



# FORESTS OF Tennessee, 2012

This resource update provides an overview of forest resource attributes for the State of Tennessee based on an annual inventory conducted by the Forest Inventory and Analysis (FIA) Program at the Southern Research Station of the United States Department of Agriculture Forest Service in cooperation with the Tennessee Department of Agriculture Division of Forestry. These annual estimates, along with Web-posted supplemental tables, will be updated annually. For more information regarding past inventory reports for this State, inventory program information, field sampling methodology, and estimation procedures, please refer to the citations at the end of this report.

## Overview

In 2012, Tennessee forests accounted for an estimated 13.9 million acres (table 1) of which 13.5 million acres (97 percent) are considered available for timber production (timberland). More than 8 billion live trees are estimated to be growing in Tennessee forests, over 1,200 trees for every person living in the State. In those trees  $\geq 5$  inches diameter at breast height (d.b.h.), the State's forests contain 29.6 billion cubic feet of wood volume. Average annual net growth has declined since 2011 while mortality and removals have increased (table 1).

**Table 1—Tennessee forest statistics, change<sup>a</sup> between 2011 and 2012**

Forest statistics	2012 estimate	Sampling error percent 2012	Change since 2011 (percent)
<b>Forest land estimates<sup>b</sup></b>			
Area (acres)	13,920,503	0.75	-0.15
Number of live trees $\geq 1$ inch d.b.h. (trees)	8,041,574,800	1.56	0.32
Net volume in live trees $\geq 5$ inches d.b.h. (cubic feet)	29,601,913,645	1.35	0.47
Net volume of growing-stock trees (cubic feet)	25,560,218,981	1.50	0.38
All live tree aboveground biomass $\geq 1$ inch d.b.h. (dry short tons)	776,151,917	1.23	0.30
Annual net growth of live trees $\geq 5$ inches d.b.h. (cubic feet per year)	664,677,836	3.20	-5.15
Annual removals of live trees $\geq 5$ inches d.b.h. (cubic feet per year)	455,017,147	6.76	3.45
Annual mortality of live trees $\geq 5$ inches d.b.h. (cubic feet per year)	310,238,395	4.75	12.83
<b>Timberland estimates<sup>c</sup></b>			
Area (acres)	13,491,835	0.81	-0.06
Number of live trees $\geq 1$ inch d.b.h. (trees)	7,836,432,597	1.61	0.43
Net volume in live trees $\geq 5$ inches d.b.h. (cubic feet)	28,285,983,574	1.42	0.61
Net volume of growing-stock trees (cubic feet)	24,396,212,780	1.56	0.46
All live tree aboveground biomass $\geq 1$ inch d.b.h. (dry short tons)	744,404,673	1.30	0.41
Annual net growth of live trees $\geq 5$ inches d.b.h. (cubic feet per year)	661,721,393	3.11	-14.71
Annual removals of live trees $\geq 5$ inches d.b.h. (cubic feet per year)	454,833,371	6.77	3.18
Annual mortality of live trees $\geq 5$ inches d.b.h. (cubic feet per year)	290,245,618	4.70	10.19

<sup>a</sup> Change estimates are based on a comparison of plots measured from 2003–07 to the same plots measured from 2008–12.

<sup>b</sup> Forest land is defined as land currently or recently at least 10 percent stocked by forest trees and not currently developed for nonforest use with a minimum area of 1 acre and 120 feet wide.

<sup>c</sup> Timberland is defined as forest land capable of producing at least 20 cubic feet of industrial wood per acre per year and not withdrawn from timber utilization.



# Forest Area

In 2012, forest land in the State of Tennessee covered an estimated 13.9 million acres. The Tennessee landscape has remained  $\geq 50$  percent forested for about 50 years. In fact, forest land has been increasing over that time period (table 2). From an estimate in 1961 of 13.7 million acres to the 2012 estimate of 13.9 million acres, forest land has increased nearly 2 percent. Essentially, while small fluctuations have occurred over the last 5 decades, Tennessee forests are more plentiful today as they were in the 1960s. Since the 1999 inventory, there has been very little change in any region (fig. 1).

Tennessee forests are largely held within private ownerships across the State. In fact, 84 percent of all forest land or 11.7 million acres in Tennessee is privately owned (fig. 2). About 10 percent or 1.4 million acres is Federally owned and managed. The remaining 6 percent of forest land across the State is owned by State and local governments.

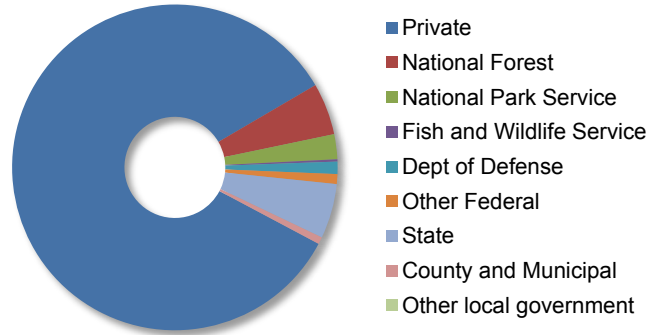


Figure 2—Relative area of forest land by ownership, Tennessee, 2012.

In 2012, the oak-hickory forest-type group represented nearly three-fourths (72 percent) of all forests across the State with 10.0 million acres (fig. 3). The oak-pine forest-type group was the second largest group with an estimated 1.0 million acres distributed across Tennessee. The loblolly-shortleaf pine and elm-ash-cottonwood forest-type groups were found on 973,000 and 801,000 acres, respectively.

Table 2—Area of land by class, Tennessee, 1961–2012

Land class	1961	1971	1980	1989	1999	2004	2009	2011	2012
	<i>thousand acres</i>								
Timberland	13,432	12,820	12,879	13,265	13,305	13,254	13,549	13,499	13,491
Other/reserved	264	317	430	337	407	566	456	442	420
<b>Total forest</b>	<b>13,696</b>	<b>13,136</b>	<b>13,309</b>	<b>13,603</b>	<b>13,712</b>	<b>13,821</b>	<b>14,004</b>	<b>13,941</b>	<b>13,920</b>
Nonforest land	12,826	13,339	13,142	12,845	13,260	13,151	12,313	12,370	12,394
<b>Total land area</b>	<b>26,522</b>	<b>26,475</b>	<b>26,450</b>	<b>26,447</b>	<b>26,972</b>	<b>26,972</b>	<b>26,972</b>	<b>26,972</b>	<b>26,972</b>
Percent forested <sup>a</sup>	52	50	50	51	51	51	52	52	52

<sup>a</sup> Based on the current U.S. Census Bureau estimate of 26.9 million acres of land in

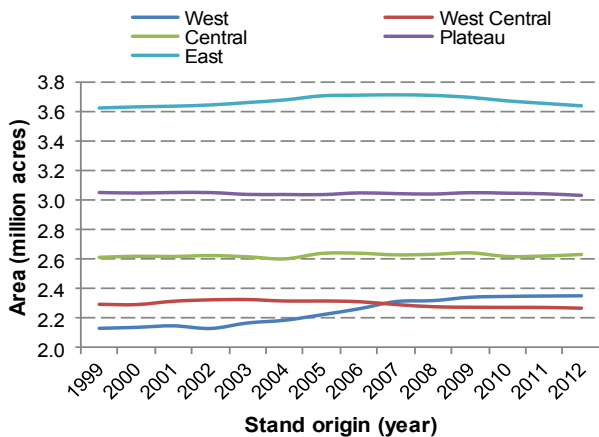


Figure 1—Forest land area by survey unit, Tennessee, 2012.

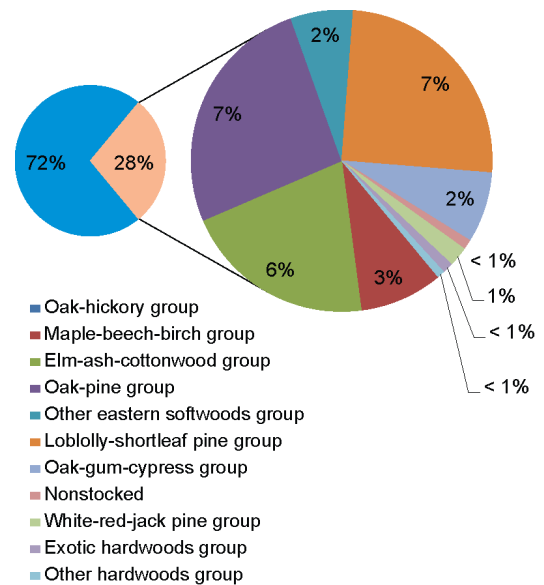


Figure 3—Relative area of forest land by forest-type group, Tennessee, 2012.

## Volume, Biomass, and Trends

In 2012 there was an estimated 30 billion cubic feet of standing tree ( $\geq 5$  inches d.b.h.) wood volume distributed across Tennessee forests. An overwhelming 87 percent of the standing volume in Tennessee is represented by hardwood species. Pine species and other softwood species accounted for 13 percent of the total standing tree wood volume. Yellow-poplar and select white oaks accounted for the greatest live tree volume on forest land across all species groups (table 3). Yellow-poplar accounted for the greatest sawtimber volume (board feet) across Tennessee (table 3).

An estimated 7.8 million dry tons of aboveground woody biomass was found among an estimated 8 billion trees across Tennessee in 2012. Species groups such as select white oak, hickory, other red oaks, and yellow-poplar maintained greater quantities of biomass with fewer trees while species groups such as soft maple, other eastern soft hardwoods, and eastern noncommercial hardwoods maintained less biomass on a greater number of trees. The ratio of total biomass to tree population provides some indication of the average size of

the trees within those groups and suggests the canopy position the species comprising those groups are often found. For instance, individuals in the select white oak group are often larger trees and frequently occupy the upper canopy within Tennessee forests. Eastern noncommercial hardwoods, on the other hand, are often smaller, greater in number, and occupy lower and mid-canopy positions.



Cherokee National Forest.  
(photo courtesy of J. Knowlton)

**Table 3—Live tree and sawtimber volume by species group on forest land, Tennessee, 2012**

Species group	Live-tree volume <i>cubic feet</i>	Sawtimber volume <i>board feet</i>
Yellow-poplar	3,320,909,056	13,694,919,680
Select white oaks	3,273,518,336	10,748,469,248
Other red oaks	3,032,838,144	11,024,223,232
Other white oaks	3,008,155,136	8,914,129,920
Hickory	2,573,105,408	7,511,532,032
Other eastern soft hardwoods	2,192,086,784	4,418,321,408
Soft maple	1,680,013,184	2,680,386,048
Loblolly and shortleaf pine	1,400,690,048	4,531,382,272
Sweetgum	1,171,110,784	3,449,166,848
Select red oaks	1,123,633,536	4,097,976,064
Hard maple	943,006,464	1,923,602,944
Ash	928,631,872	2,566,513,920
Other yellow pines	649,361,280	1,891,155,456
Eastern noncommercial hardwoods	642,904,896	—
Other eastern softwoods	640,416,512	923,893,760
Beech	592,713,792	1,288,460,160
Eastern white and red pine	520,625,888	2,252,408,064
Tupelo and blackgum	495,643,872	985,251,520
Other eastern hard hardwoods	372,708,128	394,981,792
Eastern hemlock	331,618,560	1,110,304,640
Black walnut	242,191,360	562,462,144
Basswood	160,608,416	471,000,288
Cypress	148,793,280	739,188,544
Yellow birch	94,311,664	3,855,804
Cottonwood and aspen	38,925,572	128,120,368
Spruce and balsam fir	23,391,952	—

### FIA Program Information

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### Additional Tennessee Inventory Information

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# Impact of the Southern pine beetle in Tennessee

Between the years of 1999 and 2001 populations of the Southern pine beetle (SPB; *Dendroctonus frontalis* Zimmermann) reached epidemic levels wherein thousands of acres of pine forests in Tennessee were impacted (Oswalt and others 2009). Mortality of southern yellow pines significantly increased and many pine forests of Tennessee were altered. Now, over a decade following the beginning of that event, it is important to investigate the potential impact the SPB had on current Tennessee forests.

Average annual net growth of softwood species is positive (table 4) after many years of being negative due to high rates of softwood mortality due to the SPB event. While the highest levels of SPB activity (measured as the number of counties with epidemic beetle populations) were between the years of 1999 and 2001 (Oswalt and others 2009), acres of forest land impacted by insect activity did not peak in the FIA data until 2005 (fig. 4). Forest land area impacted by insect activity, in 2012, has declined to pre-SPB levels. In addition, mortality in softwood forest types, while significantly higher in the early 2000's, has declined significantly over time (fig. 5). The positive average annual softwood growth, decreased softwood mortality, and significant decline in forest land area impacted by insects all suggest Tennessee forests are rebounding following the SPB event of 1999–2001.

While the immediate impacts of the most recent SPB event have begun to subside, long-term changes as a result of this insect activity could be realized in the State for some time. Plot-to-plot comparisons suggest that some forests once

classified as a softwood forest type have changed to mixed hardwood/softwood stands or hardwood stands. Not all of the changes are a direct result of SPB activity, or even insect activity in general, but SPB has changed many softwood stands and contributed to a loss of pine forests in Tennessee.

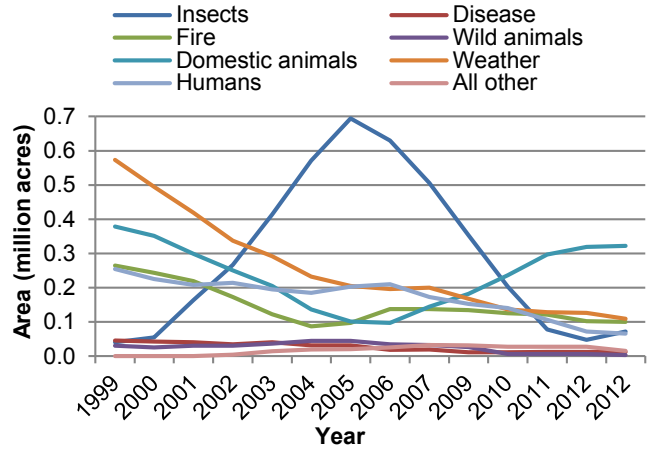


Figure 4—Area of forest land by primary disturbance 1999–2012, Tennessee.

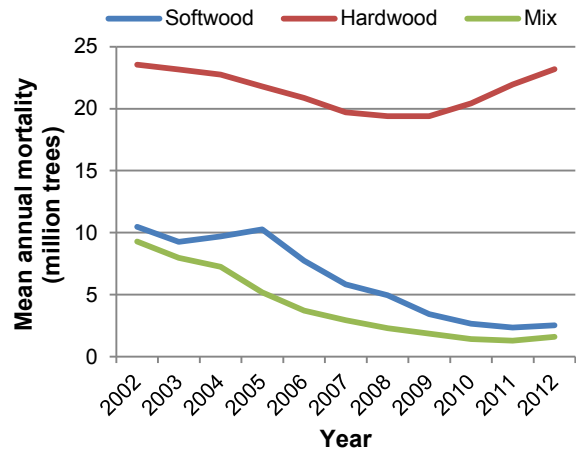


Figure 5—Mean annual mortality (number of trees ≥5 inches d.b.h) by broad forest type 2002–12, Tennessee.

**Table 4—Net growth, mortality, and removals by broad species group on forest land, Tennessee, 2012**

Species group	Net growth	Mortality	Removals
	million cubic feet per year		
Softwoods	129,631,029	4,576,462	85,351,349
Hardwoods	535,046,808	22,775,919	369,665,799
<b>Total</b>	<b>664,677,837</b>	<b>27,352,381</b>	<b>455,017,148</b>

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