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Missouri's Forest Resources in 2003

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Missouri's Forest Resources in 2003

The North Central Research Station's Forest Inventory and Analysis (NCFIA) program began fieldwork for the fifth forest inventory of Missouri's forest resources in 1999. This inventory initiated the new annual inventory system in which one-fifth of the field plots (considered one panel) in the State is selected for measurement each year. A complete inventory consists of measuring and compiling the data for all plots (for all five panels). Once all panels have been measured, each will be remeasured approximately every 5 years. For example, in Missouri, the field plots measured in 2000 will be remeasured in 2005.

In 2003, NCFIA continued the annual inventory effort with the fifth (annual) panel of the fifth Missouri forest inventory. Previous inventories of Missouri occurred in 1947, 1959, 1972, and 1989 (USDA Forest Service 1948, Gansner 1965, Spencer and Essex 1976, Spencer *et al.* 1992). This fifth inventory of Missouri's forest resources was completed in 2003. Estimates presented in this report are based on measurements from the field plots for all five panels constituting a complete inventory. The underlying data are a combination of measurements for the first year's panel in 1999, measurements for the second year's panel in 2000, measurements for the third year's panel from 2001, measurements for the fourth year's panel in 2002, and measurements for the fifth year's panel in 2003. An earlier report for the combined 1999, 2000, 2001, and 2002 panels (Moser *et al.* 2003) was published. The results presented are estimates based on sampling techniques; estimates for this report were compiled assuming all five panels (1999 through 2003) represent one sample.

Estimates from new inventories are often compared with estimates from earlier inventories to determine trends in forest resources. However, for the comparisons to be valid, the procedures used in the two inventories must be similar. As a result of our ongoing efforts to improve the efficiency and reliability of the inventory, several changes in procedures and definitions have been made since the last Missouri inventory in 1989 (Hahn and Spencer 1991, Spencer *et al.* 1992). Although these changes will have little impact on statewide estimates of forest area, timber volume, and tree biomass, they may have significant impacts on plot classification variables such as forest type and stand-size class. Some of these changes make it inappropriate to directly compare portions of the 1999–2003 estimates with those published for earlier inventories.

RESULTS

Area

Total forest land area consisted of 14.6 million acres in 2003 (table 1). Eighteen percent of this area is owned by public agencies and 82 percent is owned by private landowners. Four percent of the area was dominated by softwoods and the remaining 96 percent by hardwoods. Oak/hickory forests made up over 82 percent of the total hardwood area. The pinyon/juniper forest type group (primarily made up of eastern redcedar)[1] constituted over 73 percent of all forest land dominated by softwoods. The oak component has increased, with the 1947 oak/pine, oak/hickory, and white oak forest type groups constituting 77.6 percent of the total forest land area, and the 1999-2003 oak/pine and oak/hickory groups making up 86.0 percent.

[1] *Before 1999, pinyon/juniper was referred to as eastern redcedar in the inventories.*

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Like forest land, timberland area has continued to increase since its low point in the 1972 inventory (fig. 1), but the total area of 14.1 million acres in 2003 was still less than the 15 million acres estimated in the 1947 survey (USDA Forest Service 1948).

The area of timberland by forest type group was dominated by hardwoods (table 2), particularly the 11.1 million acres of oak/hickory in 2003 (table 3 and fig. 2). Hardwoods made up 95 percent of the total acreage, 94 percent of all public land acreage, and 95 percent of all private landholdings. For most of the forest type groups, the preponderance of acreage was classified as sawtimber stand-size class. The exceptions were pinyon/juniper, and oak/pine.

The acreage of timberland in the sawtimber class has increased by over 5 million acres since 1947 (fig. 3). When one combines the sawtimber acreage with the poletimber acreage, it appears Missouri's forests are composed of many large-diameter and, presumably, old trees. Increased reforestation, both natural and artificial, appears to have resulted in a negligible number of acres in the nonstocked category.

Volume

The net volume of all live trees on forest land, which includes growing stock, rough trees, and rotten trees, was 18.0 billion cubic feet in 2003 (table 4). Hardwoods constitute 16.7 billion cubic feet and softwoods made up 1.3 billion cubic feet. The net volume of all oaks was 11.1 billion cubic feet or 67 percent of all hardwoods. The net volume of select oaks (red and white) were 5.2 billion cubic feet or 47 percent of all oaks and 31.4 percent of all hardwoods. This represents a large increase over the 1972 inventory, which listed the total cubic foot volume of all live trees as 9 billion cubic feet, all hardwoods as 8.6 billion cubic feet, all oaks as 6.4 billion cubic feet, and all select oaks as 2.6 billion cubic feet (Spencer and Essex 1976).

Net volume of all live trees and salvable dead trees on timberland was 17.6 billion cubic

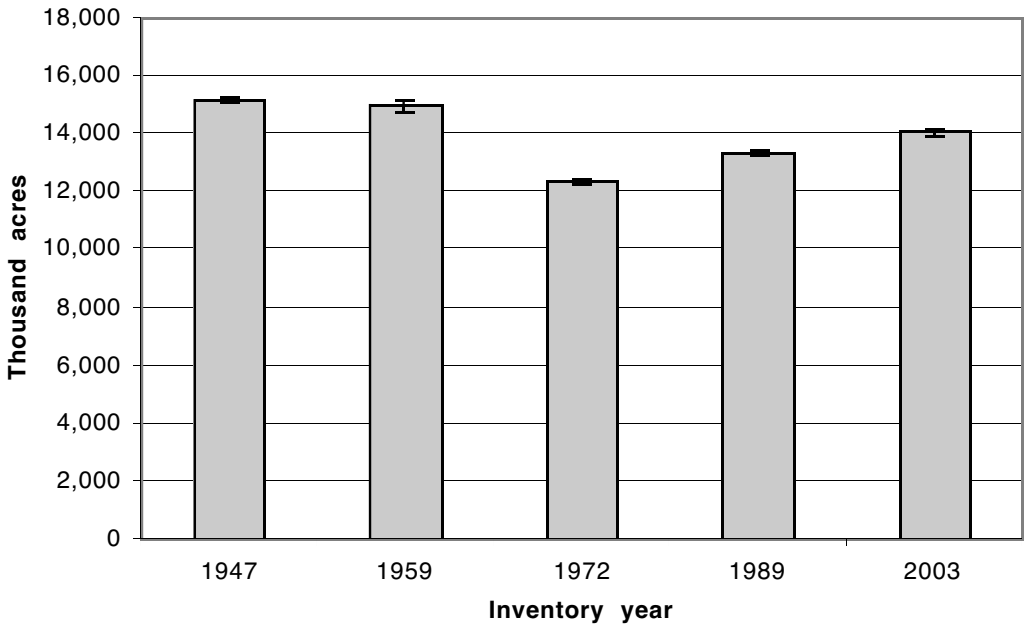


Figure 1. — Area of timberland in Missouri by inventory year, 1947-2003. The vertical line at the top of each bar repreents the sampling error associated with each inventory.

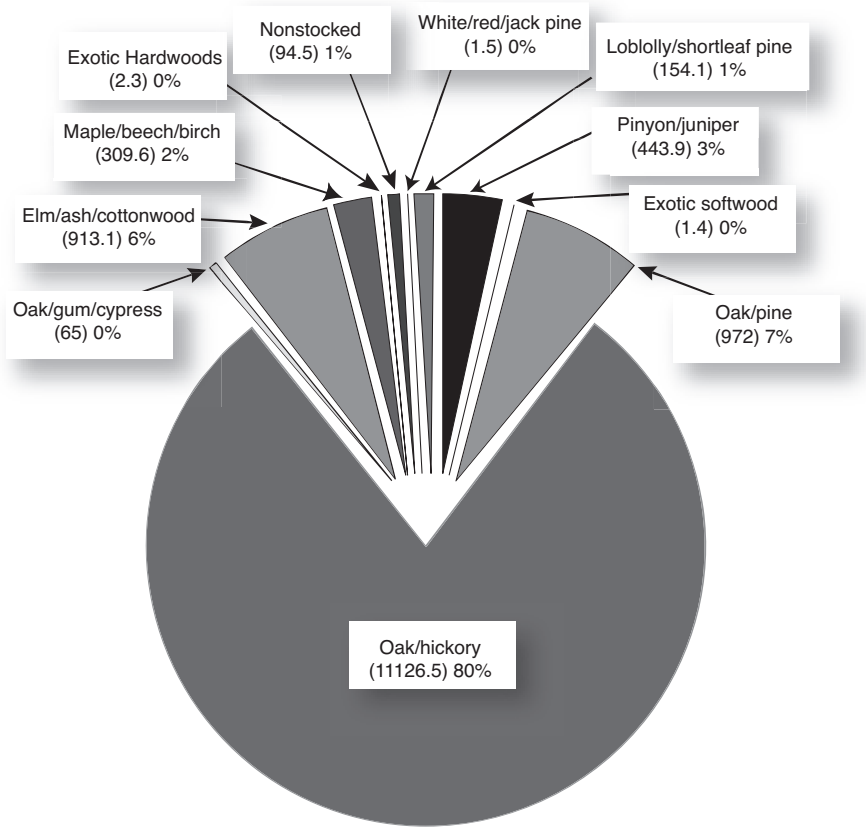


Figure 2. — *Area of timberland in Missouri by forest type group, in thousands of acres and percentage of total timberland area, 1999-2003.*

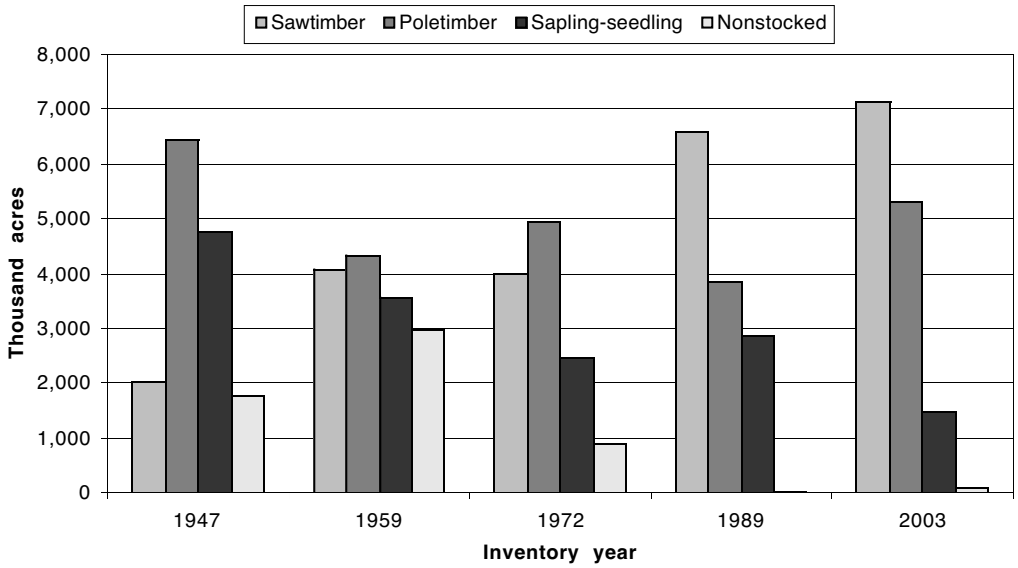


Figure 3. — Area of timberland in Missouri by stand-size class, 1947-2003.

feet in 2003 (table 5 and fig. 4). All live trees made up 17.4 billion cubic feet or 99 percent. The difference between the total and the 18.0 billion cubic feet volume of all live trees on forest land (table 4) represents land that is either of low productivity (incapable of growth greater than 20 cubic feet per acre per year at the culmination of mean annual increment) or reserved (e.g., parks, wilderness areas). Of the 14.6 billion cubic feet of growing-stock trees, 9.7 billion cubic feet or 66 percent was sawtimber. The sawtimber percentages for softwoods and hardwoods were similar to the overall proportions.

Cull trees, at 2.8 billion cubic feet, made up 16.1 percent of all live trees. The softwood cull tree volume represented only 7.0 percent of the total softwood live tree volume, whereas hardwood culls represented 16.8 percent of the total hardwood volume. Given the phototropic (sun-following) growth habit of hardwoods, the poor stem form resulting from inadequate self-pruning, and the history of high grading in hardwood stands, the disparity in the cull percentage is not surprising.

The net volume of growing stock on timberland totaled 14.6 billion cubic feet in 2003 (table 6). Over 96 percent (14.1 billion cubic feet) were hardwood forest types and 3.4 percent (501 million cubic feet) were softwoods. In this table, the volumes were calculated for softwoods and hardwoods for each forest type group. For example, the oak/pine forest type group had 424 million cubic feet of softwoods and 461 million cubic feet of hardwoods. Growing-stock volume has been steadily increasing in Missouri over the last 55 years (fig. 5).

Table 7 shows net volume of growing stock on timberland by species group and diameter class. The totals for softwood and hardwood volumes, 1.2 billion cubic feet and 13.4 billion cubic feet, respectively, are the same as the totals at the bottom of the columns in table 6.

The net volume of sawtimber on timberland was 46.5 billion board feet (table 8). As with many other measures of coverage and abundance in Missouri, hardwoods constituted the

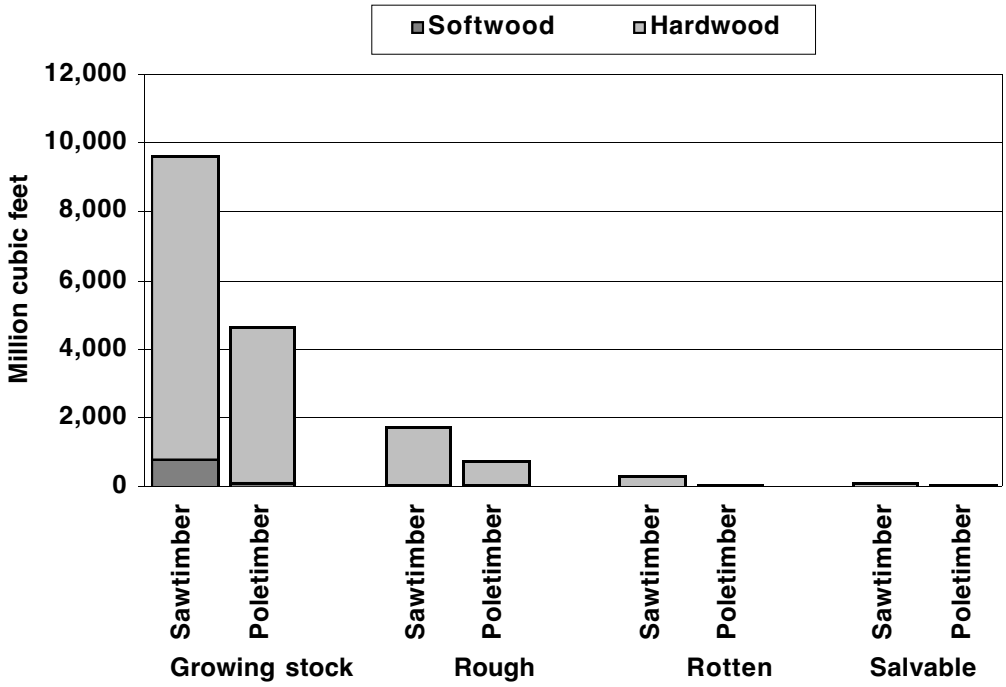


Figure 4. — Net volume of all live trees and salvable dead trees on timberland in Missouri by class of timber and softwood/hardwood category, 1999-2003.

preponderance of the volume (91 percent or 42.3 billion board feet). Red and white oaks totaled 30.8 billion board feet or 73 percent of the hardwood sawtimber total. Trees that were 19 or more inches in diameter were 5.5 percent of the softwood volume (227.5 million board feet) and 22.7 percent of the hardwood volume (9.6 billion board feet). In 1989, the proportions were 3.6 percent and 16.8 percent, respectively (Spencer *et al.* 1992).

Biomass

The all live aboveground biomass on timberland in Missouri totaled 554.3 million dry tons in the 1999-2003 inventory (table 9). Almost 9 percent of that total, or 48.6 million dry tons, was in 1- to 5-inch trees; 73.9 percent, or 409.6 million tons, was in growing-stock trees; and 17.3 percent, or 96.1 million tons, was in non-growing-stock trees. Private landowners held 82.3 percent or 456.3 million tons, and public owners held 17.6 percent (97.9 million dry tons). Of the 409.6 million dry tons in growing-stock trees, 81.3 percent was on private land and 18.7 percent was on public land. Among non-growing-stock trees, 87.6 percent of the biomass was on private land and 12.4 percent was on public land (fig. 6).

Almost 72 percent of the total biomass of the growing-stock trees was in the boles, and the remaining 28.1 percent was in stumps, tops, and limbs. Approximately the same proportions existed for the 96.1 million dry tons of non-growing-stock trees: 72.6 percent was in bolewood and 27.4 percent was in stumps, tops, and limbs. The only apparent deviation was the percentage of biomass in publicly owned growing-stock softwoods: 83.2 percent of the biomass was made up of tree boles, and the remaining 16.8 percent constituted the stumps, tops, and limbs. This difference might reflect management activities, or perhaps the stands were made up mainly of younger, more densely stocked pine plantings and natural regeneration. Non-growing-stock softwoods on public land, a relatively small 215.9 thousand dry tons, also had a slightly higher percentage in the boles, 74.7 percent, than did the total ownership, non-growing-stock percentage of 72.6 percent.

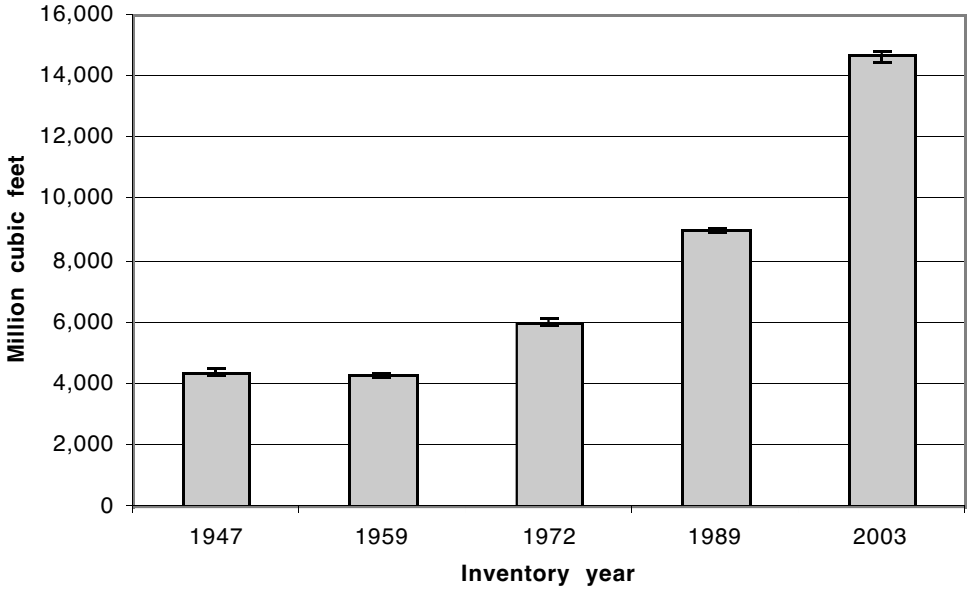


Figure 5. — *Growing-stock volume on timberland in Missouri, 1947-2003. The vertical line at the top of each bar represents the sampling error associated with each inventory.*

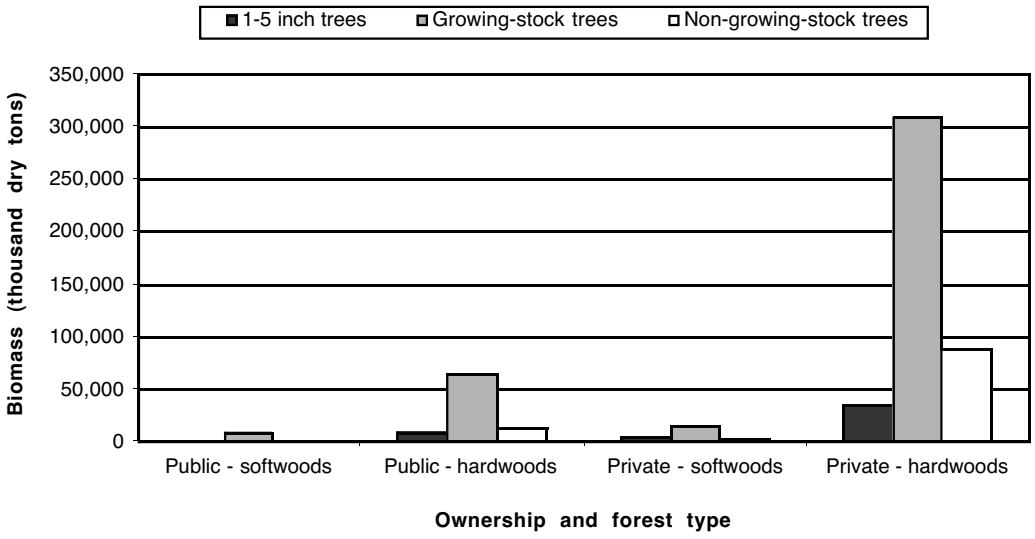


Figure 6. — *Live aboveground biomass in Missouri, in dry tons, by ownership type and forest type, 1999-2003.*

Growth, Removals, and Mortality

The net growth of growing stock on Missouri's timberland increased, on average, 629.4 million cubic feet per year from 1989 to 1999-2003 (table 10). Softwood growth was 44.1 million cubic feet per year. Hardwood growth was 585.3 million cubic feet per year. Hardwood growth was 93.0 percent of the total growth in the latest inventory; the hardwood growing stock in the previous inventory (1989) was 90.4 percent of the total volume. Some of the species groups with the greatest growth included other soft hardwoods, with a net increase of 50.5 million cubic feet per year, and hickory at 53.7 million cubic feet per year. Select oaks (white and red) had a net average increase of 175.4 million cubic feet per year.

Average annual removals of growing stock on timberland (table 11) totaled 118.6 million cubic feet per year from 1989 to 1999-2003. Softwood removals were 11.5 million cubic feet per year or 9.7 percent of the total. Hardwood removals were 107.1 million cubic feet per year. Removals from private property totaled 100.0 million cubic feet per year, 84.3 percent of all removals. Public land removals averaged 18.6 million cubic feet per year. The species group category "other red oaks" had the highest average annual removals, at 40.2 million cubic feet per year or 37.5 percent of the total average hardwood removals. The next highest species group was "select white oaks." at 30.4 million cubic feet per year (28.4 percent of total hardwood removals), followed by "other white oaks" at 10.1 million cubic feet per year or 9.4 percent of the hardwood total.

Average annual mortality of all growing stock on timberland, 1989 through 1999–2003, was 81.8 million cubic feet per year (table 12). Over 94 percent of the total mortality, or almost 77.2 million cubic feet per year, was from hardwoods, while the remaining 4.7 million cubic feet per year was from softwoods. Across all species groups, 19.5 percent, or 15.9 million cubic feet per year, occurred on public lands. For hardwoods alone, 17.8 percent or 13.8 million cubic feet per year of average annual mortality was on public lands; for softwoods alone, 46.7 percent or 2.2 million cubic feet per year of average annual mortality was on public land. Among hardwood species groups, the "other

red oaks" category had the highest average annual mortality at 26.5 million cubic feet per year or 34.3 percent of all hardwood mortality. This species group also had the highest average annual mortality on public lands, 5.7 million cubic feet per year. The 21.5 percent of "other red oak" mortality that occurred on public lands was the highest percentage for all hardwoods and no doubt reflected the impact of the oak decline complex on the dense, overmature timber disproportionately represented on such lands (Lawrence *et al*. 2002).

Forest Health

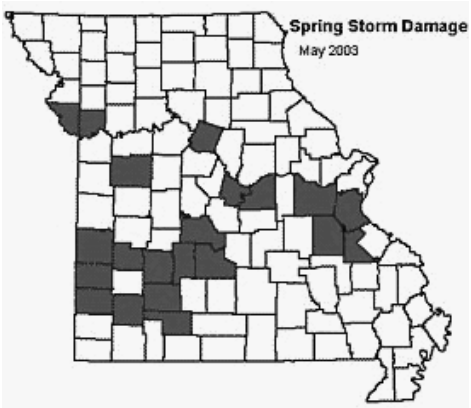
The following information about pathogens and insects affecting Missouri forests was excerpted from the national Forest Health Monitoring (FHM) program Web site at: http://www.na.fs.fed.us/spfo/fhm/fhh/fhh-03/mo/mo_03.htm.

Special Issues

Storms and drought, two frequent forest health concerns in Missouri, took center stage again in 2003.

Spring Storms—A series of very destructive storms occurred in Missouri during late April and early May. At least 40 tornadoes occurred during May 4-10. The average number of tornadoes in Missouri is 26 per year. On May 4 occurred the largest single-day tornado outbreak ever recorded in Missouri (19 tornadoes). Aerial surveys revealed that 27,300 acres of forest land were damaged by tornadoes in western Missouri. The largest areas were near the communities of Stockton (16,220 acres), Camdenton (4,900 acres), Pierce City (2,190 acres), and Liberty (1,850 acres)

The storms of early May also brought damaging hail and straight-line winds to some areas. Hail stripped all foliage from trees in Cole County (3,410 acres) and Howard County (7,330 acres) Most hail-damaged trees had reflushed by late June, but new foliage was clumped, poorly distributed in tree crowns, and much reduced in volume from normal conditions. Straight-line winds in eastern Missouri caused extensive damage to 58,580 acres of forest land in Franklin, Jefferson, St. Francois, and Washington Counties.



Drought—Northwestern, west-central and north-central Missouri were hit hard by drought during the past 2 years. The drought is particularly severe in the northwest, where accumulated 2-year precipitation deficits as of September 2003 approached 25 inches (65 percent of normal precipitation) in some counties, according to University of Missouri Extension reports. The current drought is the most severe in that region since the drought of 1988-1989. West-central Missouri received some relief when remnants of tropical storm Grace dumped heavy rains during August 30-31, but returned to below normal precipitation levels in October and November. Drought conditions continued throughout the fall in the northwest. Even if precipitation levels in the northwest are near normal in early 2004, it is unlikely that winter precipitation will be adequate to replenish water supplies.

Insects and Diseases

Wood borers and Bark Beetles—Increased attacks by wood borers and bark beetles can be expected on both hardwood and conifer tree species stressed by drought. Trees growing on thin, rocky soils or in stressful urban settings are particularly at risk. In 2003, many attacks by *Ips* beetles and various wood borers were reported in the Kansas City area on conifers not native to Missouri such as Scotch, Austrian, white, red, and jack pines. High

Tornado damage in western Missouri.

Trees completely defoliated by hail—Cole County, Missouri.

numbers of twig girdler attacks were seen on oaks and other hardwoods throughout western Missouri.

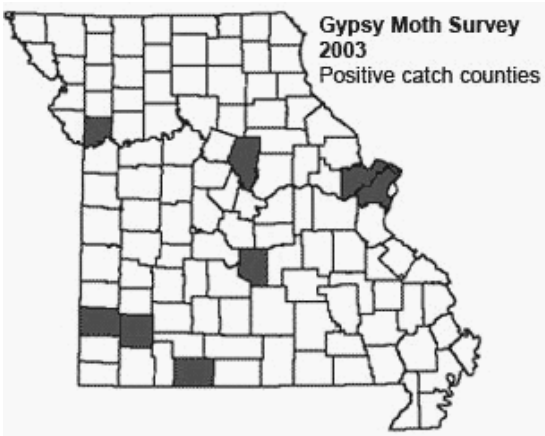
Oak Decline—Relatively abundant spring rains fell in southern Missouri in 2003. The increased moisture should be beneficial to declining oaks, but the benefits can be expected to be short-lived. Increasing tree ages, high stand densities, and site conditions will continue to be dominant factors in oak decline for many years. Red oak borers (*Enaphalodes rufulus*), a major contributing factor in oak decline, began to emerge in the Ozark Highlands in late June and continued through July, completing their 2-year life cycle. Missouri Department of Conservation (MDC) researchers operating a black light in southeastern Missouri (Reynolds County) captured about 15 red oak borer adults per hour during trapping sessions on July 16-17.

Oak Wilt—There were 18 confirmed cases of oak wilt caused by *Ceratocystis fagacearum* out of 34 samples sent to the MDC forest health diagnostic laboratory, up slightly from 2002. Positives for 2003 were taken from Adair, Caldwell, Callaway, Cass, Daviess, Holt, Jasper, Jackson, Livingston, Morgan, St. Charles, St. Louis, and Shelby Counties. This diagnostic season included a first positive for a white oak, found in Livingston County.

Defoliators—Damage from defoliating insects was noticeably absent throughout Missouri's oak forests in 2003. Lepidopteran populations were very low. Defoliator activity appeared to be even less than that observed in 2002, which also was relatively low compared to recent years. Causes of low populations are not known, but may be related to poor overwintering survival or impacts related to frequent spring rains in some areas.

Gypsy Moth—The Missouri Cooperative Gypsy Moth Survey continued its annual effort to detect the presence of gypsy moths by placing and monitoring more than 11,500 traps throughout the State in 2003. A total of 11 moths were captured statewide. Following the pattern of the last several years, moths were captured in the St. Louis area (four moths in St. Louis County and one in St. Charles County) and near the popular recreation areas of Branson and Table Rock Lake (one moth in Taney County). However, this is the first year since 1999 that gypsy moths were also captured in other widely scattered locations. One moth was captured in Kansas City (Clay County), one in Columbia (Boone County), and one moth each in Jasper, Lawrence, and Pulaski Counties in southern Missouri.
In spite of repeated moth captures in some areas, there are no known populations of gypsy moths in Missouri at this time. Sites where gypsy moths have been captured are surveyed with an increased trap density in the following year. In most cases, survey results in the vicinity of past captures have been negative within 1 or 2 years following the original capture. Despite these favorable past results, the risk of gypsy moths establishing in

Missouri continues to increase as infested areas in nearby states expand. Statewide gypsy moth monitoring efforts will continue annually in Missouri.



SUMMARY

As long-term trends continue in Missouri, most measures of forested area and volume show increases. Forest land area has increased steadily since a low point in 1972, and standing volume has continued to increase since 1947. By and large, Missouri's forests are healthy, but there are more and more signs of problems, particularly with respect to oak decline. The severity of oak decline in neighboring Arkansas suggests that Missouri forests are at risk.

Additional data related to the two most recent inventories of Missouri (1989 and 1999–2003) are available at:
http://www.ncrs.fs.fed.us/4801/fiadb/index.htm
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APPENDIX

Inventory Methods

Since the 1989 inventory of Missouri, several changes have been made in NCFIA inventory methods to improve the quality of the inventory as well as to meet increasing demands for timely forest resource information. The most significant difference between inventories is the change from periodic inventories to annual inventories. Historically, NCFIA periodically inventoried each State on a cycle that averaged about 12 years. However, the need for timely and consistent data across large regions, combined with national legislative mandates, resulted in NCFIA's implementation of an annual inventory system. Missouri was one of the first States in the North Central region, and in the Nation, to be inventoried with this new system, beginning with the 1999 inventory.

With the NCFIA annual inventory system, about one-fifth of all field plots are measured each year. After 5 years, an entire inventory cycle will be completed. After the first 5 years, NCFIA will report and analyze results as a moving 5-year average. For example, NCFIA will be able to generate a report based on inventory results for 1999 through 2004 or for 2001 through 2006. Although there are great advantages for an annual inventory, one difficulty is reporting results before an entire cycle is completed. With the completion of all five (1999-2003) annual panels, 100 percent of all field plots to which we have gained access have been measured. Sampling error estimates for the 2003 inventory results are area of forest land, 0.80 percent; area of timberland, 0.87 percent; number of growing-stock trees on timberland, 1.48 percent; volume of growing stock on timberland, 1.39 percent; and volume of sawtimber on timberland, 1.78 percent. These sampling error estimates are higher than those for the last periodic inventory completed in 1989 (i.e., 0.53 percent for timberland area and 1.04 percent for growing-stock volume).

Other significant changes between inventories include new remote sensing technology, a new sampling design configuration, and additional remotely sensed and field data. The advent of remote sensing technology since the previous inventory in 1989 has allowed NCFIA to use computer-assisted classifications of Multi-Resolution Land Characterization (MRLC) data and other available remote sensing products to stratify the total area of the State and to improve the precision of estimates. Previous inventories in Missouri (1947, 1959, 1972, and 1989) used manual interpretation of aerial photos to stratify the State.

New algorithms were used in 1999–2003 to assign forest type and stand-size class to each condition observed on a plot. These algorithms are being used nationwide by FIA to increase consistency among States and will be used to reassign the forest type and stand-size class of every plot measured in the 1989 inventory when it is updated. This will be done so that changes in forest type and stand-size class will more accurately reflect actual changes in the forest and not changes in how values are computed. The list of recognized forest types, grouping of these forest types for reporting purposes, models used to assign stocking values to individual trees, definition of nonstocked, and names given to the forest types changed with the new algorithms. As a result, comparisons between the published 2003 inventory results and those published for the 1989 inventory may not be valid. For additional details about algorithms used in both inventories, please contact NCFIA.

Sampling Phases

The 1999–2003 Missouri survey was based on a three-phase inventory. The first phase used classified satellite imagery to stratify the State and aerial photographs to select plots for measurement. The second phase measured the

traditional FIA suite of mensurational variables, while the third phase focused on a suite of variables related to the health of the forest.

The only land that could not be sampled was (1) private land where field personnel could not obtain permission from the owner to measure the field plot and (2) plots that could not be accessed because of a hazard or danger to field personnel. The methods used in the preparation of this report make the necessary adjustments to account for sites where access was denied or hazardous.

Phase 1

The 2003 inventory used a computer-assisted classification of satellite imagery. FIA used the imagery to form two initial strata—forest and nonforest. Pixels within 60 m (2 pixel widths) of a forest/nonforest edge formed two additional strata—forest/nonforest and nonforest/forest. Forest pixels within 60 m on the forest side of a forest/nonforest boundary were classified into a forest edge stratum. Pixels within 60 m of the boundary on the nonforest side were classified into a nonforest edge stratum. The estimated population total for a variable is the sum across all strata of the product of each stratum's estimated area and the variable's estimated mean per unit area for the stratum.

Phase 2

Phase 2 of the inventory consisted of the measurement of the annual panel of field plots in Missouri. Current FIA precision standards for annual inventories require a sampling intensity of one plot for approximately every 6,000 acres. FIA has divided the entire area of the United States into nonoverlapping hexagons, each of which contains 5,937 acres (McRoberts 1999).

An array of field plots was established by selecting one plot from each hexagon based on the following rules: (1) if a Forest Health Monitoring (FHM) plot (Mangold 1998) fell within a hexagon, it was selected; (2) if no FHM plot fell within a hexagon, the existing NCFIA plot from the 1989 inventory nearest the hexagon center was selected; and (3) if neither FHM nor existing NCFIA plots fell within the hexagon, a new NCFIA plot was established in the hexagon (McRoberts 1999). This array of plots is designated the Federal base sample and is considered an equal probability sample; its measurement in Missouri is funded by the Federal government. In addition, the Missouri Department of Conservation contributed personnel and equipment that allowed for intensified sampling in several regions of the State.

The total Federal base sample of plots was systematically divided into five interpenetrating, non-overlapping subsamples or panels. Each year the plots in a single panel are measured, and panels are selected on a 5-year, rotating basis (McRoberts 1999). For estimation purposes, the measurement of each panel of plots may be considered an independent systematic sample of all land in a State. Field crews measure vegetation on plots forested at the time of the last inventory and on plots currently classified as forest by trained photointerpreters using aerial photos or digital orthoquads.

Phase 3

NCFIA has two categories of field plot measurements—phase 2 field plots (standard FIA plots) and phase 3 plots (forest health plots). Both types of plot are uniformly distributed both geographically and temporally. Phase 3 plots are measured with the full suite of FHM vegetative and health variables (Mangold 1998) collected as well as the full suite of measures associated with phase 2 plots. Phase 3 plots must be measured between June 1 and August 30 to accommodate the additional measurement of nonwoody understory vegetation, ground cover, soils, and other variables. In Missouri, the complete 5-year annual inventory included measurement of 221 phase 3 plots.

On the remaining plots, referred to as phase 2 plots, only variables that can be measured throughout the entire year are collected. In Missouri, the complete 5-year annual inventory included measurement of 4,632 phase 2 forested plots.

The new national FIA plot cofiguration (fig. 7) was first used for data collection in Missouri in 1999, the first annual inventory year. This design was also used in the 2000 through 2003 panels and will be used in subsequent panels. The national plot configuration requires mapping forest conditions on each plot. Due to the small sample size (20 percent) each year, precision associated with change factors such as mortality will be relatively low. Now that the fifth and final panel of the annual inventory was completed in 2003, the full range of change data will be available.

The overall plot layout for the new design consists of four subplots. The centers of subplots 2, 3, and 4 are located 120 feet from the center of subplot 1. The azimuths to subplots 2, 3, and 4 are 0, 120, and 240 degrees, respectively. The center of the new plot is located at the same point as the center of the previous plot if a previous plot existed within the sample unit. Trees with d.b.h. 5 inches and larger are measured on a 24-foot-radius (1/24 acre) circular subplot. All trees less than 5 inches d.b.h. are measured on a 6.8-foot-radius (1/300 acre) circular microplot located 12 feet east of the center of each of the four subplots. Forest conditions that occur on any of the four subplots are recorded. Factors that differentiate forest conditions are changes in forest type, stand-size class, reserved status, ownership, and density. Each condition that occurs anywhere on any of the subplots is identified, described, and mapped if the area of the condition meets or exceeds 1 acre in size.

Field plot measurements are combined with phase 1 estimates in the compilation process and table production. The number of published tables generated from less than five panels of data is limited. Additional data related to the most recent inventories of Missouri are available at:
http://www.ncrs.fs.fed.us/4801/fiadb/index.htm.

For additional information, contact:
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or

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Missouri Department of Conservation
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Jefferson City, MO 65102
Web site: http://www.mdc.state.mo.us/forest/

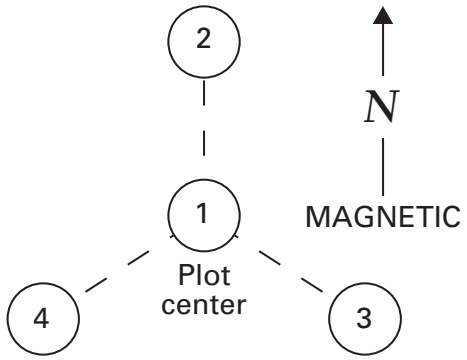

Figure 7. — Current NCFIA field plot design.

LITERATURE CITED

Gansner, D.A. 1965.
Missouri's forests, 1959. Resour. Bull. CS-2. Columbus, OH: U.S. Department of Agriculture, Forest Service, Central States Forest Experiment Station. 53 p.

Hahn, J.T.; Spencer, J.S. 1991.
Timber resource of Missouri. Resour. Bull. NC-119. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station. 123 p.

Lawrence, R.; Moltzan, B.; Moser, W.K. 2002.
Oak decline and the future of Missouri's forests. Missouri Conservationist. 63(7): 11–18.

Mangold, R.D. 1998.
Forest health monitoring field methods guide (National 1998). Research Triangle Park, NC: U.S. Department of Agriculture, Forest Service, National Forest Health Monitoring Program. 429 p. (Revision 0, April 1998)

McRoberts, R.E. 1999.
Joint annual forest inventory and monitoring system, the North Central perspective. Journal of Forestry. 97(12): 27-31.

Moser, W.K.; Brand, G.J.; Treiman, T.B.; Moltzan, B.; Lawrence, R. 2004.
Missouri's forest resources in 2002. Resour. Bull. NC-233. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Research Station. 42 p. [Available only on line at: www.ncrs.fs.fed.us]

Spencer, J.S., Jr.; Essex, B.L. 1976.
Timber in Missouri, 1972. Resour. Bull. NC-30. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station. 108 p.

Spencer, J.S., Jr.; Roussopoulos, S.M.; Massengale, R.A. 1992.
Missouri's forest resource, 1989: an analysis. Resour. Bull. NC-139. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station. 84 p.

U.S. Department of Agriculture, Forest Service. 1948.
Forest resources of Missouri, 1947. For. Surv. Rel. 6. Columbus, OH: U.S. Department of Agriculture, Forest Service, Central States Forest Experiment Station. 19 p.

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TABLES

Table 1. -- Area of forest land by forest type group, forest type, and owner category, Missouri, 1999-2003

(In thousand acres)

Forest type group/ forest type	Owner category			
	All owners	Public	Private	Unidentified owner
Softwood type groups				
White / red / jack pine group				
Eastern white pine	1.5	1.5	- -	- -
All forest types	1.5	1.5	- -	- -
Loblolly / shortleaf pine group				
Shortleaf pine	163.5	98.1	65.4	- -
All forest types	163.5	98.1	65.4	- -
Pinyon / juniper group				
Eastern redcedar	456.1	34.4	421.7	- -
All forest types	456.1	34.4	421.7	- -
Exotic softwoods group				
Scotch pine	1.4	1.4	- -	- -
All forest types	1.4	1.4	- -	- -
All softwood groups	622.6	135.5	487.2	- -
Hardwood type groups				
Oak / pine group				
White pine / red oak / white ash	2.5	- -	2.5	- -
Eastern redcedar / hardwood	641.2	79.7	561.5	- -
Shortleaf pine / oak	391.8	223.3	168.5	- -
All forest types	1,035.5	303.0	732.5	- -

(Table 1 continued on next page)

(Table 1 continued)

Forest type group/ forest type	Owner category			
	All owners	Public	Private	Unidentified owner
Hardwood type groups				
Oak / hickory group				
Oak / hickory group	5.3	0.4	4.9	- -
Post oak / blackjack oak	1,505.0	197.8	1,307.2	- -
White oak / red oak / hickory	6,378.7	1,141.0	5,237.6	- -
White oak	1,581.1	307.4	1,273.7	- -
Northern red oak	132.7	28.9	103.8	- -
Sassafras / persimmon	115.7	18.3	97.5	- -
Sweetgum / yellow-poplar	9.4	1.7	7.7	- -
Bur oak	13.1	- -	13.1	- -
Scarlet oak	131.8	67.9	63.9	- -
Yellow-poplar	0.8	0.8	- -	- -
Black walnut	61.5	13.8	47.7	- -
Black locust	18.6	2.0	16.5	- -
Chestnut oak / black oak / scarlet oak	323.7	101.9	221.8	- -
Red maple / oak	8.2	4.4	3.8	- -
Mixed upland hardwoods	1,210.7	84.5	1,126.2	- -
All forest types	11,496.3	1,970.9	9,525.4	- -
Oak / gum / cypress group				
Swamp chestnut oak / cherrybark oak	16.4	- -	16.4	- -
Sweetgum / Nuttall oak / willow oak	6.1	3.1	3.0	- -
Overcup oak / water hickory	39.9	14.2	25.7	- -
Baldcypress / water tupelo	2.6	- -	2.6	- -
Sweetbay / swamp tupelo / red maple	3.1	3.1	- -	- -
All forest types	68.0	20.3	47.7	- -
Elm / ash / cottonwood group				
Elm / ash / cottonwood group	1.6	- -	1.6	- -
Black ash / American elm / red maple	18.7	1.4	17.4	- -
River birch / sycamore	186.6	17.2	169.5	- -
Cottonwood	52.5	14.7	37.8	- -
Willow	39.6	5.0	34.6	- -
Sycamore / pecan / American elm	91.3	13.6	77.8	- -
Sugarberry / hackberry / elm / green ash	374.1	34.3	339.9	- -
Silver maple / American elm	146.8	33.8	113.0	- -
Red maple / lowland	7.3	4.0	3.3	- -
Cottonwood / willow	20.9	5.7	15.2	- -
All forest types	939.6	129.6	809.9	- -

(Table 1 continued on next page)

(Table 1 continued)

Forest type group/ forest type	Owner category			
	All owners	Public	Private	Unidentified owner
Hardwood type groups				
Maple / beech / birch group				
Sugar maple / beech / yellow birch	162.2	24.1	138.1	- -
Black cherry	1.5	0.9	0.6	- -
Cherry / ash / yellow-poplar	35.5	- -	35.5	- -
Hard maple / basswood	53.4	6.2	47.2	- -
Elm / ash / locust	62.6	2.2	60.4	- -
Red maple / upland	2.4	2.4	- -	- -
All forest types	317.6	35.8	281.8	- -
Exotic hardwoods group				
Other exotic hardwoods	2.3	- -	2.3	- -
All forest types	2.3	- -	2.3	- -
All hardwood groups	13,859.3	2,459.7	11,399.6	- -
Nonstocked	94.5	14.6	79.9	- -
All forest groups	14,576.5	2,609.8	11,966.7	- -

All table cells without observations in the inventory sample are indicated by --. Table value of 0.0 indicates the acres round to less than 0.1 thousand acres. Columns and rows may not add to their totals due to rounding.

Table 2. -- Area of timberland by major forest type group, stand origin, and owner category, Missouri, 1999-2003

(In thousand acres)

Major forest type group and stand origin	Owner category			
	All owners	Public	Private	Unidentified owner
Softwood type groups				
Natural	568.8	98.8	470.0	- -
Planted	32.2	21.1	11.1	- -
All softwood types	601.0	119.9	481.1	- -
Hardwood type groups				
Natural	13,364.0	2,192.9	11,171.1	- -
Planted	24.6	9.3	15.2	- -
All hardwood types	13,388.6	2,202.3	11,186.3	- -
Nonstocked	94.5	14.6	79.9	- -
All groups	14,084.2	2,336.8	11,747.4	- -

All table cells without observations in the inventory sample are indicated by --. Table value of 0.0 indicates the acres round to less than 0.1 thousand acres. Columns and rows may not add to their totals due to rounding.

Table 3. -- Area of timberland by forest type group, forest type, and stand-size class, Missouri, 1999-2003

(In thousand acres)

Forest type group/ forest type	Stand-size class				
	All stands	Sawtimber	Poletimber	Sapling-seedling	Non-stocked
Softwood type groups					
White / red / jack pine group					
Eastern white pine	1.5	1.5	- -	- -	- -
All forest types	1.5	1.5	- -	- -	- -
Loblolly / shortleaf pine group					
Shortleaf pine	154.1	104.3	46.2	3.6	- -
All forest types	154.1	104.3	46.2	3.6	- -
Pinyon / juniper group					
Eastern redcedar	443.9	84.4	221.8	137.8	- -
All forest types	443.9	84.4	221.8	137.8	- -
Exotic softwoods group					
Scotch pine	1.4	1.4	- -	- -	- -
All forest types	1.4	1.4	- -	- -	- -
All softwood groups	601.0	191.7	268.0	141.3	- -
Hardwood type groups					
Oak / pine group					
White pine / red oak / white ash	2.5	2.5	- -	- -	- -
Eastern redcedar / hardwood	577.7	129.8	319.5	128.4	- -
Shortleaf pine / oak	391.8	252.8	125.2	13.8	- -
All forest types	972.0	385.1	444.8	142.2	- -

(Table 3 continued on next page)

(Table 3 continued)

Forest type group/ forest type	Stand-size class				
	All stands	Sawtimber	Poletimber	Sapling-seedling	Non-stocked
Hardwood type groups					
Oak / hickory group					
Oak / hickory group	5.3	2.8	1.9	0.7	- -
Post oak / blackjack oak	1,379.6	540.7	727.0	111.9	- -
White oak / red oak / hickory	6,214.3	3,426.8	2,278.0	509.5	- -
White oak	1,549.0	1,059.1	478.0	11.9	- -
Northern red oak	129.5	91.8	36.7	1.0	- -
Sassafras / persimmon	112.5	10.9	30.2	71.5	- -
Sweetgum / yellow-poplar	7.7	2.2	3.0	2.5	- -
Bur oak	13.1	12.0	- -	1.1	- -
Scarlet oak	119.7	73.9	42.3	3.5	- -
Yellow-poplar	0.8	- -	0.8	- -	- -
Black walnut	57.5	26.1	28.0	3.4	- -
Black locust	18.6	7.3	11.3	- -	- -
Chestnut oak / black oak / scarlet oak	313.1	171.3	107.7	34.1	- -
Red maple / oak	6.7	- -	- -	6.7	- -
Mixed upland hardwoods	1,199.2	441.2	503.0	255.1	- -
All forest types	11,126.5	5,865.9	4,247.7	1,012.9	- -
Oak / gum / cypress group					
Swamp chestnut oak / cherrybark oak	16.4	5.7	10.8	- -	- -
Sweetgum / Nuttall oak / willow oak	6.1	- -	6.1	- -	- -
Overcup oak / water hickory	36.8	35.4	1.4	- -	- -
Baldcypress / water tupelo	2.6	2.6	- -	- -	- -
Sweetbay / swamp tupelo / red maple	3.1	3.1	- -	- -	- -
All forest types	65.0	46.7	18.2	- -	- -
Elm / ash / cottonwood group					
Elm / ash / cottonwood group	1.6	- -	1.6	- -	- -
Black ash / American elm / red maple	18.0	2.5	12.0	3.6	- -
River birch / sycamore	173.3	120.7	38.5	14.1	- -
Cottonwood	52.5	32.2	9.6	10.7	- -
Willow	39.6	17.9	1.7	20.0	- -
Sycamore / pecan / American elm	88.7	72.5	15.1	1.1	- -
Sugarberry / hackberry / elm / green ash	370.9	190.4	133.6	46.9	- -
Silver maple / American elm	140.3	104.4	29.0	6.8	- -
Red maple / lowland	7.3	3.3	3.6	0.5	- -
Cottonwood / willow	20.9	20.9	- -	- -	- -
All forest types	913.1	564.9	244.7	103.6	- -

(Table 3 continued on next page)

(Table 3 continued)

Forest type group/ forest type	Stand-size class				
	All stands	Sawtimber	Poletimber	Sapling-seedling	Non-stocked
Hardwood type groups					
Maple / beech / birch group					
Sugar maple / beech / yellow birch	154.2	71.7	59.1	23.4	- -
Black cherry	1.5	- -	- -	1.5	- -
Cherry / ash / yellow-poplar	35.5	1.6	9.9	24.0	- -
Hard maple / basswood	53.4	30.5	18.7	4.2	- -
Elm / ash / locust	62.6	11.0	26.6	25.0	- -
Red maple / upland	2.4	- -	- -	2.4	- -
All forest types	309.6	114.8	114.4	80.5	- -
Exotic hardwoods group					
Other exotic hardwoods	2.3	2.3	- -	- -	- -
All forest types	2.3	2.3	- -	- -	- -
All hardwood groups	13,388.6	6,979.6	5,069.8	1,339.2	- -
Nonstocked	94.5	- -	- -	- -	94.5
All forest groups	14,084.2	7,171.3	5,337.8	1,480.6	94.5

All table cells without observations in the inventory sample are indicated by --. Table value of 0.0 indicates the acres round to less than 0.1 thousand acres. Columns and rows may not add to their totals due to rounding.

Table 4. -- Net volume of all live trees on forest land by species group, species, and owner category, Missouri, 1999-2003

(In thousand cubic feet)

Species group/ species	Owner category			
	All owners	Public	Private	Unidentified owner
Softwoods				
Loblolly and shortleaf pines				
Shortleaf pine	806,877	478,199	328,679	- -
All species	806,877	478,199	328,679	- -
Other yellow pines				
Scotch pine	953	451	503	- -
All species	953	451	503	- -
Eastern white and red pines				
Eastern white pine	6,111	3,828	2,283	- -
All species	6,111	3,828	2,283	- -
Cypress				
Baldcypress	345	- -	345	- -
All species	345	- -	345	- -
Other eastern softwoods				
Eastern redcedar	538,639	57,455	481,184	- -
All species	538,639	57,455	481,184	- -
Total softwoods	1,352,925	539,931	812,994	- -
Hardwoods				
Select white oaks				
White oak	3,631,935	797,629	2,834,306	- -
Swamp white oak	67,531	4,077	63,454	- -
Bur oak	99,968	13,171	86,797	- -
Swamp chestnut oak	7,061	3,055	4,006	- -
Chinkapin oak	358,929	47,932	310,997	- -
All species	4,165,424	865,865	3,299,560	- -
Select red oaks				
Cherrybark oak	7,593	775	6,818	- -
Northern red oak	983,906	205,232	778,673	- -
Shumard oak	75,919	7,948	67,971	- -
All species	1,067,418	213,955	853,463	- -

(Table 4 continued on next page)

(Table 4 continued)

Species group/ species	Owner category			
	All owners	Public	Private	Unidentified owner
Hardwoods				
Other white oaks				
Overcup oak	16,104	15,536	568	- -
Chestnut oak	586	524	63	- -
Post oak	1,897,758	238,707	1,659,051	- -
All species	1,914,449	254,767	1,659,681	- -
Other red oaks				
Scarlet oak	595,498	276,901	318,597	- -
Northern pin oak	7,265	6,590	675	- -
Southern red oak	59,113	14,617	44,495	- -
Shingle oak	194,034	9,731	184,303	- -
Blackjack oak	228,400	17,855	210,546	- -
Pin oak	174,114	18,374	155,740	- -
Willow oak	4,543	1,148	3,395	- -
Black oak	2,786,694	563,321	2,223,372	- -
All species	4,049,660	908,537	3,141,124	- -
Hickory				
Bitternut hickory	214,794	23,743	191,051	- -
Pignut hickory	156,640	27,910	128,730	- -
Pecan	26,046	1,292	24,754	- -
Shellbark hickory	37,443	5,703	31,739	- -
Shagbark hickory	463,417	35,073	428,344	- -
Black hickory	407,149	83,062	324,087	- -
Mockernut hickory	323,111	64,241	258,870	- -
All species	1,628,600	241,024	1,387,576	- -
Hard maple				
Black maple	2,846	- -	2,846	- -
Sugar maple	262,468	32,717	229,751	- -
All species	265,314	32,717	232,597	- -
Soft maple				
Red maple	46,685	9,441	37,244	- -
Silver maple	336,283	79,606	256,677	- -
All species	382,968	89,048	293,921	- -

(Table 4 continued on next page)

(Table 4 continued)

Species group/ species	Owner category			
	All owners	Public	Private	Unidentified owner
Hardwoods				
Beech				
American beech	6,087	3,961	2,126	- -
All species	6,087	3,961	2,126	- -
Sweetgum				
Sweetgum	27,935	6,104	21,831	- -
All species	27,935	6,104	21,831	- -
Tupelo and blackgum				
Water tupelo	7,445	42	7,403	- -
Blackgum	85,346	26,670	58,676	- -
Swamp tupelo	412	29	383	- -
All species	93,203	26,740	66,462	- -
Ash				
White ash	225,174	15,835	209,339	- -
Green ash	160,267	15,413	144,854	- -
Blue ash	8,149	395	7,754	- -
All species	393,591	31,643	361,947	- -
Cottonwood and aspen				
Eastern cottonwood	154,196	30,983	123,212	- -
Swamp cottonwood	32	32	- -	- -
All species	154,227	31,015	123,212	- -
Basswood				
American basswood	39,777	2,547	37,230	- -
All species	39,777	2,547	37,230	- -
Yellow-poplar				
Yellow-poplar	21,121	10,473	10,648	- -
All species	21,121	10,473	10,648	- -
Black walnut				
Black walnut	509,547	66,208	443,339	- -
All species	509,547	66,208	443,339	- -

(Table 4 continued on next page)

(Table 4 continued)

Species group/ species	Owner category			
	All owners	Public	Private	Unidentified owner
Hardwoods				
Other eastern soft hardwoods				
Boxelder	62,194	14,842	47,352	- -
Ohio buckeye	5,283	954	4,329	- -
European Alder		- -		- -
River birch	33,688	444	33,245	- -
Northern catalpa	316	- -	316	- -
Sugarberry	5,238	683	4,555	- -
Hackberry	301,375	10,713	290,662	- -
Butternut	6,103	3,900	2,203	- -
American sycamore	338,597	61,224	277,373	- -
Black cherry	93,469	8,023	85,447	- -
Black willow	39,956	7,951	32,005	- -
Sassafras	37,795	3,068	34,727	- -
Winged elm	24,835	5,733	19,102	- -
American elm	334,583	24,940	309,642	- -
Siberian elm	6,036	- -	6,036	- -
Slippery elm	114,754	18,122	96,631	- -
All species	1,404,220	160,596	1,243,624	- -
Other eastern hard hardwoods				
Flowering dogwood	9,689	1,939	7,750	- -
Common persimmon	26,700	2,559	24,142	- -
Waterlocust	2,591	564	2,027	- -
Honeylocust	250,358	14,128	236,229	- -
Kentucky coffeetree	11,395	855	10,540	- -
Mulberry spp.	145	54	90	- -
White mulberry	8,987	191	8,795	- -
Red mulberry	60,953	7,321	53,632	- -
Black locust	45,223	6,735	38,489	- -
Rock elm		- -		- -
All species	416,041	34,346	381,695	- -

(Table 4 continued on next page)

(Table 4 continued)

Species group/ species	Owner category			
	All owners	Public	Private	Unidentified owner
Hardwoods				
Eastern noncommercial hardwoods				
Ailanthus	84	- -	84	- -
Serviceberry spp.	416	138	278	- -
Pawpaw	122	- -	122	- -
Chittamwood, gum bumelia	1,833	723	1,110	- -
American hornbeam, musclewood	463	147	316	- -
American chestnut		- -		- -
Eastern redbud	11,843	1,890	9,953	- -
Hawthorn spp.	603	219	383	- -
Cockspur hawthorn	34	- -	34	- -
Downy hawthorn		- -		- -
Osage-orange	111,453	2,977	108,476	- -
Apple spp.	67	- -	67	- -
Eastern hophornbeam	3,870	75	3,795	- -
Cherry and plum spp.		- -	- -	- -
Chokecherry		- -	- -	- -
American plum	454	286	168	- -
Willow spp.		- -		- -
Peachleaf willow	1,130	1,130	- -	- -
Smoketree	192	159	32	- -
Other or unknown tree	89	- -	89	- -
All species	132,651	7,744	124,907	- -
Total hardwoods	16,672,235	2,987,290	13,684,944	- -
All species groups	18,025,160	3,527,222	14,497,938	- -

All table cells without observations in the inventory sample are indicated by --. Table value of 0 indicates that the volume rounds to less than 1 thousand cubic feet. Columns and rows may not add to their totals due to rounding.

Table 5. -- Net volume of all live trees and salvable dead trees on timberland by class of timber and softwood/hardwood species category, Missouri, 1999-2003

(In thousand cubic feet)

Class of timber	All species	Softwood species	Hardwood species
Live trees			
Growing-stock trees			
Sawtimber			
Saw log portion	8,179,040	710,137	7,468,903
Upper stem portion	1,477,869	90,724	1,387,145
Total	9,656,909	800,861	8,856,047
Poletimber	4,981,253	403,281	4,577,972
All growing-stock trees	14,638,161	1,204,142	13,434,019
Cull trees			
Rough trees[1]			
Sawtimber size	1,734,651	51,645	1,683,007
Poletimber size	751,350	37,932	713,418
Total	2,486,001	89,577	2,396,425
Rotten trees[1]			
Sawtimber size	280,985	1,487	279,498
Poletimber size	35,217	237	34,980
Total	316,202	1,724	314,478
All live cull trees	2,802,204	91,301	2,710,903
All live trees	17,440,365	1,295,443	16,144,922
Salvable dead trees			
Sawtimber size	93,845	2,977	90,868
Poletimber size	76,110	3,607	72,503
All salvable dead trees	169,955	6,584	163,371
All classes	17,610,320	1,302,027	16,308,293

All table cells without observations in the inventory sample are indicated by --. Table value of 0 indicates that the volume rounds to less than 1 thousand cubic feet. Columns and rows may not add to their totals due to rounding.

[1] Includes noncommercial species.

Table 6. -- Net volume of growing stock on timberland by forest type group, forest type, and softwood/hardwood species category, Missouri, 1999-2003

(In thousand cubic feet)

Forest type group/ forest type	All species	Softwood species	Hardwood species
Softwood type groups			
White / red / jack pine group			
Eastern white pine	3,382	3,188	194
All forest types	3,382	3,188	194
Loblolly / shortleaf pine group			
Shortleaf pine	277,158	237,168	39,990
All forest types	277,158	237,168	39,990
Pinyon / juniper group			
Eastern redcedar	220,783	157,333	63,450
All forest types	220,783	157,333	63,450
Exotic softwoods group			
Scotch pine	322	322	- -
All forest types	322	322	- -
All softwood groups	501,645	398,011	103,634
Hardwood type groups			
Oak / pine group			
White pine / red oak / white ash	2,539	1,257	1,282
Eastern redcedar / hardwood	324,465	124,012	200,453
Shortleaf pine / oak	557,632	298,641	258,992
All forest types	884,637	423,910	460,727

(Table 6 continued on next page)

(Table 6 continued)

Forest type group/ forest type	All species	Softwood species	Hardwood species
Hardwood type groups			
Oak / hickory group			
Oak / hickory group	16,681	134	16,547
Post oak / blackjack oak	1,232,983	53,814	1,179,168
White oak / red oak / hickory	6,861,808	219,920	6,641,888
White oak	2,079,688	34,209	2,045,479
Northern red oak	181,297	3,589	177,708
Sassafras / persimmon	34,960	1,745	33,215
Sweetgum / yellow-poplar	10,395	- -	10,395
Bur oak	9,093	- -	9,093
Scarlet oak	143,913	9,489	134,424
Yellow-poplar	1,984	- -	1,984
Black walnut	48,108	908	47,199
Black locust	14,172	137	14,036
Chestnut oak / black oak / scarlet oak	348,134	23,213	324,921
Red maple / oak	1,442	209	1,233
Mixed upland hardwoods	786,239	25,237	761,002
All forest types	11,770,897	372,605	11,398,292
Oak / gum / cypress group			
Swamp chestnut oak / cherrybark oak	13,111	51	13,061
Sweetgum / Nuttall oak / willow oak	5,850	- -	5,850
Overcup oak / water hickory	58,188	- -	58,188
Baldcypress / water tupelo	8,729	- -	8,729
Sweetbay / swamp tupelo / red maple	9,582	- -	9,582
All forest types	95,461	51	95,410

(Table 6 continued on next page)

(Table 6 continued)

Forest type group/ forest type	All species	Softwood species	Hardwood species
Hardwood type groups			
Elm / ash / cottonwood group			
Elm / ash / cottonwood group	1,271	- -	1,271
Black ash / American elm / red maple	8,546	- -	8,546
River birch / sycamore	221,828	1,036	220,792
Cottonwood	90,523	41	90,482
Willow	19,924	- -	19,924
Sycamore / pecan / American elm	135,310	1,406	133,904
Sugarberry / hackberry / elm / green ash	404,810	2,239	402,571
Silver maple / American elm	176,430	- -	176,430
Red maple / lowland	14,953	- -	14,953
Cottonwood / willow	63,119	- -	63,119
All forest types	1,136,714	4,722	1,131,992
Maple / beech / birch group			
Sugar maple / beech / yellow birch	157,477	2,662	154,815
Black cherry	78	- -	78
Cherry / ash / yellow-poplar	9,460	- -	9,460
Hard maple / basswood	53,913	548	53,365
Elm / ash / locust	26,085	1,477	24,608
All forest types	247,012	4,687	242,325
All hardwood groups	14,134,721	805,975	13,328,746
Nonstocked	1,795	156	1,638
All forest groups	14,638,161	1,204,142	13,434,019

All table cells without observations in the inventory sample are indicated by --. Table value of 0 indicates that the volume rounds to less than 1 thousand cubic feet. Columns and rows may not add to their totals due to rounding.

Table 7. -- Net volume of growing stock on timberland by species group, species, and diameter class, Missouri, 1999-2003

(In thousand cubic feet)

Species group/ species	All classes	Diameter class (inches at breast height)									
		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+
Softwoods											
Loblolly and shortleaf pines											
Shortleaf pine	770,204	53,696	102,314	153,127	171,219	131,838	77,504	42,823	29,303	8,379	- -
All species	770,204	53,696	102,314	153,127	171,219	131,838	77,504	42,823	29,303	8,379	- -
Other yellow pines											
Scotch pine	561	133	105	322	- -	- -	- -	- -	- -	- -	- -
All species	561	133	105	322	- -	- -	- -	- -	- -	- -	- -
Eastern white and red pines											
Eastern white pine	5,404	49	484	603	2,015	2,252	- -	- -	- -	- -	- -
All species	5,404	49	484	603	2,015	2,252	- -	- -	- -	- -	- -
Cypress											
Baldcypress	345	- -	- -	- -	345	- -	- -	- -	- -	- -	- -
All species	345	- -	- -	- -	345	- -	- -	- -	- -	- -	- -
Other eastern softwoods											
Eastern redcedar	427,629	128,650	117,850	83,767	44,704	33,902	10,413	3,053	1,903	3,387	- -
All species	427,629	128,650	117,850	83,767	44,704	33,902	10,413	3,053	1,903	3,387	- -
Total softwoods	1,204,142	182,527	220,754	237,821	218,284	167,991	87,917	45,876	31,206	11,766	- -
Hardwoods											
Select white oaks											
White oak	3,155,909	206,498	319,980	431,360	512,441	517,728	434,253	295,110	187,376	224,684	26,479
Swamp white oak	51,200	2,280	2,775	7,342	7,532	4,761	11,467	3,744	5,638	5,661	- -
Bur oak	63,949	2,788	4,781	3,794	8,649	5,732	9,684	3,606	- -	16,198	8,717
Swamp chestnut oak	7,061	107	- -	- -	198	- -	- -	- -	2,028	1,672	3,055
Chinkapin oak	203,988	16,872	27,135	31,910	29,082	23,876	19,055	16,681	12,849	18,261	8,267
All species	3,482,106	228,546	354,671	474,407	557,902	552,096	474,459	319,141	207,891	266,476	46,518
Select red oaks											
Cherrybark oak	7,593	191	662	1,229	978	499	3,317	718	- -	- -	- -
Northern red oak	845,800	33,687	56,230	75,135	88,077	114,841	109,422	105,927	108,663	124,900	28,918
Shumard oak	62,028	4,745	5,591	7,983	6,947	12,471	5,621	4,611	1,459	12,600	- -
All species	915,421	38,623	62,482	84,348	96,001	127,812	118,360	111,256	110,122	137,500	28,918
Other white oaks											
Overcup oak	9,112	31	- -	170	752	- -	627	- -	- -	1,412	6,121
Chestnut oak	586	63	- -	- -	- -	524	- -	- -	- -	- -	- -
Post oak	1,440,855	149,010	252,347	269,895	239,683	201,111	152,668	78,547	50,684	31,868	15,040
All species	1,450,553	149,104	252,347	270,065	240,435	201,635	153,295	78,547	50,684	33,280	21,161

(Table 7 continued on next page)

(Table 7 continued)

Species group/ species	All classes	Diameter class (inches at breast height) 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+
Hardwoods											
Other red oaks											
Scarlet oak	528,113	31,040	54,854	77,239	86,772	84,618	84,241	48,917	33,025	24,044	3,363
Northern pin oak	675	202	126	346	- -	- -	- -	- -	- -	- -	- -
Southern red oak	52,921	4,191	5,018	5,447	7,263	8,434	2,684	963	5,311	9,768	3,841
Shingle oak	160,123	15,898	20,800	24,434	18,087	13,479	22,611	15,431	11,067	13,181	5,134
Blackjack oak	147,938	20,799	22,992	23,004	24,407	18,849	14,998	9,510	3,068	5,003	5,308
Pin oak	158,865	6,275	9,045	19,978	20,318	21,425	15,268	17,068	12,992	31,773	4,723
Willow oak	4,543	242	162	445	480	971	- -	- -	- -	2,244	- -
Black oak	2,419,594	126,076	218,546	333,590	412,325	405,378	322,149	247,016	164,742	181,108	8,664
All species	3,472,770	204,723	331,544	484,484	569,651	553,153	461,950	338,906	230,206	267,121	31,033
Hickory											
Bitternut hickory	180,688	22,695	28,982	27,513	34,193	21,626	24,883	9,382	8,632	2,782	- -
Pignut hickory	139,233	14,890	21,650	23,301	24,583	19,769	16,479	8,823	1,004	8,733	- -
Pecan	19,479	989	1,233	3,441	3,958	4,552	2,318	1,342	1,647	- -	- -
Shellbark hickory	33,318	2,653	3,927	5,718	4,872	4,619	583	2,649	1,903	6,394	- -
Shagbark hickory	412,108	49,848	67,415	77,279	66,840	47,234	43,350	28,325	7,367	24,451	- -
Black hickory	357,895	54,730	72,783	60,233	69,517	43,812	29,851	13,208	12,640	1,122	- -
Mockernut hickory	276,853	40,323	51,284	56,685	53,621	32,483	19,907	12,424	3,756	6,369	- -
All species	1,419,575	186,129	247,274	254,169	257,584	174,093	137,373	76,154	36,949	49,851	- -
Hard maple											
Black maple	2,761	174	87	582	- -	- -	- -	- -	1,918	- -	- -
Sugar maple	199,484	33,256	32,462	37,735	28,040	19,051	17,874	13,346	12,879	4,841	- -
All species	202,245	33,429	32,549	38,317	28,040	19,051	17,874	13,346	14,797	4,841	- -
Soft maple											
Red maple	34,149	6,134	5,912	5,295	2,322	1,902	2,103	2,463	2,265	5,752	- -
Silver maple	194,573	6,390	10,887	13,419	15,801	18,141	34,273	10,380	20,341	44,081	20,859
All species	228,722	12,525	16,799	18,713	18,123	20,043	36,376	12,843	22,606	49,833	20,859
Beech											
American beech	644	- -	78	130	- -	437	- -	- -	- -	- -	- -
All species	644	- -	78	130	- -	437	- -	- -	- -	- -	- -
Sweetgum											
Sweetgum	23,780	1,255	2,911	3,062	2,213	2,680	3,473	4,974	3,212	- -	- -
All species	23,780	1,255	2,911	3,062	2,213	2,680	3,473	4,974	3,212	- -	- -
Tupelo and blackgum											
Water tupelo	6,587	73	100	- -	493	1,056	3,193	709	963	- -	- -
Blackgum	72,482	13,270	12,065	11,397	8,129	10,042	3,747	4,094	3,732	6,006	- -
Swamp tupelo	339	53	- -	- -	286	- -	- -	- -	- -	- -	- -
All species	79,408	13,396	12,166	11,397	8,908	11,098	6,939	4,803	4,695	6,006	- -

(Table 7 continued on next page)

(Table 7 continued)

Species group/ species	All classes	Diameter class (inches at breast height)									
		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+
Hardwoods											
Ash											
White ash	168,555	18,534	20,958	28,321	21,069	20,788	22,847	15,354	12,812	7,872	- -
Green ash	127,878	9,965	17,233	17,141	21,348	17,980	25,162	7,733	5,855	5,460	- -
Blue ash	4,538	497	596	1,445	921	1,078	- -	- -	- -	- -	- -
All species	300,971	28,996	38,788	46,907	43,338	39,846	48,009	23,087	18,668	13,332	- -
Cottonwood and aspen											
Eastern cottonwood	144,616	1,507	1,676	832	5,461	1,301	11,604	16,488	21,592	19,996	64,159
All species	144,616	1,507	1,676	832	5,461	1,301	11,604	16,488	21,592	19,996	64,159
Basswood											
American basswood	31,820	1,058	2,390	3,152	4,010	1,967	3,240	2,049	4,747	9,207	- -
All species	31,820	1,058	2,390	3,152	4,010	1,967	3,240	2,049	4,747	9,207	- -
Yellow-poplar											
Yellow-poplar	13,852	255	457	954	1,554	4,288	2,588	876	2,879	- -	- -
All species	13,852	255	457	954	1,554	4,288	2,588	876	2,879	- -	- -
Black walnut											
Black walnut	392,251	19,860	38,384	52,189	71,578	58,998	43,243	49,317	28,779	29,904	- -
All species	392,251	19,860	38,384	52,189	71,578	58,998	43,243	49,317	28,779	29,904	- -
Other eastern soft hardwoods											
Boxelder	26,966	3,663	3,551	4,113	4,324	5,361	2,232	3,722	- -	- -	- -
Ohio buckeye	4,039	1,345	938	163	1,188	405	- -	- -	- -	- -	- -
European Alder		- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
River birch	25,063	1,209	2,953	3,658	5,933	6,949	1,937	2,424	- -	- -	- -
Sugarberry	3,141	479	516	375	1,770	- -	- -	- -	- -	- -	- -
Hackberry	248,471	21,774	29,550	38,620	38,835	33,678	21,557	19,274	15,081	30,101	- -
Butternut	3,064	137	358	269	1,567	733	- -	- -	- -	- -	- -
American sycamore	300,532	5,820	10,925	11,944	25,156	29,337	30,590	35,817	35,062	76,752	39,129
Black cherry	64,642	13,171	14,151	11,254	10,503	9,599	5,207	757	- -	- -	- -
Black willow	26,998	1,490	1,361	3,726	4,591	920	6,017	7,519	- -	1,374	- -
Sassafras	20,286	6,299	4,498	3,437	2,425	1,951	- -	1,675	- -	- -	- -
Winged elm	19,902	7,756	6,867	2,129	838	667	1,644	- -	- -	- -	- -
American elm	227,010	47,964	50,144	43,335	29,161	14,838	18,827	11,234	10,207	1,299	- -
Slippery elm	85,865	23,105	18,419	15,140	12,294	4,967	6,116	3,670	2,154	- -	- -
All species	1,055,979	134,214	144,232	138,164	138,585	109,406	94,126	86,092	62,504	109,526	39,129

(Table 7 continued on next page)

(Table 7 continued)

Species group/ species	All classes	Diameter class (inches at breast height)									
		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+
Hardwoods											
Other eastern hard hardwoods											
Flowering dogwood	3,097	2,827	270	- -	- -	- -	- -	- -	- -	- -	- -
Common persimmon	19,853	7,889	6,647	3,609	1,167	541	- -	- -	- -	- -	- -
Waterlocust	2,027	30	200	- -	938	- -	- -	858	- -	- -	- -
Honeylocust	137,133	11,832	16,730	22,367	19,115	21,909	4,236	13,628	16,436	5,172	5,707
Kentucky coffeetree	7,406	566	631	2,277	766	3,166	- -	- -	- -	- -	- -
Mulberry spp.	90	90	- -	- -	- -	- -	- -	- -	- -	- -	- -
White mulberry	2,542	295	304	404	346	331	- -	- -	862	- -	- -
Red mulberry	17,018	3,154	4,503	3,176	2,813	776	649	1,947	- -	- -	- -
Black locust	30,137	3,410	5,403	7,699	4,147	5,292	3,268	918	- -	- -	- -
Rock elm		- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
All species	219,304	30,094	34,688	39,531	29,292	32,015	8,153	17,353	17,299	5,172	5,707
Total hardwoods	13,434,019	1,083,714	1,573,435	1,920,823	2,072,675	1,909,919	1,621,062	1,155,232	837,628	1,002,046	257,484
All species groups	14,638,161	1,266,241	1,794,189	2,158,644	2,290,959	2,077,911	1,708,979	1,201,108	868,835	1,013,812	257,484

All table cells without observations in the inventory sample are indicated by --. Table value of 0 indicates that the volume rounds to less than 1 thousand cubic feet. Columns and rows may not add to their totals due to rounding.

Table 8. -- Net volume of sawtimber on timberland by species group, species, and diameter class, Missouri, 1999-2003

(In thousand board feet)[1]

Species group/ species	All classes	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+
Softwoods									
Loblolly and shortleaf pines									
Shortleaf pine	3,181,724	764,563	877,970	689,724	412,458	231,374	158,989	46,646	- -
All species	3,181,724	764,563	877,970	689,724	412,458	231,374	158,989	46,646	- -
Other yellow pines									
Scotch pine	1,660	1,660	- -	- -	- -	- -	- -	- -	- -
All species	1,660	1,660	- -	- -	- -	- -	- -	- -	- -
Eastern white and red pines									
Eastern white pine	22,981	2,758	9,341	10,883	- -	- -	- -	- -	- -
All species	22,981	2,758	9,341	10,883	- -	- -	- -	- -	- -
Cypress									
Baldcypress	1,430	- -	1,430	- -	- -	- -	- -	- -	- -
All species	1,430	- -	1,430	- -	- -	- -	- -	- -	- -
Other eastern softwoods									
Eastern redcedar	943,549	464,037	230,991	165,072	48,102	13,462	8,125	13,760	- -
All species	943,549	464,037	230,991	165,072	48,102	13,462	8,125	13,760	- -
Total softwoods	4,151,345	1,233,018	1,119,731	865,678	460,560	244,836	167,115	60,406	- -
Hardwoods									
Select white oaks									
White oak	10,338,086	- -	2,504,544	2,487,652	2,050,850	1,364,752	849,076	976,940	104,272
Swamp white oak	182,103	- -	36,971	23,144	54,401	17,347	25,492	24,748	- -
Bur oak	232,206	- -	42,464	27,522	45,640	16,715	- -	68,326	31,540
Swamp chestnut oak	29,566	- -	973	- -	- -	- -	9,290	7,505	11,797
Chinkapin oak	592,745	- -	141,661	114,280	89,998	77,251	58,164	80,450	30,942
All species	11,374,707	- -	2,726,613	2,652,597	2,240,889	1,476,065	942,023	1,157,969	178,551
Select red oaks									
Cherrybark oak	27,390	- -	4,818	2,475	16,524	3,574	- -	- -	- -
Northern red oak	3,349,827	- -	436,669	574,120	548,513	528,899	539,154	600,940	121,531
Shumard oak	215,245	- -	34,594	62,358	28,156	22,994	7,324	59,819	- -
All species	3,592,462	- -	476,081	638,954	593,193	555,467	546,478	660,759	121,531
Other white oaks									
Overcup oak	41,850	- -	3,957	- -	3,308	- -	- -	6,964	27,622
Chestnut oak	2,664	- -	- -	2,664	- -	- -	- -	- -	- -
Post oak	3,707,275	- -	1,167,625	973,486	739,754	377,354	241,521	146,593	60,943
All species	3,751,790	- -	1,171,582	976,150	743,062	377,354	241,521	153,557	88,565
Other red oaks									
Scarlet oak	1,798,217	- -	430,010	420,607	417,647	240,940	161,142	113,865	14,006
Southern red oak	181,615	- -	35,983	41,983	13,256	4,679	25,884	44,093	15,736
Shingle oak	483,046	- -	89,582	66,855	112,210	76,021	53,886	62,461	22,030
Blackjack oak	393,503	- -	121,611	94,145	74,579	46,946	15,017	23,496	17,708
Pin oak	596,537	- -	100,184	106,202	75,456	83,940	63,008	147,030	20,718
Willow oak	17,552	- -	2,341	4,777	- -	- -	- -	10,434	- -
Black oak	8,587,654	- -	2,047,309	2,018,922	1,601,299	1,218,474	803,775	860,098	37,778
All species	12,058,124	- -	2,827,021	2,753,492	2,294,447	1,671,000	1,122,712	1,261,478	127,975

(Table 8 continued on next page)

(Table 8 continued)

Species group/ species	All classes	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+
Hardwoods									
Hickory									
Bitternut hickory	504,205	- -	169,646	107,492	123,505	46,852	42,896	13,813	- -
Pignut hickory	393,708	- -	121,683	98,062	81,865	43,866	4,996	43,238	- -
Pecan	66,786	- -	19,069	21,995	11,237	6,489	7,995	- -	- -
Shellbark hickory	101,972	- -	23,572	22,446	2,821	12,806	9,247	31,080	- -
Shagbark hickory	1,055,687	- -	323,544	229,166	210,408	137,659	35,884	119,026	- -
Black hickory	843,133	- -	343,900	217,128	148,360	65,641	62,589	5,515	- -
Mockernut hickory	622,823	- -	259,247	157,419	96,593	60,432	18,164	30,968	- -
All species	3,588,315	- -	1,260,661	853,709	674,790	373,744	181,771	243,640	- -
Hard maple									
Black maple	8,841	- -	- -	- -	- -	- -	8,841	- -	- -
Sugar maple	453,148	- -	132,888	90,413	84,809	62,820	60,166	22,053	- -
All species	461,989	- -	132,888	90,413	84,809	62,820	69,007	22,053	- -
Soft maple									
Red maple	72,707	- -	10,058	8,293	9,233	10,772	9,880	24,471	- -
Silver maple	700,850	- -	68,550	79,325	150,350	45,533	88,779	187,752	80,561
All species	773,557	- -	78,608	87,618	159,583	56,305	98,659	212,223	80,561
Beech									
American beech	2,205	- -	- -	2,205	- -	- -	- -	- -	- -
All species	2,205	- -	- -	2,205	- -	- -	- -	- -	- -
Sweetgum									
Sweetgum	74,734	- -	10,079	12,314	15,802	22,330	14,208	- -	- -
All species	74,734	- -	10,079	12,314	15,802	22,330	14,208	- -	- -
Tupelo and blackgum									
Water tupelo	28,959	- -	2,249	4,812	14,455	3,184	4,259	- -	- -
Blackgum	162,993	- -	37,670	46,406	17,288	18,668	16,750	26,211	- -
Swamp tupelo	1,339	- -	1,339	- -	- -	- -	- -	- -	- -
All species	193,291	- -	41,258	51,218	31,743	21,853	21,009	26,211	- -
Ash									
White ash	470,247	- -	95,368	96,261	107,534	73,043	61,129	36,912	- -
Green ash	388,920	- -	96,605	83,174	118,485	36,736	27,935	25,987	- -
Blue ash	9,162	- -	4,197	4,964	- -	- -	- -	- -	- -
All species	868,329	- -	196,170	184,399	226,019	109,779	89,063	62,899	- -
Cottonwood and aspen									
Eastern cottonwood	665,283	- -	25,459	6,335	56,902	82,833	108,999	101,042	283,712
All species	665,283	- -	25,459	6,335	56,902	82,833	108,999	101,042	283,712
Basswood									
American basswood	124,449	- -	20,285	9,907	16,202	10,183	23,348	44,523	- -
All species	124,449	- -	20,285	9,907	16,202	10,183	23,348	44,523	- -
Yellow-poplar									
Yellow-poplar	62,226	- -	7,564	21,707	13,531	4,474	14,951	- -	- -
All species	62,226	- -	7,564	21,707	13,531	4,474	14,951	- -	- -
Black walnut									
Black walnut	1,322,455	- -	342,272	281,242	204,931	231,925	132,800	129,285	- -
All species	1,322,455	- -	342,272	281,242	204,931	231,925	132,800	129,285	- -

(Table 8 continued on next page)

(Table 8 continued)

Species group/ species	All classes	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+
Hardwoods									
Other eastern soft hardwoods									
Boxelder	71,452	- -	19,842	24,602	10,151	16,857	- -	- -	- -
Ohio buckeye	7,307	- -	5,431	1,876	- -	- -	- -	- -	- -
River birch	79,352	- -	27,363	32,036	8,876	11,077	- -	- -	- -
Sugarberry	8,193	- -	8,193	- -	- -	- -	- -	- -	- -
Hackberry	699,274	- -	179,942	153,053	96,685	84,264	64,565	120,766	- -
Butternut	10,584	- -	7,188	3,396	- -	- -	- -	- -	- -
American sycamore	1,238,045	- -	111,449	132,568	139,862	164,632	163,137	354,180	172,217
Black cherry	120,388	- -	48,475	44,375	24,081	3,457	- -	- -	- -
Black willow	89,086	- -	20,121	4,094	26,506	32,515	- -	5,850	- -
Sassafras	27,943	- -	11,266	9,046	- -	7,631	- -	- -	- -
Winged elm	13,598	- -	3,879	2,780	6,939	- -	- -	- -	- -
American elm	385,296	- -	135,167	67,341	84,640	48,500	44,056	5,593	- -
Slippery elm	131,775	- -	57,005	22,586	27,010	16,074	9,100	- -	- -
All species	2,882,294	- -	635,322	497,753	424,750	385,006	280,857	486,388	172,217
Other eastern hard hardwoods									
Common persimmon	7,964	- -	5,398	2,566	- -	- -	- -	- -	- -
Waterlocust	8,361	- -	4,389	- -	- -	3,972	- -	- -	- -
Honeylocust	390,381	- -	88,391	101,452	19,346	62,141	74,057	22,131	22,862
Kentucky coffeetree	18,094	- -	3,529	14,565	- -	- -	- -	- -	- -
White mulberry	7,014	- -	1,614	1,525	- -	- -	3,875	- -	- -
Red mulberry	28,560	- -	12,963	3,606	3,009	8,983	- -	- -	- -
Black locust	62,886	- -	19,120	24,515	15,120	4,131	- -	- -	- -
All species	523,261	- -	135,404	148,229	37,475	79,228	77,932	22,131	22,862
Total hardwoods	42,319,472	- -	10,087,266	9,268,243	7,818,126	5,520,366	3,965,338	4,584,157	1,075,974
All species groups	46,470,816	1,233,018	11,206,998	10,133,922	8,278,686	5,765,202	4,132,453	4,644,563	1,075,974

All table cells without observations in the inventory sample are indicated by --. Table value of 0 indicates the volume rounds to less than 1 thousand board feet. Columns and rows may not add to their totals due to rounding.

[1] International 1/4-inch rule.

Table 9. -- All live aboveground tree biomass on timberland by owner category, softwood/hardwood species category, and tree biomass component, Missouri, 1999-2003

(In dry tons)

Owner category and softwood/hardwood category	All components	Tree biomass component						
		All live 1-5 inch trees	Growing-stock trees			Non-growing-stock trees		
			Total	Boles	Stumps, tops, and limbs	Total	Boles	Stumps, tops, and limbs
Public								
Softwoods	10,180,520	627,874	9,336,718	7,773,661	1,563,057	215,929	161,401	54,527
Hardwoods	87,790,624	9,029,244	67,074,217	48,118,937	18,955,279	11,687,163	8,494,040	3,193,123
Total	97,971,144	9,657,118	76,410,935	55,892,598	20,518,337	11,903,092	8,655,442	3,247,650
Private								
Softwoods	20,234,706	3,560,935	14,706,865	11,174,898	3,531,967	1,966,907	1,407,761	559,146
Hardwoods	436,067,921	35,375,727	318,441,847	227,389,002	91,052,846	82,250,347	59,768,415	22,481,932
Total	456,302,627	38,936,662	333,148,712	238,563,900	94,584,812	84,217,253	61,176,176	23,041,077
All ownerships								
Softwoods	30,415,227	4,188,809	24,043,583	18,948,559	5,095,024	2,182,835	1,569,162	613,673
Hardwoods	523,858,544	44,404,971	385,516,064	275,507,939	110,008,125	93,937,510	68,262,455	25,675,055
Total	554,273,771	48,593,779	409,559,647	294,456,498	115,103,149	96,120,345	69,831,617	26,288,727

All table cells without observations in the inventory sample are indicated by --. Table value of 0 indicates the aboveground tree biomass rounds to less than 1 dry ton. Columns and rows may not add to their totals due to rounding.

Table 10. -- Average annual net growth of growing stock on timberland by species group and owner category, Missouri, 1989 to 1999-2003

(In thousand cubic feet per year)

Species group	Owner category			
	All owners	Public	Private	Unidentified owner
Softwoods				
Loblolly and shortleaf pines	18,480	9,801	8,679	- -
Other yellow pines	- -	- -	- -	- -
Eastern white and red pines	485	485	- -	- -
Cypress	27	27	- -	- -
Other eastern softwoods	25,103	2,374	22,730	- -
Total softwoods	44,096	12,687	31,409	- -
Hardwoods				
Select white oaks	145,399	24,535	120,864	- -
Select red oaks	29,976	4,546	25,431	- -
Other white oaks	66,481	7,230	59,251	- -
Other red oaks	152,925	24,402	128,522	- -
Hickory	53,712	5,436	48,277	- -
Hard maple	11,015	764	10,252	- -
Soft maple	8,998	1,615	7,383	- -
Beech	- -	- -	- -	- -
Sweetgum	1,137	286	851	- -
Tupelo and blackgum	3,217	605	2,613	- -
Ash	14,294	1,329	12,965	- -
Cottonwood and aspen	7,032	1,514	5,518	- -
Basswood	1,823	34	1,789	- -
Yellow-poplar	-27	- -	-27	- -
Black walnut	21,016	618	20,398	- -
Other eastern soft hardwoods	50,470	2,394	48,077	- -
Other eastern hard hardwoods	17,817	573	17,244	- -
Total hardwoods	585,287	75,880	509,407	- -
All species groups	629,383	88,567	540,816	- -

All table cells without observations in the inventory sample are indicated by --. Table value of 0 indicates that the volume rounds to less than 1 thousand cubic feet. Columns and rows may not add to their totals due to rounding.

Table 11. -- Average annual removals of growing stock on timberland by species group and owner category, Missouri, 1989 to 1999-2003

(In thousand cubic feet per year)

Species group	Owner category			
	All owners	Public	Private	Unidentified owner
Softwoods				
Loblolly and shortleaf pines	8,560	3,199	5,361	- -
Cypress	424	424	- -	- -
Other eastern softwoods	2,546	- -	2,546	- -
Total softwoods	11,530	3,623	7,907	- -
Hardwoods				
Select white oaks	30,375	3,019	27,356	- -
Select red oaks	5,315	800	4,515	- -
Other white oaks	10,050	1,193	8,858	- -
Other red oaks	40,182	8,059	32,123	- -
Hickory	6,170	405	5,765	- -
Hard maple	526	- -	526	- -
Soft maple	976	- -	976	- -
Tupelo and blackgum	303	- -	303	- -
Ash	1,419	- -	1,419	- -
Cottonwood and aspen	2,571	1,061	1,510	- -
Basswood	371	- -	371	- -
Yellow-poplar	399	- -	399	- -
Black walnut	1,302	- -	1,302	- -
Other eastern soft hardwoods	6,708	332	6,376	- -
Other eastern hard hardwoods	392	116	276	- -
Total hardwoods	107,059	14,986	92,073	- -
All species groups	118,589	18,609	99,980	- -

All table cells without observations in the inventory sample are indicated by --. Table value of 0 indicates that the volume rounds to less than 1 thousand cubic feet. Columns and rows may not add to their totals due to rounding.

Table 12. -- Average annual mortality of growing stock on timberland by species group and owner category, Missouri, 1989 to 1999-2003

(In thousand cubic feet per year)

Species group	Owner category			
	All owners	Public	Private	Unidentified owner
Softwoods				
Loblolly and shortleaf pines	3,102	1,554	1,548	- -
Other yellow pines	122	- -	122	- -
Eastern white and red pines	85	85	- -	- -
Other eastern softwoods	1,352	542	810	- -
Total softwoods	4,661	2,181	2,480	- -
Hardwoods				
Select white oaks	8,667	1,605	7,062	- -
Select red oaks	5,510	1,939	3,571	- -
Other white oaks	5,377	891	4,487	- -
Other red oaks	26,453	5,684	20,769	- -
Hickory	7,840	1,038	6,802	- -
Hard maple	592	206	385	- -
Soft maple	1,771	- -	1,771	- -
Tupelo and blackgum	139	139	- -	- -
Ash	1,718	- -	1,718	- -
Cottonwood and aspen	2,854	- -	2,854	- -
Basswood	145	- -	145	- -
Yellow-poplar	167	- -	167	- -
Black walnut	3,045	701	2,345	- -
Other eastern soft hardwoods	11,510	1,377	10,133	- -
Other eastern hard hardwoods	1,387	183	1,203	- -
Total hardwoods	77,176	13,763	63,412	- -
All species groups	81,837	15,944	65,893	- -

All table cells without observations in the inventory sample are indicated by --. Table value of 0 indicates that the volume rounds to less than 1 thousand cubic feet. Columns and rows may not add to their totals due to rounding.

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Reports the initial results of all five annual panels (1999–2003) of the fifth inventory of Missouri's forest resources, the first annual inventory of the State. Includes information on forest area; volume; biomass; growth, removals, and mortality; and forest health.

KEY WORDS: Annual inventory, forest area, forest type, volume, biomass, Missouri.

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