	103.5	27.3
Hard pine group	32.2	50.4	20.9	.0	103.5	27.3
Wh. pine/no. red oak/wh. ash	155.0	40.3	5.4	.0	200.8	21.0
Eastern redcedar/hardwood	.0	11.4	.0	.0	11.4	100.0
Other oak/pine	.0	24.5	9.4	.0	33.8	52.1
Oak/pine group	155.0	76.2	14.8	.0	246.0	19.1
Post, black, or bear oak	13.8	129.2	.0	.0	143.0	24.9
Chestnut oak	.0	6.9	.0	.0	6.9	100.0
White oak/red oak/hickory	24.3	35.2	.0	.0	59.4	39.1
White oak	.0	7.7	20.1	.0	27.7	58.2
Northern red oak	144.8	96.9	8.7	.0	250.4	16.9
Scarlet oak	.0	55.0	26.7	.0	81.8	32.7
Red maple/central hardwoods	.0	45.5	.0	.0	45.5	46.5
Mixed central hardwoods	116.4	137.8	15.3	.0	269.5	16.8
Oak/hickory group	299.2	514.3	70.8	.0	884.3	8.2
Atlantic white cedar	.0	10.2	.0	.0	10.2	100.0
Oak/gum/cypress group	.0	10.2	.0	.0	10.2	100.0
Black ash/Amer. elm/red maple	39.8	22.7	10.8	.0	73.3	36.4
Red maple(lowland)	26.5	15.3	.0	.0	41.8	39.0
Red maple(upland)	22.8	14.9	.0	.0	37.7	44.1
Willow	.0	10.6	.0	.0	10.6	100.0
Elm/ash/red maple group	89.1	63.5	10.8	.0	163.4	22.6
Sugar maple/beech/yellow birch	181.9	49.9	21.6	.0	253.3	17.7
Black cherry	23.8	21.9	.0	.0	45.7	45.9
Red maple/northern hardwoods	106.8	104.2	.0	.0	211.1	20.5
Mixed northern hardwoods	93.6	85.8	.0	.0	179.4	22.2
Northern hardwoods group	406.1	261.8	21.6	.0	689.5	9.5
Aspen	4.6	20.3	9.0	.0	33.9	46.7
Paper birch	2.3	.0	.0	.0	2.3	100.0
Gray birch	8.7	.0	.0	.0	8.7	100.0
Aspen/birch group	15.6	20.3	9.0	.0	44.9	40.6
All forest types	1,607.3	1,121.8	183.2	.0	2,912.3	1.8
SE	5.2	7.4	22.1	.0	1.8	

Table 6.--Area of timberland by forest type, forest-type group, and stand-size class (stocking based on basal area), Massachusetts, 1998

(In thousands of acres)

Forest type	Stand-size class				All classes	SE
	Saw-timber	Pole-timber	Sapling and seedling	Non-stocked		
White pine	445.1	29.9	13.6	.0	488.6	9.9
White pine/hemlock	49.5	21.6	.0	.0	71.1	28.1
Hemlock	160.2	.0	6.9	.0	167.1	18.0
Scotch pine	6.4	.0	.0	.0	6.4	100.0
White/red pine group	661.2	51.4	20.5	.0	733.2	7.8
Red spruce/balsam fir	6.1	.0	.0	.0	6.1	100.0
Spruce/fir group	6.1	.0	.0	.0	6.1	100.0
Pitch pine	.0	25.3	6.8	.0	32.1	44.2
Hard pine group	.0	25.3	6.8	.0	32.1	44.2
Wh. pine/no. red oak/wh. ash	145.3	24.2	.0	.0	169.5	18.6
Other oak/pine	.0	62.9	.0	.0	62.9	29.5
Oak/pine group	145.3	87.1	.0	.0	232.4	15.6
Post, black, or bear oak	18.3	19.0	12.7	.0	50.0	33.8
White oak/red oak/hickory	18.9	19.1	.0	.0	38.0	40.1
White oak	6.8	5.8	.0	.0	12.6	70.9
Northern red oak	141.3	24.7	.0	.0	166.0	18.9
Hawthorn/reverting field	6.4	.0	6.5	.0	12.9	70.7
Scarlet oak	22.7	12.8	.0	.0	35.5	40.3
Red maple/central hardwoods	12.9	.0	.0	.0	12.9	70.7
Mixed central hardwoods	225.8	87.0	25.1	.0	337.9	12.6
Oak/hickory group	453.1	168.4	44.3	.0	665.8	8.6
Atlantic white cedar	.0	4.4	.0	.0	4.4	100.0
Oak/gum/cypress group	.0	4.4	.0	.0	4.4	100.0
Black ash/Amer. elm/red maple	13.2	12.6	.0	.0	25.8	49.2
Red maple(lowland)	36.2	22.7	.0	.0	58.9	32.0
Red maple(upland)	25.3	6.8	6.6	.0	38.6	40.8
Cottonwood	6.3	.0	.0	.0	6.3	100.0
Elm/ash/red maple group	80.9	42.1	6.6	.0	129.6	21.2
Sugar maple/beech/yellow birch	169.9	57.0	.0	.0	226.8	15.2
Black cherry	50.2	12.8	13.1	.0	76.2	27.3
Red maple/northern hardwoods	155.4	76.1	.0	.0	231.5	15.2
Pin cherry/reverting field	.0	.0	6.0	.0	6.0	100.0
Mixed northern hardwoods	151.9	60.6	12.9	.0	225.3	16.2
Northern hardwoods group	527.3	206.5	32.0	.0	765.8	7.1
Aspen	19.0	12.5	6.3	.0	37.8	40.2
Aspen/birch group	19.0	12.5	6.3	.0	37.8	40.2
All forest types	1,892.9	597.6	116.6	.0	2,607.1	2.3
SE	3.4	9.3	22.8	.0	2.3	

Table 7.--Area of timberland by forest-type group and ownership class, Massachusetts, 1998

(In thousands of acres)

Forest-type group	Owner class				All classes	SE
	National Forest	Other public	Forest industry	Other private		
White/red pine	.0	73.9	.0	366.1	440.0	10.3
Spruce/fir	.0	.0	.0	1.5	1.5	100.0
Hard pine	.0	10.4	.0	18.6	29.0	42.3
Oak/pine	.0	31.5	6.1	167.9	205.4	15.9
Oak/hickory	.0	178.3	.0	556.4	734.7	7.6
Oak/gum/cypress	.0	.0	.0	3.3	3.3	100.0
Elm/ash/red maple	.0	30.7	.0	92.9	123.6	20.2
Northern hardwoods	.0	218.4	8.1	811.8	1,038.2	5.4
Aspen/birch	.0	11.1	.0	44.4	55.6	30.1
All groups	.0	554.2	14.2	2,062.9	2,631.3	2.0
SE	.0	9.5	56.7	3.2	2.0	

Table 8.--Area of timberland by stand-size class and ownership class, Massachusetts, 1998

(In thousands of acres)

Stand-size class	Owner class				All classes	SE
	National Forest	Other public	Forest industry	Other private		
Sawtimber	.0	353.1	4.0	1,397.4	1,754.6	3.5
Poletimber	.0	175.9	10.1	550.0	736.1	7.7
Sapling and seedling	.0	25.2	.0	115.4	140.6	18.0
All classes	.0	554.2	14.2	2,062.9	2,631.3	2.0
SE	.0	9.5	56.7	3.2	2.0	

Table 9.--Area of timberland by board-foot stand-volume class and ownership class,
Massachusetts, 1998

(In thousands of acres)

Stand-volume class	Owner class				All classes	SE
	National Forest	Other public	Forest industry	Other private		
0 - 1,999	.0	122.6	6.1	363.5	492.2	9.3
2,000 - 3,999	.0	81.5	.0	387.0	468.5	10.0
4,000 - 5,999	.0	118.6	8.1	403.1	529.7	9.6
6,000 - 7,999	.0	66.0	.0	338.2	404.2	11.1
8,000 - 9,999	.0	47.0	.0	200.5	247.5	14.5
10,000+	.0	118.5	.0	370.6	489.2	9.6
All classes	.0	554.2	14.2	2,062.9	2,631.3	2.0
SE	.0	9.5	56.7	3.2	2.0	

Table 10.--Area of timberland by stocking class of growing-stock trees and
ownership class, Massachusetts, 1998

(In thousands of acres)

Stocking class	Owner class				All classes	SE
	National Forest	Other public	Forest industry	Other private		
Nonstocked	.0	6.1	.0	44.0	50.1	33.6
Poorly stocked	.0	25.0	.0	188.1	213.1	16.0
Moderately stocked	.0	238.2	10.1	807.0	1,055.4	6.0
Fully stocked	.0	268.1	4.0	966.2	1,238.4	5.1
Overstocked	.0	16.8	.0	57.6	74.4	24.7
All classes	.0	554.2	14.2	2,062.9	2,631.3	2.0
SE	.0	9.5	56.7	3.2	2.0	

Table 11.--Area of timberland by forest-type group and cubic-foot stand-volume class of growing-stock trees, Massachusetts, 1998

(In thousands of acres)

Forest-type group	Stand-volume class (cubic feet per acre)						All classes	SE
	0-499	500-999	1000-1499	1500-1999	2000-2499	2500+		
White/red pine	13.1	12.8	3.2	49.1	47.7	314.0	440.0	10.3
Spruce/fir	1.5	.0	.0	.0	.0	.0	1.5	100.0
Hard pine	9.7	17.1	.0	.0	2.2	.0	29.0	42.3
Oak/pine	9.1	26.1	38.3	13.4	32.7	85.8	205.4	15.9
Oak/hickory	56.1	37.5	190.5	160.5	164.3	125.9	734.7	7.6
Oak/gum/cypress	.0	.0	.0	.0	.0	3.3	3.3	100.0
Elm/ash/red maple	22.0	8.4	28.7	12.0	21.5	31.1	123.6	20.2
Northern hardwoods	77.5	36.3	120.6	221.0	224.6	358.3	1,038.2	5.4
Aspen/birch	16.1	7.8	4.7	4.7	15.8	6.4	55.6	30.1
All groups	205.0	146.2	385.9	460.6	508.8	924.7	2,631.3	2.0
SE	14.8	18.2	11.4	10.3	9.8	6.2	2.0	

Table 12.--Area of timberland by forest-type group and board-foot stand-volume class, Massachusetts, 1998

(In thousands of acres)

Forest-type group	Stand-volume class (board feet per acre)						All classes	SE
	0-1,999	2,000-3,999	4,000-5,999	6,000-7,999	8,000-9,999	10,000+		
White/red pine	14.7	17.3	51.1	68.2	52.1	236.6	440.0	10.3
Spruce/fir	1.5	.0	.0	.0	.0	.0	1.5	100.0
Hard pine	26.8	2.2	.0	.0	.0	.0	29.0	42.3
Oak/pine	50.3	19.1	24.1	32.9	22.1	56.8	205.4	15.9
Oak/hickory	169.4	183.4	147.5	144.4	48.4	41.7	734.7	7.6
Oak/gum/cypress	.0	.0	3.3	.0	.0	.0	3.3	100.0
Elm/ash/red maple	49.4	27.4	26.9	6.3	.0	13.5	123.6	20.2
Northern hardwoods	151.4	206.6	276.7	147.6	115.3	140.6	1,038.2	5.4
Aspen/birch	28.7	12.5	.0	4.8	9.6	.0	55.6	30.1
All groups	492.2	468.5	529.7	404.2	247.5	489.2	2,631.3	2.0
SE	9.3	10.0	9.6	11.1	14.5	9.6	2.0	

Table 13.--**Area of timberland by forest-type group and stocking class of all live trees, Massachusetts, 1985

(In thousands of acres)

Forest-type group	Stocking class					All classes	SE
	Nonstocked	Poorly stocked	Moderately stocked	Fully stocked	Over-stocked		
White/red pine	.0	14.7	118.6	240.9	68.7	442.9	12.7
Spruce/fir	.0	.0	13.7	8.2	4.6	26.5	62.6
Hard pine	.0	10.7	21.4	39.9	.0	71.9	32.9
Oak/pine	.0	9.4	48.7	69.0	.0	127.1	26.2
Oak/hickory	.0	47.7	371.4	546.9	63.7	1,029.7	7.4
Oak/gum/cypress	.0	.0	.0	.0	10.2	10.2	100.0
Elm/ash/red maple	.0	6.0	44.2	75.9	.0	126.1	24.9
Northern hardwoods	.0	16.7	308.8	584.9	117.0	1,027.4	7.0
Aspen/birch	.0	4.0	32.8	11.3	2.3	50.4	41.6
All groups	.0	109.2	959.5	1,577.1	266.5	2,912.3	1.8
SE	.0	27.1	8.2	5.2	17.3	1.8	

Table 14.--Area of timberland by forest-type group and stocking class of all live trees, Massachusetts, 1998

(In thousands of acres)

Forest-type group	Stocking class					All classes	SE
	Nonstocked	Poorly stocked	Moderately stocked	Fully stocked	Over-stocked		
White/red pine	.0	2.2	68.4	277.2	92.3	440.0	10.3
Spruce/fir	.0	.0	.0	1.5	.0	1.5	100.0
Hard pine	.0	.0	14.4	12.4	2.2	29.0	42.3
Oak/pine	.0	.9	30.1	158.4	16.1	205.4	15.9
Oak/hickory	.0	13.8	176.9	486.9	57.1	734.7	7.6
Oak/gum/cypress	.0	.0	.0	.0	3.3	3.3	100.0
Elm/ash/red maple	.0	21.5	32.3	68.1	1.6	123.6	20.2
Northern hardwoods	.0	12.4	164.7	741.2	119.9	1,038.2	5.4
Aspen/birch	.0	.0	17.7	37.9	.0	55.6	30.1
All groups	.0	50.7	504.5	1,783.7	292.4	2,631.3	2.0
SE	.0	31.4	9.7	3.7	12.7	2.0	

Table 15.--**Area of timberland by forest-type group and stocking class of growing-stock trees, Massachusetts, 1985

(In thousands of acres)

Forest-type group	Stocking class					All classes	SE
	Nonstocked	Poorly stocked	Moderately stocked	Fully stocked	Over-stocked		
White/red pine	.0	23.3	165.6	230.0	23.9	442.9	12.7
Spruce/fir	.0	13.7	.0	12.9	.0	26.5	62.6
Loblolly/shortleaf	.0	10.7	50.6	10.7	.0	71.9	32.9
Oak/pine	9.4	20.9	48.2	48.6	.0	127.1	26.2
Oak/hickory	.0	97.9	439.9	456.4	35.5	1,029.7	7.4
Oak/gum/cypress	.0	.0	.0	10.2	.0	10.2	100.0
Elm/ash/red maple	.0	24.5	48.3	53.4	.0	126.1	24.9
Northern hardwoods	12.6	111.9	435.0	387.5	80.3	1,027.4	7.0
Aspen/birch	4.0	11.3	32.8	.0	2.3	50.4	41.6
All groups	26.0	314.2	1,220.4	1,209.8	142.0	2,912.3	1.8
SE	62.3	16.9	6.8	6.5	24.2	1.8	

Table 16.--Area of timberland by forest-type group and stocking class of growing-stock trees, Massachusetts, 1998

(In thousands of acres)

Forest-type group	Stocking class					All classes	SE
	Nonstocked	Poorly stocked	Moderately stocked	Fully stocked	Over-stocked		
White/red pine	.0	13.4	79.4	294.1	53.0	440.0	10.3
Spruce/fir	.0	.0	.0	1.5	.0	1.5	100.0
Loblolly/shortleaf	.0	.0	14.4	12.4	2.2	29.0	42.3
Oak/pine	.0	6.9	73.0	113.4	12.1	205.4	15.9
Oak/hickory	.0	17.4	225.5	449.9	41.9	734.7	7.6
Oak/gum/cypress	.0	.0	.0	.0	3.3	3.3	100.0
Elm/ash/red maple	.0	26.7	37.8	57.4	1.6	123.6	20.2
Northern hardwoods	3.0	39.4	243.9	700.7	51.2	1,038.2	5.4
Aspen/birch	.0	.0	23.9	31.6	.0	55.6	30.1
All groups	3.0	103.9	697.9	1,661.0	165.4	2,631.3	2.0
SE	100.0	22.9	8.0	4.0	17.4	2.0	

Table 17.--Area of timberland by stand-size class, forest-type group, and basal-area class (all live trees), Massachusetts, 1998

(In thousands of acres)

Forest-type group	Basal area class (square feet per acre)							All classes	SE
	0-49	50-99	100-149	150-199	200-249	250-299	300+		
Sawtimber:									
White/red pine	.0	19.5	114.5	194.3	72.1	17.7	1.5	419.7	10.6
Oak/pine	1.0	9.9	61.0	38.4	5.8	.0	.0	116.1	21.5
Oak/hickory	.0	122.2	289.2	61.2	4.2	1.6	.2	478.6	9.8
Elm/ash/red maple	6.3	10.5	38.1	6.0	1.2	.0	.0	62.0	31.2
Northern hardwoods	1.7	85.2	291.5	240.8	30.0	6.5	1.8	657.5	7.7
Aspen/birch	.0	6.3	14.4	.0	.0	.0	.0	20.7	49.2
All type groups	9.0	253.6	808.6	540.7	113.4	25.8	3.5	1,754.6	3.5
Poletimber:									
White/red pine	1.1	4.7	1.6	.0	.9	.0	.0	8.3	48.5
Spruce/fir	.0	1.5	.0	.0	.0	.0	.0	1.5	100.0
Hard pine	7.6	12.8	.0	2.2	.0	.0	.0	22.6	46.4
Oak/pine	7.8	31.4	29.8	8.8	.0	.0	1.2	79.0	25.7
Oak/hickory	11.1	119.9	85.6	1.6	.0	.0	.0	218.1	16.0
Oak/gum/cypress	.0	.0	.0	.0	3.3	.0	.0	3.3	100.0
Elm/ash/red maple	11.1	19.2	23.6	3.2	.0	.0	.0	57.2	28.2
Northern hardwoods	13.6	71.0	190.3	39.8	4.6	.0	1.3	320.6	12.2
Aspen/birch	.0	17.6	7.8	.0	.0	.0	.0	25.4	45.2
All type groups	52.4	278.2	338.6	55.7	8.7	.0	2.5	736.1	7.7
Seedling/sapling:									
White/red pine	12.0	.0	.0	.0	.0	.0	.0	12.0	62.0
Hard pine	.0	6.4	.0	.0	.0	.0	.0	6.4	100.0
Oak/pine	.0	.0	6.4	3.9	.0	.0	.0	10.3	72.6
Oak/hickory	33.0	5.0	.0	.0	.0	.0	.0	38.0	37.8
Elm/ash/red maple	4.4	.0	.0	.0	.0	.0	.0	4.4	100.0
Northern hardwoods	51.9	6.7	1.5	.0	.0	.0	.0	60.0	29.9
Aspen/birch	6.3	3.2	.0	.0	.0	.0	.0	9.5	74.4
All type groups	107.6	21.2	7.8	3.9	.0	.0	.0	140.6	18.0
All classes	169.0	553.0	1,155.1	600.3	122.1	25.8	6.0	2,631.3	2.0
SE	16.6	9.2	5.6	8.5	20.6	40.3	44.4	2.0	

Table 18.--Number of live trees (1.0+ inches d.b.h.) on all forest land by species
and diameter group, Massachusetts, 1998

(In thousands of trees)

Species	Diameter class (inches at breast height)					All classes	SE
	1.0- 4.9	5.0- 8.9	9.0- 14.9	15.0- 20.9	21.0+		
Balsam fir	7,486	787	149	0	0	8,422	62.2
Atlantic white-cedar	18,701	2,227	590	0	0	21,518	89.1
Eastern redcedar	5,221	741	94	0	0	6,057	42.0
Tamarack (native)	0	0	37	0	0	37	100.0
White spruce	0	37	0	0	0	37	100.0
Red spruce	12,788	3,475	2,461	183	0	18,908	25.6
Red pine	508	421	582	38	0	1,549	51.5
Pitch pine	12,101	8,729	5,220	413	0	26,465	19.3
White pine	100,089	35,472	27,542	11,957	4,767	179,827	7.2
Scotch pine	0	193	930	78	0	1,201	70.7
Northern white-cedar	485	0	0	0	0	485	100.0
Eastern hemlock	110,719	37,125	20,161	4,799	859	173,663	10.1
All softwoods	268,099	89,208	57,767	17,469	5,626	438,169	6.7
Boxelder	0	30	0	0	0	30	100.0
Striped maple	28,813	1,001	0	0	0	29,813	21.8
Red maple	252,370	85,161	44,643	6,638	867	389,679	5.7
Silver maple	4,688	827	205	299	98	6,117	56.7
Sugar maple	61,332	11,897	6,931	1,540	344	82,044	13.8
Mountain maple	2,848	102	0	0	0	2,951	45.3
Norway maple	474	192	39	0	0	705	72.7
Serviceberry	14,442	416	0	0	0	14,858	32.0
Yellow birch	40,586	9,747	5,763	528	193	56,817	13.7
Sweet birch	52,813	13,537	6,887	711	79	74,027	12.0
River birch	487	0	0	0	0	487	100.0
Paper birch	22,079	7,326	4,260	271	0	33,936	17.7
Gray birch	15,255	1,714	191	0	0	17,161	26.8
American hornbeam	18,183	281	40	0	0	18,504	29.8
Hickory species	0	76	0	0	0	76	70.7
Bitternut hickory	0	228	63	0	0	291	34.6
Pignut hickory	9,565	2,167	1,170	227	0	13,129	21.5
Shellbark hickory	472	79	38	0	0	588	81.5
Shagbark hickory	1,943	929	387	119	0	3,378	40.0
American chestnut	5,879	81	0	0	0	5,960	29.6
Eastern redbud	0	37	0	0	0	37	100.0
Flowering dogwood	2,474	0	0	0	0	2,474	60.1
Hawthorn species	969	39	0	0	0	1,008	68.1
Beech	110,418	12,759	5,867	1,621	269	130,934	11.7
White ash	39,569	7,770	5,525	1,724	304	54,893	14.2
Black ash	1,414	583	148	39	0	2,184	76.7
Green ash	945	309	158	0	0	1,412	54.6
Honeylocust	479	0	0	0	0	479	100.0

Table 18.-continued

(In thousands of trees)

Species	Diameter class (inches at breast height)					All classes	SE
	1.0-	5.0-	9.0-	15.0-	21.0+		
	4.9	8.9	14.9	20.9			
American holly	4,467	75	0	0	0	4,541	98.4
Butternut	0	0	36	0	0	36	100.0
Tulip-poplar	0	0	39	39	37	115	75.2
Apple species	4,103	843	235	0	39	5,220	37.4
Red mulberry	0	38	0	0	0	38	100.0
Blackgum	4,481	1,625	535	39	0	6,679	29.5
Eastern hophornbeam	16,671	1,373	192	0	0	18,236	25.1
American sycamore	456	37	0	0	0	493	100.0
Eastern cottonwood	0	312	227	113	75	727	56.7
Bigtooth aspen	5,377	1,553	2,378	192	0	9,499	40.6
Quaking aspen	5,257	1,722	1,073	39	0	8,090	33.0
Pin cherry	5,289	608	39	0	0	5,936	41.7
Black cherry	31,917	6,657	6,499	1,523	266	46,862	15.8
Choke cherry	3,757	149	76	0	0	3,981	37.7
Oak species	0	0	37	0	0	37	100.0
White oak	22,974	10,875	6,855	1,081	118	41,903	13.1
Swamp white oak	449	254	295	0	0	998	92.2
Scarlet oak	19,162	13,860	6,381	468	63	39,935	19.3
Northern pin oak	0	38	0	0	0	38	100.0
Bear oak	6,115	0	0	0	0	6,115	57.6
Bur oak	0	0	78	0	39	118	100.0
Swamp chestnut oak	0	26	0	0	0	26	100.0
Chestnut oak	470	449	432	105	0	1,456	56.0
Northern red oak	47,908	17,785	20,411	4,994	1,235	92,334	9.4
Black oak	28,994	12,671	10,811	2,217	684	55,376	12.2
Black locust	455	742	503	82	0	1,782	51.1
Willow species	882	0	51	37	0	969	91.2
Black willow	0	146	0	60	39	245	55.7
Sassafras	4,925	717	261	0	0	5,903	30.9
American mountain-ash	0	41	0	0	0	41	100.0
American basswood	3,417	368	271	0	37	4,093	61.4
American elm	6,692	1,116	342	115	0	8,265	30.8
Slippery elm	1,852	95	0	0	0	1,947	59.5
Unknown	479	67	0	0	0	545	88.2
All hardwoods	915,042	231,530	140,372	24,821	4,787	1,316,553	3.5
All species	1,183,141	320,738	198,139	42,290	10,413	1,754,722	3.0
SE	4.3	2.5	2.4	4.0	7.3	3.0	

Table 19.--Number of live trees (1.0+ inches d.b.h.) on timberland by species and diameter class, Massachusetts, 1998
(In thousands of trees)

Species	Diameter class (inches at breast height)									
	1.0- 2.9	3.0- 4.9	5.0- 6.9	7.0- 8.9	9.0- 10.9	11.0- 12.9	13.0- 14.9	15.0- 16.9		
Spruce/fir	13,237	6,563	2,612	1,572	1,363	879	292	145		
Red pine	0	0	38	265	269	117	155	38		
Pitch pine	2,931	3,763	2,520	2,486	1,597	1,004	195	147		
White pine	59,530	27,038	18,622	14,213	11,303	7,510	6,875	4,766		
Eastern hemlock	67,955	38,067	21,652	13,603	8,175	6,541	4,776	3,037		
Other softwoods	3,391	1,420	1,173	1,038	642	334	38	0		
Total softwoods	147,043	76,851	46,618	33,177	23,351	16,384	12,331	8,134		
Red maple	155,779	62,926	42,769	32,501	20,415	13,544	5,981	3,131		
Sugar maple	45,711	14,159	7,448	4,258	3,186	2,271	1,356	1,017		
Yellow birch	28,279	11,058	5,569	3,636	3,302	1,348	764	230		
Sweet birch	41,566	9,285	7,160	5,793	3,345	2,252	893	523		
Paper birch	14,461	4,745	4,069	2,992	2,190	1,356	639	194		
Hickory	7,728	2,821	1,963	1,129	834	401	155	229		
Beech	86,083	20,479	7,350	4,986	3,396	1,789	372	808		
White ash	25,867	9,212	4,056	2,999	2,681	1,667	1,061	960		
Aspen	5,367	3,880	1,847	1,323	1,630	1,100	756	153		
Black cherry	20,537	8,227	2,729	3,093	2,923	1,711	1,108	840		
White oak	11,498	5,154	4,969	3,383	3,126	1,719	1,121	359		
Northern red oak	32,177	13,282	7,870	8,104	7,186	7,220	4,252	2,595		
Other red oaks	25,570	13,400	11,281	10,037	6,768	5,044	2,588	1,050		
Elm	3,258	1,431	662	150	113	75	0	0		
Other commercial hardwoods	8,833	4,275	2,943	1,322	974	599	215	229		
Noncommercial hardwoods	90,020	15,379	5,049	1,708	683	86	195	0		
Total hardwoods	602,734	199,715	117,735	87,415	62,754	42,184	21,459	12,318		
All species	749,777	276,567	164,353	120,593	86,105	58,568	33,791	20,452		
SE	5.3	5.4	3.3	3.3	3.3	3.7	4.2	5.5		

Table 19.-continued

Species	Diameter class (inches at breast height)					All classes	SE
	17.0- 18.9	19.0- 20.9	21.0- 28.9	29.0+	Total 5.0+		
Spruce/fir	0	0	0	0	6,864	26,664	30.5
Red pine	0	0	0	0	882	882	64.2
Pitch pine	76	0	0	0	8,026	14,720	29.9
White pine	3,647	2,641	3,506	686	73,771	160,339	7.8
Eastern hemlock	1,165	522	646	137	60,254	166,276	10.4
Other softwoods	0	0	0	0	3,226	8,036	40.0
Total softwoods	4,888	3,163	4,152	824	153,023	376,917	6.0
Red maple	1,667	601	752	115	121,476	340,182	6.4
Sugar maple	347	137	156	188	20,365	80,235	14.0
Yellow birch	152	107	154	0	15,263	54,599	14.2
Sweet birch	188	0	79	0	20,233	71,085	12.3
Paper birch	0	38	0	0	11,478	30,684	18.6
Hickory	79	38	0	0	4,827	15,377	20.3
Beech	232	234	193	37	19,398	125,960	12.0
White ash	500	153	228	0	14,306	49,386	15.2
Aspen	190	0	75	0	7,075	16,322	32.6
Black cherry	341	304	228	0	13,277	42,042	17.0
White oak	263	267	0	41	15,248	31,900	16.1
Northern red oak	1,398	502	928	154	40,210	85,669	9.8
Other red oaks	800	223	634	0	38,426	77,396	12.2
Elm	38	38	0	0	1,078	5,768	36.8
Other commercial hardwoods	151	112	152	39	6,736	19,844	22.8
Noncommercial hardwoods	0	0	0	39	7,760	113,159	10.1
Total hardwoods	6,346	2,754	3,580	613	357,159	1,159,609	3.9
All species	11,235	5,917	7,732	1,437	510,182	1,536,526	3.3
SE	6.7	9.4	8.4	18.8	2.4	3.3	

Table 20.--Number of all live trees on timberland by diameter class, tree class,
and species group, Massachusetts, 1998

(In thousands of trees)

Diameter class	Growing stock		Cull		All classes	SE
	Soft- woods	Hard- woods	Soft- woods	Hard- woods		
Seedlings	1,077,858	3,956,969	-	1,243,979	6,278,806	5.6
1.0 - 2.9	147,043	512,714	-	90,020	749,777	5.3
3.0 - 4.9	76,851	184,336	-	15,379	276,567	5.4
Total saplings	223,894	697,050	-	105,399	1,026,343	4.6
5.0 - 6.9	42,704	102,895	3,914	14,840	164,353	3.3
7.0 - 8.9	31,102	80,355	2,075	7,060	120,593	3.3
9.0 - 10.9	-	59,045	-	3,709	62,754	3.7
Total poletimber	73,807	242,295	5,989	25,610	347,700	2.8
9.0 - 10.9	20,205	-	3,145	-	23,351	6.8
11.0 - 12.9	15,335	37,424	1,049	4,759	58,568	3.7
13.0 - 14.9	11,853	19,313	479	2,146	33,791	4.2
Total small sawtimber	47,393	56,738	4,673	6,905	115,709	3.3
15.0 - 16.9	7,768	10,935	365	1,382	20,452	5.5
17.0 - 18.9	4,665	5,848	223	499	11,235	6.7
19.0 - 20.9	3,009	2,389	154	365	5,917	9.4
21.0 - 28.9	3,849	3,044	304	535	7,732	8.4
29.0 and larger	603	266	221	347	1,437	18.8
Total large sawtimber	19,893	22,483	1,268	3,128	46,773	4.3
All classes	1,442,845	4,975,535	11,930	1,385,021	7,815,332	4.6
SE	11.1	5.5	10.0	9.8	4.6	

Table 21.--Number of trees (5.0+ inches d.b.h.) on timberland by species and tree class, Massachusetts, 1998
(In thousands of trees)

Species	Tree class					All classes	SE			
	Preferred	Acceptable	All growing stock	Rough cull	Rotten cull					
						All live	Salvable dead	Nonsalvable dead		
Spruce/fir	39	6,560	6,599	228	37	6,864	501	1,257	8,623	24.2
Red pine	41	841	882	0	0	882	0	0	882	64.2
Pitch pine	0	7,531	7,531	419	77	8,026	239	858	9,123	23.1
White pine	946	67,171	68,117	5,277	377	73,771	2,062	10,152	85,985	7.0
Eastern hemlock	148	54,822	54,970	4,947	337	60,254	1,153	2,447	63,854	8.9
Other softwoods	26	2,968	2,994	181	50	3,226	114	509	3,849	56.4
Total softwoods	1,199	139,893	141,092	11,051	879	153,023	4,069	15,223	172,315	5.0
Red maple	293	107,705	107,998	9,911	3,568	121,476	1,506	7,531	130,514	5.0
Sugar maple	262	19,238	19,500	522	342	20,365	266	2,210	22,840	10.5
Yellow birch	75	13,744	13,819	1,212	232	15,263	148	1,420	16,831	9.8
Sweet birch	77	18,949	19,027	806	400	20,233	120	815	21,168	10.8
Paper birch	38	11,175	11,213	227	38	11,478	533	1,962	13,973	10.5
Hickory	117	4,521	4,639	150	38	4,827	77	78	4,982	15.5
Beech	0	17,047	17,047	1,444	908	19,398	184	1,222	20,804	11.4
White ash	647	13,060	13,707	307	292	14,306	989	925	16,220	12.1
Aspen	266	6,658	6,924	113	38	7,075	305	1,069	8,451	19.3
Black cherry	450	11,486	11,936	1,265	76	13,277	613	1,780	15,670	10.6
White oak	64	13,785	13,849	1,223	175	15,248	532	2,795	18,575	9.8
Northern red oak	2,346	36,577	38,923	922	366	40,210	268	2,055	42,534	8.2
Other red oaks	244	35,525	35,769	2,003	654	38,426	343	1,884	40,652	9.9
Elm	0	959	959	119	0	1,078	76	246	1,400	21.9
Other commercial hardwoods	145	6,061	6,206	458	72	6,736	78	646	7,460	18.3
Noncommercial hardwoods	-	-	-	7,534	226	7,760	151	1,532	9,443	12.2
Total hardwoods	5,025	316,491	321,516	28,218	7,426	357,159	6,188	28,170	391,518	2.7
All species	6,224	456,384	462,608	39,269	8,305	510,182	10,257	43,394	563,833	2.4
SE	10.1	2.5	2.5	5.6	8.8	2.4	8.2	4.7	2.4	

Table 22.--**Number of growing-stock trees (5.0+ inches d.b.h.) on timberland by species and diameter class, Massachusetts, 1985
(In thousands of trees)

Species	Diameter class (inches at breast height)												All classes	SE
	5.0- 6.9	7.0- 8.9	9.0- 10.9	11.0- 12.9	13.0- 14.9	15.0- 16.9	17.0- 18.9	19.0- 20.9	21.0- 22.9	23.0- 24.9	25.0- 26.9	27.0- 28.9	29.0+	
Spruce/fir	2,754	3,038	1,021	1,055	381	122	22	20	0	0	0	0	8,414	32.5
Red pine	236	60	315	321	176	27	0	0	0	0	0	0	1,135	51.1
Pitch pine	3,274	3,641	1,810	969	437	157	71	49	0	0	0	0	10,407	21.3
White pine	16,937	13,669	9,691	7,620	5,253	4,112	2,703	1,885	2,158	116	64,144	9.8	9.8	9.8
Eastern hemlock	14,547	9,817	6,177	4,511	2,840	1,559	607	170	227	42	40,498	13.5	13.5	13.5
Other softwoods	3,538	2,291	414	246	0	0	0	0	0	0	0	0	6,489	74.4
Total softwoods	41,286	32,517	19,428	14,722	9,086	5,977	3,402	2,125	2,385	158	131,086	7.6	7.6	7.6
Red maple	42,602	31,239	15,759	10,223	3,663	1,183	727	202	366	26	105,991	7.4	7.4	7.4
Sugar maple	5,496	5,479	2,302	1,533	1,002	494	242	155	187	32	16,923	18.2	18.2	18.2
Yellow birch	4,792	3,951	1,396	1,133	459	167	64	63	39	10	12,074	17.7	17.7	17.7
Sweet birch	5,903	3,947	2,010	1,195	452	289	31	0	23	0	13,850	20.9	20.9	20.9
Paper birch	5,820	4,323	2,050	809	332	64	63	0	0	0	13,461	19.5	19.5	19.5
Hickory	2,061	1,651	867	422	237	67	44	20	0	0	5,368	25.4	25.4	25.4
Beech	5,330	2,269	859	997	804	255	177	52	59	0	10,801	17.1	17.1	17.1
White ash	4,727	2,439	2,127	1,247	1,078	450	383	55	127	0	12,633	16.5	16.5	16.5
Aspen	1,435	2,151	1,537	838	363	65	0	38	41	9	6,477	23.9	23.9	23.9
Black cherry	3,223	2,855	2,558	1,286	554	561	46	143	9	0	11,236	14.5	14.5	14.5
White oak	8,199	5,067	3,411	1,109	562	329	106	156	107	0	19,049	12.8	12.8	12.8
Northern red oak	12,459	12,331	10,862	6,607	2,983	2,165	948	281	361	45	49,042	11.5	11.5	11.5
Other red oaks	14,459	13,705	8,729	3,915	2,179	567	315	280	246	19	44,414	11.9	11.9	11.9
Elm	201	141	158	123	0	32	22	0	0	0	677	35.7	35.7	35.7
Other hardwoods	2,351	2,106	2,199	965	490	269	110	0	64	0	8,555	23.0	23.0	23.0
Total hardwoods	119,057	93,655	56,828	32,403	15,160	6,956	3,279	1,445	1,628	140	330,552	3.7	3.7	3.7
All species	160,343	126,172	76,256	47,126	24,246	12,933	6,681	3,570	4,014	298	461,639	3.0	3.0	3.0
SE	4.8	4.3	4.6	4.5	5.0	6.7	9.8	12.0	12.4	27.3	3.0	3.0	3.0	3.0

Table 23. ---Number of growing-stock trees (5.0+ inches d.b.h.) on timberland by species and diameter class, Massachusetts, 1998

(In thousands of trees)														
Species	Diameter class (inches at breast height)											All classes	SE	
	5.0- 6.9	7.0- 8.9	9.0- 10.9	11.0- 12.9	13.0- 14.9	15.0- 16.9	17.0- 18.9	19.0- 20.9	21.0- 28.9	29.0+				
Spruce/fir	2,575	1,534	1,211	840	292	145	0	0	0	0	0	0	6,599	24.8
Red pine	38	265	269	117	155	38	0	0	0	0	0	0	882	64.2
Pitch pine	2,403	2,409	1,367	932	195	147	76	0	0	0	0	0	7,531	24.9
White pine	16,426	12,963	10,359	7,164	6,722	4,537	3,570	2,601	3,278	495	0	0	68,117	7.1
Eastern hemlock	20,127	13,036	6,406	5,947	4,451	2,901	1,018	407	571	107	0	0	54,970	9.2
Other softwoods	1,135	895	592	334	38	0	0	0	0	0	0	0	2,994	65.5
Total softwoods	42,704	31,102	20,205	15,335	11,853	7,768	4,665	3,009	3,849	603	0	0	141,092	5.2
Red maple	37,844	29,712	19,236	11,167	5,077	2,475	1,436	449	525	77	0	0	107,998	5.1
Sugar maple	7,219	4,220	3,147	2,085	1,282	902	308	107	156	74	0	0	19,500	10.5
Yellow birch	4,987	3,522	2,963	1,198	695	115	152	71	115	0	0	0	13,819	10.2
Sweet birch	6,787	5,555	3,201	2,101	673	484	147	0	79	0	0	0	19,027	11.1
Paper birch	4,029	2,877	2,155	1,356	601	156	0	38	0	0	0	0	11,213	11.3
Hickory	1,848	1,090	834	365	155	229	79	38	0	0	0	0	4,639	15.7
Beech	6,706	4,524	2,950	1,377	332	614	194	234	115	0	0	0	17,047	11.4
White ash	3,937	2,897	2,681	1,556	1,023	805	500	79	228	0	0	0	13,707	12.2
Aspen	1,771	1,323	1,630	1,062	756	153	152	0	75	0	0	0	6,924	20.2
Black cherry	2,413	2,791	2,691	1,407	994	804	304	304	228	0	0	0	11,936	11.3
White oak	4,271	3,197	3,010	1,570	1,023	322	227	228	0	0	0	0	13,849	10.4
Northern red oak	7,528	7,838	7,093	6,868	4,213	2,595	1,359	502	852	76	0	0	38,923	8.3
Other red oaks	10,320	9,374	6,507	4,698	2,311	1,050	800	188	520	0	0	0	35,769	9.9
Elm	543	150	113	75	0	0	38	38	0	0	0	0	959	23.8
Other hardwoods	2,692	1,283	834	538	176	229	151	112	152	39	0	0	6,206	19.0
Total hardwoods	102,895	80,355	59,045	37,424	19,313	10,935	5,848	2,389	3,044	266	0	0	321,516	2.7
All species	145,599	111,457	79,250	52,759	31,166	18,704	10,513	5,398	6,893	869	0	0	462,608	2.5
SE	3.5	3.4	3.4	3.8	4.4	5.8	7.1	10.0	9.0	21.8	0	0	2.5	

Number of growing-stock trees on timberland, Massachusetts, 1985 and 1998

Number of growing-stock trees on timberland, top 10 species, Massachusetts, 1985 and 1998

Table 24.--Number of seedlings and saplings on timberland by species and stand-size class, Massachusetts, 1998

(In millions of stems)

Species	Stand-size class				All classes	SE
	Saw-timber	Pole-timber	Sapling and seedling	Non-stocked		
Balsam fir	30	8	0	0	38	39.0
Eastern redcedar	1	5	3	0	9	51.6
Spruce species	37	37	0	0	73	36.7
Pitch pine	0	27	3	0	30	62.9
Eastern white pine	633	123	39	0	795	15.9
Northern white-cedar	0	0	0	0	0	100.0
Eastern hemlock	270	80	6	0	356	23.0
Boxelder	2	0	0	0	2	100.0
Striped maple	259	103	1	0	364	19.5
Red maple	635	191	108	0	933	9.9
Silver maple	0	3	0	0	3	100.0
Sugar maple	246	130	1	0	377	17.6
Mountain maple	62	33	0	0	95	47.6
Serviceberry	84	93	8	0	185	34.0
Yellow birch	200	75	6	0	282	34.9
Sweet birch	180	52	6	0	239	18.4
River birch	0	0	0	0	0	100.0
Paper birch	77	23	34	0	135	29.6
Gray birch	71	41	3	0	114	36.5
American hornbeam	79	7	0	0	86	35.0
Hickory species	5	0	0	0	5	74.1
Bitternut hickory	5	0	0	0	5	57.7
Pignut hickory	42	10	0	0	52	28.4
Shagbark hickory	13	0	0	0	13	45.0
American chestnut	23	31	0	0	55	40.6
Flowering dogwood	7	0	0	0	8	66.2
Hawthorn species	28	3	6	0	38	30.1
American beech	347	188	111	0	646	17.8
White ash	201	50	89	0	340	24.3
Black ash	2	19	0	0	21	92.3
Green ash	0	0	0	0	0	100.0
Sweetgum	1	0	0	0	1	100.0
Apple species	5	5	7	0	17	49.0
Black tupelo	8	1	5	0	13	48.6
Eastern hophornbeam	51	23	6	0	80	29.5
Eastern cottonwood	1	0	0	0	1	100.0
Bigtooth aspen	7	3	19	0	29	67.1
Quaking aspen	13	6	11	0	30	33.6
Pin cherry	46	23	0	0	69	44.0
Black cherry	402	151	17	0	571	13.2
Chokecherry	120	8	29	0	157	31.8
White oak	109	58	30	0	196	17.3
Scarlet oak	0	38	16	0	55	43.1
Scrub, bear oak	0	8	0	0	8	81.1
Chestnut oak	0	7	0	0	7	100.0
Northern red oak	286	86	18	0	389	12.2
Black oak	82	78	87	0	247	25.9
Black locust	0	0	0	0	0	100.0
Willow species	33	5	0	0	38	66.1
Sassafras	4	14	8	0	27	41.2
American basswood	12	2	0	0	15	48.9
American elm	36	7	0	0	43	46.4
Slippery elm	1	0	0	0	1	74.5
Unknown tree	6	0	0	0	6	79.1
All species	4,766	1,861	678	0	7,305	4.9
SE	6.5	11.3	26.5	.0	4.9	

Table 25.--Number of standing dead trees (5.0+ inches d.b.h.) on timberland by species, condition class, and diameter class, Massachusetts, 1998

(In thousands of trees)

Species	Intact trees				Broken trees			
	5.0- 10.9	11.0- 14.9	15+	Total intact	5.0- 10.9	11.0- 14.9	15+	Total broken
Spruce/fir	377	39	39	455	1,075	228	0	1,303
Pitch pine	521	0	0	521	539	37	0	576
White pine	4,075	304	77	4,456	5,965	859	612	7,435
Eastern hemlock	382	101	149	632	2,379	329	114	2,822
Other softwoods	200	0	0	200	385	0	0	385
Total softwoods	5,555	444	265	6,264	10,343	1,452	726	12,521
Red maple	1,553	39	0	1,593	5,970	765	710	7,445
Sugar maple	263	77	38	378	1,441	419	237	2,098
Yellow birch	105	39	0	144	1,069	211	144	1,424
Sweet birch	69	0	0	69	710	114	0	825
Paper birch	253	108	0	361	1,686	338	0	2,023
Hickory	0	0	0	0	154	0	0	154
Beech	103	118	0	222	875	232	78	1,184
White ash	528	39	0	567	1,113	117	116	1,347
Aspen	187	39	0	226	953	116	0	1,070
Black cherry	337	37	0	374	1,674	267	39	1,980
White oak	1,023	39	0	1,063	2,078	148	38	2,264
Northern red oak	916	75	0	991	1,068	150	39	1,256
Other red oaks	608	60	0	669	1,304	208	45	1,558
Elm	38	0	39	77	192	0	52	245
Other commercial hardwoods	151	77	0	228	496	0	0	496
Noncommercial hardwoods	417	0	0	417	1,227	0	0	1,227
Total hardwoods	6,554	748	77	7,380	22,011	3,085	1,500	26,596
All species	12,109	1,192	343	13,644	32,354	4,538	2,225	39,117
								52,761

Table 26.--Net volume of all trees on timberland by class of timber and species group, Massachusetts, 1998

(In millions of cubic feet)

Class of timber	Species group				All groups	SE
	Pines	Other softwoods	Soft hardwoods	Hard hardwoods		
Sawtimber trees:						
Sawlog portion	1,152.6	469.6	757.6	954.3	3,334.2	3.6
Upper stem	119.8	57.6	187.2	231.1	595.8	3.1
Total sawtimber trees	1,272.5	527.2	944.8	1,185.4	3,929.9	3.5
Poletimber trees	149.5	147.8	758.9	735.5	1,791.7	2.9
Total growing-stock trees	1,422.0	675.0	1,703.7	1,920.9	5,721.6	2.7
Rough trees:						
Sawtimber size	50.3	47.8	72.5	60.3	230.9	9.9
Poletimber size	10.8	4.6	36.4	26.9	78.7	8.0
Total rough trees	61.2	52.4	108.8	87.2	309.5	7.7
Rotten trees:						
Sawtimber size	3.3	3.1	22.5	26.9	55.7	14.8
Poletimber size	.3	.3	5.2	3.4	9.1	22.0
Total rotten trees	3.5	3.3	27.7	30.2	64.8	13.3
Salvable dead ^a trees:						
Sawtimber size	5.2	6.5	10.1	.7	22.4	24.9
Poletimber size	4.6	3.5	11.0	6.0	25.1	11.7
Total salvable dead trees	9.8	10.0	21.1	6.7	47.5	14.1
All classes	1,496.4	740.7	1,861.3	2,045.0	6,143.5	2.6
SE	7.7	9.5	4.6	4.4	2.6	

^a Includes noncommercial species.

Table 27.--Net volume of all live, growing-stock, and sawtimber trees on timberland
by species group and ownership class, Massachusetts, 1998

(In millions of cubic feet)

Species group	Owner class				All classes
	National Forest	Other public	Forest industry	Other private	
<u>All live</u>					
(In millions of cubic feet)					
Softwoods	.0	434.3	9.6	1,773.5	2,217.4
Hardwoods	.0	884.3	13.1	2,981.1	3,878.5
Total all live	.0	1,318.6	22.7	4,754.6	6,095.9
<u>Growing stock</u>					
(In millions of cubic feet)					
Softwoods	.0	419.7	9.6	1,667.7	2,097.0
Hardwoods	.0	822.7	12.4	2,789.6	3,624.6
Total growing stock	.0	1,242.3	22.0	4,457.3	5,721.6
<u>Sawtimber</u>					
(In millions of board feet)					
Softwoods	.0	1,536.7	37.0	6,240.7	7,814.5
Hardwoods	.0	1,982.7	13.4	6,720.6	8,716.7
Total sawtimber	.0	3,519.4	50.4	12,961.3	16,531.1

^a For all board-foot volume tables, International 1/4-inch rule is used.

Table 28.--Net volume of growing-stock trees on timberland by forest-type group and stand-size class, Massachusetts, 1998

(In millions of cubic feet)

Forest-type group	Stand-size class				All classes	SE
	Saw-timber	Pole-timber	Sapling and seedling	Non-stocked		
White/red pine	1,400.3	14.9	.1	.0	1,415.4	11.1
Spruce/fir	.0	.1	.0	.0	.1	100.0
Hard pine	.0	17.8	2.2	.0	19.9	45.9
Oak/pine	305.6	119.6	15.7	.0	440.9	18.0
Oak/hickory	1,020.2	283.2	9.4	.0	1,312.8	8.4
Oak/gum/cypress	.0	13.4	.0	.0	13.4	100.0
Elm/ash/red maple	138.4	64.7	.0	.0	203.1	23.8
Northern hardwoods	1,652.7	576.8	6.4	.0	2,235.9	6.1
Aspen/birch	42.2	36.5	1.4	.0	80.1	34.6
All groups	4,559.5	1,127.0	35.2	.0	5,721.6	2.7
SE	4.0	8.6	38.8	.0	2.7	

Table 29.--**Net volume of growing-stock trees on timberland by species and forest-type group, Massachusetts, 1985
(In millions of cubic feet)

Species	Forest-type group									All groups	SE
	White/red pine	Spruce/fir	Hard pine	Oak/pine	Oak/hickory	Oak/gum/cypress	Elm/ash/red maple	Northern hardwoods	Aspen/birch		
Spruce/fir	15.9	32.6	.0	.0	.4	.0	.0	33.3	.0	82.2	31.1
Red pine	7.9	.0	.8	.2	2.5	.0	.0	5.1	.6	17.1	49.3
Pitch pine	6.0	.0	50.6	12.4	6.8	.0	.0	2.3	.0	78.2	23.1
White pine	583.6	1.3	10.9	90.5	150.7	.0	6.1	267.8	16.2	1,127.1	9.8
Eastern hemlock	228.3	8.5	.0	3.4	15.2	.0	1.0	151.9	1.7	410.0	14.1
Other softwoods	5.1	.0	.0	2.5	.8	18.9	.0	1.1	.0	28.4	68.9
Total softwoods	846.7	42.3	62.3	109.1	176.4	18.9	7.1	461.6	18.5	1,743.0	7.3
Red maple	95.3	3.5	1.3	19.9	208.8	4.4	126.4	435.1	3.2	897.9	7.5
Sugar maple	8.7	.0	.0	.0	4.9	.0	.0	189.3	2.5	205.4	17.4
Yellow birch	11.8	.6	.2	.0	11.3	.0	.0	84.4	.0	108.3	17.4
Sweet birch	18.8	.0	.0	.0	16.8	.0	.0	83.5	.0	119.1	21.2
Paper birch	8.0	.0	.0	5.1	23.7	.0	.0	56.2	12.6	105.5	16.7
Hickory	1.0	.0	.0	1.2	39.6	.0	.0	10.0	.0	51.9	25.5
Beech	15.5	.0	.0	4.1	10.6	.0	.0	72.3	.3	102.9	15.2
White ash	10.4	.0	.0	4.7	20.1	.0	13.6	110.0	.8	159.6	16.7
Aspen	7.9	.0	.0	3.5	8.9	.0	8.6	29.6	19.6	78.1	21.4
Black cherry	15.6	1.6	.0	4.7	4.6	.0	1.7	106.9	3.1	138.2	15.5
White oak	5.5	.0	2.8	5.3	107.1	.0	.0	17.9	.0	138.6	11.7
Northern red oak	27.5	.0	4.6	22.7	469.7	.0	.0	43.2	1.1	568.7	10.7
Other red oaks	34.7	.0	9.6	12.1	323.2	.0	.8	9.8	.0	390.2	10.4
Elm	.5	.0	.0	.0	.6	.0	2.7	2.8	.0	6.6	39.6
Other hardwoods	.2	1.0	.2	.8	25.5	.0	24.5	44.1	.1	96.5	25.8
Total hardwoods	261.5	6.7	18.7	84.0	1,275.4	4.4	178.3	1,295.1	43.3	3,167.4	3.6
All species	1,108.2	49.0	81.0	193.1	1,451.9	23.3	185.4	1,756.7	61.7	4,910.4	3.0
SE	13.4	62.0	36.7	30.8	8.5	100.0	27.0	8.5	40.5	3.0	

Table 30.--Net volume of growing-stock trees on timberland by species and forest-type group, Massachusetts, 1998

(In millions of cubic feet)											
Species	Forest-type group									All groups	SE
	White/red pine	Spruce/fir	Hard pine	Oak/pine	Oak/hickory	Oak/gum/cypress	Elm/ash/red maple	Northern hardwoods	Aspen/birch		
Spruce/fir	17.5	.1	.0	.0	3.9	.0	.0	41.9	.0	63.4	28.1
Red pine	11.6	.0	.0	.1	.8	.0	.0	1.3	.0	13.8	61.9
Pitch pine	6.6	.0	16.3	20.0	8.3	.0	.0	3.5	.0	54.6	20.2
White pine	714.1	.0	.8	223.5	138.4	.0	7.1	256.8	5.5	1,346.2	8.1
Eastern hemlock	316.6	.0	.0	7.1	31.9	.0	1.9	240.0	.3	597.8	10.4
Other softwoods	8.1	.0	.3	.0	.2	11.5	1.0	.2	.0	21.3	64.3
Total softwoods	1,074.5	.1	17.4	250.7	183.4	11.5	10.0	543.7	5.8	2,097.0	5.9
Red maple	125.1	.0	.0	41.4	189.7	1.9	142.4	535.7	4.4	1,040.5	5.9
Sugar maple	19.3	.0	.0	4.6	10.9	.0	.1	201.1	2.8	238.8	11.9
Yellow birch	19.0	.0	.0	.6	2.9	.0	1.6	100.8	.4	125.1	11.3
Sweet birch	13.1	.0	.0	3.9	22.0	.0	.1	154.4	.2	193.8	14.6
Paper birch	26.2	.0	.0	5.6	17.1	.0	.6	50.8	9.0	109.3	12.3
Hickory	1.9	.0	.0	2.7	30.1	.0	.1	11.6	1.2	47.7	19.1
Beech	9.0	.0	.0	2.6	14.7	.0	.0	138.1	.3	164.7	13.5
White ash	17.9	.0	.0	7.9	23.6	.0	1.1	149.9	1.6	202.1	14.3
Aspen	6.2	.0	.0	1.0	16.9	.0	11.2	16.5	44.7	96.6	21.5
Black cherry	20.5	.0	.0	11.4	8.8	.0	.0	149.8	3.6	194.1	13.4
White oak	14.5	.0	1.3	8.6	94.2	.0	1.3	9.9	1.9	131.8	11.8
Northern red oak	39.4	.0	.0	49.2	408.5	.0	.6	124.2	1.7	623.5	8.8
Other red oaks	26.1	.0	1.3	50.0	269.7	.0	2.9	17.0	1.7	368.7	9.4
Elm	.6	.0	.0	.0	.2	.0	3.9	3.0	.0	7.6	39.2
Other hardwoods	2.0	.0	.0	.8	20.0	.0	27.2	29.4	.8	80.2	27.9
Total hardwoods	340.8	.0	2.5	190.2	1,129.4	1.9	193.1	1,692.2	74.3	3,624.6	3.0
All species	1,415.4	.1	19.9	440.9	1,312.8	13.4	203.1	2,235.9	80.1	5,721.6	2.7
SE	11.1	100.0	45.9	18.0	8.4	100.0	23.8	6.1	34.6	2.7	

Table 31.--**Net volume of growing-stock trees on timberland by species and stand-size class, Massachusetts, 1985

(In millions of cubic feet)

Species	Stand-size class				All classes	SE
	Saw-timber	Pole-timber	Sapling and seedling	Non-stocked		
Spruce/fir	37.0	39.2	5.9	.0	82.2	31.1
Red pine	16.0	1.1	.0	.0	17.1	49.3
Pitch pine	36.3	37.2	4.8	.0	78.2	23.1
White pine	819.7	277.9	29.5	.0	1,127.1	9.8
Eastern hemlock	291.7	118.3	.0	.0	410.0	14.1
Other softwoods	6.0	22.4	.0	.0	28.4	68.9
Total softwoods	1,206.7	496.1	40.2	.0	1,743.0	7.3
Red maple	371.2	518.2	8.5	.0	897.9	7.5
Sugar maple	116.9	84.3	4.2	.0	205.4	17.4
Yellow birch	56.6	51.7	.0	.0	108.3	17.4
Sweet birch	64.3	54.8	.0	.0	119.1	21.2
Paper birch	32.0	73.5	.0	.0	105.5	16.7
Hickory	29.5	22.3	.0	.0	51.9	25.5
Beech	69.1	33.6	.3	.0	102.9	15.2
White ash	90.7	68.6	.3	.0	159.6	16.7
Aspen	31.6	40.9	5.5	.0	78.1	21.4
Black cherry	67.5	66.1	4.6	.0	138.2	15.5
White oak	46.0	89.2	3.4	.0	138.6	11.7
Northern red oak	256.5	309.1	3.2	.0	568.7	10.7
Other red oaks	105.6	280.9	3.7	.0	390.2	10.4
Elm	4.1	2.5	.0	.0	6.6	39.6
Other hardwoods	41.0	55.5	.0	.0	96.5	25.8
Total hardwoods	1,382.7	1,751.2	33.5	.0	3,167.4	3.6
All species	2,589.3	2,247.3	73.8	.0	4,910.4	3.0
SE	7.4	6.6	28.0	.0	3.0	

Table 32.--Net volume of growing-stock trees on timberland by species and stand-size class, Massachusetts, 1998

(In millions of cubic feet)

Species	Stand-size class				All classes	SE
	Saw-timber	Pole-timber	Sapling and seedling	Non-stocked		
Spruce/fir	52.2	11.2	.0	.0	63.4	28.1
Red pine	12.2	1.6	.0	.0	13.8	61.9
Pitch pine	12.0	36.6	6.0	.0	54.6	20.2
White pine	1,171.3	163.1	11.8	.0	1,346.2	8.1
Eastern hemlock	543.4	52.5	1.8	.0	597.8	10.4
Other softwoods	8.9	12.4	.0	.0	21.3	64.3
Total softwoods	1,799.9	277.5	19.6	.0	2,097.0	5.9
Red maple	775.1	261.2	4.2	.0	1,040.5	5.9
Sugar maple	199.6	38.9	.2	.0	238.8	11.9
Yellow birch	77.2	47.6	.3	.0	125.1	11.3
Sweet birch	160.6	33.0	.2	.0	193.8	14.6
Paper birch	79.0	30.1	.2	.0	109.3	12.3
Hickory	41.8	5.9	.0	.0	47.7	19.1
Beech	128.0	35.8	.9	.0	164.7	13.5
White ash	165.6	35.3	1.1	.0	202.1	14.3
Aspen	62.3	33.7	.7	.0	96.6	21.5
Black cherry	140.8	51.9	1.4	.0	194.1	13.4
White oak	94.2	37.4	.2	.0	131.8	11.8
Northern red oak	525.2	95.5	2.8	.0	623.5	8.8
Other red oaks	239.4	126.0	3.4	.0	368.7	9.4
Elm	4.1	3.6	.0	.0	7.6	39.2
Other hardwoods	66.6	13.6	.0	.0	80.2	27.9
Total hardwoods	2,759.6	849.5	15.6	.0	3,624.6	3.0
All species	4,559.5	1,127.0	35.2	.0	5,721.6	2.7
SE	4.0	8.6	38.8	.0	2.7	

Table 33.---**Net volume of growing-stock trees on timberland by species and diameter class, Massachusetts, 1985
(In millions of cubic feet)

Species	Diameter class (inches at breast height)										All classes	SE
	5.0- 6.9	7.0- 8.9	9.0- 10.9	11.0- 12.9	13.0- 14.9	15.0- 16.9	17.0- 18.9	19.0- 20.9	21.0- 28.9	29.0+		
spruce/fir	7.4	20.9	13.9	21.9	11.0	4.8	1.2	1.2	1.2	.0	82.2	31.1
Red pine	.7	.5	4.0	6.3	4.7	1.0	.0	.0	.0	.0	17.1	49.3
Pitch pine	8.9	20.0	17.4	13.5	8.7	4.4	2.9	2.4	.0	.0	78.2	23.1
White pine	49.0	88.6	122.0	145.0	140.7	151.9	128.6	111.7	174.0	15.6	1,127.1	9.8
Eastern hemlock	38.3	55.7	65.7	74.9	67.4	51.4	25.2	8.5	17.9	5.0	410.0	14.1
Other softwoods	8.7	12.5	3.7	3.6	.0	.0	.0	.0	.0	.0	28.4	68.9
Total softwoods	112.9	198.3	226.6	265.1	232.6	213.4	157.9	123.7	191.9	20.6	1,743.0	7.3
Red maple	117.7	208.4	187.7	183.8	91.6	38.6	30.7	10.6	25.1	3.8	897.9	7.5
Sugar maple	17.9	43.3	30.1	30.9	27.1	17.2	11.8	8.4	13.4	5.3	205.4	17.4
Yellow birch	13.9	28.9	17.2	21.1	11.5	5.3	2.7	2.7	3.3	1.6	108.3	17.4
Sweet birch	19.3	29.3	24.8	22.1	11.4	9.5	1.3	.0	1.6	.0	119.1	21.2
Paper birch	18.6	32.1	27.3	14.7	8.6	1.9	2.4	.0	.0	.0	105.5	16.7
Hickory	6.5	14.0	11.2	7.7	7.0	2.3	2.4	.9	.0	.0	51.9	25.5
Beech	14.9	15.0	10.9	19.8	20.7	9.0	7.2	2.9	2.5	.0	102.9	15.2
White ash	15.8	17.8	28.6	24.4	30.3	15.9	16.2	3.1	7.4	.0	159.6	16.7
Aspen	4.9	16.7	20.9	15.4	10.1	2.4	.0	2.2	3.8	1.5	78.1	21.4
Black cherry	10.8	20.4	34.9	26.4	15.0	20.4	2.2	7.4	.8	.0	138.2	15.5
White oak	20.0	27.4	34.5	17.1	12.0	9.8	4.4	6.9	6.4	.0	138.6	11.7
Northern red oak	31.7	76.3	120.5	112.8	72.1	69.9	37.5	12.7	22.5	12.6	568.7	10.7
Other red oaks	35.8	82.9	93.5	64.2	53.2	18.3	12.3	12.8	15.1	2.1	390.2	10.4
Elm	.4	.8	1.5	1.8	.0	1.1	1.0	.0	.0	.0	6.6	39.6
Other hardwoods	6.3	14.0	27.3	18.4	11.9	9.4	4.8	.0	4.5	.0	96.5	25.8
Total hardwoods	334.5	627.1	670.8	580.7	382.6	231.1	136.6	70.6	106.5	27.0	3,167.4	3.6
All species	447.4	825.4	897.4	845.8	615.1	444.5	294.5	194.3	298.4	47.6	4,910.4	3.0
SE	4.8	4.3	4.7	4.5	5.1	6.9	10.0	12.2	13.1	30.6	3.0	

Table 34.--Net volume of growing-stock trees on timberland by species and diameter class, Massachusetts, 1998

Species	(In millions of cubic feet)											SE
	Diameter class (inches at breast height)										All classes	
	5.0- 6.9	7.0- 8.9	9.0- 10.9	11.0- 12.9	13.0- 14.9	15.0- 16.9	17.0- 18.9	19.0- 20.9	21.0- 28.9	29.0+		
Spruce/fir	6.8	10.6	15.5	17.1	8.0	5.3	.0	.0	.0	.0	63.4	28.1
Red pine	.1	2.1	3.9	2.1	4.2	1.3	.0	.0	.0	.0	13.8	61.9
Pitch pine	5.9	12.8	12.2	12.6	3.9	4.0	3.2	.0	.0	.0	54.6	20.2
White pine	46.9	81.3	121.4	129.0	173.2	160.3	161.8	143.8	255.9	72.5	1,346.2	8.1
Eastern hemlock	52.7	69.5	67.4	98.2	102.6	91.5	42.3	20.4	39.8	13.3	597.8	10.4
Other softwoods	3.3	5.3	6.5	5.3	.9	.0	.0	.0	.0	.0	21.3	64.3
Total softwoods	115.7	181.6	227.0	264.4	292.8	262.4	207.4	164.2	295.7	85.8	2,097.0	5.9
Red maple	99.1	186.9	221.4	197.5	126.9	77.7	60.1	23.2	34.3	13.2	1,040.5	5.9
Sugar maple	22.2	29.8	38.8	41.1	35.5	29.6	13.7	6.0	11.9	10.1	238.8	11.9
Yellow birch	13.7	23.1	34.2	19.8	15.9	2.5	6.0	2.1	7.7	.0	125.1	11.3
Sweet birch	21.1	41.7	41.7	41.8	18.3	17.4	5.9	.0	5.9	.0	193.8	14.6
Paper birch	13.0	20.9	26.5	25.7	15.8	5.5	.0	1.7	.0	.0	109.3	12.3
Hickory	5.0	8.1	10.6	6.5	4.7	7.5	4.0	1.3	.0	.0	47.7	19.1
Beech	18.4	29.4	33.8	26.0	7.4	20.7	8.1	12.9	8.1	.0	164.7	13.5
White ash	12.9	22.7	36.3	29.7	28.4	30.4	23.0	4.2	14.6	.0	202.1	14.3
Aspen	5.2	10.3	22.0	20.9	21.0	5.7	6.2	.0	5.3	.0	96.6	21.5
Black cherry	8.1	20.7	34.9	28.1	27.3	29.1	14.4	15.1	16.6	.0	194.1	13.4
White oak	9.7	17.4	29.0	23.8	23.1	9.1	9.3	10.4	.0	.0	131.8	11.8
Northern red oak	21.6	53.3	80.2	122.9	103.1	84.3	56.1	25.4	62.1	14.5	623.5	8.8
Other red oaks	24.9	55.4	62.8	70.7	51.8	31.8	30.2	8.7	32.4	.0	368.7	9.4
Elm	1.1	.7	1.0	1.0	.0	.0	2.0	1.8	.0	.0	7.6	39.2
Other hardwoods	6.8	8.2	9.8	9.3	4.7	8.6	6.5	5.0	16.4	5.1	80.2	27.9
Total hardwoods	282.8	528.7	683.0	664.9	483.9	359.8	245.6	117.9	215.2	42.9	3,624.6	3.0
All species	398.5	710.3	910.0	929.3	776.6	622.2	453.0	282.1	510.9	128.7	5,721.6	2.7
SE	3.6	3.4	3.5	4.0	4.5	6.0	7.3	10.4	9.4	22.8	2.7	

Net volume of growing-stock trees on timberland, Massachusetts, 1985 and 1998

Net volume of growing-stock trees on timberland, top 10 species, Massachusetts, 1985 and 1998

Table 35.--Net volume of growing stock in the sawlog portion of sawtimber trees on timberland by species and diameter class, Massachusetts, 1998

(In millions of cubic feet)												
Species	Diameter class (inches at breast height)										All classes	SE
	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-28.9	29.0+				
Spruce/fir	13.1	14.9	7.2	4.8	.0	.0	.0	.0	.0	40.0	30.9	
Red pine	3.3	1.9	3.8	1.1	.0	.0	.0	.0	.0	10.1	60.9	
Pitch pine	10.2	11.0	3.5	3.6	3.0	.0	.0	.0	.0	31.3	19.6	
White pine	102.2	112.2	154.8	145.9	149.3	133.8	239.3	67.8	1,105.2	8.6		
Eastern hemlock	56.7	85.5	91.7	83.3	39.1	18.9	37.2	12.4	424.8	11.4		
Other softwoods	5.5	4.6	.8	.0	.0	.0	.0	.0	10.9	65.8		
Total softwoods	191.0	230.0	261.7	238.8	191.3	152.7	276.5	80.2	1,622.2	6.5		
Red maple	-	145.4	102.8	65.3	51.1	19.8	29.2	11.2	424.7	8.3		
Sugar maple	-	30.2	28.8	24.9	11.6	5.1	10.1	8.6	119.3	14.6		
Yellow birch	-	14.6	12.9	2.1	5.1	1.8	6.5	.0	43.1	17.2		
Sweet birch	-	30.8	14.8	14.6	5.0	.0	5.0	.0	70.3	23.2		
Paper birch	-	18.9	12.8	4.6	.0	1.4	.0	.0	37.8	17.3		
Hickory	-	4.8	3.8	6.3	3.4	1.1	.0	.0	19.5	28.3		
Beech	-	19.2	6.0	17.3	6.9	11.0	6.9	.0	67.2	18.9		
White ash	-	21.8	23.0	25.5	19.5	3.5	12.4	.0	105.8	18.3		
Aspen	-	15.4	17.0	4.8	5.3	.0	4.5	.0	47.0	25.9		
Black cherry	-	20.7	22.1	24.5	12.2	12.9	14.1	.0	106.4	16.4		
White oak	-	17.5	18.7	7.6	7.9	8.8	.0	.0	60.6	16.7		
Northern red oak	-	90.4	83.5	70.8	47.7	21.6	52.7	12.3	379.2	9.7		
Other red oaks	-	52.1	41.9	26.7	25.7	7.4	27.5	.0	181.3	10.9		
Elm	-	.7	.0	.0	1.7	1.6	.0	.0	4.0	58.8		
Other hardwoods	-	6.9	3.8	7.2	5.5	4.2	13.9	4.3	45.8	36.2		
Total hardwoods	-	489.4	391.9	302.3	208.8	100.2	182.9	36.5	1,711.9	4.2		
All species	191.0	719.4	653.7	541.0	400.1	252.9	459.4	116.7	3,334.2	3.6		
SE	7.6	4.1	4.5	6.0	7.3	10.6	9.4	22.7	3.6			

Table 36.--**Net volume of sawtimber trees on timberland by species and diameter class, Massachusetts, 1985

Species	(In millions of board feet)								All classes	SE
	Diameter class (inches at breast height)									
	9.0- 10.9	11.0- 12.9	13.0- 14.9	15.0- 16.9	17.0- 18.9	19.0- 20.9	21.0- 28.9	29.0+		
Spruce/fir	52.3	101.2	54.2	23.9	6.1	5.8	.0	.0	243.5	33.6
Red pine	13.2	25.5	20.5	4.5	.0	.0	.0	.0	63.7	49.1
Pitch pine	52.9	45.5	32.5	16.9	13.4	10.9	.0	.0	172.2	26.7
White pine	402.8	576.7	607.0	710.7	615.7	546.0	889.2	77.1	4,425.1	10.9
Eastern hemlock	212.8	282.0	270.5	222.0	113.7	38.6	87.3	22.4	1,249.1	15.2
Other softwoods	9.5	12.2	.0	.0	.0	.0	.0	.0	21.8	46.8
Total softwoods	743.6	1,043.1	984.6	977.9	748.9	601.3	976.4	99.5	6,175.3	8.5
Red maple	-	676.3	361.5	163.0	128.3	45.1	115.8	16.0	1,506.0	9.6
Sugar maple	-	119.7	109.4	73.9	51.9	36.0	60.2	25.3	476.3	21.3
Yellow birch	-	83.1	47.2	20.3	10.2	10.8	13.4	6.4	191.4	21.9
Sweet birch	-	88.3	46.4	36.8	4.3	.0	6.3	.0	182.2	22.7
Paper birch	-	58.3	35.5	7.3	8.1	.0	.0	.0	109.1	24.2
Hickory	-	30.0	30.6	8.8	11.5	4.2	.0	.0	85.0	30.1
Beech	-	79.5	88.7	38.2	34.6	13.1	12.8	.0	267.0	18.1
White ash	-	104.4	131.2	70.1	70.0	11.1	32.4	.0	419.2	21.3
Aspen	-	65.5	44.3	10.6	.0	7.9	18.3	6.4	153.0	27.2
Black cherry	-	103.4	61.9	89.6	10.2	32.6	4.0	.0	301.6	21.9
White oak	-	66.9	46.9	41.3	17.1	27.6	29.2	.0	229.2	17.9
Northern red oak	-	427.6	293.1	289.9	159.5	51.4	96.6	46.3	1,364.4	12.2
Other red oaks	-	240.5	213.0	74.2	51.1	52.7	65.5	7.7	704.7	12.3
Elm	-	6.9	.0	4.9	4.3	.0	.0	.0	16.0	48.2
Other hardwoods	-	72.0	47.3	40.9	20.6	.0	21.1	.0	201.8	34.5
Total hardwoods	-	2,222.4	1,556.9	969.7	581.5	292.7	475.8	108.2	6,207.1	5.2
All species	743.6	3,265.4	2,541.5	1,947.6	1,330.4	894.0	1,452.2	207.7	12,382.4	4.7
SE	11.1	4.6	5.1	7.0	10.3	12.6	13.4	29.5	4.7	

Table 37.--Net volume of sawtimber trees on timberland by species and diameter class, Massachusetts, 1998
(In millions of board feet)

Species	Diameter class (inches at breast height)								All classes	SE
	9.0- 10.9	11.0- 12.9	13.0- 14.9	15.0- 16.9	17.0- 18.9	19.0- 20.9	21.0- 28.9	29.0+		
Spruce/fir	56.2	76.8	38.4	24.2	.0	.0	.0	.0	195.6	32.0
Red pine	16.0	9.0	19.9	6.1	.0	.0	.0	.0	50.9	60.0
Pitch pine	38.3	46.0	15.6	16.4	13.2	.0	.0	.0	129.5	20.0
White pine	401.2	526.4	765.8	752.8	784.6	716.5	1,287.7	367.7	5,602.8	8.9
Eastern hemlock	213.1	351.0	394.7	370.7	173.3	65.6	174.2	49.7	1,792.4	11.9
Other softwoods	21.4	19.2	2.7	.0	.0	.0	.0	.0	43.2	64.7
Total softwoods	746.2	1,028.4	1,237.1	1,170.1	971.2	782.1	1,461.9	417.5	7,814.5	6.8
Red maple	-	724.9	502.2	316.2	250.1	101.9	147.6	67.2	2,110.1	8.7
Sugar maple	-	157.6	140.5	124.4	56.8	24.1	57.2	43.2	603.8	14.8
Yellow birch	-	76.8	64.6	10.0	20.8	10.5	29.9	.0	212.6	17.1
Sweet birch	-	169.7	76.3	66.4	22.1	.0	29.1	.0	363.7	22.8
Paper birch	-	103.8	60.7	24.0	.0	6.1	.0	.0	194.6	18.1
Hickory	-	24.9	20.3	27.5	20.3	7.1	.0	.0	100.2	28.3
Beech	-	111.1	31.9	87.5	37.5	59.9	37.0	.0	365.0	19.0
White ash	-	117.5	118.5	126.8	97.8	12.0	61.6	.0	534.1	17.8
Aspen	-	91.5	92.2	24.6	27.5	.0	28.7	.0	264.5	25.8
Black cherry	-	113.5	114.0	130.2	67.2	62.7	79.0	.0	566.6	17.0
White oak	-	93.2	93.0	39.3	34.8	42.3	.0	.0	302.6	16.5
Northern red oak	-	463.5	417.9	353.3	241.4	116.4	284.3	69.3	1,946.1	9.8
Other red oaks	-	258.1	206.4	130.1	119.5	33.6	135.8	.0	883.6	11.2
Elm	-	3.9	.0	.0	9.5	8.2	.0	.0	21.5	58.9
Other hardwoods	-	37.9	20.1	34.2	30.4	25.0	84.9	15.4	247.8	38.1
Total hardwoods	-	2,547.9	1,958.7	1,494.6	1,035.6	509.8	974.9	195.1	8,716.7	4.3
All species	746.2	3,576.3	3,195.8	2,664.7	2,006.8	1,291.9	2,436.8	612.6	16,531.1	3.7
SE	8.0	4.1	4.6	6.1	7.5	10.8	9.6	23.7	3.7	

Net volume of sawtimber trees on timberland, Massachusetts, 1985 and 1998

Net volume of sawtimber trees on timberland, top 10 species, Massachusetts, 1985 and 1998

Table 38.--Net volume of sawtimber trees on timberland by species, size class, and tree grade, Massachusetts, 1998
(In millions of board feet)

Species	>15" Diameter at breast height					All size classes										
	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	All grades	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	All grades				
Spruce/fir	10.8	-	-	-	13.4	24.2	147.3	-	-	-	-	-	48.3	195.6		
Red pine	.0	.0	6.1	-	.0	6.1	6.3	.0	44.6	-	.0	50.9	-	50.9		
Pitch pine	6.2	7.0	16.4	-	.0	29.6	11.5	17.4	97.1	-	3.5	129.5	-	129.5		
White pine	140.9	876.6	1,372.3	791.5	728.1	3,909.4	166.6	1,261.4	2,246.5	1,078.9	849.4	5,602.8	-	5,602.8		
Eastern hemlock	458.4	-	-	-	375.2	833.6	1,195.1	-	-	-	597.3	1,792.4	-	1,792.4		
Other softwoods	.0	.0	.0	-	.0	.0	19.7	12.5	9.6	-	1.5	43.2	-	43.2		
Total softwoods	616.3	883.6	1,394.8	791.5	1,116.7	4,802.8	1,546.5	1,291.3	2,397.7	1,078.9	1,500.0	7,814.5	-	7,814.5		
Red maple	92.5	198.8	221.9	60.5	309.3	883.0	92.5	421.8	1,058.2	148.0	389.6	2,110.1	-	2,110.1		
Sugar maple	81.2	53.9	84.3	16.0	70.2	305.7	81.2	137.2	271.4	34.1	80.0	603.8	-	603.8		
Yellow birch	4.5	10.6	12.3	3.8	40.0	71.2	4.5	45.3	109.2	3.8	49.8	212.6	-	212.6		
Sweet birch	20.1	43.9	33.3	17.3	3.1	117.6	20.1	92.8	218.8	21.2	10.7	363.7	-	363.7		
Paper birch	14.2	12.2	.0	.0	3.7	30.1	14.2	37.3	134.1	2.4	6.6	194.6	-	194.6		
Hickory	11.2	22.3	14.2	7.1	.0	54.9	11.2	36.0	45.9	7.1	.0	100.2	-	100.2		
Beech	11.8	45.0	62.1	51.1	52.0	222.0	11.8	54.4	172.5	62.0	64.3	365.0	-	365.0		
White ash	148.6	58.9	48.9	.0	41.8	298.1	148.6	135.7	198.0	3.4	48.4	534.1	-	534.1		
Aspen	25.2	6.5	32.6	16.4	.0	80.8	25.2	82.6	135.3	16.4	5.0	264.5	-	264.5		
Black cherry	126.7	78.6	64.3	4.9	64.6	339.1	126.7	140.9	193.5	27.6	77.9	566.6	-	566.6		
White oak	30.6	33.4	21.9	3.8	26.8	116.4	30.6	75.2	142.7	18.3	35.9	302.6	-	302.6		
Northern red oak	370.4	376.4	155.8	5.3	156.9	1,064.7	370.4	645.9	726.7	15.9	187.3	1,946.1	-	1,946.1		
Other red oaks	118.4	114.7	108.2	40.0	37.9	419.1	118.4	210.9	424.3	83.1	46.8	883.6	-	883.6		
Elm	.0	17.7	.0	.0	.0	17.7	.0	17.7	3.9	.0	.0	21.5	-	21.5		
Other hardwoods	61.9	63.2	42.7	.0	22.0	189.8	61.9	77.2	84.6	.0	24.0	247.8	-	247.8		
Total hardwoods	1,117.3	1,136.0	902.4	226.1	828.3	4,210.0	1,117.3	2,210.7	3,919.0	443.4	1,026.4	8,716.7	-	8,716.7		
All species	1,733.6	2,019.6	2,297.1	1,017.6	1,944.9	9,012.8	2,663.8	3,502.1	6,316.7	1,522.2	2,526.4	16,531.1	-	16,531.1		

Net volume of 15+ inches d.b.h. sawtimber trees on timberland, top 10 species by tree grade, Massachusetts, 1998

Table 39.--Average annual net change of growing-stock volume on timberland by species and component of change, Massachusetts, 1984-97
(In thousands of cubic feet)

Species	Component of change							Net change	
	Ingrowth	Accretion	Gross growth	Mortality	Cull decrement	Cull increment	Net growth		
							Harvest removals	Land use removals	Total removals
Spruce/fir	1,205	1,497	2,703	-705	208	-404	1,802	-652	0
Red pine	28	219	247	0	0	-324	-77	-127	-74
Pitch pine	902	282	1,184	-667	142	-223	437	-57	-1,459
White pine	5,804	23,109	28,914	-3,657	551	-5,121	20,686	-3,158	-7,903
Eastern hemlock	6,373	10,596	16,969	-946	789	-1,923	14,888	-667	-600
Other softwoods	428	566	993	-133	497	-170	1,187	0	-155
Total softwoods	14,740	36,270	51,010	-6,108	2,187	-8,165	38,924	-4,660	-10,191
Red maple	10,319	14,061	24,380	-7,314	2,342	-5,866	13,542	-1,574	-3,773
Sugar maple	1,751	2,042	3,793	-1,566	737	-1,314	1,650	-379	-51
Yellow birch	1,650	1,604	3,254	-217	510	-452	3,096	-474	-3,139
Sweet birch	1,872	3,409	5,281	-538	332	-136	4,940	-151	-1,530
Paper birch	1,175	1,291	2,466	-1,730	486	-69	1,152	-165	-241
Hickory	1,072	816	1,888	0	0	0	1,888	-305	-54
Beech	1,536	2,988	4,524	-1,565	1,442	-946	3,455	-187	-62
White ash	2,354	1,883	4,237	-736	939	-132	4,308	-823	-277
Aspen	1,088	907	1,995	-1,442	0	-160	393	-83	0
Black cherry	1,965	2,271	4,236	-251	592	-293	4,283	-477	0
White oak	580	1,169	1,749	-1,077	423	-161	933	-127	-2,823
Northern red oak	4,737	9,114	13,851	-1,789	245	-2,605	9,701	-2,242	-10,249
Other red oaks	3,270	5,230	8,500	-1,331	890	-1,262	6,798	-1,041	-6,947
Elm	208	159	367	0	0	0	367	0	-129
Other hardwoods	777	1,033	1,809	-321	567	-37	2,019	-251	-1,497
Total hardwoods	34,354	47,977	82,331	-19,877	9,506	-13,433	58,527	-8,279	-30,771
All species	49,094	84,247	133,341	-25,985	11,693	-21,598	97,451	-12,939	-40,963

Table 40.--Average annual net growth and average annual
removals of growing-stock volume on timberland
by species, Massachusetts, 1984-97

(In thousands of cubic feet)

Species	Component	
	Growth	Removals
Spruce/fir	1,802	652
Red pine	-77	201
Pitch pine	437	1,515
White pine	20,686	11,061
Eastern hemlock	14,888	1,267
Other softwoods	1,187	155
Total softwoods	38,924	14,851
Red maple	13,542	5,347
Sugar maple	1,650	430
Yellow birch	3,096	3,612
Sweet birch	4,940	1,681
Paper birch	1,152	406
Hickory	1,888	359
Beech	3,455	249
White ash	4,308	1,100
Aspen	393	83
Black cherry	4,283	477
White oak	933	2,950
Northern red oak	9,701	12,490
Other red oaks	6,798	7,988
Elm	367	129
Other hardwoods	2,019	1,748
Total hardwoods	58,527	39,051
All species	97,451	53,902

Average annual net growth and average annual removals of growing-stock volume on timberland by species, Massachusetts, 1984-97

Table 41.--Average annual net growth and average annual
removals of sawtimber volume on timberland
by species, Massachusetts, 1984-97

(In thousands of board feet)

Species	Component	
	Growth	Removals
Spruce/fir	8,509	1,103
Red pine	-333	826
Pitch pine	1,753	3,307
White pine	111,310	43,469
Eastern hemlock	46,862	3,147
Other softwoods	3,819	0
Total softwoods	171,920	51,853
Red maple	43,978	6,731
Sugar maple	4,824	1,224
Yellow birch	5,133	13,865
Sweet birch	12,367	1,609
Paper birch	6,135	458
Hickory	5,166	1,255
Beech	5,057	775
White ash	16,055	2,514
Aspen	9,390	369
Black cherry	19,454	427
White oak	5,542	3,717
Northern red oak	47,750	27,541
Other red oaks	27,809	15,180
Elm	512	484
Other hardwoods	7,334	4,309
Total hardwoods	216,506	80,459
All species	388,426	132,311

Average annual net growth and average annual removals of sawtimber volume on timberland by species, Massachusetts, 1984-97

Table 42.--Average annual mortality of growing-stock and sawtimber volume on timberland by species, Massachusetts, 1984-97

(In thousands of cubic feet/board feet)

Species	Mortality	
	Growing-stock	Sawtimber
Spruce/fir	705	2,437
Pitch pine	667	451
White pine	3,657	13,242
Eastern hemlock	946	3,707
Other softwoods	133	165
Total softwoods	6,108	20,004
Red maple	7,314	15,249
Sugar maple	1,566	3,663
Yellow birch	217	831
Sweet birch	538	648
Paper birch	1,730	2,335
Beech	1,565	3,718
White ash	736	776
Aspen	1,442	701
Black cherry	251	0
White oak	1,077	1,085
Northern red oak	1,789	3,532
Other red oaks	1,331	1,538
Other hardwoods	321	294
Total hardwoods	19,877	34,371
All species	25,985	54,374

Table 43.--Average annual net growth and average annual removals of growing-stock volume on timberland by ownership class and species group, Massachusetts, 1984-97

(In thousands of cubic feet)

Ownership class	Net Growth			Removals		
	Softwoods	Hardwoods	All groups	Softwoods	Hardwoods	All groups
Other public	6,580	13,956	20,537	1,489	7,787	9,276
Forest industry	318	-326	-7	0	0	0
Other private	32,025	44,896	76,922	13,362	31,264	44,626
All classes	38,924	58,527	97,451	14,851	39,051	53,902

Table 44.--Average annual net growth and average annual removals of sawtimber volume on timberland by ownership class and species group, Massachusetts, 1984-97

(In thousands of board feet)

Ownership class	Net Growth			Removals		
	Softwoods	Hardwoods	All groups	Softwoods	Hardwoods	All groups
Other public	25,061	57,158	82,219	5,857	20,705	26,563
Forest industry	1,669	183	1,852	0	0	0
Other private	145,190	159,165	304,355	45,995	59,753	105,749
All classes	171,920	216,506	388,426	51,853	80,459	132,311

Table 45.--Change in area of timberland between inventories by
forest-type group, Massachusetts, 1985 and 1998

(In thousands of acres)

Forest-type group	1985	1998	Change	Percent change
White/red pine	442.9	440.0	-2.9	-.7
Oak/pine	127.1	205.4	78.3	61.6
Oak/hickory	1,029.7	734.7	-295.0	-28.6
Elm/ash/red maple	126.1	123.6	-2.5	-2.0
Northern hardwoods	1,027.4	1,038.2	10.8	1.1
Other types	159.0	89.4	-69.6	-43.8
All types	2,912.3	2,631.3	-281.0	-9.6

Table 46.--Change in area of timberland between inventories by
stand-size class, Massachusetts, 1985 and 1998

(In thousands of acres)

Stand-size class	1985	1998	Change	Percent change
Sawtimber	1,182.9	1,754.6	571.7	48.3
Poletimber	1,506.4	736.1	-770.3	-51.1
Sapling and seedling	223.0	140.6	-82.4	-37.0
Nonstocked	.0	.0	.0	.0
All classes	2,912.3	2,631.3	-281.0	-9.6

Table 47.--Change in volume on timberland between inventories,
Massachusetts, 1985 and 1998

Species group	1985	1998	Change	Percent change
Growing stock (Millions of cubic feet)				
Softwoods	1,743.0	2,097.0	354.0	20.3
Hardwoods	3,167.4	3,624.6	457.2	14.4
All groups	4,910.4	5,721.6	811.2	16.5
Sawtimber (Millions of board feet)				
Softwoods	6,175.3	7,814.5	1,639.2	26.5
Hardwoods	6,207.1	8,716.7	2,509.6	40.4
All groups	12,382.4	16,531.1	4,148.8	33.5

COUNTY TABLES

COUNTY TABLES

Table 48.--Land area by county and land class, Massachusetts, 1998

(In thousands of acres)

County	Land class							All classes
	Timberland	Reserved productive	Urban forest	Other forest	Christmas trees	Reserved other forest	Total forest land	Nonforest land
Berkshire	447.0	19.2	9.8	1.5	.2	6.4	484.0	112.1
Bristol	144.3	4.0	33.0	11.7	.0	.0	193.1	162.8
Essex	109.7	.0	36.8	13.1	.0	.0	159.6	159.2
Franklin	361.5	6.3	1.6	.0	.0	.0	369.4	80.0
Hampden	218.2	3.3	23.5	6.4	.0	.0	251.4	144.5
Hampshire	237.8	5.0	.0	.0	.0	.0	242.8	95.8
Middlesex	165.9	13.0	48.7	2.9	.0	6.0	236.5	290.5
Norfolk	89.3	13.5	8.6	23.9	.0	.0	135.4	120.4
Plymouth	201.1	.0	39.1	8.8	.0	5.1	254.1	168.7
Suffolk	.0	.0	.0	.0	.0	.0	.0	37.5
Worcester	593.1	6.4	12.9	21.7	.0	.0	634.0	334.4
Barnstable/Dukes/Nantucket	63.5	25.1	28.0	36.3	.0	13.1	165.8	184.5
All counties	2,631.3	95.7	242.1	126.5	.2	30.5	3,126.2	1,890.1
								5,016.3

Table 49.--Area of all forest land by county and forest-type group, Massachusetts, 1998

(In thousands of acres)

County	Forest-type group									Total	SE
	White/ red pine	Spruce/ fir	Hard pine	Oak/ pine	Oak/ hickory	Oak/gum/ cypress	Elm/ash/ red maple	Northern hardwoods	Aspen/ birch		
Berkshire	88.2	1.5	.0	11.0	44.7	.0	1.8	317.9	19.0	484.0	1.6
Bristol	1.8	.0	4.8	16.3	115.1	6.1	20.2	28.7	.0	193.1	5.4
Essex	20.6	.0	.0	11.2	78.9	.0	18.7	26.0	4.1	159.6	6.9
Franklin	90.4	.0	1.6	.0	39.3	.0	.0	231.6	6.6	369.4	2.8
Hampden	24.2	.0	.0	18.3	58.7	.0	36.5	97.9	15.8	251.4	5.6
Hampshire	27.4	.0	.0	11.5	54.4	.0	11.0	136.9	1.5	242.8	4.2
Middlesex	40.9	.0	.0	22.1	94.8	.0	34.2	37.6	7.0	236.5	6.4
Norfolk	20.3	.0	.0	11.9	47.1	.0	42.3	13.9	.0	135.4	8.1
Plymouth	53.4	.0	13.1	46.5	72.2	3.3	20.8	44.9	.0	254.1	4.9
Worcester	110.7	6.3	.0	55.8	254.8	.0	2.9	180.1	23.4	634.0	3.3
Barnstable/Dukes/Nantucket	.0	.0	47.5	56.6	53.5	.0	.0	8.1	.0	165.8	8.0
All counties	477.8	7.9	67.1	261.3	913.5	9.3	188.3	1,123.6	77.4	3,126.2	1.4
SE	9.7	82.8	27.1	13.5	6.5	73.9	16.2	5.2	25.4	1.4	

Percent of forest land by county, Massachusetts, 1998

Table 50.--Area of all forest land by county and stand-size class, Massachusetts, 1998

(In thousands of acres)

County	Stand-size class				All classes	SE
	Saw- timber	Pole- timber	Sapling and seedling	Non- stocked		
Berkshire	350.0	114.9	19.1	.0	484.0	1.6
Bristol	80.3	73.9	38.9	.0	193.1	5.4
Essex	98.3	38.3	22.9	.0	159.6	6.9
Franklin	270.7	78.6	20.1	.0	369.4	2.8
Hampden	177.2	60.1	14.2	.0	251.4	5.6
Hampshire	172.3	64.7	5.9	.0	242.8	4.2
Middlesex	167.6	67.5	1.4	.0	236.5	6.4
Norfolk	75.4	36.1	23.9	.0	135.4	8.1
Plymouth	131.5	73.2	49.3	.0	254.1	4.9
Worcester	427.7	163.3	43.0	.0	634.0	3.3
Barnstable/Dukes/Nantucket	26.9	89.1	49.9	.0	165.8	8.0
All counties	1,977.9	859.7	288.5	.0	3,126.2	1.4
SE	3.1	6.8	12.3	.0	1.4	

Table 51.--Area of timberland by county and ownership class, Massachusetts, 1998

(In thousands of acres)

County	Ownership class					All			SE	
	National Forest	Misc. federal	State	County and municipal	Forest industry	Farmer	Corporate	Individual		
Berkshire	.0	.0	121.3	19.4	.0	6.5	68.5	231.2	447.0	3.5
Bristol	.0	.0	6.5	26.0	14.2	5.1	34.4	58.2	144.3	10.7
Essex	.0	.0	6.1	18.8	.0	.0	40.0	44.8	109.7	13.7
Franklin	.0	.0	51.7	.0	.0	13.1	51.6	245.2	361.5	3.4
Hampden	.0	6.9	19.0	24.6	.0	.0	44.1	123.6	218.2	6.6
Hampshire	.0	.0	27.6	4.9	.0	.0	38.3	167.0	237.8	4.8
Middlesex	.0	.0	24.7	16.5	.0	.0	36.8	87.9	165.9	11.8
Norfolk	.0	.0	.0	11.8	.0	.0	34.4	43.2	89.3	14.5
Plymouth	.0	.0	9.3	20.0	.0	4.4	99.9	67.6	201.1	8.2
Worcester	.0	18.1	71.2	26.6	.0	20.2	97.4	359.6	593.1	3.8
Barnstable/Dukes/Nantucket	.0	10.4	6.5	6.5	.0	.0	19.5	20.5	63.5	23.0
All counties	.0	35.3	343.8	175.1	14.2	49.3	564.9	1,448.7	2,631.3	2.0
SE	.0	38.3	12.3	17.9	56.7	34.3	9.2	4.5	2.0	

Table 52.--Area of timberland by county and forest-type group, Massachusetts, 1998

(In thousands of acres)

County	Forest-type group									Total	SE
	White/ red pine	Spruce/ fir	Loblolly/ shortleaf	Oak/ pine	Oak/ hickory	Oak/gum/ cypress	Elm/ash/ red maple	Northern hardwoods	Aspen/ birch		
Berkshire	75.4	1.5	.0	11.0	31.8	.0	.0	308.3	19.0	447.0	3.5
Bristol	1.8	.0	3.3	16.3	93.1	.0	9.9	20.0	.0	144.3	10.7
Essex	18.9	.0	.0	5.0	62.1	.0	7.9	15.8	.0	109.7	13.7
Franklin	90.4	.0	.0	.0	39.3	.0	.0	225.3	6.6	361.5	3.4
Hampden	19.8	.0	.0	18.3	42.7	.0	30.1	91.5	15.8	218.2	6.6
Hampshire	27.4	.0	.0	11.5	54.4	.0	6.0	136.9	1.5	237.8	4.8
Middlesex	34.4	.0	.0	15.0	65.7	.0	25.4	25.2	.0	165.9	11.8
Norfolk	20.3	.0	.0	8.9	30.3	.0	29.8	.0	.0	89.3	14.5
Plymouth	47.2	.0	13.1	39.8	51.1	3.3	11.5	35.0	.0	201.1	8.2
Worcester	104.4	.0	.0	50.9	242.1	.0	2.9	180.1	12.6	593.1	3.8
Barnstable/Dukes/Nantucket	.0	.0	12.6	28.6	22.2	.0	.0	.0	.0	63.5	23.0
All counties	440.0	1.5	29.0	205.4	734.7	3.3	123.6	1,038.2	55.6	2,631.3	2.0
SE	10.3	100.0	42.3	15.9	7.6	100.0	20.2	5.4	30.1	2.0	

Table 53.--Area of timberland by county and stand-size class, Massachusetts, 1998

(In thousands of acres)

County	Stand-size class				All classes	SE
	Saw-timber	Pole-timber	Sapling and seedling	Non-stocked		
Berkshire	322.8	113.4	10.8	.0	447.0	3.5
Bristol	59.1	58.1	27.2	.0	144.3	10.7
Essex	82.6	25.8	1.3	.0	109.7	13.7
Franklin	264.5	77.0	20.1	.0	361.5	3.4
Hampden	157.9	52.6	7.8	.0	218.2	6.6
Hampshire	167.3	64.7	5.9	.0	237.8	4.8
Middlesex	117.3	48.5	.0	.0	165.9	11.8
Norfolk	55.6	26.9	6.8	.0	89.3	14.5
Plymouth	109.0	56.6	35.4	.0	201.1	8.2
Worcester	418.0	149.6	25.4	.0	593.1	3.8
Barnstable/Dukes/Nantucket	.6	62.9	.0	.0	63.5	23.0
All counties	1,754.6	736.1	140.6	.0	2,631.3	2.0
SE	3.5	7.7	18.0	.0	2.0	

Table 54.--Area of timberland by county and cubic-foot stand-volume class of growing-stock trees, Massachusetts, 1998

(In thousands of acres)

County	Stand-volume class (cubic feet per acre)						All classes
	0-499	500-999	1000-1499	1500-1999	2000-2499	2500+	
Berkshire	18.0	1.2	48.7	87.6	107.2	184.3	447.0
Bristol	33.5	11.0	35.7	23.3	25.1	15.8	144.3
Essex	7.2	6.3	21.1	32.3	14.0	28.8	109.7
Franklin	36.5	7.9	35.1	21.8	58.1	202.1	361.5
Hampden	3.6	12.5	33.1	59.7	31.6	77.6	218.2
Hampshire	5.0	4.6	29.2	57.6	49.5	92.0	237.8
Middlesex	21.7	6.0	38.1	31.5	19.1	49.5	165.9
Norfolk	11.3	12.7	11.8	.0	25.5	28.1	89.3
Plymouth	29.1	13.1	33.7	28.3	27.6	69.4	201.1
Worcester	29.4	44.0	81.6	112.1	148.8	177.3	593.1
Barnstable/Dukes/Nantucket	10.0	26.8	17.9	6.5	2.2	.0	63.5
All counties	205.0	146.2	385.9	460.6	508.8	924.7	2,631.3

Table 55.--Area of timberland by county and stocking class of growing-stock trees, Massachusetts, 1998

(In thousands of acres)

County	Stocking class					All classes	SE
	Nonstocked	Poorly stocked	Moderately stocked	Fully stocked	Over-stocked		
Berkshire	3.0	1.0	90.2	325.7	27.0	447.0	3.5
Bristol	.0	5.8	55.7	82.8	.0	144.3	10.7
Essex	.0	7.6	46.4	51.4	4.3	109.7	13.7
Franklin	.0	21.3	32.6	272.4	35.3	361.5	3.4
Hampden	.0	.0	64.9	139.6	13.7	218.2	6.6
Hampshire	.0	11.8	63.1	142.2	20.6	237.8	4.8
Middlesex	.0	19.6	60.1	80.3	5.9	165.9	11.8
Norfolk	.0	4.5	41.1	36.7	7.0	89.3	14.5
Plymouth	.0	.0	67.0	116.9	17.2	201.1	8.2
Worcester	.0	22.5	155.0	383.3	32.3	593.1	3.8
Barnstable/Dukes/Nantucket	.0	9.8	21.7	29.8	2.2	63.5	23.0
All counties	3.0	103.9	697.9	1,661.0	165.4	2,631.3	2.0
SE	100.0	22.9	8.0	4.0	17.4	2.0	

Table 56.--Area of timberland by county and site-productivity class, Massachusetts, 1998

(In thousands of acres)

County	Productivity class(cuft/a/yr)				All classes	SE
	Very good (120+)	Good (85-119)	Fair (50-84)	Poor (20-49)		
Berkshire	29.4	62.7	170.4	184.4	447.0	3.5
Bristol	6.1	24.7	59.2	54.3	144.3	10.7
Essex	18.9	12.2	51.2	27.4	109.7	13.7
Franklin	49.8	27.5	128.0	156.2	361.5	3.4
Hampden	12.2	18.6	91.7	95.7	218.2	6.6
Hampshire	26.4	16.2	112.3	82.8	237.8	4.8
Middlesex	19.9	41.1	50.2	54.6	165.9	11.8
Norfolk	12.8	6.0	30.6	40.0	89.3	14.5
Plymouth	6.8	21.4	83.4	89.4	201.1	8.2
Worcester	50.3	87.5	267.8	187.6	593.1	3.8
Barnstable/Dukes/Nantucket	.0	.6	.0	62.9	63.5	23.0
All counties	232.5	318.5	1,044.8	1,035.5	2,631.3	2.0
SE	15.5	12.7	5.9	6.1	2.0	

Table 57.--Biomass of all trees and shrubs on all forest land by county and component, Massachusetts, 1998

(In thousands of dry tons)

County	Component							All trees, shrubs		SE
	Preferred/ acceptable	Cull	Total timber	Saplings	Seedlings	live trees	Total	Salvage dead trees		
Berkshire	40,297	5,227	45,524	3,216	347	49,087	105	607	49,800	3.8
Bristol	9,669	1,470	11,139	1,423	77	12,639	50	39	12,729	8.4
Essex	10,169	711	10,880	492	59	11,431	80	163	11,674	11.1
Franklin	31,379	3,009	34,388	2,369	209	36,966	58	182	37,206	5.2
Hampden	19,088	1,733	20,821	1,319	127	22,267	81	244	22,592	7.5
Hampshire	20,799	1,430	22,229	1,445	161	23,834	55	75	23,964	5.7
Middlesex	17,306	1,962	19,268	776	111	20,155	133	249	20,538	8.2
Norfolk	8,360	1,183	9,542	558	81	10,181	57	74	10,312	11.9
Plymouth	16,102	1,165	17,267	1,355	94	18,716	67	59	18,841	7.3
Worcester	46,799	4,999	51,798	2,886	362	55,046	431	440	55,917	4.7
Barnstable/Dukes/Nantucket	4,405	1,529	5,935	743	129	6,807	18	53	6,878	11.5
All counties	224,373	24,418	248,792	16,582	1,758	267,131	1,134	2,185	270,451	2.0
SE	2.2	6.5	2.1	4.6	5.1	2.0	11.9	11.6	2.0	

Table 58.--Biomass of growing stock on timberland by county and component, Massachusetts, 1998

County	(In thousands of dry tons)			SE	
	Growing stock		Total growing stock		
	Pole timber	Sawlog			Upper stem
Berkshire	8,904	13,772	2,786	25,462	5.1
Bristol	2,185	2,351	517	5,054	12.6
Essex	1,890	2,917	586	5,393	16.9
Franklin	5,972	12,305	2,375	20,652	6.3
Hampden	3,472	6,791	1,373	11,637	8.8
Hampshire	4,399	7,422	1,419	13,240	6.1
Middlesex	2,516	4,192	773	7,481	13.2
Norfolk	1,132	2,946	503	4,581	18.7
Plymouth	3,020	4,781	845	8,646	10.7
Worcester	9,243	17,686	3,374	30,304	5.3
Barnstable/Dukes/Nantucket	1,159	406	75	1,640	27.5
All counties	43,894	75,569	14,628	134,091	2.5
SE	2.8	3.3	3.3	2.5	

Table 59.--Biomass of all timber on timberland by county, class of timber, and component, Massachusetts, 1998

(In thousands of dry tons)

County	Growing stock trees				Total timber	SE
	Growing stock	Branches	Foliage	Stump and roots		
Berkshire	25,462	3,365	1,297	7,792	42,830	5.1
Bristol	5,054	673	261	1,560	8,444	12.4
Essex	5,393	730	290	1,659	8,511	16.2
Franklin	20,652	2,758	1,130	6,282	33,784	6.0
Hampden	11,637	1,511	582	3,507	18,926	9.5
Hampshire	13,240	1,755	673	4,053	21,091	5.9
Middlesex	7,481	1,039	443	2,316	12,232	12.9
Norfolk	4,581	629	259	1,403	7,808	17.9
Plymouth	8,646	1,250	575	2,708	14,148	10.4
Worcester	30,304	4,145	1,698	9,301	50,159	5.1
Barnstable/Dukes/Nantucket	1,640	240	117	526	3,056	27.5
All counties	134,091	18,096	7,324	41,107	220,991	2.5
SE	2.5	2.6	3.1	2.5	7.5	2.5

Table 60.--Biomass of all trees and shrubs on timberland by county and class of material, Massachusetts, 1998

County	(In thousands of dry tons)						SE
	Non-timber					Total trees and shrubs	
	Timber	Salvable dead trees	Saplings	Seedlings	Shrubs		
Berkshire	42,830	570	3,089	334	85	46,909	4.8
Bristol	8,444	20	866	63	37	9,431	11.8
Essex	8,511	107	397	43	48	9,106	15.8
Franklin	33,784	182	2,304	205	58	36,533	5.6
Hampden	18,926	153	1,189	111	57	20,436	8.9
Hampshire	21,091	75	1,424	161	55	22,806	5.7
Middlesex	12,232	88	569	84	95	13,069	12.8
Norfolk	7,808	25	195	72	20	8,120	17.5
Plymouth	14,148	56	1,125	69	40	15,438	9.8
Worcester	50,159	420	2,733	351	272	53,935	4.9
Barnstable/Dukes/Nantucket	3,056	12	396	27	6	3,497	26.2
All counties	220,991	1,708	14,287	1,519	775	239,279	2.4
SE	2.5	12.5	4.8	5.6	9.9	2.4	

Table 61.--Net volume of growing-stock trees on timberland by county and forest-type group, Massachusetts, 1998

(In millions of cubic feet)

County	Forest-type group									Total	SE
	White/ red pine	Spruce/ fir	Hard pine	Oak/ pine	Oak/ hickory	Oak/gum/ cypress	Elm/ash/ red maple	Northern hardwoods	Aspen/ birch		
Berkshire	235.9	.1	.0	24.7	77.8	.0	.0	694.6	40.7	1,073.7	5.6
Bristol	10.0	.0	.3	24.8	114.6	.0	27.6	27.9	.0	205.2	12.8
Essex	80.9	.0	.0	8.7	105.8	.0	8.1	27.6	.0	231.1	18.8
Franklin	283.3	.0	.0	.0	79.0	.0	.0	539.4	3.2	905.0	6.0
Hampden	61.1	.0	.0	56.4	81.0	.0	53.6	203.6	25.5	481.2	9.2
Hampshire	98.3	.0	.0	42.8	110.1	.0	1.8	313.2	1.3	567.4	7.4
Middlesex	122.3	.0	.0	30.8	110.5	.0	27.0	44.5	.0	335.1	14.4
Norfolk	77.2	.0	.0	24.3	35.0	.0	56.4	.0	.0	192.8	19.8
Plymouth	113.1	.0	8.5	75.5	89.5	13.4	23.1	76.2	.0	399.3	11.1
Worcester	333.3	.0	.0	129.3	488.6	.0	5.6	308.9	9.4	1,275.1	5.7
Barnstable/Dukes/Nantucket	.0	.0	11.1	23.7	21.0	.0	.0	.0	.0	55.7	26.3
All counties	1,415.4	.1	19.9	440.9	1,312.8	13.4	203.1	2,235.9	80.1	5,721.6	2.7
SE	11.1	100.0	45.9	18.0	8.4	100.0	23.8	6.1	34.6	2.7	

Table 62.--Net volume of growing-stock trees on timberland by county and stand-size class, Massachusetts, 1998

(In millions of cubic feet)

County	Stand-size class				All classes	SE
	Saw-timber	Pole-timber	Sapling and seedling	Non-stocked		
Berkshire	859.1	213.2	1.4	.0	1,073.7	5.6
Bristol	116.5	70.9	17.8	.0	205.2	12.8
Essex	198.5	32.4	.1	.0	231.1	18.8
Franklin	783.5	120.4	1.2	.0	905.0	6.0
Hampden	397.8	79.5	3.9	.0	481.2	9.2
Hampshire	437.1	129.2	1.1	.0	567.4	7.4
Middlesex	294.4	40.7	.0	.0	335.1	14.4
Norfolk	156.4	34.4	2.1	.0	192.8	19.8
Plymouth	285.0	106.7	7.6	.0	399.3	11.1
Worcester	1,031.0	244.0	.1	.0	1,275.1	5.7
Barnstable/Dukes/Nantucket	.2	55.6	.0	.0	55.7	26.3
All counties	4,559.5	1,127.0	35.2	.0	5,721.6	2.7
SE	4.0	8.6	38.8	.0	2.7	

Table 63.--Net volume of growing-stock and sawtimber trees on timberland by county and species group, Massachusetts, 1998

County	Growing stock (In millions of cubic feet)					Sawtimber (In millions of board feet)				
	Pine		Other softwoods		Hardwoods	Total	Pine		Other softwoods	Hardwoods
	hardwoods		hardwoods		hardwoods		hardwoods		hardwoods	hardwoods
Berkshire	111.5	194.8	445.1	322.4	1,073.7	473.0	549.0	1,219.2	798.3	3,039.5
Bristol	59.3	2.4	75.7	67.8	205.2	229.0	3.8	104.4	144.2	481.5
Essex	76.8	16.2	62.0	76.1	231.1	343.3	47.9	112.8	190.9	694.9
Franklin	153.4	186.2	222.0	343.4	905.0	598.4	555.7	481.9	929.7	2,565.6
Hampden	63.0	81.0	156.7	180.5	481.2	262.4	244.9	467.9	484.0	1,459.2
Hampshire	98.5	76.6	190.3	202.0	567.4	391.6	220.1	431.0	531.1	1,573.9
Middlesex	151.2	3.9	69.8	110.2	335.1	601.3	11.7	119.9	252.6	985.4
Norfolk	88.0	.2	65.3	39.3	192.8	397.4	.0	163.0	111.6	671.9
Plymouth	190.5	23.4	93.3	92.1	399.3	762.1	55.7	185.0	208.9	1,211.7
Worcester	403.1	90.4	323.5	458.2	1,275.1	1,697.8	318.9	579.5	1,186.6	3,782.8
Barnstable/Dukes/Nantucket	26.7	.0	.0	29.1	55.7	50.3	.0	.0	14.3	64.6
All counties	1,422.0	675.0	1,703.7	1,920.9	5,721.6	5,806.7	2,007.7	3,864.5	4,852.2	16,531.1
SE	7.8	9.8	4.7	4.5	2.7	8.6	11.2	6.7	5.8	3.7

Table 64.--Net volume of sawtimber trees on timberland by county and forest-type group, Massachusetts, 1998

(In millions of board feet)											
County	Forest-type group									Total	SE
	White/ red pine	Spruce/ fir	Hard pine	Oak/ pine	Oak/ hickory	Oak/gum/ cypress	Elm/ash/ red maple	Northern hardwoods	Aspen/ birch		
Berkshire	771.1	.0	.0	76.0	235.6	.0	.0	1,852.6	104.2	3,039.5	7.6
Bristol	39.9	.0	.0	69.4	256.7	.0	47.9	67.5	.0	481.5	14.8
Essex	325.2	.0	.0	26.3	264.5	.0	12.8	66.2	.0	694.9	25.6
Franklin	905.9	.0	.0	.0	205.5	.0	.0	1,452.9	1.3	2,565.6	9.1
Hampden	177.8	.0	.0	229.8	218.8	.0	168.7	592.7	71.4	1,459.2	11.5
Hampshire	316.8	.0	.0	150.5	292.2	.0	.0	814.4	.0	1,573.9	10.9
Middlesex	425.9	.0	.0	77.2	285.0	.0	44.9	152.5	.0	985.4	17.5
Norfolk	343.0	.0	.0	78.4	95.4	.0	155.2	.0	.0	671.9	24.2
Plymouth	436.4	.0	13.0	215.7	234.3	14.7	42.3	255.4	.0	1,211.7	15.1
Worcester	1,258.2	.0	.0	490.7	1,255.1	.0	5.0	769.4	4.5	3,782.8	7.8
Barnstable/Dukes/Nantucket	.0	.0	9.0	35.1	20.6	.0	.0	.0	.0	64.6	29.3
All counties	5,000.2	.0	21.9	1,449.1	3,363.6	14.7	476.7	6,023.6	181.3	16,531.1	3.7
SE	11.7	.0	61.9	20.1	9.5	100.0	30.2	7.1	42.3	3.7	

Table 65.--Net volume of sawtimber trees on timberland by county and stand-size class, Massachusetts, 1998

(In millions of board feet)

County	Stand-size class				All classes	SE
	Saw-timber	Pole-timber	Sapling and seedling	Non-stocked		
Berkshire	2,672.8	364.2	2.5	.0	3,039.5	7.6
Bristol	295.1	125.9	60.4	.0	481.5	14.8
Essex	653.3	41.6	.0	.0	694.9	25.6
Franklin	2,368.0	197.6	.0	.0	2,565.6	9.1
Hampden	1,283.9	165.0	10.3	.0	1,459.2	11.5
Hampshire	1,358.6	215.2	.0	.0	1,573.9	10.9
Middlesex	945.4	40.0	.0	.0	985.4	17.5
Norfolk	599.0	68.4	4.6	.0	671.9	24.2
Plymouth	983.5	222.7	5.5	.0	1,211.7	15.1
Worcester	3,352.0	430.8	.0	.0	3,782.8	7.8
Barnstable/Dukes/Nantucket	.0	64.6	.0	.0	64.6	29.3
All counties	14,511.7	1,936.1	83.3	.0	16,531.1	3.7
SE	4.6	10.0	60.7	.0	3.7	

Table 66.--Average annual net growth of growing-stock and sawtimber volume on timberland by county and species group,
Massachusetts, 1984-97

County	(In thousands of cubic feet/board feet)					
	Growing Stock			Sawtimber		
	Softwoods	Hardwoods	All groups	Softwoods	Hardwoods	All groups
Berkshire	5,269	15,936	21,205	19,465	56,996	76,461
Bristol	760	2,714	3,475	5,499	9,314	14,813
Essex	798	1,523	2,321	4,868	10,817	15,685
Franklin	8,978	6,092	15,071	36,030	11,131	47,162
Hampden	3,837	6,774	10,611	16,977	22,599	39,576
Hampshire	4,364	7,687	12,051	14,888	24,942	39,830
Middlesex	2,034	3,810	5,844	14,153	13,747	27,900
Norfolk	725	-64	661	3,765	5,195	8,960
Plymouth	3,501	2,723	6,225	15,171	11,127	26,298
Worcester	7,877	10,880	18,756	39,559	49,960	89,519
Barnstable/Dukes/Nantucket	779	452	1,231	1,545	677	2,222
All counties	38,924	58,527	97,451	171,920	216,506	388,426

Table 67.--Average annual removals of growing-stock and sawtimber volume on timberland by county and species group,
Massachusetts, 1984-97

County	(In thousands of cubic feet/board feet)							
	Growing Stock		Sawtimber					
	Softwoods	Hardwoods	All groups	Softwoods	Hardwoods	All groups	Softwoods	Hardwoods
Berkshire	2,104	3,415	5,519	7,843	7,602	15,445		
Bristol	0	2,589	2,589	0	1,674	1,674		
Essex	1,120	1,978	3,098	3,411	3,095	6,506		
Franklin	1,472	5,277	6,749	4,133	15,534	19,667		
Hampden	507	1,940	2,447	1,470	3,488	4,958		
Hampshire	51	1,983	2,034	0	6,503	6,503		
Middlesex	2,573	8,024	10,597	10,019	15,935	25,955		
Norfolk	1,025	4,111	5,136	4,646	7,097	11,744		
Plymouth	1,501	1,690	3,192	3,758	4,681	8,439		
Worcester	2,780	6,424	9,203	13,066	14,294	27,359		
Barnstable/Dukes/Nantucket	1,717	1,621	3,338	3,507	554	4,061		
All counties	14,851	39,051	53,902	51,853	80,459	132,311		

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Alerich, Carol L. 2000. **Forest statistics for Massachusetts: 1985 and 1998.**
Resour. Bull. NE-148. Newtown Square, PA: U.S. Department of Agriculture,
Forest Service, Northeastern Research Station. 104 p.

A statistical report on the fourth forest inventory of Massachusetts (1997-1998).
Findings are displayed in 67 tables containing estimates of forest area, numbers of
trees, wildlife habitat, timber volume, growth, change, and biomass. Data are
presented at two levels: state and county.

Keywords: Forest survey; inventory; area; volume; growth; change; biomass

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