



United States  
Department of Agriculture

# TRENDS IN DELAWARE'S FORESTS

Forest Service

**Northeastern  
Research Station**

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**Delaware Department  
of Agriculture  
Forest Service**



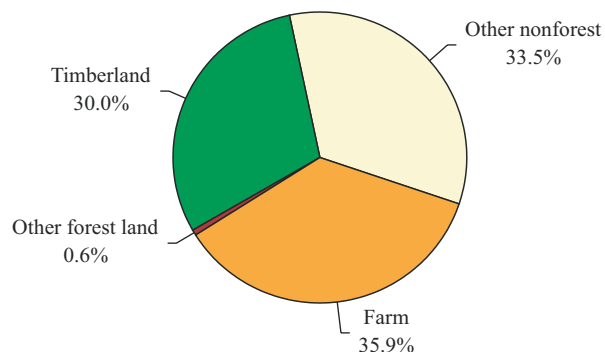
# DELAWARE FORESTS

Forests protect watersheds, provide opportunities for recreation and settings for aesthetic enjoyment, serve as habitat for wildlife, and produce wood and other forest products. The forests of Delaware contribute greatly to the quality of life of the residents, making the State a better place in which to live. This brochure highlights significant trends in Delaware's forests during the last half century. The data are summarized from reports published by the USDA Forest Service, which periodically inventories the forest resources of the 50 states. In cooperation with the Delaware Forest Service, the Northeastern Research Station completed the fourth statewide inventory of Delaware's forest resource in 1999.

## FOREST LAND AREA HAS DECLINED

Forests cover 30.6 percent of Delaware, or 382,900 acres. Early settlers found that Delaware's forests were well suited for conversion to farmland and cleared most of the original forests. By the 1800s, most remaining forests were in areas too wet for farming, in scattered farm woodlots, or in narrow strips along streams. Of the states along the Atlantic seaboard, Delaware is the least forested and has the largest percentage of cultivated land. Considering Delaware's agricultural history and the steady industrial and residential development that has taken place, it is remarkable that forests still cover nearly a third of the state.

AREA BY LAND USE, 1998



The amount of forest land has been fairly stable since 1957 because until recently, most development has been concentrated in and around Newark and Wilmington, and other areas in northern New Castle County, leaving much of the state fairly rural. There has also been a sizable decrease in the amount of land used for farming. Land in farms has declined by 240,000 acres since 1957. Although much of what formerly was farmland has been developed, a substantial portion was abandoned and has reverted to forest through natural regeneration and tree planting. These new forests have offset losses in forest land due to development.

Additionally, Delaware forests have been conserved and protected by various efforts of government as well as private organizations. Conservation of forests and other natural areas has become an increasingly common element in development plans. By guiding the location of growth, some of the negative impacts of development and urban sprawl are minimized. Yet, despite these efforts, declines in forest land area are likely to continue in the future because development pressures continue to increase on forest as well as farmland throughout the state.

The 1999 forest inventory reports that forest land decreased by 19,800 acres since the previous inventory conducted in 1986. Forest land is categorized by the Forest Service as either timberland or noncommercial forest land. Ninety-eight percent of Delaware's forest land (375,600 acres) is classified as timberland. Timberland is considered to be potentially available for harvesting, though most timberland owners do not consider production of timber products their primary reason for owning forests. There has been a decline in timberland area since 1957.

### FOREST LAND AREA TRENDS

(Thousands of acres at each inventory)

|                            | Inventory date |         |         |         |
|----------------------------|----------------|---------|---------|---------|
|                            | 1957           | 1972    | 1986**  | 1999    |
| Timberland                 | 391.0          | 384.4   | 395.8   | 375.6   |
| Noncommercial forest land  | 1.0            | 7.4     | 7.0     | 7.3     |
| Total forest land          | 392.0          | 391.8   | 402.7   | 382.9   |
| Percent forested           | 31.0%          | 30.9%   | 32.2%   | 30.6%   |
| Estimated total land area* | 1,266.0        | 1,268.5 | 1,250.0 | 1,251.0 |

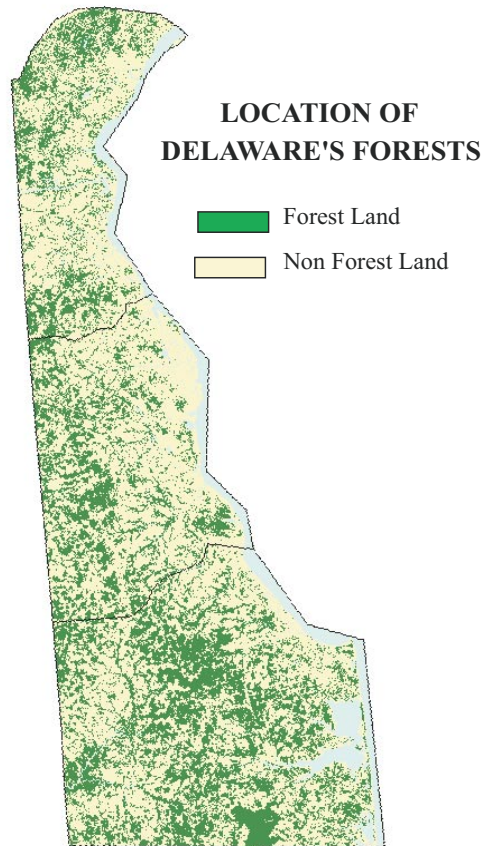
\*Estimates of the total land area have changed because of new measurement techniques and refinements in the classification of small bodies of water and streams.

\*\* Based on reprocessing of 1986 data.

The noncommercial forest land category includes reserved forest lands and unproductive forests. Harvesting for timber products on these lands is administratively restricted or economically impractical. Examples include parks, wildlife preserves, and wetlands with poor growing conditions. These categories aid in understanding the availability of forest resources and forest management planning.

Delaware's forests are highly fragmented, with few stands covering large acreages. Wildlife biologists have discovered that forest fragmentation has had a detrimental effect on many bird species and other wildlife. Many of Delaware's imperiled species are dependent on large areas of forested habitat. Some forest-dwelling species that are of concern are the Delmarva fox squirrel, the spotted salamander, and numerous birds, including the American redstart and the cerulean warbler.

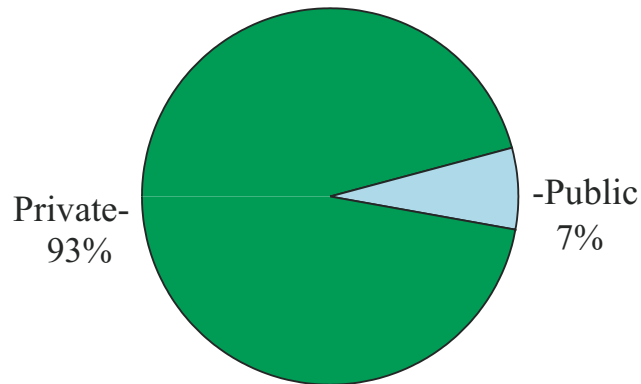
Many trees in Delaware grow along streams and serve as riparian buffers that protect and improve water quality and provide corridors used by wildlife. Research has shown that a buffer strip of trees between a stream and cropland reduces sediment and pollutants in runoff and provides shade that cools the stream. Conservation efforts have focused on saving and restoring these riparian buffers.



## PEOPLE AND FORESTS

The size of the population and how people live on the land are significant forces that shape the forest. Between 1990 and 2000, Delaware's population grew by 17.6 percent. As the population grows and sprawls into formally rural areas it has an affect on biological diversity as well as the character of the state. Ninety-three percent of Delaware forest land is owned by an estimated 17,300 private individuals and enterprises. State, federal, and other public owners hold the remaining 7 percent.

## OWNERSHIP OF FOREST LAND IN DELAWARE



A forest landowner's motives and management activities are strongly influenced by the amount of forest land owned. The number of owners holding small amounts of timberland has grown rapidly. Thirty-one percent of Delaware's private timberland is now held in ownerships of less than 50 acres. Unlike owners of large tracts, these owners are less likely to manage their forests or to allow access to their land by others for activities such as hunting and fishing.

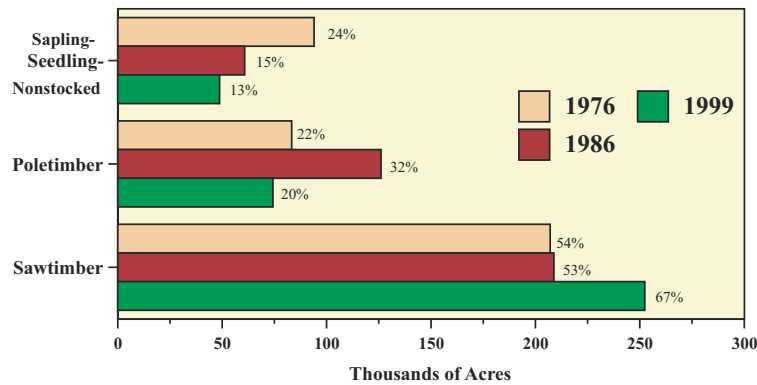
## FORESTS ARE MATURING WITH FEWER STANDS OF YOUNG TREES

**T**imberland is classified by the size of the trees growing on it. This is useful for those interested in both the timber resource and wildlife habitat. In Delaware, stands in which most of the stocking is in large trees suitable for sawlogs, have increased in acreage since the last forest inventory and now grow on two-thirds of the timberland. These stands have many attributes that benefit wildlife: an understory with herbaceous plants and shrubs that provides food and cover, bole cavities and bark flaps for nesting and feeding sites, respectively, and large, dead trees, both standing and on the forest floor. People enjoy activities, such as hiking and camping, in stands dominated by large trees because they find them attractive and aesthetically pleasing. Such benefits from these stands should increase as they continue to mature.

In Delaware, about a fifth of the forest stands are of pole timber size. Trees in these stands are not sufficiently mature to produce large amounts of nuts and seeds and often form dense overstories that inhibit the growth of understory vegetation.

Stands classified as sapling/seedling and nonstocked stands decreased from 24 percent of timberland in 1976 to 13 percent in 1999. Early-successional pioneer tree species are typically found in such stands, as well as a variety of herbaceous and shrub plants that need full sunlight to thrive. These stands provide unique nesting and feeding habitats for wildlife. Besides offering diverse habitat for wildlife and providing a steady flow of wood products, forests that contain all stand-size classes might be more resistant to devastating outbreaks of insects and diseases.

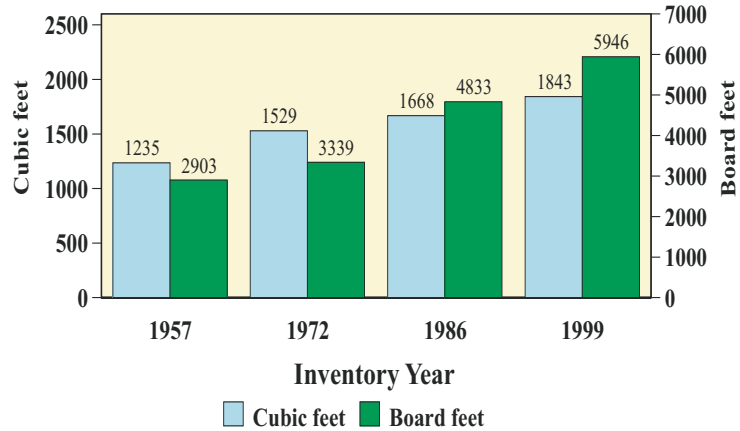
### TIMBERLAND AREA BY STAND-SIZE CLASS AND PERCENTAGE OF TOTAL BY INVENTORY YEAR



### THE VOLUME OF TREES HAS INCREASED

Delaware's forests now contain more large trees with increased volume. In order to determine this, foresters calculate the volume in the bole of trees between 1-foot above ground and the point where the top of the stem decreases to 4 inches. The average wood volume per acre increased from 1,235 cubic feet in 1957 to 1,843 cubic feet in 1999. During the most recent inventory period, the growing-stock volume, that is the volume of all trees growing on timberland, increased by 5 percent, with the portion suitable for sawing into lumber increasing by 17 percent to 2.2 billion board feet. Also during this period, the average number of trees per acre, 5 inches or greater in diameter (measured at breast height) remained steady at 165 trees per acre, with the average diameter increasing from 9.1 inches to 9.4 inches.

### AVERAGE VOLUME PER ACRE

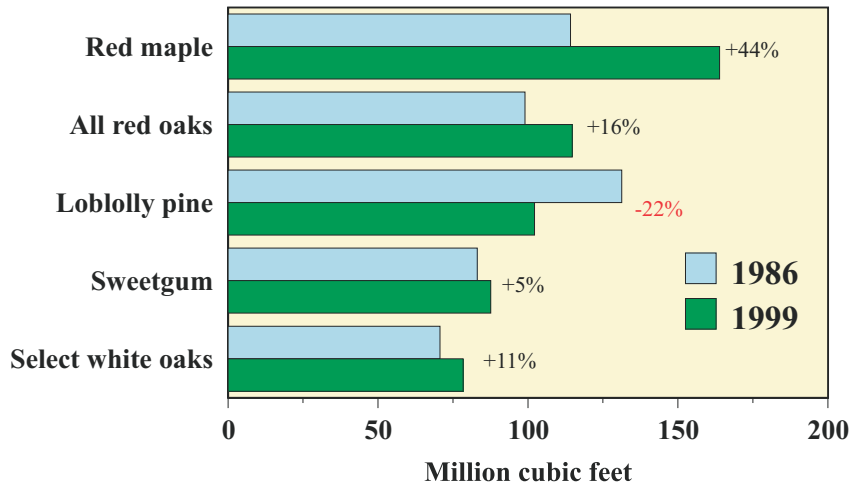


\* 80 cubic feet of solid wood is equal to approximately 1 cord

### RED MAPLE TREES LEAD IN VOLUME

Delaware's forests contain a rich mix of species, though many are uncommon. The five most common species and species groups (listed in chart below) account for 80 percent of total cubic-foot volume. Red maple had the largest increase in volume.

### CHANGE IN GROWING-STOCK VOLUME, TOP FIVE SPECIES

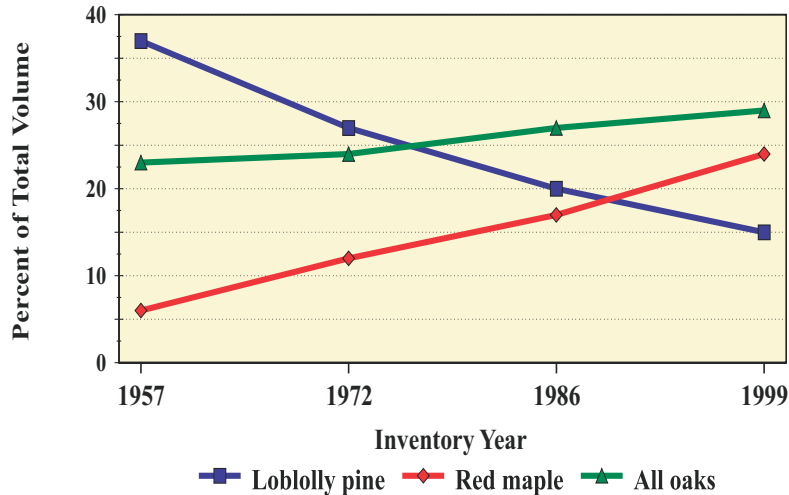




## FOREST COMPOSITION IS CHANGING

Loblolly pine now represents 15 percent of total volume—a decline from the 37 percent it represented in 1957. Since 1957, red maple has increased its portion of total volume from 6 to 24 percent. The decrease in the portion of the forest composed of loblolly pine is attributable to many factors, including; preferential harvesting of pine over hardwoods, changes in land use, control of forest fires, and changes associated with the maturing of the forest.

### CHANGES IN FOREST COMPOSITION



## GROWTH EXCEEDS REMOVALS

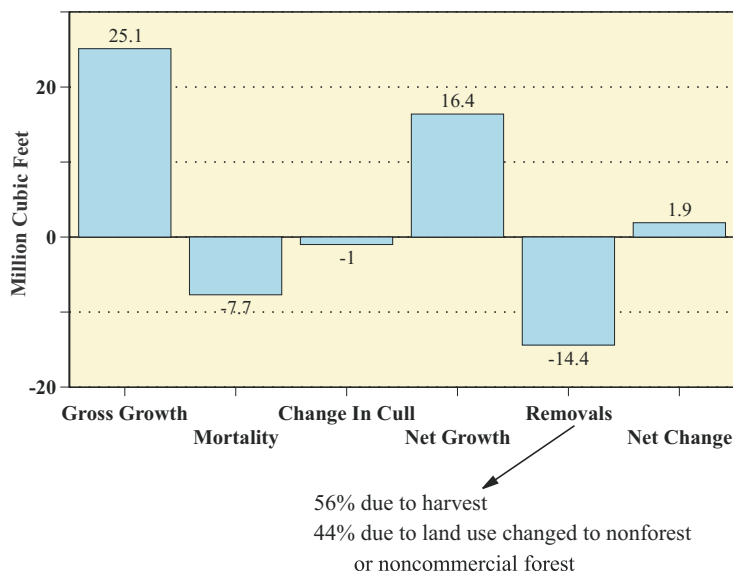
During the last 50 years in Delaware, the growth of trees has outpaced removals. The 1999 forest inventory revealed that since 1987, on an annual basis, the net growth of trees on timberland averaged 16.4 million cubic feet and removals averaged 14.4 million cubic feet. This surplus of growth has meant an annual net increase of 0.3 percent in the volume of wood on the state's timberland. The inventory recognizes two types of removals. Fifty-six percent of removals are attributed to harvesting, and 44 percent to the volume of wood on land that was either converted to nonforest uses or reclassified to noncommercial forest land. Loblolly pine accounted for 40 percent of the volume harvested.

Fire, wind, ice, insects, disease, and other causes contribute to tree mortality. In Delaware, annual mortality averaged 7.7 million cubic feet, or 1.1 percent of the inventory volume. Beech and loblolly pine accounted for 56 percent of the mortality. There are now an average of 14 standing dead trees 5 inches or larger in diameter per acre of timberland. Ninety-three percent of these dead trees are between 5 and 12 inches in diameter.



## COMPONENTS OF VOLUME CHANGE, 1987-99

Gross Growth – Mortality +/- Change in cull = Net Growth  
Net Growth – Removals = Net Change



## CONCERNS AND OBSERVATIONS

The period from 1957 to the present has been remarkable for the amount of land that has remained forested in Delaware despite increasing economic development. These forests are maturing, as shown by increases in stand size and volume of trees per acre. Overall evaluations of forest conditions show that the health of Delaware's forests is good, although introduced forest insect pests, such as gypsy moth and invasive exotic plants, are a concern.

Forest values often are difficult to discern and the adverse effects of degradation are seldom immediately evident. As the dynamics of forests are better understood, the importance of Delaware's forests to its inhabitants will only increase. The challenge for the future is to protect this valuable forest resource from the pressures of a growing population and from an increasing number of introduced pests, diseases, and invasive exotic plants, while ensuring the continued delivery of the many goods and services that Delaware residents have come to expect from the State's valuable forest resource.

**For more information contact: Forest Inventory & Analysis (610) 557-4051, or write: USDA Forest Service, FIA Unit, 11 Campus Boulevard, Suite 200, Newtown Square, PA 19073-3294. Website <http://www.fs.fed.us/ne/fia/> Or write: Delaware Forest Service, 2320 S. Dupont Highway, Dover, Delaware 19901-5515; or call (302) 698-4500. Website: <http://www.state.de.us/deptagri/index.htm>**

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