



# Tennessee, 2008

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## FOREST INVENTORY & ANALYSIS FACTSHEET



This publication 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.

occurred over the last 5 decades, Tennessee forests are just as plentiful today as they were in the 1960s. Tennessee has lost some forests to urbanization. However, at the same time, abandoned agricultural lands, particularly in west Tennessee, have reverted back to forests and account for increased forest land in that region (fig. 1). While urbanization does continue to occur and is the primary contributing factor to forest land loss, more of the development pressure is on agricultural land that is much easier to develop. While there is little change statewide, small-scale forest loss can have significant localized impacts and should not be ignored. For example, localized forest loss can contribute to negative impacts on local water quality and availability.

### Annual Update

Tennessee forest resources have changed very little since the previous annual inventory in 2007. In 2008, Tennessee forests accounted for an estimated 14 million acres (table 1) of which 13.5 million acres (96 percent) are considered available for timber production (timberland). About 8 billion live trees are estimated to be growing in Tennessee forests, nearly 1,300 trees for every person living in the State. In those trees > 5 inches diameter at breast height (d.b.h.), the State's forests contain nearly 29 billion cubic feet of wood volume. There has been little to no change in estimates of average annual net growth, mortality, and removals between 2007 and 2008 (table 1).

### Forest Extent

The Tennessee landscape has remained > 50 percent forested for the past 47 years (table 2). In fact, from an estimate in 1961 to the current estimate of 14 million acres, forest land has only changed a positive 2 percent. Essentially, while small fluctuations have

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**Table 2—Area by land class and survey, Tennessee**

Land class	1961	1971	1980	1989	1999	2004	2008
<i>thousand acres</i>							
Timberland	13,432	12,820	12,879	13,265	13,305	13,254	13,474
Other/reserved	264	317	430	337	407	566	504
<b>Total forest land</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>13,979</b>
Nonforest land	12,826	13,339	13,142	12,845	13,260	13,151	12,994
<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>
Percent forested	52	50	50	51	51	51	52

**Table 1—Tennessee forest statistics, change between 2007 and 2008**

Forest statistics	2008 estimate	Sampling error	Change since 2007	Forest statistics	2008 estimate	Sampling error	Change since 2007
<b>Forest land estimates</b>				<b>Timberland estimates</b>			
Area (acres)	13,979,456	0.74	-0.08	Area (acres)	13,473,801	0.82	0.21
Number of live trees				Number of live trees			
≥1-inch diameter (trees)	7,981,827,813	1.54	-0.78	≥1-inch diameter (trees)	7,739,254,481	1.6	-0.64
Net volume in live trees				Net volume in live trees ≥5			
≥5 inches diameter (ft <sup>3</sup> )	28,845,024,698	1.36	0.82	inches diameter (ft <sup>3</sup> )	27,338,785,431	1.43	1.26
Net volume of growing stock trees (ft <sup>3</sup> )	24,521,461,166	1.52	0.89	Net volume of growing-stock trees (ft <sup>3</sup> )	23,253,488,112	1.59	1.37
All-live tree and sapling aboveground biomass (oven-dry short tons)	762,653,423	1.23	0.51	All live tree and sapling aboveground biomass (oven-dry short tons)	725,868,760	1.31	0.91
Annual net growth of live trees ≥5 inches (ft <sup>3</sup> /year)	766,627,993	3.33	-1.92	Annual net growth of live trees ≥5 inches (ft <sup>3</sup> /year)	791,420,524	3.59	-0.60
Annual removals of live trees ≥5 inches (ft <sup>3</sup> /year)	406,737,155	8.21	-2.25	Annual removals of live trees ≥5 inches (ft <sup>3</sup> /year)	475,617,782	7.74	-3.28
Annual mortality of live trees ≥5 inches (ft <sup>3</sup> /year)	314,642,374	5.84	-3.05	Annual mortality of live trees ≥5 inches (ft <sup>3</sup> /year)	298,056,638	6.08	-2.95



# TENNESSEE, 2008

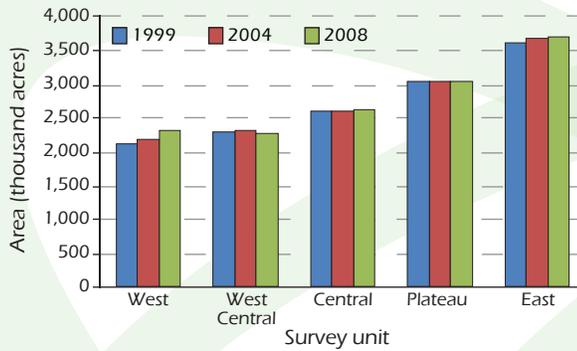


Figure 1—Area of forest land for each FIA unit in Tennessee for the 1999, 2004, and 2008 inventories.



Spring flush. (photo by Christopher Oswalt)

## Forest Characteristics

Tennessee remains dominated by the oak-hickory forest-type group, with continued presence of oak-pine and loblolly-shortleaf pine (fig. 2). In 2008, 91 percent of forest land within the State is considered a hardwood forest type (including oak-pine) and 74 percent is classified as belonging to the oak-hickory forest-type group. More so than many other Southern States, Tennessee is a “hardwood State.”

Both forest land and timberland standing volume continue to increase (fig. 3). Over approximately the last decade, standing volume (trees  $\geq$  5 inches d.b.h.) on forest land and timberland has increased by an estimated 10 percent and 9 percent, respectively. The majority of the increased standing volume has occurred on

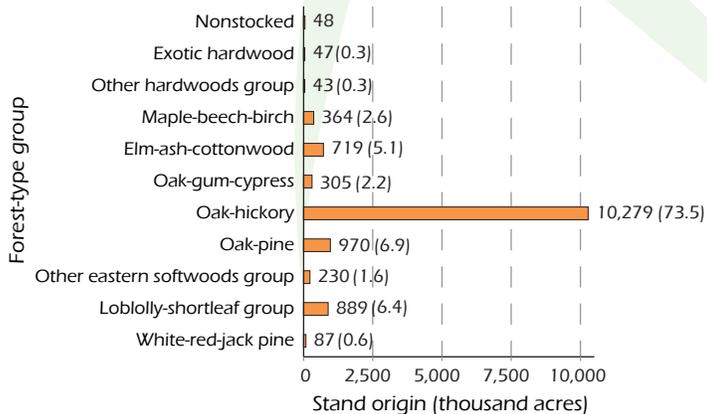


Figure 2—Forest land area for the common forest-type groups found in Tennessee, 2008. Value outside of parentheses represents area in thousands of acres and the value inside represents the percent of area for the forest-type group.

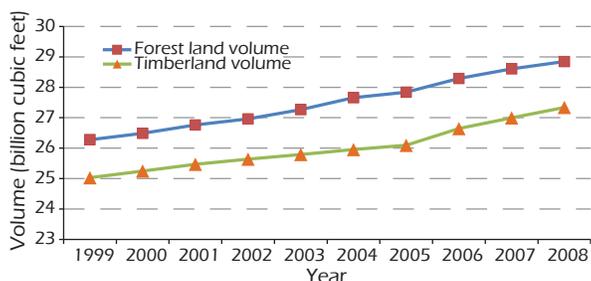


Figure 3—Standing volume of live trees  $<$ 5 inches d.b.h. on forest land and timberland in Tennessee, 2008.

hardwood tree species (fig. 4). Over the period beginning in 1999 and ending in 2008, hardwood standing volume has increased about 15 percent while softwood standing volume has declined an estimated 13 percent. Forests of Tennessee are becoming increasingly dominated by hardwood tree species and hardwood forest types.

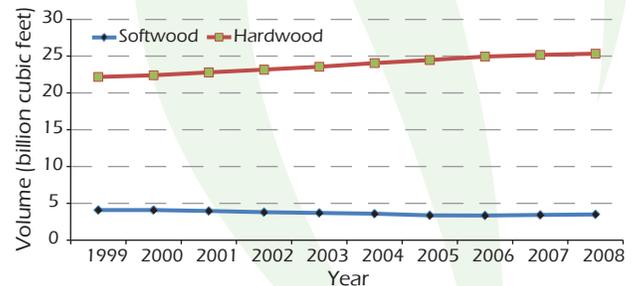


Figure 4—Softwood and hardwood standing volume of live trees  $<$ 5 inches d.b.h. on forest land in Tennessee, 2008.

Standing volume in planted forests has been increasing recently, gaining an estimated 234 million cubic feet between 2004 and 2008. Over the last decade (1999–2008), however, volume in planted forests has declined nearly 17 percent. In 1999 standing volume in planted forests accounted for an estimated 3.3 percent of total standing volume. In 2008, planted forests accounted for only 2.5 percent (fig. 5). This indicates that while planted forests in Tennessee have been increasing recently, levels are still not where they were only 10 years ago. Softwood volume has declined even further. The standing volume of planted softwood has declined by nearly 21 percent during the period 1999–2008. All standing hardwood volume within planted stands is a result of hardwood competition found in planted softwood stands.

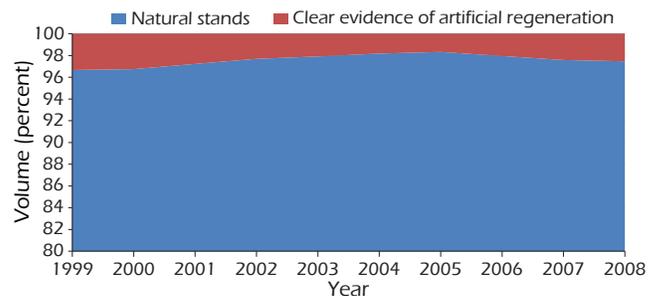


Figure 5—Percent of volume of live standing volume found in forests of natural and artificial (planted) stand origin, Tennessee, 2008.

## Loss of Industry Forest Land Base

Forest land ownership has been dramatically changing in Tennessee over the last decade. Forest industry forest land has been steadily declining since the late 1990s and now represents only 4 percent of all forest land in the State (fig. 6). In 1999 forest industry accounted for ownership of an estimated 1.3 million acres or 10 percent. Today, forest industry accounts for about 543,000 acres. There have been concomitant gains in nonindustrial private forest land ownership as forest industry has divested itself of the majority of its forest land base as the vertically integrated forest companies have shifted to a different business model. In addition, there has been a slight increase in State and local forest land ownership.

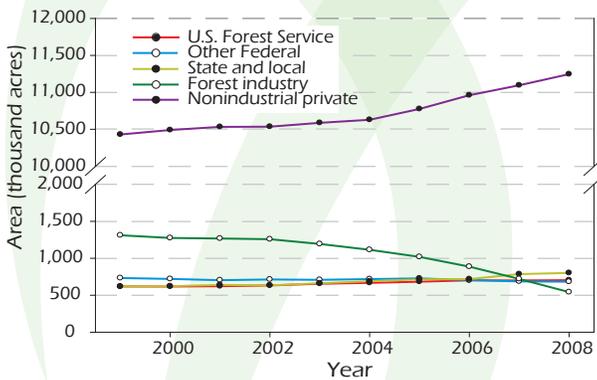


Figure 6—Area of forest land in Tennessee in common ownership groups between 1999 and 2008.

## Treatments and Disturbances

On average in Tennessee, almost 3 percent (408,000 acres) of forest land experiences some type of disturbance or treatment each year (fig. 7). About 56 percent of those acres experienced some type of cutting activity (treatments) and 44 percent experienced some other type of disturbance. Weather, domestic animals (e.g., grazing), and fire annually disturb the most acreage and partial harvests are the most common cutting activity observed.

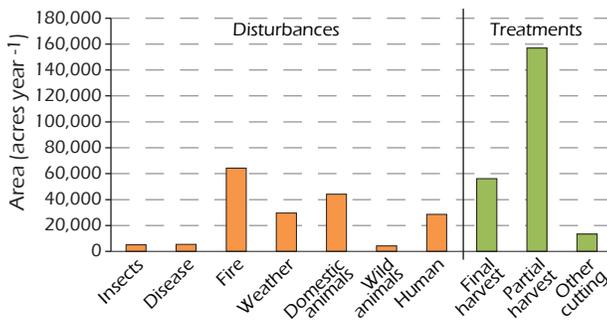


Figure 7—Average area of forest land disturbed and treated annually by disturbance and treatment category, Tennessee, 2008.

## Average Annual Net Growth, Mortality, and Removals

Average annual net growth (gross growth minus mortality), mortality, and removals of all-live volume on forest land have been steadily declining over the last 6–7 years (fig. 8). While average annual net growth appears to have stabilized over the last 4 years (2005–08), mortality and removals have continued to decline. Average annual gross growth has declined (i.e., statewide tree growth has slowed). The decline in mortality is likely due to the lessening of the impact of the 1999–2001 southern pine beetle event that killed numerous pine trees in the eastern portion of the State, while the decline in removals is likely an artifact of the current downturn in the United States economy. In fact, removals, as a percent of the total standing volume, have declined from an estimated 2 percent per year to 1.5 percent per year (fig. 9). The growth-to-removals ratio has remained between 1.5 and 2.0 during that same period (fig. 9), indicating that for every cubic foot of wood volume that is removed from Tennessee’s forests 1.5–2.0 cubic feet are grown (accounting for mortality).

### Net Growth (ft<sup>3</sup> year<sup>-1</sup>)

- Total = 766,627,993
- Softwood = 64,432,705
- Hardwood = 702,195,290

- Hardwood = 192,423,927

### Removals (ft<sup>3</sup> year<sup>-1</sup>)

- Total = 406,737,155
- Softwood = 92,602,827
- Hardwood = 314,134,328

### Mortality (ft<sup>3</sup> year<sup>-1</sup>)

- Total = 314,642,374
- Softwood = 122,218,447

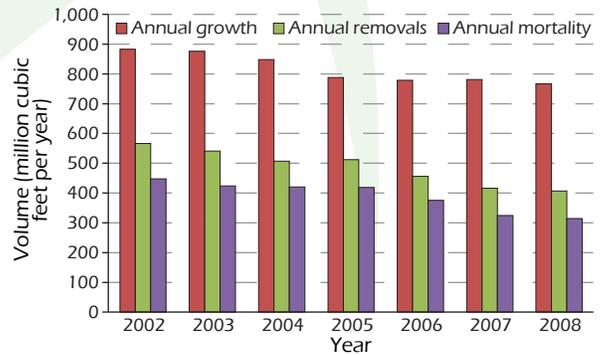


Figure 8—Average annual net growth, removals, and mortality on forest land between 2002 and 2008, Tennessee.

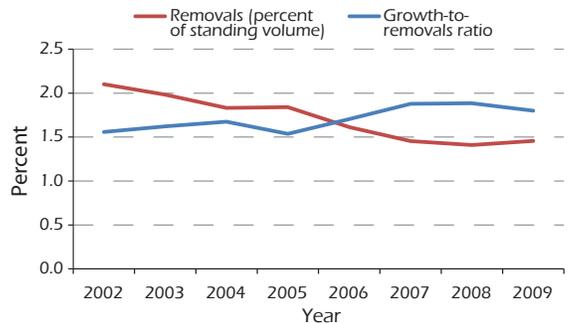


Figure 9—Average annual removals as a percent of standing volume and growth to removals ratio between 2002 and 2008 on Tennessee forest land.



## New Invaders Could Have Large Impact

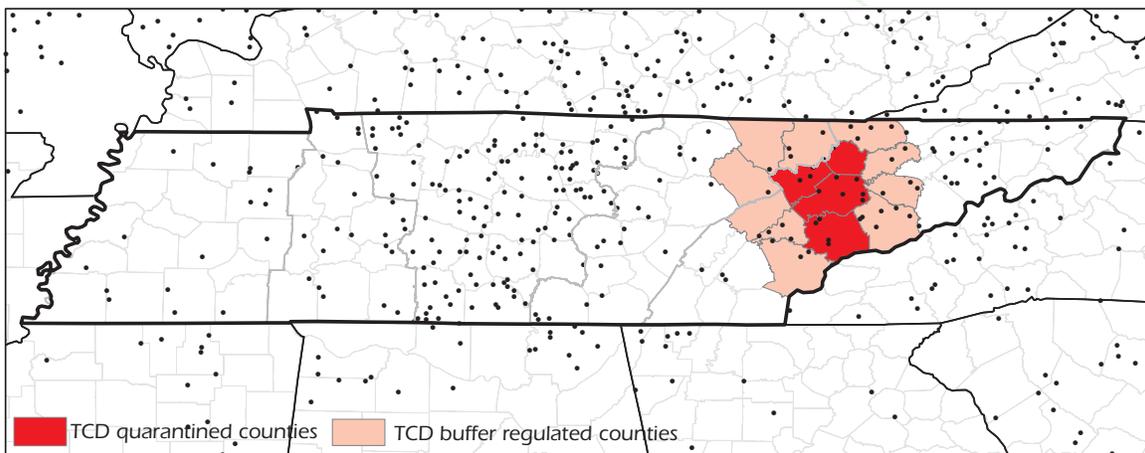
Recent announcements have revealed that both the Emerald ash borer (EAB, *Agrilus planipennis* Fairmaire) and Thousand cankers disease (TCD) have been found in east Tennessee. The EAB is a nonnative invasive beetle that has been causing ash (*Fraxinus* spp.) mortality in the United States since it was first discovered in the United States in Michigan in 2002. EAB is considered a significant threat to ash trees in Tennessee. TCD is a pest complex (caused by the fungus (*Geosmithia* sp. nov.) and transported by the walnut twig beetle (*Pityophthorus juglandis*) that has been causing walnut mortality in many Western States. The recent observation of TCD in east Tennessee is the first within the native range of black walnut and poses a serious threat to the species in Tennessee and the Eastern United States.

In Tennessee, TCD poses a threat to the estimated 27 million black walnut trees (> 1-inch d.b.h.) found in the State. In addition, the

estimated 218 million cubic feet of wood volume found in trees >5 inches d.b.h., if lost to TCD, would amount to a significant economic loss to Tennessee landowners interested in black walnut wood products. Black walnut in Tennessee is primarily found in the central and east regions of the State (fig. 10). A quarantine, that limits the transport of potentially infected wood material has been placed on several counties in the area. About 6 percent of the statewide total volume is located in the TCD quarantined counties, while an additional 9 percent is located within the buffer regulated counties (fig. 10).

Ash trees are found throughout the State (fig. 11). EAB could potentially have a much larger impact because the ash resource is much larger in Tennessee than the walnut resource. In 2008, ash species accounted for a total of 889 million cubic feet of standing wood volume in over 61 million trees >5 inches d.b.h. Currently, < 1 percent of ash volume is located within the EAB quarantined counties (fig. 11).

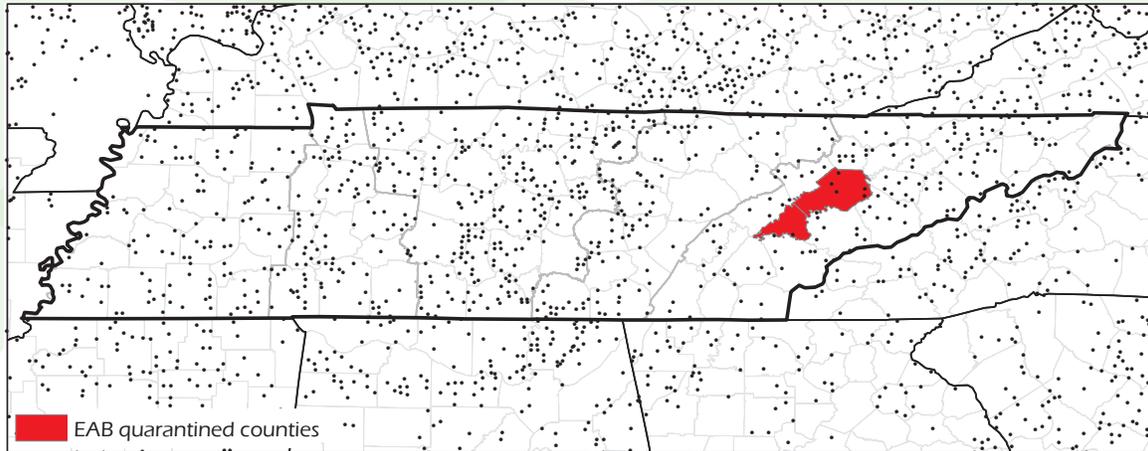
Black walnut (*Juglans nigra*)



FIA plot locations are approximate

Figure 10—Approximate location of sampled black walnut and recent Thousand canker disease (TCD) quarantined counties and buffer regulated counties in Tennessee (county designations according to Tennessee Department of Agriculture Division of Forestry).

Ash species (*Frazinus* spp.)



FIA plot locations are approximate

Figure 11—Approximate location of sampled ash species and recent Emerald ash borer (EAB) quarantined counties in Tennessee (county designations according to Tennessee Department of Agriculture Division of Forestry).

## How to Cite this Publication

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## FIA Program Information

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United States Department of Agriculture Forest Service. 2004. Forest inventory and analysis national core field guide—field data collection procedures for phase 2 plots. Volume 1. Version 3.0. [www.fia.fs.fed.us/library/field-guides-methods-proc](http://www.fia.fs.fed.us/library/field-guides-methods-proc).

## Additional Tennessee Inventory Information

Oswalt, C.M.; Oswalt, S.N.; Johnson, T.G. [and others]. 2009. Tennessee's forests, 2004. Resour. Bull. SRS-144. Asheville, NC: U.S. Department of Agriculture Forest Service, Southern Research Station. 96 p.

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Trillium in forest understory. (photo by Christopher Oswalt)

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