United States
Department of
Agriculture

Forest Service

**Southern
Research Station**

Resource Bulletin
SRS-32

Summary Report: Forest Health Monitoring in the South, 1993 and 1994

William G. Burkman, John S. Vissage, William H. Hoffard, Dale A. Starkey, and William A. Bechtold

The Authors:

William G. Burkman, Southern Forest Health Monitoring Program Coordinator, Southern Research Station, U.S. Department of Agriculture, Forest Service, Asheville, NC 28802; **John S. Vissage,** Forester, Forest Inventory and Analysis Research Work Unit, Southern Research Station, U.S. Department of Agriculture, Forest Service, Starkville, MS 39759; **William H. Hoffard,** Entomologist, Forest Health Protection Unit, U.S. Department of Agriculture, Forest Service, Asheville, NC 28802; **Dale A. Starkey,** Pathologist, Forest Health Protection Unit, U.S. Department of Agriculture, Forest Service, Pineville, LA 7 1360; and **William A. Bechtold**, Resource Analyst, Forest Inventory and Analysis Research Work Unit, Southern Research Station, U.S. Department of Agriculture, Forest Service, Asheville, NC 28802.

June 1998

Southern Research Station
P.O. Box 2680
Asheville, NC 28802

Contents

Summary Report: Forest Health Monitoring in the South, 1993 and 1994

William G. Burkman, John S. Vissage, William H. Hoffard, Dale A. Starkey, and William A. Bechtold

Introduction

Forests cover much of the South, providing timber, wildlife habitat, recreation, and many other benefits to society. Concern about the effects of air pollution, drought, and other anthropogenic and natural stressors have increased in the past decade. In response to these concerns, the U.S. Department of Agriculture, Forest Service, and the U.S. Environmental Protection Agency developed and implemented the Forest Health Monitoring (FHM) program with the State Foresters and other State and Federal agencies as cooperators and partners in the FHM program.

The primary goal of FHM is to monitor, evaluate, and report on the health of the forests at regional and national scales. To accomplish this goal, FHM is organized into three monitoring activities. The firstdetection monitoring-establishes baseline conditions and detects unusual deviations or events. In detection monitoring, selected indicators of forest health are sampled on a network of permanent plots. This sampling is referred to as on-frame sampling. Supplemental surveys designed to detect outbreaks of forest insects, diseases, or damages are referred to as off-frame or the survey component of detection monitoring. The second activity--evaluation monitoring-is triggered by unexplained changes in forest health indicators. Evaluation monitoring identifies cause-and-effect relationships, provides information for management responses, and identifies additional research needs. The third activity-intensive-site ecosystem monitoring-involves the study of forest ecosystem processes and their effects on forest health. A fourth activity-research on monitoring techniques-supports the first three levels of FHM and is responsible for developing the procedures used in all aspects of FHM.

Detection monitoring activity began in 1990 in six New England States. In 199 1, the three Mid-Atlantic States (Delaware, Maryland, and New Jersey) and three Southern States (Alabama, Georgia, and Virginia) were added. In 1992, FHM expanded with two Western States, California and Colorado. Michigan, Minnesota, and Wisconsin joined the program in 1994.

This report summarizes the results of the detection monitoring activity in the South in 1993 and 1994. The first part summarizes detection plot data from Alabama, Georgia, and Virginia for both years. All values reported are simply counts or percentages of sample observations. No statements of statistical significance are implied. The second part of this report is a synopsis from the survey component of detection monitoring and includes various insect, disease, and damage surveys for 1993 and 1994. Similar reports were published for detection monitoring activities in 199 1 (Bechtold and others 1992) and 1992 (Vissage and Hoffard 1997). Because data collection procedures of tree damage symptoms changed and the summary of crown condition data conceptually changed in 1993, results in this report cannot be directly compared with the previous reports.

Forest Health Monitoring Detection Plot Activities

Methodology

The FHM program uses a triangular grid to systematically choose FHM sample plot locations. The center points of the grid are approximately 16 miles apart. This approach provides a statistically valid sample of all land categories. An FHM plot is a cluster of four 1/24-acre fixed-radius subplots spaced 120 feet apart (see Conkling and Byers 1993 and Tallent-Halsell 1994 for a complete description of FHM methodology). Field crews install an FHM plot when any part of it falls in forest land. Trees ≥5.0 inches in diameter at breast height (d.b.h.) are recorded if they are in the 24.0-foot radius subplot and are referred to as trees in this report. Trees 1 .O to 4.9 inches in d.b.h. are recorded if they are in a 6.8-foot diameter radius (l/300-acre) microplot, which is offset 12 feet from each subplot's center. These trees are referred to as saplings in this report.

Field crews visited 358 plots in the three States and measured 8,957 trees in 1993 (table 1). In 1994, field crews visited 347 plots in the three States and measured 8,206 trees (table 2). The number of plots declined in 1994 because some plots were no longer forested. In addition, plots were not sampled when landowners denied access or plots were flooded and unsafe.

Data collection efforts in 1993 and 1994 focused on the tree damage symptoms and crown rating indicators from plots with at least one live tree ≥ 1 .O inch d.b.h. in 199 1. For each sapling and tree, field crews recorded up to three damage symptoms based on the location on the tree. Damages in the roots or bole were recorded before damages in the branches or foliage. Damage severity above a minimum threshold was also recorded, although some damages were recorded when present, regardless of severity. The damage symptoms that could cause mortality were the only damages recorded.

The crown rating variables recorded for trees were crown diameter, live-crown ratio, crown density, crown dieback, and foliage transparency. For saplings, only live-crown ratio and sapling vigor, a general measure of crown condition, were recorded. Definitions of these variables follow and additional information about the crown rating variables is available in Anderson and Belanger (1987), Belanger and Anderson (1989), and Millers and others (1992).

Crown diameter is the average of the diameter of the tree crown at its widest point and 90" from the widest point. This variable is another indicator of tree vigor (Millers and others 1992).

Live-crown ratio is the proportion of total live tree height that supports live foliage, which effectively contributes to tree growth. Dead tops and dead lower branches are excluded. This variable is associated with tree vigor and d.b.h. growth (Millers and others 1992).

Crown density is an estimate of the percent of skylight obstructed by branches, foliage, and reproductive structures. Anderson and Belanger (1987) found that high crown-density values are positively correlated with radial growth in loblolly and shortleaf pines.

Crown dieback is branch mortality that starts near the terminal and proceeds toward the trunk or at the top of the tree toward the ground. Crown dieback usually occurs in the upper part of the crown and is a symptom of various stresses on a tree, such as drought. Branches in the lower part of the crown that die from competition or shading are not counted as crown dieback.

Foliage transparency is the amount of skylight visible through the live, normally foliated portion of the crown. Dead portions of the crown and large gaps and holes are excluded. This rating is an indicator of the amount of foliage in the crown, a surrogate measure of defoliation.

Sapling vigor classifies saplings into three distinct groups of overall crown condition. A sapling must meet three criteria to be classified as good. First, at least one-third of its length must have live foliage. Second, dieback must not be present in the upper half of the crown. Third, at least 80 percent of the foliage must be undamaged or normal. When a sapling does not qualify as good, it is rated as average or poor. The criterion used to classify saplings as average or poor is percent of normal foliage. A sapling is classified as poor when 20 percent or less of its foliage is normal. A sapling is classified as average when 20 to 80 percent of its foliage is normal.

In this report, sapling vigor class and damage symptoms are presented for saplings. Crown density, crown dieback, foliage transparency, and damage symptoms are reported for trees. For the crown rating variables (crown density, crown dieback, and foliage transparency), the groupings included in the tables are patterned after developmental research results (Anderson and Belanger 1987; Belanger and Anderson 1989; Millers and others 1991, 1992). These groupings have also been used in other FHM documents (Bechtold and others 1992, Gillespie and others 1993, Vissage and Hoffard 1997). Ongoing research is investigating other methods to summarize crown rating data.

This report presents summary statistics (means and percentages) stratified by a set of species groupings commonly used by FHM. Although additional stratifications, such as tree size, crown class, or stand-level conditions, may reveal other interesting trends, they have not been used. In addition, confidence intervals, hypothesis testing, and other analytical statistical procedures were not performed. Thus, this report must be interpreted as an initial reflection of FHM plot data; definitive conclusions about forest health cannot be drawn until the data have been analyzed by appropriate statistical methodology.

1993 FHM Detection Plot Findings

Saplings accounted for 24 percent of the sampled trees. More trees were hardwoods (60 percent) than softwoods (table 3).

The average and good crown-density classes accounted for 97 percent of the trees (table 4). In softwoods, shortleaf pine had the highest proportion of trees in the poor density class; longleaf pine had no trees in this class. In hardwoods, the maple group had the highest proportion in the poor crown-density class; yellow-poplar had the lowest.

Only 2 percent of the trees were classified as having moderate or severe foliage transparency in 1993 (table 5). Virginia pine had the largest percentage of trees in the moderate foliage transparency class.

Ninety-one percent of softwoods and 87 percent of hardwoods had no crown dieback in 1993 (table 6). The proportion of trees with light dieback was the highest for Virginia pine and the red oak group. Only 1 percent of all trees were in the moderate and severe dieback classes combined. The red oak and maple groups had the largest proportion of trees in the moderate and severe dieback classes combined.

Ninety percent of softwoods and 83 percent of hardwoods had no damage in 1993 (table 7). The other hardwoods and maple groups had the most damages recorded. Shortleaf and longleaf pines were the least damaged trees.

Cankers were the most often recorded damage in softwoods (table 8). In hardwoods, indicators of decay were the most commonly recorded damage, followed by broken branches and open wounds.

Ninety-six percent of hardwood saplings and 93 percent of softwood saplings had average or good sapling vigor (table 9). Fifty percent of softwood saplings were in the good sapling-vigor class; only 30 percent of hardwood saplings were in this class.

Compared to trees, saplings had fewer damages recorded for both softwoods (2 percent) and hardwoods (10 percent) (table 10). The damage most commonly recorded in saplings duplicated those trees (table 11).

1994 FHM Detection Plot Findings

The distribution of saplings and trees did not change between 1993 and 1994. Hardwood trees still outnumbered softwoods in 1994 (table 12) but increased their proportion of total trees by 2 percent since 1993.

Ninety-eight percent of trees had average or good crown density (table 13); but the percentage in the good class increased in relative abundance by 6. I percent since 1993. Both Virginia pine and the other softwoods group were the only softwoods with an increase in relative abundance in the poor crown-density class since 1993.

Only 0.6 percent of trees were not classified as having normal foliage transparency in 1994 (table 14). The other softwoods group had the largest percentage of trees in the moderate and severe foliage transparency classes combined.

Ninety-five percent of softwoods and 90 percent of hardwoods had no crown dieback (table 15) in 1994, representing an improvement since 1993. As in 1993, the proportion of trees with light dieback were the highest for Virginia pine and the red oak group. The proportion of all trees in the moderate and severe dieback classes did not change between 1993 and 1994. The other softwoods and other hardwoods groups had the largest proportion of trees in the moderate and severe dieback classes combined.

The proportion of softwoods and hardwoods without damage did not change between 1993 and 1994 (table 16). Blackgum and the maple group had the most damages recorded. Shortleaf pine was the least damaged softwood and yellow-poplar was the least damaged hardwood.

Cankers were again the most recorded damage in softwoods (table 17), virtually unchanged from 1993 findings. In hardwoods, indicators of decay were the most commonly recorded damage, followed by open wounds and dead terminal branches. These findings represent a slight change from those in 1993. This change occurred because the difference between dead branches and dead terminal branches was clarified.

Ninety-eight percent of softwood saplings and 97 percent of hardwood saplings had average or good sapling vigor (table 18). Sixty-eight percent of softwood saplings were in the good sapling-vigor class and 67 percent of the hardwood saplings were in this class. Since 1993, the proportion of hardwoods and softwoods in the good sapling-vigor class increased in relative proportions 37 percent and 18 percent, respectively.

Compared to trees, saplings again had fewer damages recorded for both softwoods and hardwoods (table 19). The

damages most commonly recorded in saplings duplicated those in trees (table 20).

Findings from Survey Component Activities

The survey component FHM data discussed here comes from a variety of sources, including the U.S. Department of Agriculture, Forest Service, Forest Health Protection Unit and Forest Inventory and Analysis; the cooperating 13 Southern State agencies; and other Federal agencies.

Southern Pine Beetle-1993

As in previous years, southern pine beetle (SPB) populations were highly variable in the South in 1993, increasing in some areas and dropping significantly in others. Compared to 1992, the number of SPB infestations in the South increased by 23 percent, but the number of affected acres declined by about 27 percent. The most significant activity occurred in Virginia, with a 66-percent increase in the number of affected acres and an 80-percent increase in the number of infestations. The 18,531 infestations were the largest number ever recorded in one year for Virginia. Figure 1 shows the counties in outbreak status in 1993. A county is defined in outbreak status if it contains at least one multiple tree infestation for each 1,000 acres of SPB-host forest type.

In other locations, populations declined along the Gulf Coastal Plain, including the States of Alabama, Mississippi, Louisiana, and Texas. The decline in Texas was minimal, with most activity concentrated along the eastern border of the State. However, populations dropped significantly in South Carolina (30 to 50 percent) and Georgia (50 to 60 percent).

Arkansas reported 2,351 infestations (a 60-percent increase) and a 90-percent increase in affected acreage. Likewise, eastern Oklahoma showed an increase in the number of spots but did not meet the minimum criteria for outbreak status. Losses in North Carolina also intensified, with a 34-percent increase in area affected and a 52-percent increase in the number of infestations.

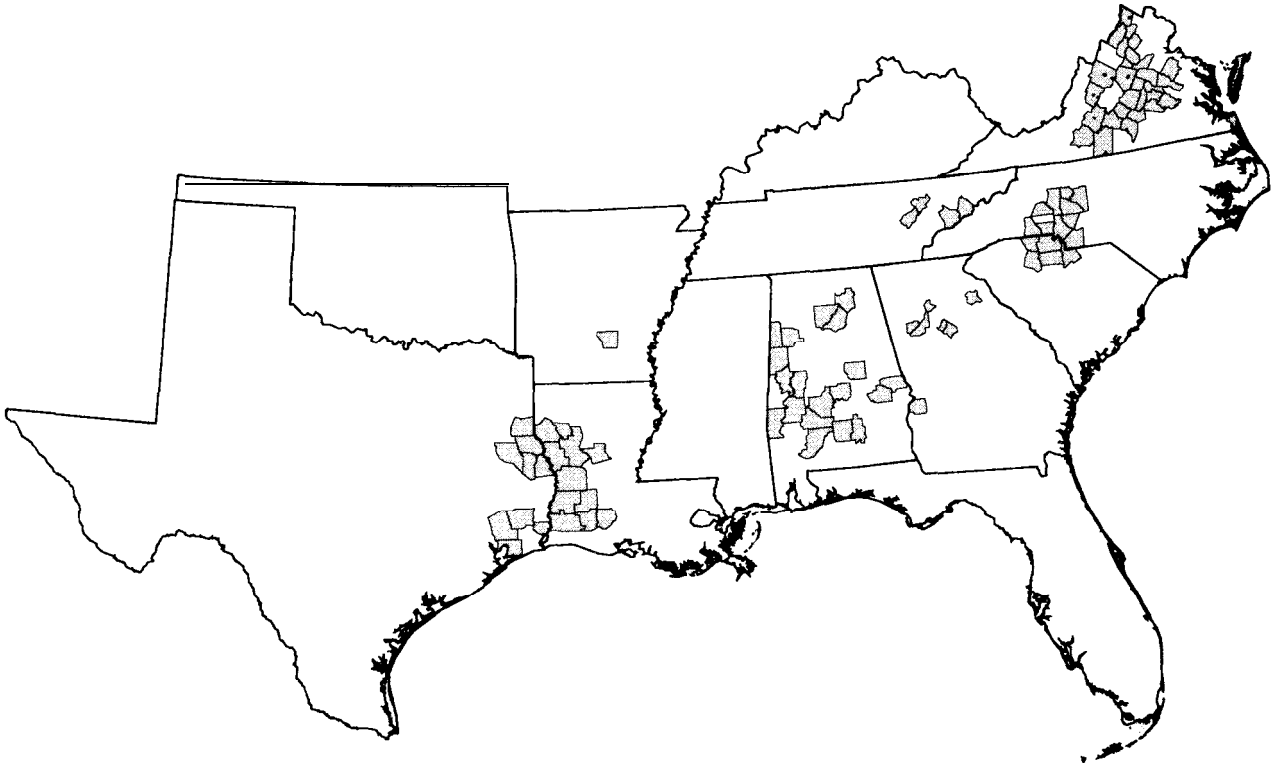

Figure I-Southern pine beetle outbreak counties and parishes, 1993. Note: Outbreak is defined as one multiple tree spot per 1,000 acres of southern pine beetle host type within a county or parish.

Southern pine beetle infestations within wildernesses in Texas continued to cause significant mortality, threatening or migrating onto private land. From 1990 to 1992, a large number of endangered red-cockaded woodpecker nesting and roosting sites were attacked in the fall season by dispersing beetles, but significantly fewer cavity trees were attacked in 1993.

Southern Pine Beetle-1994

Compared to 1993, the number of SPB infestations in the South decreased by 76 percent and the number of affected acres declined by 50 percent. The number of SPB spots dropped in every State except Florida and South Carolina. Southern pine beetle activity also decreased dramatically in Texas. Figure 2 shows the counties in outbreak status in 1994.

The two States with the highest SPB populations were Alabama and Mississippi. Activity in Alabama was heaviest in the westcentral section, while in Mississippi, losses were primarily in the southwestern comer. Southern pine beetle populations were also relatively high in the Piedmont of South Carolina and Georgia.

In Florida, where SPB populations exploded to outbreak levels within the city limits of Gainesville, more than 250 spots were detected, affecting hundreds of residential landowners. This situation is unique because the last documented incidence of a SPB outbreak in that area was 50 years ago.

Southern pine beetle populations in the designated Texas wildernesses within the national forests decreased significantly in 1994. The only activity occurred in the Turkey Hill Wilderness. Very few red-cockaded woodpecker cavity trees were attacked in 1994.

Gypsy Moth-1993

Defoliation in Virginia declined to 589,100 acres of host type in 1993 (fig. 3) from 748,000 in 1992. Virus and fungal infections (*Entomophaga maimaiga*) caused population collapses over the entire infested portions of Virginia. Defoliation occurred on 13 1,303 acres of the George Washington National Forest and 88,166 acres on other Federal lands. Isolated infestations beyond the generally infested area appeared in Arkansas, Georgia, and Tennessee.

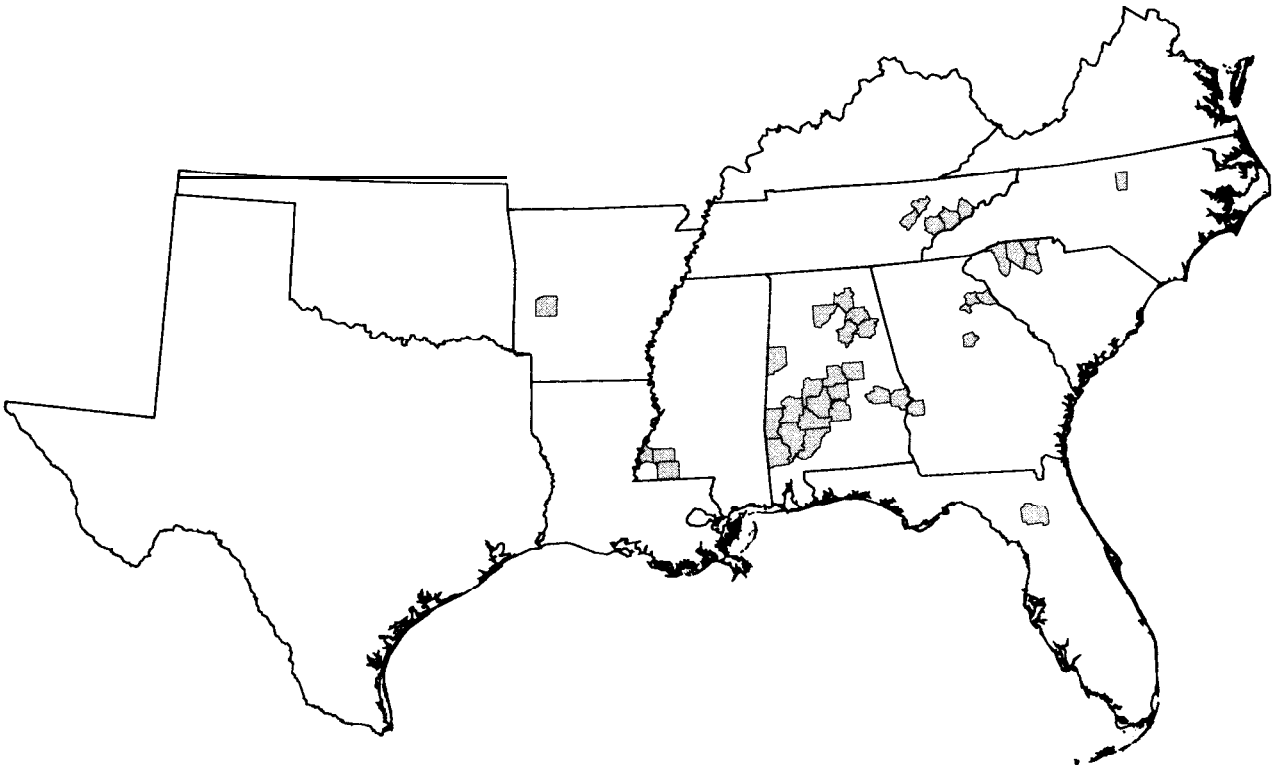

Figure Z-Southern pine beetle outbreak counties and parishes, 1994. Note: Outbreak is defined as one multiple tree spot per 1,000 acres of southern pine beetle host type within a county or parish.

Figure 3—Gypsy moth defoliated areas in Virginia, 1993.

Gypsy Moth-1994

Defoliated acreage in 1994 declined by 20 percent (589,100 to 472,475) (fig. 4). Once again, the gypsy moth virus and the fungus, *Entomophaga maimaiga,* helped keep populations in check throughout the entire infested area of Virginia. Defoliation occurred on 165,922 acres on the George Washington National Forest and 10 1,408 acres on other Federal lands.

Isolated infestations in Arkansas, Georgia, and Tennessee noted in 1993 were treated with biological insecticides. Post-treatment trapping indicated that the insect had spread beyond its original infestation boundaries in Tennessee.

Hemlock Woolly Adelgid

The hemlock woolly adelgid continued to spread in 1993 and 1994. This insect first appeared in the United States on the west coast in 1920. A second introduction occurred near Richmond, VA, in 1950. The insect has successfully colonized eastern hemlock and Carolina hemlock, causing mortality within 3 to 5 years. The situation is so severe that the insect now threatens the entire range of eastern hemlock. The voracious insect spread is illustrated by the infestation in the Shenandoah National Park, where the infestation has caused an 80-percent decline in the health of eastern hemlocks in just 5 years. Most hemlock type in Virginia is generally infested, with the exception of the southwestern counties. Much of the hemlock resource is located in riparian areas, creating a situation that threatens the health of aquatic ecosystems.

Balsam Woolly Adelgid

Fraser fir is the preferred host of balsam woolly adelgid. Fraser fii has a very limited range and is found primarily on the highest mountains of the Southern Appalachians. This species occurs in pure stands on the highest peaks or in mixture with red spruce at lower elevations. Since the introduction of the balsam woolly adelgid in the 1950's, 64,700 acres have been impacted, everywhere the tree naturally occurs. The insect prefers larger fir trees, leading to the death of virtually all mature host trees within the affected areas. Adelgid populations were high in both 1993 and 1994.

Fusiform Rust

Fusiform rust is the most damaging disease of loblolly and slash pines in the South. Figures 5 and 6 show the approximate distribution of affected plots of slash and loblolly pines, respectively. Other pine species may also be affected, but little mortality or other damage occurs. According to the most recent Forest Inventory and Analysis (FIA) data, an estimated 13.4 million acres of loblolly and

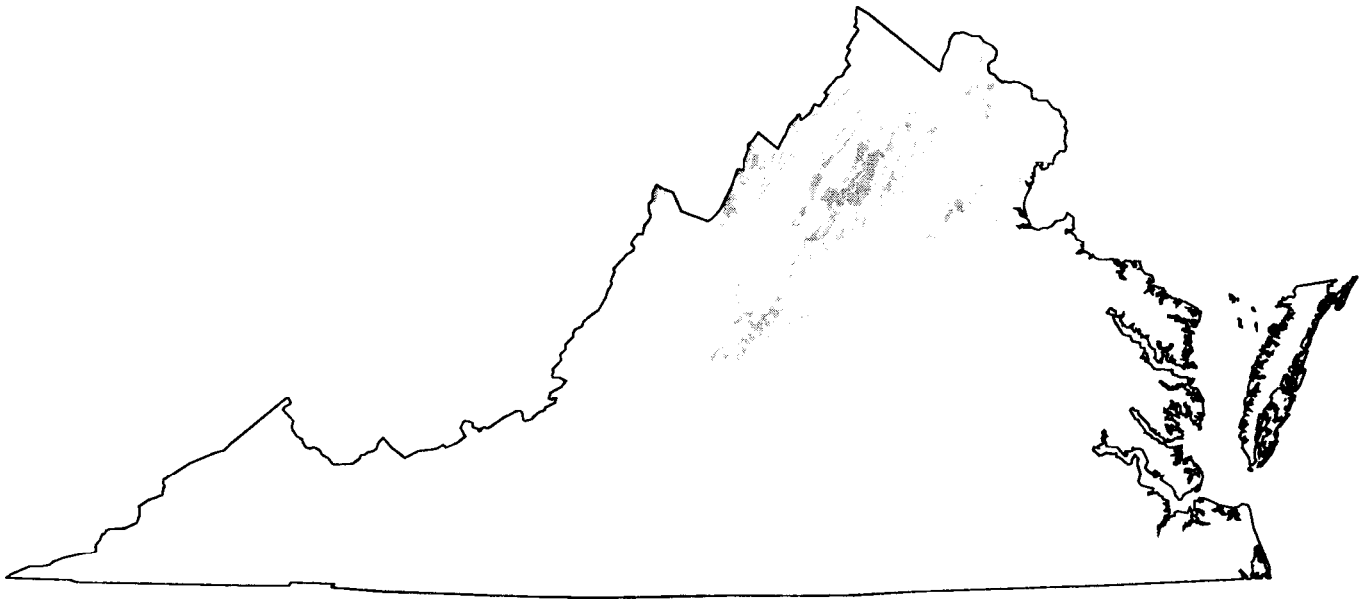

Figure 4—Gypsy moth defoliated areas in Virginia, 1994

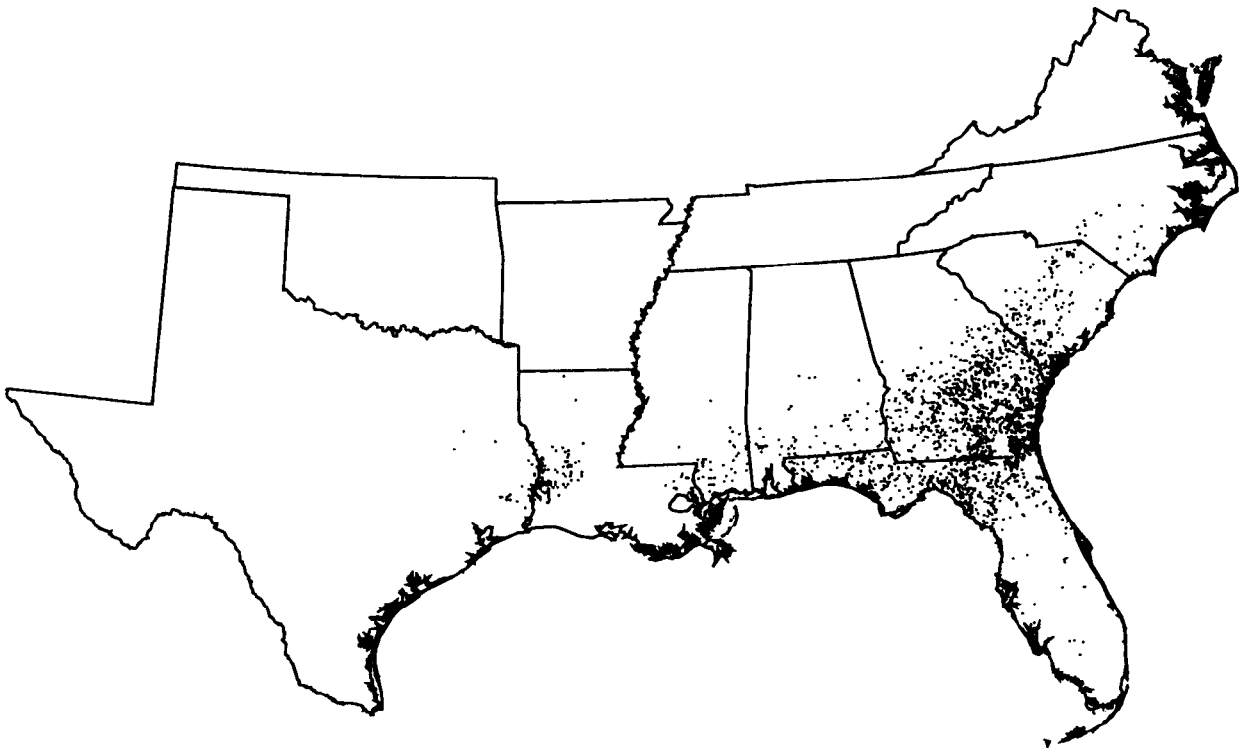

Figure 5—Forest Inventory and Analysis slash pine plots affected with fusiform rust, 1994.

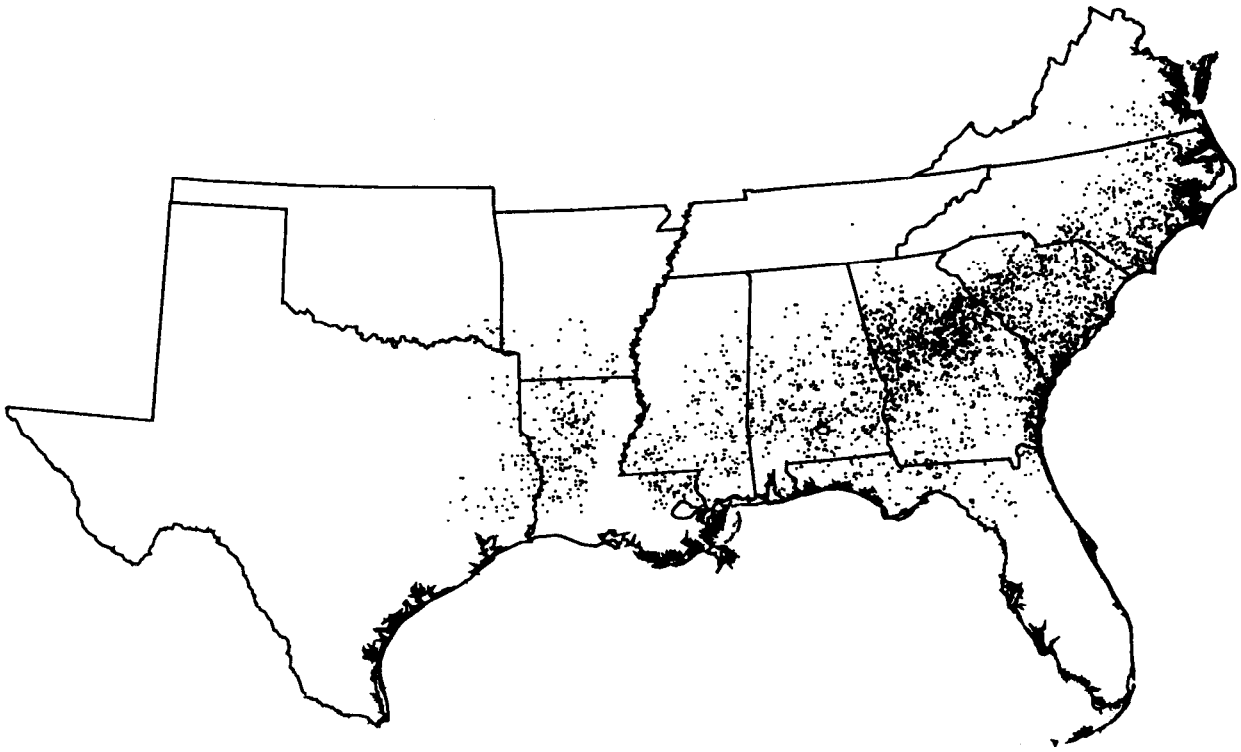

Figure 6-Forest Inventory and Analysis loblolly pine plots affected with fusiform rust, 1994.

slash pines have infection levels > 10 percent, which represents 28 percent of the host acres (table 21). Ten percent of the host acreage has >30 percent infection and 4 percent of the host acreage has >50 percent infection. Georgia had the worst disease situation, with 4.6 million acres showing 10 percent or more of the trees affected. This represents almost 50 percent of the entire host type for the State. Because a revised and improved method for selecting plots and analyzing fusiform rust incidence has been implemented, affected acres in this report can no longer be compared directly to previous years' reports.

Dogwood Anthracnose

Since discovered in the South dogwood anthracnose spread from 30,000 affected acres in north Georgia in 1987 to more than 17 million acres in Alabama, Georgia, Kentucky, North Carolina, South Carolina, Tennessee, and Virginia in 1993. In 1993, 222 Southern counties were confirmed infected and 6 additional counties appeared in 1994 (fig. 7). Dogwood anthracnose is found primarily in the mountains, foothills, and upper Piedmont. In the forest environment, damage is most severe at higher elevations and in cool, moist areas at lower elevations. By infecting dogwoods, dogwood anthracnose diminishes forest aesthetics and reduces an important source of food and cover for a variety of sylvan animal species.

Butternut Canker

This fungus has been in the South since the mid-1950's and is estimated to have killed more than three-fourths of the butternut trees in the region. Because the disease continues to spread (fig. 8), the butternut may be placed on the officially threatened species list. Found throughout the range of butternut, butternut canker will continue to devastate its host species, because almost all individuals have no natural resistance to the disease. The tree will be replaced by nonsusceptible species, such as black walnut. In the meantime, some hope lies in the development of potentially genetically resistant strains.

Oak Decline

Oak decline is a syndrome resulting in dieback and mortality of dominant and codominant oaks. Causal factors

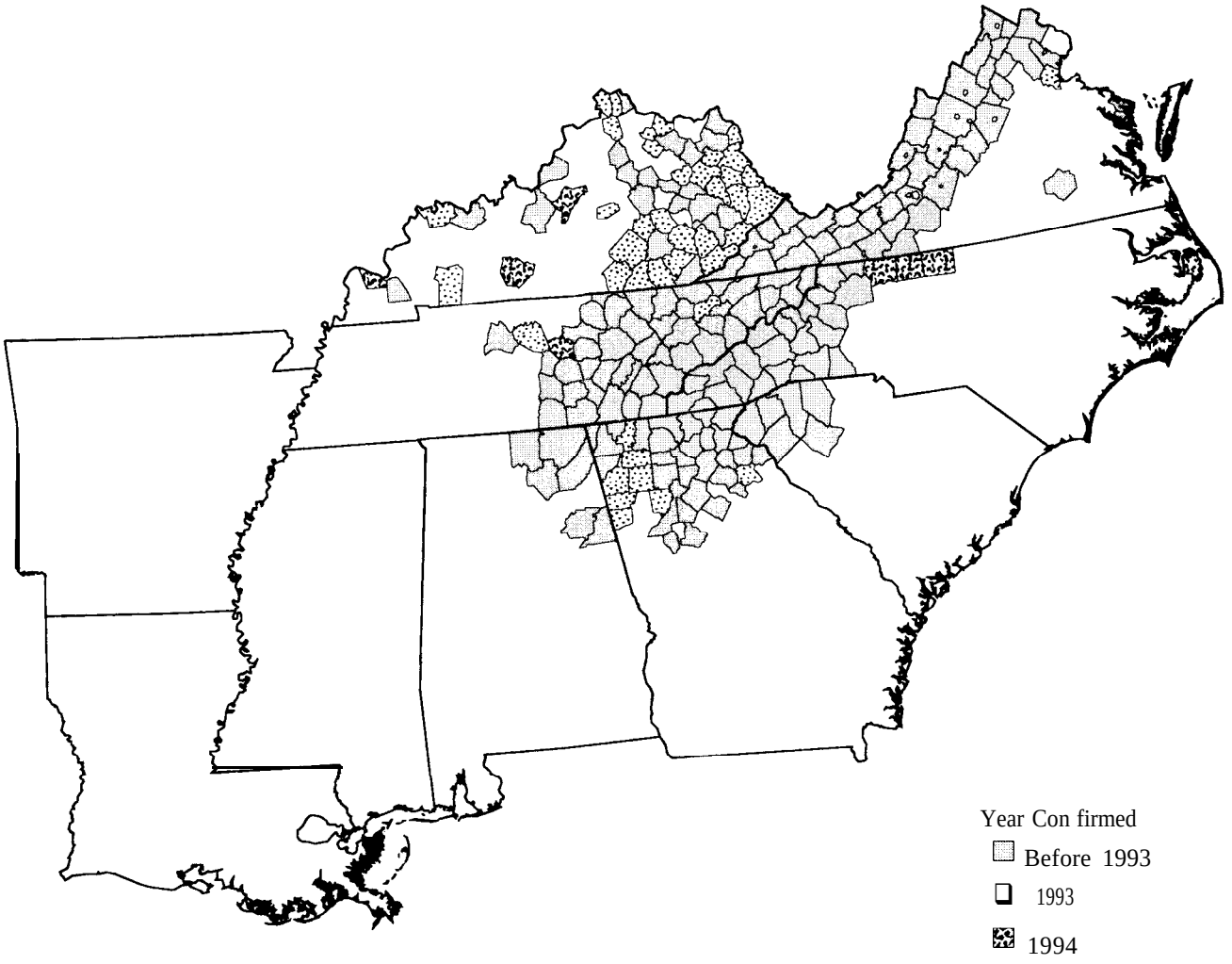

Figure 7—Southern United States counties and parishes with confirmed dogwood anthracnose, 1988-94.

are stressors, such as drought, frost, and defoliation by insects; and secondary agents, such as shoestring root rot and two-lined chestnut borer. Host age and site conditions also play a role in oak decline. Analysis of FIA data indicates that an estimated 3.9 million acres of upland hardwood forest affected by oak decline are distributed across all Southern States (fig. 9). This number represents about one-tenth of the vulnerable forest type (fig. 10, table 22). Average annual mortality volume of oaks on affected sites is 45 percent higher than on unaffected sites. Some oak decline is located in areas heavily defoliated by the gypsy moth.

Oak Wilt

Oak wilt continued to be epidemic in Texas in 1993 and 1994. The number of infected counties increased by 3 to 49 in 1993, and 6 more counties were added in 1994. The disease was also reported in Arkansas, Kentucky, North Carolina, South Carolina, Tennessee, and Virginia, although only in areas where oak wilt was already present. Figure 11 shows Southern United States counties where oak wilt has been confirmed.

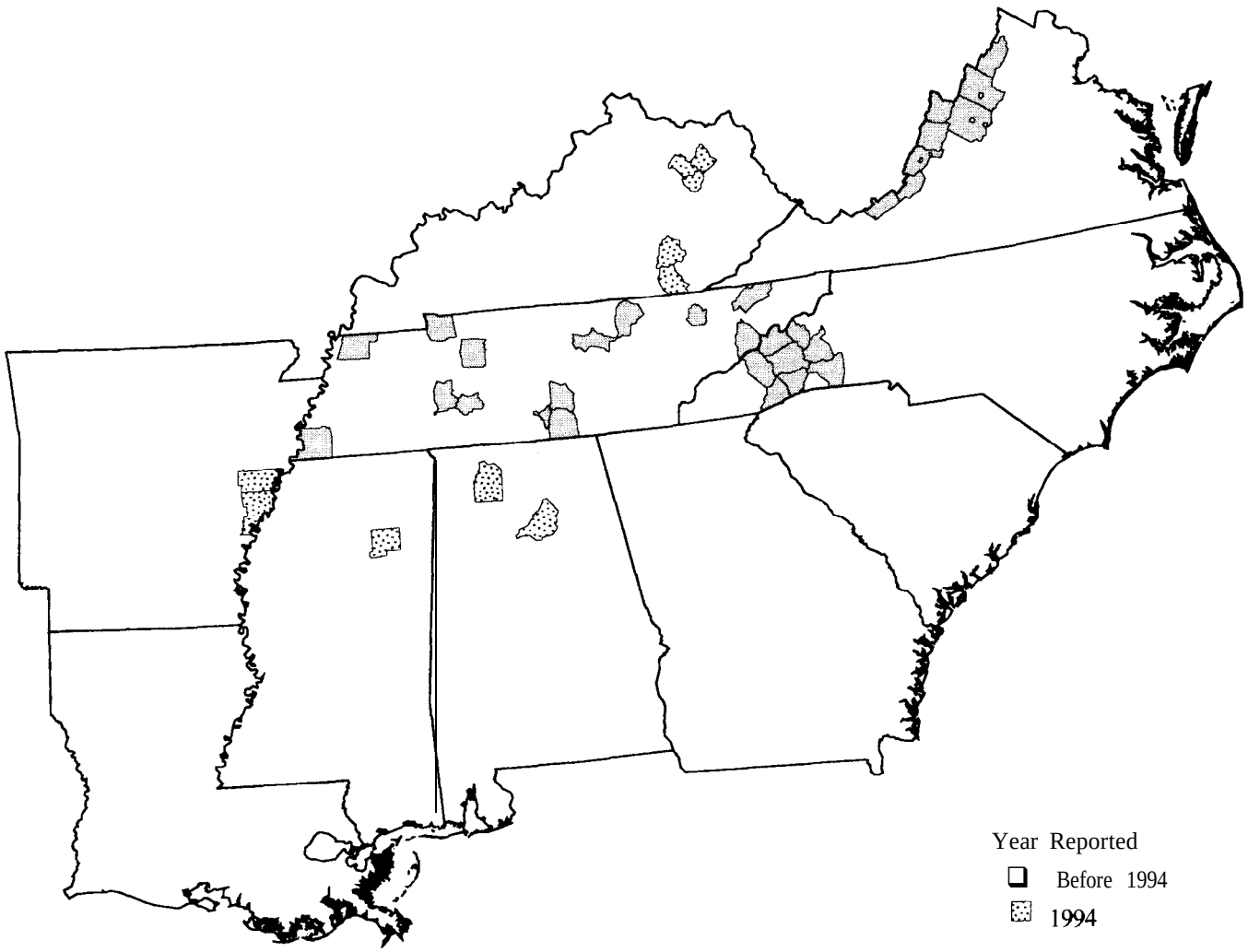

Figure 8—Southern United States counties and parishes with confirmed butternut canker up to 1994.

Beech Bark Disease

Mortality caused by this disease was found in the Great Smoky Mountains National Park, 300 miles southwest of the previously known distribution of the disease in West Virginia, The affected area encompasses about 100 acres within a 3-county area (Swain and Haywood in North Carolina and Sevier in Tennessee).

Other Conditions Affecting Southern Forests, 1993–94

In 1993, pine engraver beetle-caused mortality was significantly above average because much of the South experienced a drought. Especially hard hit were southern pines in Alabama, Mississippi, South Carolina, Texas, and eastern Oklahoma. In 1994, the condition stabilized, and engraver beetle activity was about normal.

Storm activity was higher than normal both years. Tornadoes and other high wind conditions caused significant tree breakage and mortality in Florida, Georgia, Tennessee, and Virginia.

In 1993, Asian gypsy moth (similar to the European strain) was accidentally introduced into the Military Ocean Terminal at Sunny Point, NC. Asian gypsy moths are of special concern to forest managers because, unlike the European strain, females fly, potentially increasing long-distance dispersal, and they have a higher preference for softwood foliage. An eradication project using biological insecticides was undertaken in 1994.

Ozone damage was noted on Eastern white pine and various bioindicator plants throughout the South. Designated wildernesses are surveyed annually and results are compiled

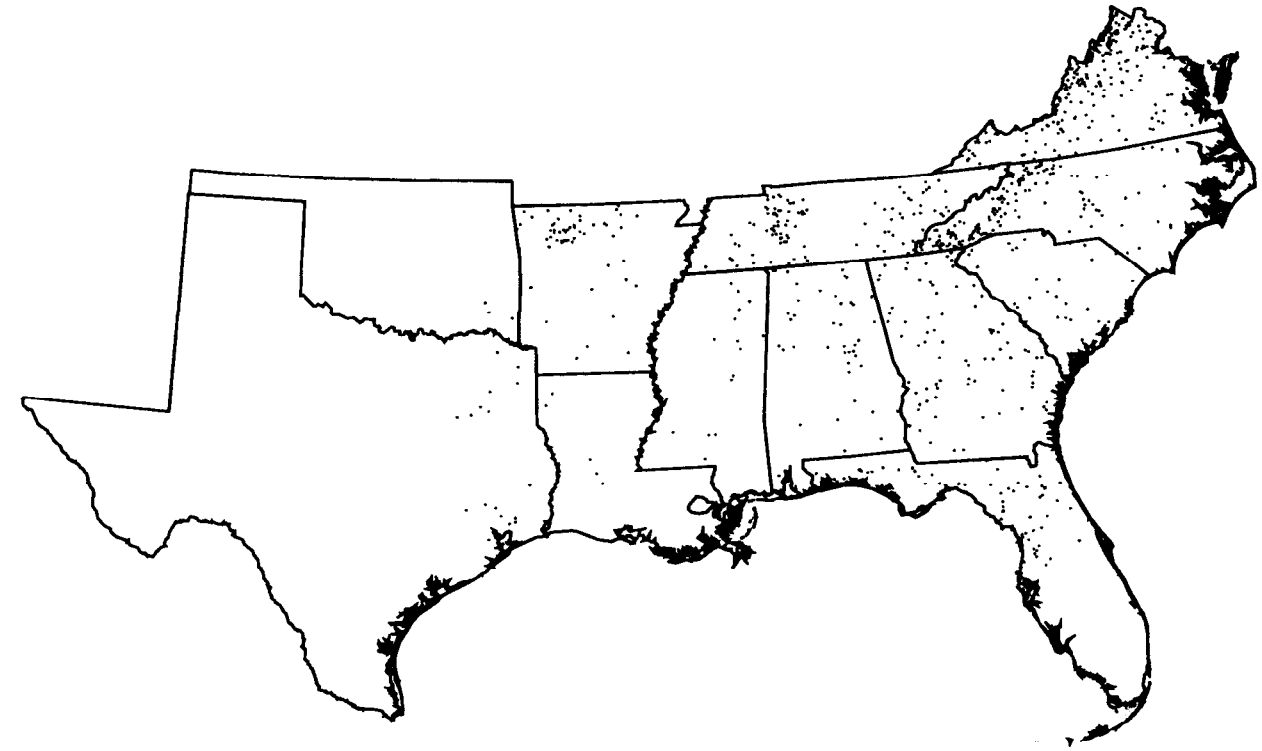

Figure 9-Forest Inventory and Analysis upland oak plots affected by oak decline, 1991 (most current information).

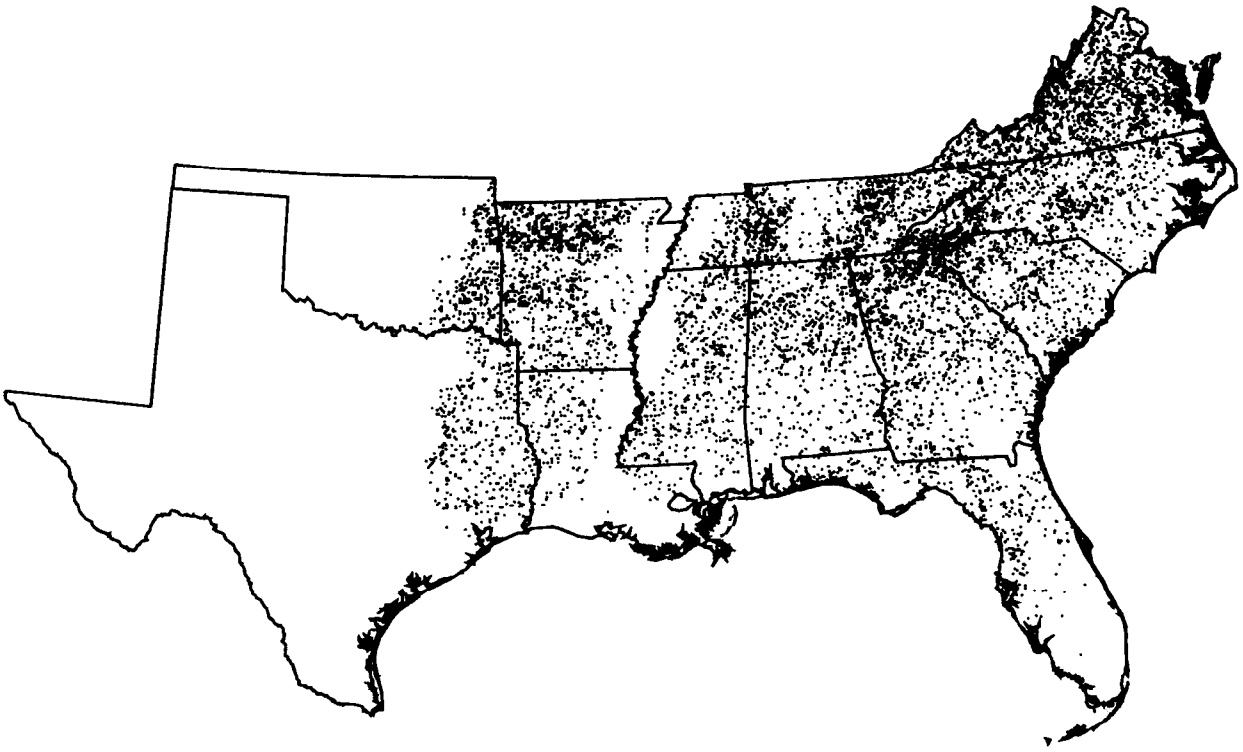

Figure **l** @--Forest Inventory and Analysis upland oak plots vulnerable to oak decline, 1991 (most current information).

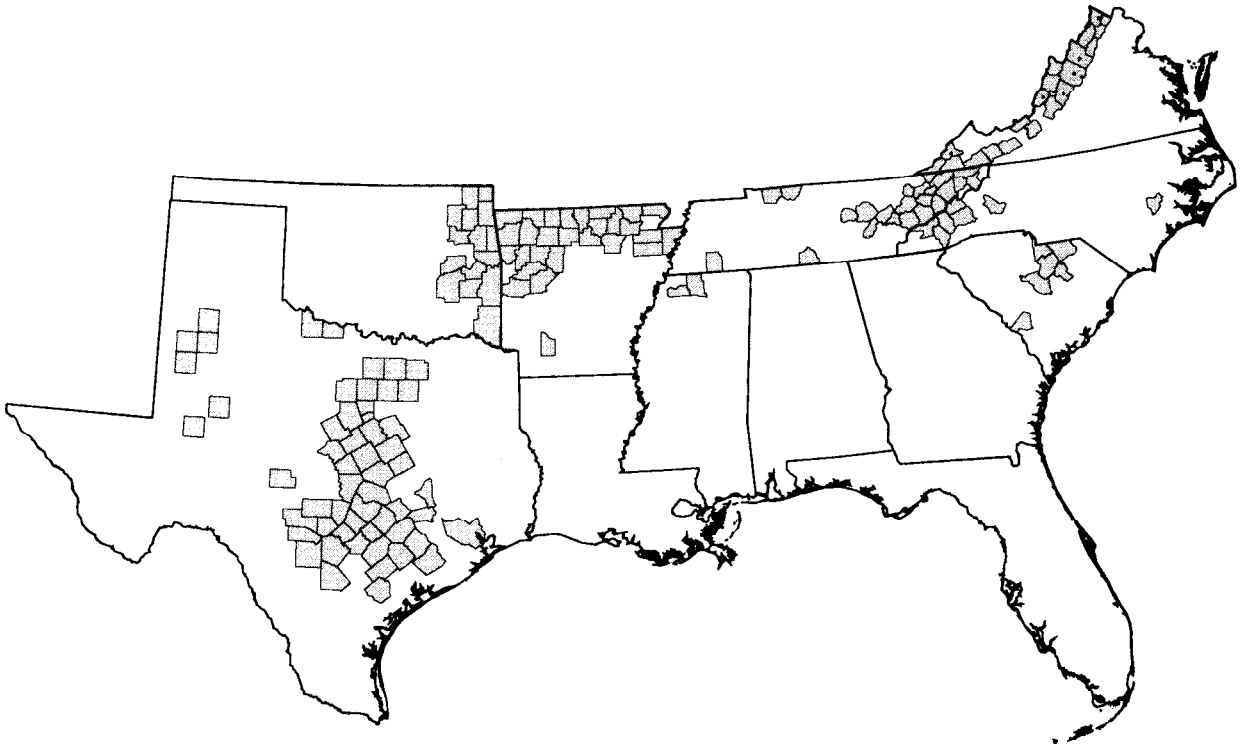

Figure 1 l--Counties with oak wilt infection confirmed, 1994.

and reported by the U.S. Department of Agriculture, Forest Service. The reports are used by air resource specialists to determine whether emissions permits will be granted. The incidence and severity of ozone damage did not differ significantly between 1993 and 1994.

Discussion and Conclusions

The crowns of the great majority of sampled trees appeared normal and crown conditions improved slightly between 1993 and 1994. Only 3 percent and 2 percent of the sample trees were in the poor crown-density class in 1993 and 1994, respectively. In 1993, 2 percent of the sample trees were in the moderate and severe foliage transparency classes. This proportion decreased to < 1 percent in 1994. The percentage of trees with no crown dieback was 88 percent in 1993 and 92 percent in 1994.

The proportion of trees with no recordable damage was unchanged between 1993 and 1994 at 86 percent. The most commonly recorded damage for both years in softwoods was cankers and in hardwoods, indicators of decay. This finding is expected in softwoods because of the regional distribution of fusiform rust (symptom--canker) on southern yellow pines (Hoffard and others 1995). The low proportion of damages in longleaf pine is expected because longleaf pine is generally very resistant to many insects and diseases (Boyer 1990).

Sapling crown vigor improved between 1993 and 1994; the number of saplings in the good sapling-vigor class increased while a comparable number in the average sapling-vigor class decreased. The proportion of saplings with recordable damage increased from 9 percent in 1993 to 12 percent in 1994. The most commonly recorded damages in saplings in 1993 and 1994 were the same as those in trees: cankers in softwoods and indicators of decay in hardwoods. These regional patterns of crown ratings and damage are also reflected in the State level results in 1993 and 1994 (tables 23 through 76).

Southern pine beetle conditions generally improved across most of the South between 1993 and 1994, due in part to extremely cold winter temperatures. Gypsy moth defoliation acreage decreased in the South from 1993 to 1994, but isolated introductions outside the generally infested area were found in Arkansas, Georgia, and Tennessee. However,

the introduction of the Asian gypsy moth in North Carolina has increased concern, because the Asian gypsy moth females can fly and have a higher preference for softwood foliage. Other conditions were generally unchanged.

While most softwoods showed a decrease in the proportion of sample trees in the poor crowndensity class from 1993 to 1994, Virginia pines increased slightly. The proportion of Virginia pines in the moderate and severe foliage transparency classes decreased from 11 percent in 1993 to 3 percent in 1994. And in crown dieback, the proportion of sample trees in the light, moderate, and severe classes decreased from 20 percent in 1993 to only 13 percent in 1994.

The causes for the poorer crown conditions in 1993 may be related to Virginia pine sawfly infestations, the impacts of drought or moisture stress, or both. The improvement in crown dieback and foliage transparency may be partially related to mortality. Between 1993 and 1994, the number of live Virginia pine trees sampled decreased from 405 to 366, a lo-percent reduction. The trees in 1993 with poorer foliage transparency values and more severe crown dieback values resulting from a regional drought that year would potentially show higher mortality in 1994. These trends should be reviewed in 1995. If they continue, a more detailed analysis of all pertinent data, the initiation of an evaluation monitoring project, or both may be appropriate.

Literature Cited

Anderson, R.L.; **Belanger,** R.P. 1987. A crown rating method for assessing tree vigor of loblolly and shortleaf pines. In: Phillips, D.R., comp. Proceedings of the fourth biennial southern silvicultural research conference; 1986 November 4-6; Atlanta. Gen. Tech. Rep. SE-42. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station: 538-543.

Bechtold, W.A.; **Hoffard, W.H.; Anderson, R.L. 1992. Summary** report: forest health monitoring in the South, 1991. Gen. Tech. Rep. SE-81. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station. 40 p.

Belanger, R.P.; **Anderson,** R.L. 1989. A guide for assessing crown densities of loblolly and shortleaf pines. Res. Note SE-352. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station. 2 p.

Boyer, W.D. 1990. Longleafpine. In: Burns, R.M.; Honkala, B.H., tech. coord. Silvics of North America--conifers. Agric. Handb. 654. Washington, DC: U.S. Department of Agriculture, Forest Service: 405-412. Vol. 1.

Conkling, B.L.; **Byers,** G.E., eds. 1993. Forest health monitoring field methods guide. Internal Rep. Las Vegas, NV: U.S. Environmental Protection Agency. 228 p.

Gillespie, A.J.R.; Miller-Weeks, M.; Bamett, C.; Burkman, W. 1993. Summary report: forest health monitoring-New England/Mid-Atlantic, 1992. NE/NA-INF-115-R93. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Area State and Private Forestry. 15 p.

Hoffard, **W.H.;** Marx, D.H.; Brown, H.D. 1995. The health of southern forests. R-8 PR-27. Atlanta, GA: U.S. Department of Agriculture, Forest Service, Southern Region. 36 p.

Millers, I.; Anderson, R.L.; Burkman, W.G.; Hoffard, W.H. 1992. Crown condition rating guide. Internal Rep. Radnor, PA: U.S. Department of Agriculture. Forest Service, Northeastern Area State and Private Forestry, Forest Health Protection. 26 p.

Millers, I.; **Lachance,** D.; Burkman, W.G.; **Allen,** D.C. 1991. North American sugar maple decline project: organization and field methods. Gen. Tech. Rep. NE-154. Radnor, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station. 26 p.

Tallent-Halsell, N.G.. ed. 1994. Forest health monitoring 1994 field methods guide. EPA/620/R-94/027. Washington, DC: U.S. Environmental Protection Agency. 338 p.

Vissage, J.S.; Hoffard, W.H. 1997. Summary report: forest health monitoring in the South, 1992. Resour. Bull. SO-195. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station. 27 p.

Index of Tables

Table l-Number of plots, saplings, and trees measured by State, Southern FHM Region, 1993

State	Plots	Saplings 1.0–4.9 in. d.b.h.	Trees ≥5.0 in. d.b.h.	Total trees
Alabama	127	779	2,233	3,012
Georgia	135	731	2,270	3,001
Virginia	96	677	2,267	2,944
Total	358	2,187	6,770	8,957

Table 2-Number of plots, saplings, and trees measured by State, Southern FHM Region, 1994

State	Plots	Saplings 1.0–4.9 in. d.b.h.	Trees ≥5.0 in. d.b.h.	Total trees
Alabama	118	681	1,991	2,672
Georgia	133	696	2,141	2,837
Virginia	96	613	2,084	2,697
Total	347	1,990	6,216	8,206

Table 3—Number of saplings and trees sampled by selected species group and tree size, Southern FHM Region, 1993

Species group	Saplings 1.0–4.9 in. d.b.h.	Trees ≥5.0 in. d.b.h.
Softwoods		
Longleaf pine	7	98
Slash pine	25	263
Shortleaf pine	28	246
Loblolly pine	287	1,563
Virginia pine	26	405
Other softwoods	39	159
All softwoods	412	2,734
Hardwoods		
White oaks	85	764
Red oaks	284	787
Maples	234	432
Sweetgum	260	467
Yellow-poplar	70	342
Blackgum	155	287
Hickories	101	305
Other hardwoods	586	652
All hardwoods	1,775	4,036
All species	2,187	6,770

Table A--Distribution of ≥5.0-inch d.b.h. trees by selected species group and crown-density class, Southern FHM Region, 1993

Species group	Sample size	Crown-density class: Good (>50%)	Average (21-50%)	Poor (1–20%)
		Percentage of trees sampled [a]		
Softwoods				
Longleaf pine	*98*	*21.4*	*78.6*	*0.0*
Slash pine	*263*	*20.5*	*73.4*	*6.1*
Shortleaf pine	*246*	*4.1*	*88.2*	*7.7*
Loblolly pine	*1,538*	*8.6*	*88.2*	*3.2*
Virginia pine	*405*	*5.7*	*88.6*	*5.7*
Other softwoods	*159*	*20.8*	*74.2*	*5.0*
All softwoods	*2.734*	10.1	85.7	4.2
Hardwoods				
White oaks	764	32.8	65.5	1.7
Red oaks	787	24.6	73.2	2.2
Maples	432	25.0	71.1	3.9
Sweetgum	467	30.6	66.8	2.6
Yellow-poplar	342	47.4	52.3	0.3
Blackgum	287	15.0	81.5	3.5
Hickories	305	37.0	61.6	1.3
Other hardwoods	*652*	*26.7*	*70.6*	*2.8*
All hardwoods	*4,036*	*29.4*	*68.3*	*2.3*
All species	*6,770*	*21.6*	*75.3*	*3.1*

[a] Because of rounding, percentages may not sum to 100.

Table 5—Distribution of ≥5.0-inch d.b.h. trees by selected species group and foliage-transparency class, Southern FHM Region, 1993

Species group	Sample size	Foliage-transparency class: Normal (0–30%)	Moderate (31-50%)	Severe (>50%)
		-- Percentage of trees sampled [a] --		
Softwoods				
Longleaf pine	*98*	100.0	0.0	0.0
Slash pine	*263*	100.0	0.0	0.0
Shortleaf pine	*246*	*99.6*	*0.4*	*0.0*
Loblolly pine	*1,563*	*97.4*	*2.4*	*0.2*
Virginia pine	*405*	*89.1*	10.1	0.7
Other softwoods	159	91.8	8.2	0.0
All softwoods	2,734	96.4	3.4	0.2
Hardwoods				
White oaks	764	98.4	0.9	0.6
Red oaks	787	98.7	0.8	0.5
Maples	432	99.1	0.9	0.0
Sweetgum	467	99.6	0.2	0.2
Yellow-poplar	342	99.4	0.3	0.3
Blackgum	287	99.3	0.0	0.7
Hickories	305	99.7	0.3	0.0
Other hardwoods	652	98.8	0.9	0.3
All hardwoods	4,036	99.0	0.6	0.4
All species	6,770	97.9	1.8	0.3

[a] Because of rounding, percentages may not sum to 100.

Table 6—Distribution of ≥5.0-inch d.b.h. trees by selected species group and crown-dieback class, Southern FHM Region, 1993

Species group	Sample size	Crown-dieback class: None (0–5%)	Light (6–20%)	Moderate (21-50%)	Severe (>50%)
		Percentage of trees sampled[a]			
Softwoods					
Longleaf pine	98	95.9	4.1	0.0	0.0
Slash pine	263	89.0	11.0	0.0	0.0
Shot-deaf pine	246	89.0	10.6	0.4	0.0
Loblolly pine	1,563	93.9	5.6	0.3	0.2
Virginia pine	405	80.0	18.8	1.2	0.0
Other softwoods	159	86.2	12.0	1.9	0.0
All softwoods	2,734	90.6	8.8	0.5	0.1
Hardwoods					
White oaks	764	89.3	9.4	0.5	0.8
Red oaks	787	75.7	21.6	1.8	0.9
Maples	432	85.6	12.0	1.6	0.7
Sweetgum	467	87.4	11.6	0.4	0.6
Yellow-poplar	342	98.2	1.5	0.0	0.3
Blackgum	287	88.5	10.4	0.7	0.4
Hickories	305	93.8	6.2	0.0	0.0
Other hardwoods	652	88.5	9.5	1.1	0.9
All hardwoods	4,036	86.9	11.5	0.9	0.7
All species	6,770	88.4	10.4	0.7	0.4

[a] Because of rounding, percentages may not sum to 100.

Table 7-Distribution of ≥5.0-inch d.b.h. trees by selected species group and number of damage symptoms recorded, Southern FHM Region, 1993

Species group	Sample size	Number of damage symptoms recorded			
		0	1	2	3
		Percentage of trees sampled[a]			
Softwoods					
Longleaf pine	*98*	*92.9*	*7.1*	*0.0*	*0.0*
Slash pine	*263*	*88.2*	*8.4*	*3.4*	*0.0*
Shortleaf pine	*246*	*95.1*	*4.9*	*0.0*	*0.0*
Loblolly pine	*1,563*	*89.3*	*9.2*	*1.4*	0.1
Virginia pine	405	92.1	7.9	0.0	0.0
Other softwoods	159	88.7	10.7	0.6	0.0
All softwoods	2,734	90.2	8.5	1.2	0.1
Hardwoods					
White oaks	764	86.6	12.4	0.9	0.0
Red oaks	787	84.0	14.1	1.9	0.0
Maples	432	78.5	19.4	1.6	0.5
Sweetgum	467	80.3	18.4	1.3	0.0
Yellow-poplar	342	89.5	9.6	0.9	0.0
Blackgum	287	86.4	12.2	1.4	0.0
Hickories	305	87.2	11.5	1.0	0.3
Other hardwoods	652	78.1	17.9	2.8	1.2
All hardwoods	4,036	83.4	14.8	1.6	0.3
All species	6,770	86.2	12.2	1.4	0.2

[a] Because of rounding, percentages may not sum to 100.

Table g--Distribution of damage types recorded for ≥5.0-inch d.b.h. trees by selected species group, Southern FHM I

Species group	Damages recorded	Cankers	conks/ decay	Open wounds	Resin./ gumm.	Broken bole	Brooms on bole	Broken roots	Dead term.	Broken branch.
		Percent of damages recorded[a]								
Softwoods										
Longleaf pine	7	28.6	14.3	28.6	14.3	0.0	0.0	0.0	0.0	0.0
Slash pine	40	52.5	2.5	10.0	22.5	0.0	0.0	5.0	0.0	0.0
Shortleaf pine	12	25.0	8.3	25.0	16.7	0.0	0.0	8.3	0.0	8.3
Loblolly pine	193	56.5	22.8	3.6	2.6	0.0	0.0	3.6	0.0	4.1
Virginia pine	32	46.9	12.5	6.2	6.2	0.0	0.0	6.2	0.0	6.2
Other softwoods	19	0.0	42.1	10.5	0.0	0.0	0.0	10.5	0.0	26.3
All softwoods	303	49.5	19.5	6.6	6.3	0.0	0.0	4.6	0.0	5.3
Hardwoods										
White oaks	109	6.4	51.4	7.3	0.0	0.0	0.0	0.0	0.0	20.2
Red oaks	141	7.8	61.7	5.7	0.0	1.4	0.0	2.8	0.0	18.4
Maples	103	4.9	64.1	6.8	0.0	1.0	0.0	1.0	0.0	21.4
Sweetgum	98	10.2	51.0	15.3	1.0	2.0	0.0	0.0	0.0	16.3
Yellow-poplar	39	17.9	48.7	10.3	5.1	0.0	0.0	0.0	0.0	12.8
Blackgum	43	4.7	44.2	11.6	0.0	0.0	0.0	0.0	0.0	23.3
Hickories	44	6.8	50.0	15.9	0.0	0.0	0.0	0.0	0.0	18.2
Other hardwoods	177	4.5	53.7	14.1	0.0	0.6	0.0	3.4	0.0	13.6
All hardwoods	754	7.0	54.9	10.5	0.4	0.8	0.0	1.5	0.0	17.6
All species	1,057	19.2	44.8	9.4	2.1	0.6	0.0	2.4	0.0	14.1

[a] Because of rounding, percentages may not sum to 100.

Table 9-Distribution of 1.0- to 4.9-inch d.b.h. saplings by selected species group and sapling-vigor class, Southern FHM Region, 1993

Species group	Sample size	Sapling-vigor class		
		Good	Average	Poor
		-- *Pct. of saplings sampled*[a] --		
Softwoods				
Longleaf pine	7	42.9	57.1	0.0
Slash pine	25	80.0	20.0	0.0
Shortleaf pine	28	21.4	75.0	3.6
Loblolly pine[b]	286	51.4	39.5	9.1
Virginia pine	26	30.8	61.5	7.7
Other softwoods	39	53.8	46.2	0.0
All softwoods	411	49.9	43.1	7.1
Hardwoods				
White oaks	85	15.3	83.5	1.2
Red oaks	284	20.8	72.2	7.0
Maples	234	32.0	65.4	2.6
Sweetgum	260	35.8	62.7	1.5
Yellow-poplar	70	40.0	57.1	2.9
Blackgum	155	36.8	58.7	4.5
Hickories	101	25.7	69.3	5.0
Other hardwoods	586	30.5	66.0	3.4
All hardwoods	1.775	29.9	66.5	3.7
All species	2,186	33.6	62.1	4.3

[a] Because of rounding, percentages may not sum to 100
[b] One tree had a missing value for sapling-vigor class.

Table 10—Distribution of 1.0- to 4.9-inch d.b.h. saplings by selected species group and number of damage symptoms recorded, Southern FHM Region, 1993

Species group	Sample size	Number of damage symptoms recorded			
		0	1	2	3
		Pct. of saplings sampled[a]			
Softwoods					
Longleaf pine	7	100.0	0.0	0.0	0.0
Slash pine	25	100.0	0.0	0.0	0.0
Shortleaf pine	28	96.4	3.6	0.0	0.0
Loblolly pine	287	98.3	1.7	0.0	0.0
Virginia pine	26	96.2	3.8	0.0	0.0
Other softwoods	39	97.4	2.6	0.0	0.0
All softwoods	412	98.1	1.9	0.0	0.0
Hardwoods					
White oaks	85	88.2	11.8	0.0	0.0
Red oaks	284	96.1	3.9	0.0	0.0
Maples	234	89.7	8.6	1.7	0.0
Sweetgum	260	89.2	8.8	1.9	0.0
Yellow-poplar	70	92.9	5.7	1.4	0.0
Blackgum	155	87.1	9.7	3.2	0.0
Hickories	101	84.2	13.9	2.0	0.0
Other hardwoods	586	89.1	9.2	1.5	0.2
All hardwoods	1,775	90.0	8.5	1.5	0.1
All species	2,187	91.5	7.3	1.2	co.1

[a] Because of rounding, percentages may not sum to 100.

Table ll-Distribution of damage types recorded for1.0- to 4.9-inch d.b.h. saplings by selected species group, Southern FHM Region, 1993

Species group	Damages recorded	Cankers	conks/ decay	Open wounds	Resin./ gumm.	Broken bole	Brooms on bole	Broken roots	Dead term.	Broken branch.	Crown brooms	Dam. foliage	Disc. foliage	Other
		Percent of damages recorded[a]												
Softwoods														
Longleaf pine	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Slash pine	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Shortleaf pine	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
Loblolly pine	5	40.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	60.0
Virginia pine	1	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other softwoods	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
All softwoods	8	37.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	37.5
Hardwoods														
White oaks	10	20.0	30.0	0.0	0.0	0.0	0.0	0.0	0.0	30.0	0.0	20.0	0.0	0.0
Red oaks	11	9.1	36.4	0.0	0.0	0.0	0.0	0.0	0.0	36.4	0.0	9.1	0.0	9.1
Maples	28	17.9	42.9	14.3	0.0	0.0	0.0	3.6	0.0	7.1	0.0	10.7	0.0	3.6
Sweetgum	33	0.0	51.5	15.2	0.0	3.0	0.0	0.0	0.0	18.2	0.0	6.1	3.0	3.0
Yellow-poplar	6	0.0	83.3	0.0	0.0	0.0	0.0	0.0	0.0	16.7	0.0	0.0	0.0	0.0
Blackgum	25	16.0	44.0	12.0	0.0	0.0	0.0	0.0	0.0	8.0	0.0	16.0	0.0	4.0
Hickories	18	0.0	11.1	22.2	0.0	5.6	0.0	0.0	0.0	27.8	0.0	16.7	0.0	16.7
Other hardwoods	75	4.0	42.7	13.3	0.0	1.3	0.0	0.0	0.0	24.0	0.0	8.0	0.0	6.7
All hardwoods	206	7.3	41.7	12.6	0.0	1.5	0.0	0.5	0.0	19.9	0.0	10.2	0.5	5.8
All species	214	8.4	40.2	12.1	0.0	1.4	0.0	0.5	0.0	20.1	0.0	9.8	0.5	7.0

[a] Because of rounding, percentages may not sum to 100.

Table U-Number of saplings and trees sampled by selected species group and tree size, Southern FHM Region, 1994

Species group	Saplings 1.0–4.9 in. d.b.h.	Trees ≥5.0 in. d.b.h.
Softwoods		
Longleaf pine	6	82
Slash pine	20	259
Shortleaf pine	27	235
Loblolly pine	273	1,303
Virginia pine	25	366
Other softwoods	39	146
All softwoods	390	2,391
Hardwoods		
White oaks	72	749
Red oaks	251	709
Maples	223	411
Sweetgum	241	446
Yellow-poplar	61	326
Blackgum	148	277
Hickories	100	300
Other hardwoods	504	607
All hardwoods	1,600	3,825
All species	1,990	6,216

Table 13—Distribution of ≥5.0-inch d.b.h. trees by selected species group and crown-density class, Southern FHM Region, 1994

Species group	Sample size	Crown-density class: Good (>50%)	Average (21-50%)	Poor (1–20%)
		-- Percentage of trees sampled[a] --		
Softwoods				
Longleaf pine	82	25.6	74.4	0.0
Slash pine	259	34.8	63.3	1.9
Shortleaf pine	235	12.8	85.1	2.1
Loblolly pine	1,303	19.0	79.5	1.4
Virginia pine	366	13.9	79.8	6.3
Other softwoods	146	24.7	63.0	12.3
All softwoods	2,391	19.9	77.2	2.9
Hardwoods				
White oaks	749	29.4	68.8	1.9
Red oaks	709	30.5	68.4	1.1
Maples	411	30.4	68.1	1.5
Sweetgum	446	34.8	63.9	1.4
Yellow-poplar	326	40.2	58.0	1.8
Blackgum	277	31.0	66.8	2.2
Hickories	300	46.3	52.3	1.3
Other hardwoods	607	28.7	67.7	3.6
All hardwoods	3,825	32.6	65.5	1.9
All species	6,216	27.7	70.0	2.3

[a] Because of rounding, percentages may not sum to 100

Table 14—Distribution of ≥5.0-inch d.b.h. trees by selected species group and foliage-transparency class, Southern FHM Region, 1994

Species group	Sample size	Foliage-transparency class: Normal (0–30%)	Moderate (31-50%)	Severe (>50%)
		-- *Percentage of trees sampled* [a] --		
Softwoods				
Longleaf pine	*82*	100.0	0.0	0.0
Slash pine	259	100.0	0.0	0.0
Shortleaf pine	235	99.6	0.4	0.0
Loblolly pine	1,303	99.7	0.2	0.1
Virginia pine	366	97.5	1.9	0.6
Other softwoods	146	94.5	2.7	2.7
All softwoods	2,391	99.1	0.6	0.3
Hardwoods				
White oaks	*749*	99.6	0.3	0.1
Red oaks	*709*	100.0	0.0	0.0
Maples	*411*	99.5	0.5	0.0
Sweetgum	*446*	99.8	0.0	0.2
Yellow-poplar	*326*	99.4	0.0	0.6
Blackgum	*277*	100.0	0.0	0.0
Hickories	*300*	99.7	0.3	0.0
Other hardwoods	*607*	98.5	0.8	0.7
All hardwoods	*3,825*	99.5	0.3	0.2
All species	6,216	99.4	0.4	0.2

[a] Because of rounding, percentages may not sum to 100.

Table H-Distribution of ≥5.0-inch d.b.h. trees by selected species group and crown-dieback class, Southern FHM Region, 1994

Species group	Sample size	Crown-dieback class			
		None (0–5%)	Light (620%)	Moderate (21–50%)	Severe (>50%)
		Percentage of trees sampled[a]			
Softwoods					
Longleaf pine	82	97.6	2.4	0.0	0.0
Slash pine	25	100.0	0.0	0.0	0.0
Shortleaf pine	235	95.7	3.8	0.4	0.0
Loblolly pine	1,303	97.1	2.8	0.2	0.0
Virginia pine	366	87.2	12.0	0.3	0.6
Other softwoods	146	90.4	5.5	2.7	1.4
All softwoods	2,391	95.4	4.1	0.3	0.2
Hardwoods					
White oaks	749	91.0	7.9	0.8	0.3
Red oaks	709	83.2	15.2	1.3	0.3
Maples	411	91.5	7.3	1.2	0.0
Sweetgum	446	89.5	10.1	0.2	0.2
Yellow-poplar	326	95.7	4.0	0.0	0.3
Blackgum	277	93.5	6.1	0.4	0.0
Hickories	300	93.3	6.3	0.3	0.0
Other hardwoods	607	89.8	8.4	1.2	0.7
All hardwoods	3,825	90.0	8.9	0.8	0.3
All species	6,216	92.1	7.1	0.6	0.2

[a]Because of rounding, percentages may not sum to 100.

Table M-Distribution of ≥ 5.0-inch d.b.h. trees by selected species group and number of damage symptoms recorded, Southern FHM Region, 1994

Species group	Sample size	Number of damage symptoms recorded			
		0	1	2	3
		Percentage *of trees* sampled [a]			
Softwoods					
Longleaf pine	82	92.7	7.3	0.0	0.0
Slash pine	259	87.3	12.4	0.4	0.0
Shortleaf pine	235	94.5	5.5	0.0	0.0
Loblolly pine	1,303	90.3	8.9	0.6	0.2
Virginia pine	366	91.5	7.9	0.6	0.0
Other softwoods	146	82.9	17.1	0.0	0.0
All softwoods	2.391	90.2	9.2	0.5	0.1
Hardwoods					
White oaks	749	83.7	14.6	1.7	0.0
Red oaks	709	86.6	12.6	0.8	0.0
Maples	411	78.6	19.5	1.7	0.2
Sweetgum	446	85.0	13.7	1.1	0.2
Yellow-poplar	326	89.3	9.5	1.2	0.0
Blackgum	277	76.9	22.4	0.7	0.0
Hickories	300	87.7	11.7	0.7	0.0
Other hardwoods	607	81.1	17.5	1.5	0.0
All hardwoods	3,825	83.7	15.0	1.2	0.1
All species	6,216	86.2	12.8	1.0	0.1

[a] Because of rounding, percentages may not sum to 100.

Table 17-Distribution of damage types recorded for ≥ 5.0-inch d.b.h. trees by selected species group, Southern FHM Region, 1994

Species group	Damages recorded	Cankers	conks/ decay	Open wounds	Resin./ gumm.	Broken bole	Brooms on bole	Broken roots	Dead term.	Broken branch.	Crown brooms	Dam. foliage	Disc. foliage	Other
		Percent of damages recorded[a]												
Softwoods														
Longleaf pine	6	16.7	0.0	66.7	0.0	0.0	0.0	0.0	0.0	16.7	0.0	0.0	0.0	0.0
Slash pine	34	58.8	0.0	26.5	0.0	5.9	0.0	0.0	2.9	2.9	0.0	0.0	0.0	2.9
Shortleaf pine	13	30.8	15.4	46.2	0.0	0.0	0.0	0.0	0.0	7.7	0.0	0.0	0.0	0.0
Loblolly pine	138	65.9	8.7	18.8	1.4	0.7	0.0	0.0	2.2	1.4	0.0	0.0	0.0	0.7
Virginia pine	33	36.4	9.1	30.3	6.1	0.0	0.0	0.0	12.1	6.1	0.0	0.0	0.0	0.0
Other softwoods	25	0.0	20.0	36.0	0.0	0.0	0.0	8.0	24.0	4.0	0.0	4.0	0.0	4.0
All softwoods	249	51.4	8.8	25.7	1.6	1.2	0.0	0.8	5.6	3.2	0.0	0.4	0.0	1.2
Hardwoods														
White oaks	135	14.8	28.1	16.3	0.0	0.7	0.0	0.0	11.9	8.8	0.0	19.3	0.0	0.0
Red oaks	101	11.9	39.6	16.8	0.0	0.0	0.0	0.0	10.9	12.9	0.0	6.9	0.0	1.0
Maples	97	9.3	38.1	16.5	0.0	1.0	0.0	0.0	25.8	7.2	0.0	1.0	0.0	1.0
Sweetgum	74	5.4	45.9	35.1	0.0	1.4	0.0	0.0	10.8	1.4	0.0	0.0	0.0	0.0
Yellow-poplar	39	12.8	25.6	17.9	10.3	0.0	0.0	2.6	15.4	7.7	0.0	2.6	2.6	2.6
Blackgum	66	3.0	30.3	45.5	0.0	0.0	0.0	0.0	12.1	4.5	0.0	3.0	1.5	0.0
Hickories	39	12.8	28.2	25.6	5.1	0.0	0.0	0.0	17.9	5.1	0.0	5.1	0.0	0.0
Other hardwoods	124	7.3	41.1	28.2	3.2	2.4	0.0	0.0	11.3	5.6	0.0	0.0	0.8	0.0
All hardwoods	675	9.8	35.7	24.1	1.5	0.9	0.0	0.1	14.1	7.1	0.0	5.8	0.4	0.4
All species	924	21.0	28.5	24.6	1.5	1.0	0.0	0.3	11.8	6.1	0.0	4.3	0.3	0.6

[a] Because of rounding, percentages may not sum to 100.

Table l&Distribution of 1.0–4.9-inches d.b.h. saplings by selected species group and sapling-vigor class, Southern FHM Region, 1994

Species group	Sample size	Sapling-vigor class		
		Good	Average	Poor
		Pct. of sap lngs sam p ld [a]		
Softwoods				
Longleaf pine	6	50.0	50.0	0.0
Slash pine	20	70.0	30.0	0.0
Shortleaf pine	27	48.2	48.2	3.7
Loblolly pine	273	67.8	29.7	2.6
Virginia pine	25	52.0	48.0	0.0
Other softwoods	39	92.3	5.1	2.6
All softwoods	390	67.7	30.0	2.3
Hardwoods				
White oaks	72	68.1	29.2	2.8
Red oaks	251	65.3	30.7	4.0
Maples	223	68.2	28.7	3.1
S weetgum	241	68.5	27.4	4.2
Yellow-poplar	61	70.5	27.9	1.6
Blackgum	148	61.5	35.8	2.7
Hickories	100	74.0	25.0	1.0
Other hardwoods	504	65.5	31.5	3.0
All hardwoods	1,600	66.8	30.1	3.1
All species	1,990	66.9	30.1	3.0

[a] Because of rounding, percentages may not sum to 100.

Table 19—Distribution of 1.0–4.9-inches d.b.h. saplings by selected species group and number of damage symptoms recorded, Southern FHM Region, 1994

Species group	Sample size	Number of damage symptoms recorded			
		0	1	2	3
		Percentage *of trees sampled*[a]			
Softwoods					
Longleaf pine	6	100.0	0.0	0.0	0.0
Slash pine	20	95.0	5.0	0.0	0.0
Shortleaf pine	27	96.3	3.7	0.0	0.0
Loblolly pine	273	96.3	3.7	0.0	0.0
Virginia pine	25	96.0	4.0	0.0	0.0
Other softwoods	39	92.3	5.1	2.6	0.0
All softwoods	390	95.9	3.8	0.3	0.0
Hardwoods					
White oaks	72	87.5	12.5	0.0	0.0
Red oaks	251	93.6	5.6	0.8	0.0
Maples	223	82.5	15.7	1.8	0.0
Sweetgum	241	86.3	13.3	0.4	0.0
Yellow-poplar	61	88.5	11.5	0.0	0.0
Blackgum	148	83.8	12.8	2.7	0.7
Hickories	100	84.0	16.0	0.0	0.0
Other hardwoods	504	85.7	12.3	2.0	0.0
All hardwoods	1,600	86.5	12.1	1.3	0.1
All species	1,990	88.3	10.5	1.1	0.1

[a] Because of rounding, percentages may not sum to 100.

Table 20—Distribution of damage types recorded for 1.0–4.9-inches d.b.h. saplings by selected species group, Southern FHM Region, 1994

Species group	Damages recorded	Cankers	conks/ decay	Open wounds	Resin./ gumm.	Broken bole	Brooms on bole	Broken roots	Dead term.	Broken branch.	Crown brooms	Dam. foliage	Disc. foliage	Other
		Percent of damages recorded[a]												
Softwoods														
Longleaf pine	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Slash pine	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0
Shortleaf pine	1	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Loblolly pine	10	80.0	0.0	0.0	10.0	0.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0	0.0
Virginia pine	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0
Other softwoods	4	0.0	0.0	75.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0
All softwoods	17	47.1	0.0	23.5	5.9	0.0	0.0	0.0	17.6	5.9	0.0	0.0	0.0	0.0
Hardwoods														
White oaks	9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	77.8	11.1	0.0	11.1	0.0	0.0
Red oaks	18	5.6	33.3	22.2	5.6	5.6	0.0	0.0	22.2	0.0	0.0	0.0	0.0	5.6
Maples	43	25.6	16.3	16.3	2.3	2.3	0.0	0.0	20.9	11.6	0.0	0.0	2.3	2.3
Sweetgum	34	5.9	52.9	23.5	0.0	0.0	0.0	0.0	14.7	2.9	0.0	0.0	0.0	0.0
Yellow-poplar	7	14.3	0.0	0.0	0.0	0.0	0.0	0.0	14.3	14.3	0.0	42.9	0.0	14.3
Blackgum	30	3.3	43.3	23.3	0.0	3.3	0.0	0.0	20.0	6.7	0.0	0.0	0.0	0.0
Hickories	16	12.5	12.5	37.5	0.0	0.0	0.0	0.0	18.8	6.2	0.0	12.5	0.0	0.0
Other hardwoods	82	7.3	28.0	34.1	0.0	0.0	0.0	0.0	19.5	7.3	0.0	1.2	1.2	1.2
All hardwoods	239	10.0	28.9	25.1	0.8	1.3	0.0	0.0	21.3	7.1	0.0	2.9	0.8	1.7
All species	256	12.5	27.0	25.0	1.2	1.2	0.0	0.0	21.1	7.0	0.0	2.7	0.8	1.6

[a] Because of rounding, percentages may not sum to 100.

Table 21-Thousands of acres of natural and planted loblolly and slash pines with fusiform rust infection at three levels, estimated from FIA data

State	Survey date	Host area	Infection level		
			>10%	>30%	>50%
	Year	*Acres (1,000's)*	*Acres (1,000's)*		
Alabama	1990	5,941	1,711 (29)[a]	665 (11)	299 (5)
Arkansas[b]	1988	2,587	167 (3)	33 (1)	16 (<1)
Florida	1987	5,777	1,166 (20)	453 (8)	213 (4)
Georgia	1989	9,411	4,594 (49)	2,199 (23)	1,016 (11)
Louisiana	1991	4,574	1,658 (36)	581 (13)	204 (4)
Mississippi	1994	5,082	1,200 (24)	338 (7)	72 (1)
North Carolina	1990	3,872	969 (25)	202 (5)	41 (1)
Oklahoma[b]	1992	465	34 (7)	17 (4)	0 (0)
South Carolina	1993	4,563	1,437 (31)	417 (9)	101 (2)
Texas	1992	3,691	419 (11)	79 (2)	16 (<1)
Virginia[b]	1992	1,996	59 (3)	0 (0)	0 (0)
Totals		**47,959**	**13,414 (28)**	**4,984 (10)**	**1,978 (4)**

[a] Number in parentheses refers to the percentage of host acres affected.
[b] No slash pine acres.

Table 22—Thousands of acres of upland hardwood forests affected by oak decline, estimated from FIA data

state	Survey date	Vulnerable host area	Affected area	Incidence
	Year	*- -Acres (1,000's) - -*		Pct.
Alabama	1990	3,867	266	7
Arkansas	1988	5,926	378	6
Florida	1987	889	166	19
Georgia	1989	3,513	275	8
Louisiana	1991	1,211	28	2
Mississippi	1994	3,250	113	3
North Carolina	1990	3,634	713	20
Oklahoma	1992	1,989	18	1
South Carolina	1993	1,568	86	5
Tennessee	1989	5,641	678	12
Texas	1992	2,495	111	4
Virginia	1992	5,686	1,088	19
Totals		39,669	3,920	10

Table 23—Number of saplings and trees sampled by selected species group and tree size, Alabama, 1993

Species group	Saplings 1.0–4.9 in. d.b.h.	Trees ≥5.0 in. d.b.h.
Softwoods		
Longleaf pine	7	57
Slash pine	4	7
Shortleaf pine	9	73
Loblolly pine	87	641
Virginia pine	7	77
Other softwoods	4	24
All softwoods	118	879
Hardwoods		
White oaks	39	165
Red oaks	108	309
Maples	76	95
Sweetgum	97	220
Yellow-poplar	17	66
Blackgum	54	116
Hickories	35	128
Other hardwoods	235	255
All hardwoods	661	1,354
All species	779	2,233

Table 24—Distribution of ≥5.0-inch d.b.h. trees by selected species group and crown-density class, Alabama, 1993

Species group	Sample size	Crown-density class: Good (>50%)	Average (21–50%)	Poor (1–20%)
		-- *Percentage of trees sampled*[a] --		
Softwoods				
Longleaf pine	57	15.8	84.2	0.0
Slash pine	7	0.0	85.7	14.3
Shortleaf pine	73	6.8	84.9	8.2
Loblolly pine	641	6.2	91.6	2.2
Virginia pine	77	11.7	84.4	3.9
Other softwoods	24	12.5	83.3	4.2
All softwoods	879	7.5	89.6	2.8
Hardwoods				
White oaks	165	28.5	70.9	0.6
Red oaks	309	20.7	75.1	4.2
Maples	95	16.8	75.8	7.4
Sweetgum	220	35.4	62.3	2.3
Yellow-poplar	66	39.4	60.6	0.0
Blackgum	116	12.1	86.2	1.7
Hickories	128	27.3	71.1	1.6
Other hardwoods	255	19.2	78.8	2.0
All hardwoods	1,354	24.3	73.1	2.6
All species	2,233	17.7	79.6	2.7

[a] Because of rounding, percentages may not sum to 100

Table 25—Distribution of ≥5.0-inch d.b.h. trees by selected species group and foliage-transparency class, Alabama, 1993

Species group	Sample size	Foliage-transparency class: Normal (0–30%)	Moderate (31-50%)	Severe (>50%)
		-- Percentage of trees sampled [a] --		
Softwoods				
Longleaf pine	57	100.0	0.0	0.0
Slash pine	7	100.0	0.0	0.0
Shot-deaf pine	73	100.0	0.0	0.0
Loblolly pine	641	99.7	0.3	0.0
Virginia pine	77	100.0	0.0	0.0
Other softwoods	24	100.0	0.0	0.0
All softwoods	879	99.8	0.2	0.0
Hardwoods				
White oaks	165	100.0	0.0	0.0
Red oaks	309	99.7	0.0	0.3
Maples	95	100.0	0.0	0.0
Sweetgum	220	100.0	0.0	0.0
Yellow-poplar	66	100.0	0.0	0.0
Blackgum	116	100.0	0.0	0.0
Hickories	128	100.0	0.0	0.0
Other hardwoods	255	100.0	0.0	0.0
All hardwoods	1.354	99.9	0.0	0.1
All species	2,233	99.8	0.1	CO.1

[a] Because of rounding, percentages may not sum to 100.

Table 26-Distribution of ≥5.0-inch d.b.h. trees by selected species group and crown-dieback class, Alabama,1993

Species group	Sample size	Crown-dieback class: None (o-S%)	Light (620%)	Moderate (21-50%)	Severe (>50%)
		Percentage of trees sampled[a]			
Softwoods					
Longleaf pine	*57*	*96.5*	*3.5*	*0.0*	*0.0*
Slash pine	*7*	100.0	0.0	0.0	0.0
Shortleaf pine	*73*	*87.7*	*12.3*	*0.0*	*0.0*
Loblolly pine	641	*94.8*	*5.0*	*0.2*	*0.0*
Virginia pine	*77*	*93.5*	*6.5*	*0.0*	*0.0*
Other softwoods	*24*	*66.7*	*33.3*	*0.0*	*0.0*
All softwoods	*879*	*93.5*	*6.4*	0.1	0.0
Hardwoods					
White oaks	165	89.1	10.9	0.0	0.0
Red oaks	309	75.4	21.4	2.3	1.0
Maples	95	89.5	8.4	1.0	1.0
Sweetgum	220	88.6	10.4	0.9	0.0
Yellow-poplar	66	100.0	0.0	0.0	0.0
Blackgum	116	85.3	13.8	0.9	0.0
Hickories	128	89.8	10.2	0.0	0.0
Other hardwoods	255	87.8	11.4	0.8	0.0
All hardwoods	1,354	86.0	12.8	1.0	0.3
All species	2,233	88.9	10.3	0.6	0.2

'Because of rounding, percentages may not sum to 100.

Table 27—Distribution of ≥5.0-inch d.b.h. trees by selected species group and number of damage symptoms recorded, Alabama, 1993

Species group	Sample size	Number of damage symptoms recorded			
		0	1	2	3
		Percentage of trees sampled [a]			
Softwoods					
Longleaf pine	*57*	*94.7*	*5.3*	*0.0*	*0.0*
Slash pine	7	100.0	0.0	0.0	0.0
Shortleaf pine	*73*	*94.5*	*5.5*	*0.0*	*0.0*
Loblolly pine	641	88.0	10.8	1.1	0.2
Virginia pine	77	92.2	7.8	0.0	0.0
Other softwoods	24	79.2	16.7	4.2	0.0
All softwoods	879	89.2	9.8	0.9	0.1
Hardwoods					
White oaks	165	91.5	8.5	0.0	0.0
Red oaks	309	81.6	16.5	1.9	0.0
Maples	95	69.5	26.3	3.2	1.0
Sweetgum	220	80.9	17.3	1.8	0.0
Yellow-poplar	66	86.4	12.1	1.5	0.0
Blackgum	116	82.8	16.4	0.9	0.0
Hickories	128	88.3	10.9	0.0	0.8
Other hardwoods	255	74.1	21.2	3.9	0.8
All hardwoods	1,354	81.4	16.5	1.8	0.3
All species	2,233	84.5	13.8	1.5	0.2

[a] Because of rounding, percentages may not sum to 100.

Table Z&Distribution of damage types recorded for SO-inch d.b.h. trees by selected species group, Alabama, 1993

Species group	Damages recorded	Cankers	conks/ decay	Open wounds	Resin./ gumm.	Broken bole	Brooms on bole	Broken roots	Dead term.	Broken branch.	Crown brooms	Dam. foliage	Disc. foliage	Other
		Percent of damages recorded[a]												
Softwoods														
Longleaf pine	3	0.0	0.0	33.3	33.3	0.0	0.0	0.0	0.0	0.0	0.0	33.3	0.0	0.0
Slash pine	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Shortleaf pine	4	0.0	0.0	50.0	25.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0
Loblolly pine	86	58.1	22.1	1.2	0.0	0.0	0.0	8.1	0.0	8.1	0.0	2.3	0.0	0.0
Virginia pine	6	0.0	16.7	16.7	0.0	0.0	0.0	16.7	0.0	33.3	0.0	0.0	0.0	16.7
Other softwoods	6	0.0	0.0	33.3	0.0	0.0	0.0	16.7	0.0	50.0	0.0	0.0	0.0	0.0
All softwoods	105	47.6	19.0	6.7	1.9	0.0	0.0	8.6	0.0	12.4	0.0	2.9	0.0	1.0
Hardwoods														
White oaks	14	14.3	71.4	0.0	0.0	0.0	0.0	0.0	0.0	14.3	0.0	0.0	0.0	0.0
Red oaks	63	3.2	65.0	1.6	0.0	1.6	0.0	3.2	0.0	23.8	0.0	1.6	0.0	0.0
Maples	34	2.9	55.9	5.9	0.0	0.0	0.0	2.9	0.0	32.4	0.0	0.0	0.0	0.0
Sweetgum	46	17.4	34.8	17.4	0.0	4.3	0.0	0.0	0.0	23.9	0.0	2.2	0.0	0.0
Yellow-poplar	10	10.0	60.0	10.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Blackgum	21	4.8	52.4	14.3	0.0	0.0	0.0	0.0	0.0	23.8	0.0	4.8	0.0	0.0
Hickories	17	5.9	41.2	17.6	0.0	0.0	0.0	0.0	0.0	29.4	0.0	5.9	0.0	0.0
Other hardwoods	80	2.5	55.0	15.0	0.0	0.0	0.0	6.2	0.0	20.0	0.0	0.0	0.0	1.2
All hardwoods	285	7.0	54.9	10.5	0.4	0.8	0.0	1.5	0.0	17.6	0.0	4.5	0.0	2.8
All species	390	17.4	44.6	9.5	1.0	0.8	0.0	4.4	0.0	20.0	0.0	1.8	0.0	0.5

'Because of rounding, percentages may not sum to 100.

Table 29-Distribution of 1.0–4.9-inches d.b.h. saplings by selected species group and sapling-vigor class, Alabama, 1993

Species group	Sample size	Sapling-vigor class		
		Good	Average	Poor
		Pct. of saplings sampled [a]		
Softwoods				
Longleaf pine	7	42.9	57.1	0.0
Slash pine	4	0.0	100.0	0.0
Shortleaf pine	9	11.1	88.9	0.0
Loblolly pine	87	40.2	57.5	2.3
Virginia pine	7	57.1	42.9	0.0
Other softwoods	4	25.0	75.0	0.0
All softwoods	118	37.3	61 .0	1.7
Hardwoods				
White oaks	39	2.6	97.4	0.0
Red oaks	108	9.3	88.9	1.8
Maples	76	4.0	93.4	2.6
Sweetgum	97	21.6	78.4	0.0
Yellow-poplar	17	23.5	76.5	0.0
Blackgum	54	7.4	88.9	3.7
Hickories	35	8.6	88.6	2.9
Other hardwoods	235	9.4	88.9	1.7
All hardwoods	661	10.3	88.0	1.7
All species	779	14.4	84.0	1.7

[a] Because of rounding, percentages may not sum to 100.

Table 30–Distribution of 1.0–4.9-inches d.b.h. saplings by selected species group and number of damage symptoms recorded, Alabama, 1993

Species group	Sample size	Number of damage symptoms recorded			
		0	1	2	3
		Pct. of saplings sampled[a]			
Softwoods					
Longleaf pine	7	100.0	0.0	0.0	0.0
Slash pine	4	100.0	0.0	0.0	0.0
Shortleaf pine	9	88.9	11.1	0.0	0.0
Loblolly pine	87	98.8	1.2	0.0	0.0
Virginia pine	7	100.0	0.0	0.0	0.0
Other softwoods	4	75.0	25.0	0.0	0.0
All softwoods	118	97.5	2.5	0.0	0.0
Hardwoods					
White oaks	39	84.6	15.4	0.0	0.0
Red oaks	108	97.2	2.8	0.0	0.0
Maples	76	96.0	2.6	1.3	0.0
Sweetgum	97	88.7	8.2	3.1	0.0
Yellow-poplar	17	100.0	0.0	0.0	0.0
Blackgum	54	88.9	3.7	7.4	0.0
Hickories	35	82.9	11.4	5.7	0.0
Other hardwoods	235	90.6	8.1	1.3	0.0
All hardwoods	661	91.4	6.7	2.0	0.0
All species	779	92.3	6.0	1.7	0.0

[a] Because of rounding, percentages may not sum to 100.

Table 31-Distribution of damage types recorded for 1.0–4.9-inches d.b.h. saplings by selected species group, Alabama, 1993

Species group	Damages recorded	Cankers	conks/ decay	Open wounds	Resin./ gumm.	Broken bole	Brooms on bole	Broken roots	Dead term.	Broken branch.	Crown brooms	Dam. foliage	Disc. foliage	Other
	Percent of damages recorded[a]													
Softwoods														
Longleaf pine	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Slash pine	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Shortleaf pine	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
Loblolly pine	1	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Virginia pine	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other softwoods	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
All softwoods	3	33.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	66.7	0.0	0.0	0.0	0.0
Hardwoods														
White oaks	6	16.7	50.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	0.0	0.0	0.0	0.0
Red oaks	3	0.0	33.3	0.0	0.0	0.0	0.0	0.0	0.0	33.3	0.0	33.3	0.0	0.0
Maples	4	0.0	75.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0
Sweetgum	14	0.0	50.0	14.3	0.0	7.1	0.0	0.0	0.0	21.4	0.0	7.1	0.0	0.0
Yellow-poplar	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Blackgum	10	10.0	50.0	10.0	0.0	0.0	0.0	0.0	0.0	10.0	0.0	20.0	0.0	0.0
Hickories	8	0.0	12.5	25.0	0.0	12.5	0.0	0.0	0.0	37.5	0.0	12.5	0.0	0.0
Other hardwoods	25	0.0	56.0	8.0	0.0	4.0	0.0	0.0	0.0	28.0	0.0	4.0	0.0	0.0
All hardwoods	70	2.9	48.6	10.0	0.0	4.3	0.0	1.4	0.0	24.3	0.0	8.6	0.0	0.0
All species	73	4.1	46.6	9.6	0.0	4.1	0.0	1.4	0.0	26.0	0.0	8.2	0.0	0.0

[a]Because of rounding, percentages may not sum to 100.

Table 32—Number of saplings and trees sampled by selected species group and tree size, Georgia, 1993

Species group	Saplings 1.0–4.9 in. d.b.h.	Trees ≥5.0 in. d.b.h.
Softwoods		
Longleaf pine	0	41
Slash pine	21	256
Shortleaf pine	17	152
Loblolly pine	130	597
Virginia pine	1	81
Other softwoods	7	51
All softwoods	176	1,178
Hardwoods		
White oaks	25	155
Red oaks	122	207
Maples	60	120
Sweetgum	86	142
Yellow-poplar	17	96
Blackgum	59	136
Hickories	20	45
Other hardwoods	166	191
All hardwoods	555	1,092
All species	731	2,270

Table 33-Distribution of ≥5.0-inch d.b.h. trees by selected species group and crown-density class, Georgia, 1993

Species group	Sample size	Crown-density class: Good (>50%)	Average (21-50%)	Poor (1–20%)
		-- Percentage of trees sampled[a] --		
Softwoods				
Longleaf pine	41	29.3	70.7	0.0
Slash pine	256	21.1	73.0	5.9
Shortleaf pine	152	2.0	90.1	7.9
Loblolly pine	597	6.0	89.4	4.5
Virginia pine	81	2.5	91.4	6.2
Other softwoods	51	15.7	80.4	3.9
All softwoods	1,178	9.8	85.1	5.2
Hardwoods				
White oaks	155	21.3	76.8	1.9
Red oaks	207	19.8	79.2	1.0
Maples	120	9.2	86.7	4.2
Sweetgum	142	16.2	79.6	4.2
Yellow-poplar	96	25.0	75.0	0.0
Blackgum	136	13.2	83.1	3.7
Hickories	45	26.7	68.9	4.4
Other hardwoods	191	18.3	79.1	2.6
All hardwoods	1,092	18.0	79.4	2.6
All species	2,270	13.7	82.3	3.9

[a] Because of rounding, percentages may not sum to 100.

Table 34-Distribution of ≥5.0-inch d.b.h. trees by selected species group and foliage-transparency class, Georgia,1993

Species group	Sample size	Foliage-transparency class: Normal (O-30%)	Moderate (31-50%)	Severe (>50%)
		-- Percentage of trees sampled [a] --		
Softwoods				
Longleaf pine	41	100.0	0.0	0.0
Slash pine	256	100.0	0.0	0.0
Shortleaf pine	152	100.0	0.0	0.0
Loblolly pine	597	99.7	0.2	0.2
Virginia pine	81	98.8	1.2	0.0
Other softwoods	51	100.0	0.0	0.0
All softwoods	1,178	99.7	0.2	0.1
Hardwoods				
White oaks	155	99.4	0.0	0.6
Red oaks	207	99.5	0.5	0.0
Maples	120	100.0	0.0	0.0
S weetgum	142	99.3	0.0	0.7
Yellow-poplar	96	100.0	0.0	0.0
Blackgum	136	99.3	0.0	0.7
Hickories	45	100.0	0.0	0.0
Other hardwoods	191	100.0	0.0	0.0
All hardwoods	1,092	99.7	0.1	0.3
All species	2,270	99.7	0.1	0.2

[a] Because of rounding, percentages may not sum to 100.

Table 35—Distribution of ≥5.0-inch d.b.h. trees by selected species group and crown-dieback class, Georgia, 1993

Species group	Sample size	Crown-dieback class: None (0–5%)	Light (6–20%)	Moderate (21-50%)	Severe (>50%)
		Percentage of trees sampled [a]			
Softwoods					
Longleaf pine	*41*	*95.1*	*4.9*	*0.0*	*0.0*
Slash pine	*256*	*88.7*	11.3	0.0	0.0
Shortleaf pine	152	89.5	9.9	0.7	0.0
Loblolly pine	597	95.3	4.0	0.3	0.3
Virginia pine	81	72.8	25.9	1.2	0.0
Other softwoods	51	90.2	9.8	0.0	0.0
All softwoods	1,178	91.3	8.2	0.3	0.2
Hardwoods					
White oaks	155	90.3	7.7	1.3	0.6
Red oaks	207	78.7	19.8	1.0	0.5
Maples	120	86.7	13.3	0.0	0.0
Sweetgum	142	87.3	10.6	0.0	2.1
Yellow-poplar	96	97.9	2.1	0.0	0.0
Blackgum	136	89.7	8.8	0.7	0.7
Hickories	45	95.6	4.4	0.0	0.0
Other hardwoods	191	92.1	5.8	1.0	1.0
All hardwoods	1,092	88.5	10.2	0.6	0.7
All species	2,270	90.0	9.1	0.5	0.4

[a] Because of rounding, percentages may not sum to 100.

Table 36—Distribution of ≥ 5.0-inch d.b.h. trees by selected species group and number of damage symptoms recorded, Georgia, 1993

Species group	Sample size	Number of damage symptoms recorded			
		0	1	2	3
		Percentage *of trees* sampled [a]			
Softwoods					
Longleaf pine	41	90.2	9.8	0.0	0.0
Slash pine	256	87.9	8.6	3.5	0.0
Shortleaf pine	152	94.7	5.3	0.0	0.0
Loblolly pine	597	85.9	11.4	2.5	0.2
Virginia pine	81	93.8	6.2	0.0	0.0
Other softwoods	51	92.2	7.8	0.0	0.0
All softwoods	1,178	88.5	9.4	2.0	0.1
Hardwoods					
White oaks	155	87.7	12.3	0.0	0.0
Red oaks	207	88.9	9.7	1.4	0.0
Maples	120	85.8	14.2	0.0	0.0
Sweetgum	142	80.3	19.0	0.7	0.0
Yellow-poplar	96	94.8	3.1	2.1	0.0
Blackgum	136	94.1	5.2	0.8	0.0
Hickories	45	91.1	8.9	0.0	0.0
Other hardwoods	191	87.4	11.0	1.0	0.5
All hardwoods	1,092	88.3	10.8	0.8	0.1
All species	2,270	88.4	10.1	1.4	0.1

[a] Because of rounding, percentages may not sum to 100.

Table 37-Distribution of damage types recorded for ≥5.0-inch d.b.h. trees by selected species group, Georgia, 1993

Species group	Damages recorded	Cankers	conks/ decay	Open wounds	Resin./ gumm.	Broken bole	Brooms on bole	Broken roots	Dead term.	Broken branch.	Crown brooms	Dam. foliage	Disc. foliage	Other
		Percent of damages recorded[a]												
Softwoods														
Longleaf pine	4	50.0	25.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Slash pine	40	52.5	2.5	10.0	22.5	0.0	0.0	5.0	0.0	0.0	0.0	7.5	0.0	0.0
Shortleaf pine	8	37.5	12.5	12.5	12.5	0.0	0.0	12.5	0.0	0.0	0.0	0.0	0.0	12.5
Loblolly pine	101	58.4	24.8	5.9	5.0	0.0	0.0	0.0	0.0	1.0	0.0	1.0	0.0	4.0
Virginia pine	5	60.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0	0.0
Other softwoods	4	0.0	25.0	0.0	0.0	0.0	0.0	25.0	0.0	25.0	0.0	25.0	0.0	0.0
All softwoods	162	54.3	18.5	7.4	9.3	0.0	0.0	2.5	0.0	1.2	0.0	3.7	0.0	3.1
Hardwoods														
White oaks	19	5.3	63.2	0.0	0.0	0.0	0.0	0.0	0.0	26.3	0.0	5.3	0.0	0.0
Red oaks	26	19.2	50.0	7.7	0.0	3.8	0.0	3.8	0.0	15.4	0.0	0.0	0.0	0.0
Maples	17	0.0	76.5	0.0	0.0	5.9	0.0	0.0	0.0	11.8	0.0	0.0	0.0	5.9
Sweetgum	29	3.4	62.1	20.7	0.0	0.0	0.0	0.0	0.0	10.3	0.0	3.4	0.0	0.0
Yellow-poplar	7	42.8	42.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3
Blackgum	9	11.1	44.4	11.1	0.0	0.0	0.0	0.0	0.0	11.1	0.0	11.1	0.0	11.1
Hickories	4	0.0	75.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other hardwoods	28	10.7	71.4	10.7	0.0	0.0	0.0	0.0	0.0	7.1	0.0	0.0	0.0	0.0
All hardwoods	139	10.1	61.9	9.4	0.0	1.4	0.0	0.7	0.0	12.2	0.0	2.2	0.0	2.2
All species	301	33.9	38.5	8.3	5.0	0.7	0.0	1.7	0.0	6.3	0.0	3.0	0.0	2.7

[a] Because of rounding, percentages may not sum to 100.

Table 38—Distribution of 1.0–4.9-inches d.b.h. saplings by selected species group and sapling-vigor class, Georgia, 1993

Species group	Sample size	Sapling-vigor class		
		Good	Average	Poor
		Pct. of saplings sampled [a]		
Softwoods				
Longleaf pine	0	0.0	0.0	0.0
Slash pine	21	95.2	4.8	0.0
Shortleaf pine	17	29.4	64.7	5.9
Loblolly pine[b]	129	54.3	30.2	15.5
Virginia pine	1	100.0	0.0	0.0
Other softwoods	7	57.1	42.9	0.0
All softwoods	175	57.1	30.9	12.0
Hardwoods				
White oaks	25	44.0	56.0	0.0
Red oaks	122	30.3	56.6	13.1
Maples	60	58.3	38.3	3.3
Sweetgum	86	40.7	55.8	3.5
Yellow-poplar	17	41.2	58.8	0.0
Blackgum	59	54.2	42.4	3.4
Hickories	20	50.0	45.0	5.0
Other hardwoods	166	50.6	45.8	3.6
All hardwoods	555	45.2	49.4	5.4
All species	730	48.1	44.9	7.0

[a] Because of rounding, percentages may not sum to 100.
[b] One loblolly pine had a missing value for sapling vigor class.

Table 39-Distribution of 1.0–4.9-inches d.b.h. saplings by selected species group and number of damage symptoms recorded, Georgia, 1993

Species group	Sample size	Number of damage symptoms recorded			
		0	1	2	3
		Pct. of saplings sampled[a]			
Softwoods					
Longleaf pine	*0*	*0.0*	*0.0*	*0.0*	*0.0*
Slash pine	21	100.0	0.0	0.0	0.0
Shortleaf pine	17	100.0	0.0	0.0	0.0
Loblolly pine	130	96.9	3.1	0.0	0.0
Virginia pine	1	100.0	0.0	0.0	0.0
Other softwoods	7	100.0	0.0	0.0	0.0
All softwoods	176	97.7	2.3	0.0	0.0
Hardwoods					
White oaks	25	92.0	8.0	0.0	0.0
Red oaks	122	95.9	4.1	0.0	0.0
Maples	60	93.3	6.7	0.0	0.0
Sweetgum	86	94.2	5.8	0.0	0.0
Yellow-poplar	17	100.0	0.0	0.0	0.0
Blackgum	59	88.1	10.2	1.7	0.0
Hickories	20	85.0	15.0	0.0	0.0
Other hardwoods	166	92.8	5.4	1.2	0.6
All hardwoods	555	93.2	6.1	0.5	0.2
All species	731	94.2	5.2	0.4	0.1

[a] Because of rounding, percentages may not sum to 100.

Table 40—Distribution of damage types recorded for 1.0–4.9-inches d.b.h. saplings by selected species group, Georgia, 1993

Species group	Damages recorded	Cankers	conks/ decay	Open wounds	Resin./ gumm.	Broken bole	Brooms on bole	Broken roots	Dead term.	Broken branch.	Crown brooms	Dam. foliage	Disc. foliage	Other
		Percent of damages recorded[a]												
Softwoods														
Longleaf pine	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Slash pine	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Shortleaf pine	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Loblolly pine	4	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	75.0
Virginia pine	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other softwoods	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All softwoods	4	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	75.0
Hardwoods														
White oaks	2	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0
Red oaks	5	20.0	40.0	0.0	0.0	0.0	0.0	0.0	0.0	40.0	0.0	0.0	0.0	0.0
Maples	4	25.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	25.0
S weetgum	5	0.0	20.0	20.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0	20.0	0.0	20.0
Yellow-poplar	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Blackgum	8	25.0	62.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.5	0.0	0.0
Hickories	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	0.0	66.6	0.0	0.0
Other hardwoods	16	0.0	50.0	12.5	0.0	0.0	0.0	0.0	0.0	25.0	0.0	6.2	0.0	6.2
All hardwoods	43	11.6	39.5	7.0	0.0	0.0	0.0	0.0	0.0	20.9	0.0	14.0	0.0	7.0
All species	47	12.8	36.2	6.4	0.0	0.0	0.0	0.0	0.0	19.1	0.0	12.8	0.0	12.8

[a] Because of rounding, percentages may not sum to 100.

Table 41-Number of saplings and trees sampled by selected species group and tree size, Virginia, 1993

Species group	Saplings 1.0–4.9 in. d.b.h.	Trees ≥5.0 in. d.b.h.
Softwoods		
Longleaf pine	0	0
Slash pine	0	0
Shortleaf pine	2	21
Loblolly pine	70	325
Virginia pine	18	247
Other softwoods	28	84
All softwoods	118	677
Hardwoods		
White oaks	21	444
Red oaks	54	271
Maples	98	217
Sweetgum	77	105
Yellow-poplar	36	180
Blackgum	42	35
Hickories	46	132
Other hardwoods	185	206
All hardwoods	559	1,590
All species	677	2,267

Table 42-Distribution of ≥5.0-inch d.b.h. trees by selected species group and crown-density class, Virginia,1993

Species group	Sample size	Crown-density class: Good (>50%)	Average (21-50%)	Poor (1–20%)
		-- *Percentage of trees sampled*[a] --		
Softwoods				
Longleaf pine	0	0.0	0.0	0.0
Slash pine	0	0.0	0.0	0.0
Shortleaf pine	21	9.5	85.7	4.8
Loblolly pine	325	18.2	79.4	2.5
Virginia pine	247	4.9	89.1	6.1
Other softwoods	84	26.2	67.9	6.0
All softwoods	***677***	***14.0***	***81.7***	***4.3***
Hardwoods				
White oaks	444	38.5	59.5	2.0
Red oaks	271	32.8	66.4	0.7
Maples	217	37.3	60.4	2.3
Sweetgum	105	40.0	59.0	1.0
Yellow-poplar	180	62.2	37.2	0.6
Blackgum	35	31.4	60.0	8.6
Hickories	132	50.0	50.0	0.0
Other hardwoods	206	43.7	52.4	3.9
All hardwoods	***1,590***	41.6	56.5	1.8
All species	2,267	33.4	64.0	2.6

[a] Because of rounding, percentages may not sum to 100.

Table 43-Distribution of ≥5.0-inch d.b.h. trees by selected species group and foliage-transparency class, Virginia,1993

Species group	Sample size	Foliage-transparency class: Normal (O-308)	Moderate (31-50%)	Severe (>50%)
		-- Percentage of trees sampled [a] --		
Softwoods				
Longleaf pine	0	0.0	0.0	0.0
Slash pine	0	0.0	0.0	0.0
Shortleaf pine	21	95.2	4.8	0.0
Loblolly pine	325	88.6	10.8	0.6
Virginia pine	247	82.6	16.2	1.2
Other softwoods	84	84.5	15.5	0.0
All softwoods	677	86.1	13.2	0.7
Hardwoods				
White oaks	444	97.5	1.6	0.9
Red oaks	271	97.0	1.8	1.1
Maples	217	98.2	1.8	0.0
Sweetgum	105	99.0	1.0	0.0
Yellow-poplar	180	98.9	0.6	0.6
Blackgum	35	97.1	0.0	2.9
Hickories	132	99.2	0.8	0.0
Other hardwoods	206	96.1	2.9	1.0
All hardwoods	1,590	97.7	1.6	0.7
All species	2,267	94.3	5.0	0.7

[a] Because of rounding, percentages may not sum to 100.

Table 44—Distribution of ≥5.0-inch d.b.h. trees by selected species group and crown-dieback class, Virginia, 1993

Species group	Sample size	Crown-dieback class: None (0–5%)	Light (6–20%)	Moderate (21-50%)	Severe (>50%)
		Percentage of trees sampled[a]			
Softwoods					
Longleaf pine	0	0.0	0.0	0.0	0.0
Slash pine	0	0.0	0.0	0.0	0.0
Shortleaf pine	21	90.5	9.5	0.0	0.0
Loblolly pine	325	89.5	9.8	0.3	0.3
Virginia pine	247	78.1	20.2	1.6	0.0
Other softwoods	84	89.3	7.1	3.6	0.0
All softwoods	677	85.4	13.3	1.2	0.2
Hardwoods					
White oaks	444	*89.0*	*9.5*	*0.4*	1.1
Red oaks	271	73.8	23.2	1.8	1.1
Maples	217	83.4	12.9	2.8	0.9
Sweetgum	105	84.8	15.2	0.0	0.0
Yellow-poplar	180	97.8	1.7	0.0	0.6
Blackgum	35	94.3	5.7	0.0	0.0
Hickories	132	97.0	3.0	0.0	0.0
Other hardwoods	206	85.9	10.7	1.5	1.9
All hardwoods	1,590	86.7	11.3	1.0	0.9
All species	2,267	86.3	11.9	1.1	0.7

[a] Because of rounding, percentages may not sum to 100.

Table 45—Distribution of ≥5.0-inch d.b.h. trees by selected species group and number of damage symptoms recorded, Virginia, 1993

Species group	Sample size	Number of damage symptoms recorded			
		0	1	2	3
		Percentage of trees sampled [a]			
Softwoods					
Longleaf pine	0	0.0	0.0	0.0	0.0
Slash pine	0	0.0	0.0	0.0	0.0
Shortleaf pine	21	100.0	0.0	0.0	0.0
Loblolly pine	325	98.2	1.8	0.0	0.0
Virginia pine	247	91.5	8.5	0.0	0.0
Other softwoods	84	89.3	10.7	0.0	0.0
All softwoods	677	94.7	5.3	0.0	0.0
Hardwoods					
White oaks	444	84.5	14.0	1.6	0.0
Red oaks	271	83.0	14.8	2.2	0.0
Maples	217	78.3	19.4	1.8	0.5
Sweetgum	105	79.0	20.0	1.0	0.0
Yellow-poplar	180	87.8	12.2	0.0	0.0
Blackgum	35	68.6	25.7	5.7	0.0
Hickories	132	84.8	12.9	2.3	0.0
Other hardwoods	206	74.3	20.4	2.9	2.4
All hardwoods	1,590	81.8	16.0	1.8	0.4
All species	2,267	85.6	12.8	1.3	0.3

[a] Because of rounding, percentages may not sum to 100.

Table 46—Distribution of damage types recorded for ≥5.0-inch d.b.h. trees by selected species group, Virginia, 1993

Species group	Damages recorded	Cankers	Conks/ decay	Open wounds	Resin./ gumm.	Broken bole	Brooms on bole	Broken roots	Dead term.	Broken branch.	Crown brooms	Dam. foliage	Disc. foliage	Other
		Percent of damages recorded[a]												
Softwoods														
Longleaf pine	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Slash pine	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Shortleaf pine	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Loblolly pine	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
Virginia pine	21	57.1	9.5	4.8	9.5	0.0	0.0	4.8	0.0	0.0	0.0	0.0	0.0	14.3
Other softwoods	9	77.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	0.0	0.0	11.1
All softwoods	36	33.3	25.0	2.8	5.6	0.0	0.0	2.8	0.0	2.8	0.0	0.0	0.0	27.8
Hardwoods														
White oaks	76	5.3	44.7	10.5	0.0	0.0	0.0	0.0	0.0	19.7	0.0	11.8	0.0	7.9
Red oaks	52	7.7	63.5	9.6	0.0	0.0	0.0	1.9	0.0	13.5	0.0	3.8	0.0	0.0
Maples	52	7.7	65.4	9.6	0.0	0.0	0.0	0.0	0.0	17.3	0.0	0.0	0.0	0.0
Sweetgum	23	4.3	69.6	4.3	4.3	0.0	0.0	0.0	0.0	8.7	0.0	0.0	0.0	8.7
Yellow-poplar	22	13.6	45.5	13.6	0.0	0.0	0.0	0.0	0.0	22.7	0.0	0.0	0.0	4.5
Blackgum	13	0.0	30.8	7.7	0.0	0.0	0.0	0.0	0.0	30.8	0.0	23.1	0.0	7.7
Hickories	23	8.7	52.2	13.0	0.0	0.0	0.0	0.0	0.0	13.0	0.0	0.0	0.0	13.0
Other hardwoods	69	4.3	44.9	14.5	0.0	1.4	0.0	1.4	0.0	8.7	0.0	18.8	0.0	5.8
All hardwoods	330	6.4	52.7	10.9	0.3	0.3	0.0	0.6	0.0	15.5	0.0	8.2	0.0	5.2
All species	336	9.8	50.0	10.1	0.8	0.3	0.0	0.8	0.0	14.2	0.0	7.4	0.0	7.4

[a] Because of rounding, percentages may not sum to 100.

Table 47-Distribution of 1.0–4.9-inches d.b.h. saplings by selected species group and sapling-vigor class, Virginia, 1993

Species group	Sample size	Sapling-vigor class		
		Good	Average	Poor
		Pct. of saplings sampled [a]		
softwoods				
Longleaf pine	0	0.0	0.0	0.0
Slash pine	0	0.0	0.0	0.0
Shortleaf pine	2	0.0	100.0	0.0
Loblolly pine	70	60.0	34.3	5.7
Virginia pine	18	16.7	72.2	11.1
Other softwoods	28	57.1	42.9	0.0
All softwoods	118	51.7	43.2	5.1
Hardwoods				
White oaks	21	4.8	90.5	4.8
Red oaks	54	22.2	74.1	3.7
Maples	98	37.8	60.2	2.0
Sweetgum	77	48.0	50.6	1.3
Yellow-poplar	36	47.2	47.2	5.6
Blackgum	42	50.0	42.9	7.1
Hickories	46	28.3	65.2	6.5
Other hardwoods	185	39.5	55.1	5.4
All hardwoods	559	37.8	58.0	4.3
All species	677	40.2	55.4	4.4

[a] Because of rounding, percentages may not sum to 100.

Table 48—Distribution of 1.0–4.9-inches d.b.h. saplings by selected species group and number of damage symptoms recorded, Virginia, 1993

Species group	Sample size	Number of damage symptoms recorded			
		0	1	2	3
		Pct. of saplings sampled[a]			
Softwoods					
Longleaf pine	*0*	*0.0*	*0.0*	*0.0*	*0.0*
Slash pine	*0*	*0.0*	*0.0*	*0.0*	*0.0*
Shortleaf pine	*2*	100.0	0.0	0.0	0.0
Loblolly pine	70	100.0	0.0	0.0	0.0
Virginia pine	18	94.4	5.6	0.0	0.0
Other softwoods	28	100.0	0.0	0.0	0.0
All softwoods	118	99.2	0.8	0.0	0.0
Hardwoods					
White oaks	21	90.5	9.5	0.0	0.0
Red oaks	54	94.4	5.6	0.0	0.0
Maples	98	82.6	14.3	3.1	0.0
Sweetgum	77	84.4	13.0	2.6	0.0
Yellow-poplar	36	86.1	11.1	2.8	0.0
Blackgum	42	83.3	16.7	0.0	0.0
Hickories	46	84.8	15.2	0.0	0.0
Other hardwoods	185	83.8	14.0	2.2	0.0
All hardwoods	559	85.2	13.1	1.8	0.0
All species	677	87.6	10.9	1.5	0.0

[a]Because of rounding, percentages may not sum to 100.

Table 49—Distribution of damage types recorded for 1.0–4.9-inches d.b.h. saplings by selected species group, Virginia, 1993

Species group	Damages recorded	Cankers	Conks/ decay	Open wounds	Resin./ gumm.	Broken bole	Brooms on bole	Broken roots	Dead term.	Broken branch.	Crown brooms	Dam. foliage	Disc. foliage	Other
		Percent of damages recorded[a]												
Softwoods														
Longleaf pine	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Slash pine	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Shortleaf pine	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Loblolly pine	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Virginia pine	1	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other softwoods	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All softwoods	1	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hardwoods														
White oaks	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	50.0	0.0	0.0
Red oaks	3	0.0	33.3	0.0	0.0	0.0	0.0	0.0	0.0	33.3	0.0	0.0	0.0	33.3
Maples	20	20.0	40.0	20.0	0.0	0.0	0.0	0.0	0.0	5.0	0.0	15.0	0.0	0.0
Sweetgum	14	0.0	64.3	14.3	0.0	0.0	0.0	0.0	0.0	14.3	0.0	0.0	7.1	0.0
Yellow-poplar	6	0.0	83.3	0.0	0.0	0.0	0.0	0.0	0.0	16.7	0.0	0.0	0.0	0.0
Blackgum	7	14.3	14.3	28.6	0.0	0.0	0.0	0.0	0.0	14.3	0.0	14.3	0.0	14.3
Hickories	7	0.0	14.3	28.6	0.0	0.0	0.0	0.0	0.0	14.3	0.0	0.0	0.0	42.9
Other hardwoods	34	8.8	29.4	17.6	0.0	0.0	0.0	0.0	0.0	20.6	0.0	11.8	0.0	11.8
All hardwoods	93	8.6	37.6	17.2	0.0	0.0	0.0	0.0	0.0	16.1	0.0	9.7	1.1	9.7
All species	94	9.6	37.2	17.0	0.0	0.0	0.0	0.0	0.0	16.0	0.0	9.6	1.1	9.6

[a] Because of rounding, percentages may not sum to 100.

Table SO-Number of saplings and trees sampled by selected species group and tree size, Alabama, 1994

Species group	Saplings 1.0–4.9 in. d.b.h.	Trees ≥5.0 in. d.b.h.
Softwoods		
Longleaf pine	6	43
Slash pine	4	7
Shortleaf pine	8	71
Loblolly pine	80	534
Virginia pine	6	73
Other softwoods	4	18
All softwoods	108	746
Hardwoods		
White oaks	33	165
Red oaks	94	253
Maples	74	85
Sweetgum	90	214
Yellow-poplar	15	63
Blackgum	51	110
Hickories	35	133
Other hardwoods	181	222
All hardwoods	573	1,245
All species	681	1,991

Table 51Distribution of ≥5.0-inch d.b.h. trees by selected species group and crown-density class, Alabama, 1994

Species group	Sample size	Crown-density class: Good (>50%)	Average (21–50%)	Poor (1–20%)
		-- *Percentage of trees sampled*[a] --		
Softwoods				
Longleaf pine	*43*	*16.3*	*83.7*	*0.0*
Slash pine	*7*	*0.0*	100.0	0.0
Shortleaf pine	71	22.5	76.1	1.4
Loblolly pine	534	18.2	19.2	2.6
Virginia pine	73	28.8	68.5	2.7
Other softwoods	18	11.1	83.3	5.6
All softwoods	746	19.2	78.4	2.4
Hardwoods				
White oaks	165	44.8	54.6	0.6
Red oaks	253	41.1	58.9	0.0
Maples	85	37.6	62.4	0.0
Sweetgum	214	42.1	57.0	0.9
Yellow-poplar	63	52.4	47.6	0.0
Blackgum	110	52.7	47.3	0.0
Hickories	133	57.1	42.1	0.8
Other hardwoods	222	38.3	59.5	2.2
All hardwoods	1,245	44.1	55.2	0.7
All species	1,991	34.8	63.9	1.4

[a]Because of rounding, percentages may not sum to 100.

Table S-Distribution of ≥5.0-inch d.b.h. trees by selected species group and foliage-transparency class, Alabama, 1994

Species group	Sample size	Foliage-transparency class: Normal (0–30%)	Moderate (31–50%)	Severe (>50%)
		-- Percentage of trees sampled[a] --		
Softwoods				
Longleaf pine	43	100.0	0.0	0.0
Slash pine	7	100.0	0.0	0.0
Shortleaf pine	71	100.0	0.0	0.0
Loblolly pine	534	100.0	0.0	0.0
Virginia pine	73	100.0	0.0	0.0
Other softwoods	18	100.0	0.0	0.0
All softwoods	746	100.0	0.0	0.0
Hardwoods				
White oaks	165	100.0	0.0	0.0
Red oaks	253	100.0	0.0	0.0
Maples	85	100.0	0.0	0.0
Sweetgum	214	100.0	0.0	0.0
Yellow-poplar	63	100.0	0.0	0.0
Blackgum	110	100.0	0.0	0.0
Hickories	133	100.0	0.0	0.0
Other hardwoods	222	99.6	0.4	0.0
All hardwoods	1,245	99.9	0.1	0.0
All species	1,991	99.9	0.1	0.0

[a] Because of rounding, percentages may not sum to 100.

Table B--Distribution of ≥5.0-inch d.b.h. trees by selected species group and crown-dieback class, Alabama, 1994

Species group	Sample size	Crown-dieback class: None (0–5%)	Light (6–20%)	Moderate (21-50%)	Severe (>50%)
		Percentage of trees sampled[a]			
Softwoods					
Longleaf pine	*43*	*95.4*	*4.6*	*0.0*	*0.0*
Slash pine	*7*	100.0	0.0	0.0	0.0
Shortleaf pine	71	88.7	9.9	1.4	0.0
Loblolly pine	534	93.8	6.0	0.2	0.0
Virginia pine	73	71.2	27.4	1.4	0.0
Other softwoods	18	77.8	16.7	5.6	0.0
All softwoods	746	90.9	8.6	0.5	0.0
Hardwoods					
White oaks	165	90.9	7.9	1.2	0.0
Red oaks	253	85.0	13.8	1.2	0.0
Maples	85	89.4	10.6	0.0	0.0
Sweetgum	214	89.2	10.8	0.0	0.0
Yellow-poplar	63	96.8	3.2	0.0	0.0
Blackgum	110	93.6	6.4	0.0	0.0
Hickories	133	90.2	9.0	0.8	0.0
Other hardwoods	222	90.1	9.0	0.9	0.0
All hardwoods	1,245	89.6	9.7	0.6	0.0
All species	1,991	90.1	9.3	0.6	0.0

[a]Because of rounding, percentages may not sum to 100.

Table H-Distribution of ≥5.0-inch d.b.h. trees by selected species group and number of damage symptoms recorded, Alabama, 1994

Species group	Sample size	Number of damage symptoms recorded			
		0	1	2	3
		Percentage of trees sampled[a]			
Softwoods					
Longleaf pine	*43*	*95.4*	*4.6*	*0.0*	*0.0*
Slash pine	*7*	*100.0*	*0.0*	*0.0*	*0.0*
Shortleaf pine	*71*	*94.4*	*5.6*	*0.0*	*0.0*
Loblolly pine	*534*	*86.3*	*11.8*	1.5	0.4
Virginia pine	73	87.7	9.6	2.7	0.0
Other softwoods	18	61.1	38.9	0.0	0.0
All softwoods	*746*	*87.3*	11.1	1.3	0.3
Hardwoods					
White oaks	165	89.7	9.7	0.6	0.0
Red oaks	253	86.6	13.0	0.4	0.0
Maples	85	80.0	16.5	3.5	0.0
Sweetgum	214	83.6	14.5	1.4	0.5
Yellow-poplar	63	88.9	9.5	1.6	0.0
Blackgum	110	68.2	31.8	0.0	0.0
Hickories	133	92.5	6.8	0.8	0.0
Other hardwoods	222	71.2	26.6	2.2	0.0
All hardwoods	*1,245*	*82.4*	*16.3*	*1.2*	0.1
All species	1,991	84.2	14.4	1.3	0.2

[a]Because of rounding, percentages may not sum to 100.

Table 55—Distribution of damage types recorded for ≥ 5.0-inch d.b.h. trees by selected species group, Alabama, 1994

Species group	Damages recorded	Cankers	conks/ decay	Open wounds	Resin./ gumm.	Broken bole	Brooms on bole	Broken roots	Dead term.	Broken branch.	Crown brooms	Dam. foliage	Disc. foliage	Other
		Percent of damages recorded[a]												
Softwoods														
Longleaf pine	2	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0
Slash pine	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Shortleaf pine	4	25.0	25.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Loblolly pine	85	72.9	10.6	10.6	1.2	1.2	0.0	0.0	2.4	1.2	0.0	0.0	0.0	0.0
Virginia pine	11	9.1	0.0	63.6	9.1	0.0	0.0	0.0	18.2	0.0	0.0	0.0	0.0	0.0
Other softwoods	7	0.0	14.3	71.4	0.0	0.0	0.0	0.0	14.3	0.0	0.0	0.0	0.0	0.0
All softwoods	109	58.7	10.1	22.0	1.8	0.9	0.0	0.0	4.6	1.8	0.0	0.0	0.0	0.0
Hardwoods														
White oaks	18	5.6	55.6	11.1	0.0	5.6	0.0	0.0	5.6	11.1	0.0	5.6	0.0	0.0
Red oaks	35	0.0	51.4	22.9	0.0	0.0	0.0	0.0	11.4	14.3	0.0	0.0	0.0	0.0
Maples	20	0.0	70.0	15.0	0.0	0.0	0.0	0.0	10.0	5.0	0.0	0.0	0.0	0.0
Sweetgum	40	0.0	45.0	40.0	0.0	2.5	0.0	0.0	12.5	0.0	0.0	0.0	0.0	0.0
Yellow-poplar	8	0.0	37.5	0.0	50.0	0.0	0.0	12.5	0.0	0.0	0.0	0.0	0.0	0.0
Blackgum	35	5.7	5.7	68.6	0.0	0.0	0.0	0.0	11.4	5.7	0.0	0.0	2.9	0.0
Hickories	11	0.0	54.5	0.0	18.2	0.0	0.0	0.0	27.3	0.0	0.0	0.0	0.0	0.0
Other hardwoods	69	2.9	43.5	29.0	4.3	4.3	0.0	0.0	8.7	7.2	0.0	0.0	0.0	0.0
All hardwoods	236	2.1	42.8	30.9	3.8	2.1	0.0	0.4	10.6	6.4	0.0	0.4	0.4	0.0
All species	345	20.0	32.5	28.1	3.2	1.7	0.0	0.3	8.7	4.9	0.0	0.3	0.3	0.0

[a] Because of rounding, percentages may not sum to 100

Table S-Distribution of 1.0–4.9-inches d.b.h. saplings by selected species group and sapling-vigor class, Alabama, 1994

Species group	Sample size	Sapling-vigor class		
		Good	Average	Poor
		Pct. of saplings sampled [a]		
Softwoods				
Longleaf pine	6	50.0	50.0	0.0
Slash pine	4	0.0	100.0	0.0
Shortleaf pine	8	37.5	50.0	12.5
Loblolly pine	80	76.2	21.2	2.5
Virginia pine	6	66.7	33.3	0.0
Other softwoods	4	75.0	25.0	0.0
All softwoods	108	68.5	28.7	2.8
Hardwoods				
White oaks	33	60.6	36.4	3.0
Red oaks	94	69.2	30.8	0.0
Maples	74	79.7	20.3	0.0
Sweetgum	90	81.1	17.8	1.1
Yellow-poplar	15	66.7	33.3	0.0
Blackgum	51	68.6	31.4	0.0
Hickories	35	80.0	20.0	0.0
Other hardwoods	181	70.7	26.5	2.8
All hardwoods	573	73.0	25.8	1.2
All species	681	72.2	26.3	1.5

[a] Because of rounding, percentages may not sum to 100.

Table 57—Distribution of 1.0–4.9-inches d.b.h. saplings by selected species group and number of damage symptoms recorded, Alabama, 1994

Species group	Sample size	Number of damage symptoms recorded			
		0	1	2	3
		Pct. of saplings sampled[a]			
Softwoods					
Longleaf pine	6	100.0	0.0	0.0	0.0
Slash pine	4	75.0	25.0	0.0	0.0
Shortleaf pine	8	87.5	12.5	0.0	0.0
Loblolly pine	80	91.2	9.9	0.0	0.0
Virginia pine	6	100.0	0.0	0.0	0.0
Other softwoods	4	75.0	25.0	0.0	0.0
All softwoods	108	90.7	9.3	0.0	0.0
Hardwoods					
White oaks	33	78.8	21.2	0.0	0.0
Red oaks	94	93.6	5.3	0.0	0.0
Maples	74	90.5	8.1	1.4	0.0
Sweetgum	90	82.2	16.7	1.1	0.0
Yellow-poplar	15	86.7	13.3	0.0	0.0
Blackgum	51	74.5	17.6	5.9	2.0
Hickories	35	77.1	22.9	0.0	0.0
Other hardwoods	181	82.9	13.8	3.3	0.0
All hardwoods	573	84.3	13.4	2.1	0.2
All species	681	85.3	12.8	1.8	0.2

[a] Because of rounding, percentages may not sum to 100.

Table B-Distribution of damage types recorded for 1.0–4.9-inches d.b.h. saplings by selected species group, Alabama, 1994

Species group	Damages recorded	Cankers	Conks/ decay	Open wounds	Resin./ gumm.	Broken bole	Brooms on bole	Broken roots	Dead term.	Broken branch.	Crown brooms	Dam. foliage	Disc. foliage	Other
		Percent of damages recorded[a]												
softwoods														
Longleaf pine	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Slash pine	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0
Shortleaf pine	1	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Loblolly pine	7	85.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3	0.0	0.0	0.0	0.0
Virginia pine	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other softwoods	1	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All softwoods	10	60.0	0.0	20.0	0.0	0.0	0.0	0.0	10.0	10.0	0.0	0.0	0.0	0.0
Hardwoods														
White oaks	7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	85.7	0.0	0.0	14.3	0.0	0.0
Red oaks	7	0.0	42.9	28.6	0.0	0.0	0.0	0.0	28.6	0.0	0.0	0.0	0.0	0.0
Maples	8	0.0	50.0	12.5	0.0	0.0	0.0	0.0	0.0	37.5	0.0	0.0	0.0	0.0
Sweetgum	17	0.0	70.6	23.5	0.0	0.0	0.0	0.0	5.9	0.0	0.0	0.0	0.0	0.0
Yellow-poplar	2	50.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0
Blackgum	18	0.0	44.4	27.8	0.0	5.6	0.0	0.0	11.1	5.6	0.0	0.0	0.0	0.0
Hickories	8	0.0	12.5	37.5	0.0	0.0	0.0	0.0	12.5	12.5	0.0	25.0	0.0	0.0
Other hardwoods	37	0.0	37.8	40.5	0.0	0.0	0.0	0.0	13.5	5.4	0.0	2.7	0.0	0.0
All hardwoods	104	1.0	40.4	28.9	0.0	1.0	0.0	0.0	17.3	7.7	0.0	3.8	0.0	0.0
All species	114	6.1	36.8	28.1	0.0	0.9	0.0	0.0	16.7	7.9	0.0	3.5	0.0	0.0

[a]Because of rounding, percentages may not sum to 100.

Table 59—Number of saplings and trees sampled by selected species group and tree size, Georgia, 1994

Species group	Saplings 1.0–4.9 in. d.b.h.	Trees ≥5.0 in. d.b.h.
Softwoods		
Longleaf pine	0	39
Slash pine	16	252
Shortleaf pine	17	143
Loblolly pine	126	537
Virginia pine	1	79
Other softwoods	7	46
All softwoods	167	1,096
Hardwoods		
White oaks	21	147
Red oaks	117	190
Maples	57	115
Sweetgum	79	137
Yellow-poplar	16	93
Blackgum	58	132
Hickories	20	41
Other hardwoods	161	190
All hardwoods	529	1,045
All species	696	2,141

Table 60—Distribution of ≥5.0-inch d.b.h. trees by selected species group and crown-density class, Georgia, 1994

Species group	Sample size	Crown-density class: Good (>50%)	Average (21-50%)	Poor (1-20%)
		-- Percentage *of trees sampled*[a] --		
Softwoods				
Longleaf pine	39	35.9	64.1	0.0
Slash pine	252	35.7	62.3	2.0
Shot-deaf pine	143	9.8	88.1	2.1
Loblolly pine	537	24.8	75.0	0.2
Virginia pine	79	2.5	86.1	11.4
Other softwoods	46	28.3	67.4	4.4
All softwoods	**1,096**	**24.3**	**73.9**	**1.8**
Hardwoods				
White oaks	147	17.0	81.6	1.4
Red oaks	190	19.0	81.0	0.0
Maples	115	15.6	81.7	2.6
Sweetgum	137	15.3	82.5	2.2
Yellow-poplar	93	23.7	74.2	2.2
Blackgum	132	10.6	85.6	3.8
Hickories	41	14.6	82.9	2.4
Other hardwoods	190	13.7	84.2	2.1
All hardwoods	1.045	16.1	82.0	1.9
All species	2,141	20.3	77.9	1.9

[a] Because of rounding, percentages may not sum to 100.

Table 61-Distribution of ≥5.0-inch d.b.h. trees by selected species group and foliage-transparency class, Georgia, 1994

Species group	Sample size	Foliage-transparency class: Normal (0–30%)	Moderate (31-50%)	Severe (>50%)
		-- Percentage of trees sampled[a] --		
Softwoods				
Longleaf pine	*39*	100.0	0.0	0.0
Slash pine	*252*	100.0	0.0	0.0
Shortleaf pine	*143*	100.0	0.0	0.0
Loblolly pine	*537*	*99.6*	*0.4*	*0.0*
Virginia pine	*79*	*98.7*	*1.3*	*0.0*
Other softwoods	*46*	*95.6*	*2.2*	*2.2*
All softwoods	*1,096*	*99.5*	*0.4*	*0.1*
Hardwoods				
White oaks	147	99.3	0.7	0.0
Red oaks	190	100.0	0.0	0.0
Maples	115	100.0	0.0	0.0
Sweetgum	137	100.0	0.0	0.0
Yellow-poplar	93	98.9	0.0	1.1
Blackgum	132	100.0	0.0	0.0
Hickories	41	97.6	2.4	0.0
Other hardwoods	190	99.5	0.0	0.5
All hardwoods	1,045	99.6	0.2	0.2
All species	2,132	99.6	0.3	0.1

[a] Because of rounding, percentages may not sum to 100.

Table 62-Distribution of ≥5.0-inch d.b.h. trees by selected species group and crown-dieback class, Georgia, 1994

Species group	Sample size	Crown-dieback class: None (0–5%)	Light (6-20%)	Moderate (21-50%)	Severe (>50%)
		Percentage of trees sampled[a]			
Softwoods					
Longleaf pine	39	100.0	0.0	0.0	0.0
Slash pine	252	100.0	0.0	0.0	0.0
Shortleaf pine	143	98.6	1.4	0.0	0.0
Loblolly pine	537	99.3	0.6	0.2	0.0
Virginia pine	79	86.1	13.9	0.0	0.0
Other softwoods	46	93.5	4.4	2.2	0.0
All softwoods	1.096	98.2	1.6	0.2	0.0
Hardwoods					
White oaks	147	88.4	11.6	0.0	0.0
Red oaks	190	92.6	7.4	0.0	0.0
Maples	115	93.9	6.1	0.0	0.0
Sweetgum	137	87.6	11.7	0.7	0.0
Yellow-poplar	93	93.6	6.4	0.0	0.0
Blackgum	132	94.7	4.6	0.8	0.0
Hickories	41	95.1	4.9	0.0	0.0
Other hardwoods	190	91.1	6.8	1.6	0.5
All hardwoods	1.045	91.7	7.8	0.5	0.1
All species	2,141	95.0	4.6	0.3	co.1

[a] Because of rounding, percentages may not sum to 100.

Table 63-Distribution of ≥5.0-inch d.b.h. trees by selected species group and number of damage symptoms recorded, Georgia, 1994

Species group	Sample size	Number of damage symptoms recorded			
		0	1	2	3
		Percentage of trees sampled [a]			
Softwoods					
Longleaf pine	*39*	*89.7*	*10.3*	*0.0*	*0.0*
Slash pine	*252*	*86.9*	*12.7*	*0.4*	*0.0*
Shortleaf pine	*143*	*94.4*	*5.6*	*0.0*	*0.0*
Loblolly pine	*537*	*90.5*	*9.5*	*0.0*	*0.0*
Virginia pine	*79*	*96.2*	*3.8*	*0.0*	*0.0*
Other softwoods	*46*	*91.3*	*8.7*	*0.0*	*0.0*
All softwoods	*1,096*	*90.6*	*9.3*	0.1	0.0
Hardwoods					
White oaks	147	89.1	10.9	0.0	0.0
Red oaks	190	91.6	7.4	1.0	0.0
Maples	115	80.0	19.1	0.9	0.0
Sweetgum	137	87.6	11.7	0.7	0.0
Yellow-poplar	93	96.8	2.2	1 .l	0.0
Blackgum	132	85.6	14.4	0.0	0.0
Hickories	41	95.1	4.9	0.0	0.0
Other hardwoods	190	92.1	7.9	0.0	0.0
All hardwoods	1,045	89.4	10.1	0.5	0.0
All species	2,141	90.0	9.7	0.3	0.0

[a] Because of rounding, percentages may not sum to 100.

Table 64-Distribution of damage types recorded for ≥ 5.0-inch d.b.h. trees by selected species group, Georgia, 1994

Species group	Damages recorded	Cankers	conks/ decay	Open wounds	Resin./ gumm.	Broken bole	Brooms on bole	Broken roots	Dead term.	Broken branch.	Crown brooms	Dam. foliage	Disc. foliage	Other
		Percent of damages recorded[a]												
Softwoods														
Longleaf pine	4	25.0	0.0	75.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Slash pine	34	58.8	0.0	26.5	0.0	5.9	0.0	0.0	2.9	2.9	0.0	0.0	0.0	2.9
Shortleaf pine	8	37.5	12.5	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Loblolly pine	51	54.9	5.9	31.4	2.0	0.0	0.0	0.0	2.0	2.0	0.0	0.0	0.0	2.0
Virginia pine	3	33.3	33.3	0.0	0.0	0.0	0.0	0.0	33.3	0.0	0.0	0.0	0.0	0.0
Other softwoods	4	0.0	0.0	0.0	0.0	0.0	0.0	25.0	25.0	0.0	0.0	25.0	0.0	25.0
All softwoods	104	51.0	4.8	30.8	1.0	1.9	0.0	1.0	3.8	1.9	0.0	1.0	0.0	2.9
Hardwoods														
White oaks	16	12.5	56.2	6.2	0.0	0.0	0.0	0.0	18.8	6.2	0.0	0.0	0.0	0.0
Red oaks	18	5.6	66.7	11.1	0.0	0.0	0.0	0.0	11.1	5.6	0.0	0.0	0.0	0.0
Maples	24	0.0	37.5	4.2	0.0	4.2	0.0	0.0	33.3	12.5	0.0	4.2	0.0	4.2
Sweetgum	18	11.1	66.7	16.7	0.0	0.0	0.0	0.0	0.0	5.6	0.0	0.0	0.0	0.0
Yellow-poplar	4	0.0	25.0	0.0	0.0	0.0	0.0	0.0	25.0	25.0	0.0	0.0	0.0	25.0
Blackgum	19	0.0	84.2	5.3	0.0	0.0	0.0	0.0	5.3	5.3	0.0	0.0	0.0	0.0
Hickories	2	0.0	50.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0
Other hardwoods	15	0.0	66.7	6.7	0.0	0.0	0.0	0.0	26.7	0.0	0.0	0.0	0.0	0.0
All hardwoods	116	4.3	60.3	7.8	0.0	0.9	0.0	0.0	17.2	6.9	0.0	0.9	0.0	1.7
All species	220	26.4	34.1	18.6	0.5	1.4	0.0	0.5	10.9	4.5	0.0	0.9	0.0	2.3

[a] Because of rounding, percentages may not sum to 100.

Table 65--Distribution of 1.0–4.9-inches d.b.h. saplings by selected species group and sapling-vigor class, Georgia, 1994

Species group	Sample size	Sapling-vigor class		
		Good	Average	Poor
		Pct. of saplings sampled [a]		
Softwoods				
Longleaf pine	0	0.0	0.0	0.0
Slash pine	16	87.5	12.5	0.0
Shot-deaf pine	17	47.1	52.9	0.0
Loblolly pine	126	65.1	31.0	4.0
Virginia pine	1	0.0	100.0	0.0
Other softwoods	7	71.4	14.3	14.3
All softwoods	167	65.3	31.1	3.6
Hardwoods				
White oaks	21	90.5	9.5	0.0
Red oaks	117	62.4	31.6	6.0
Maples	57	68.4	22.8	8.8
Sweetgum	79	59.5	34.2	6.3
Yellow-poplar	16	62.5	31.2	6.2
Blackgum	58	50.0	44.8	5.2
Hickories	20	55.0	45.0	0.0
Other hardwoods	161	59.6	37.3	3.1
All hardwoods	529	61.2	33.8	4.9
All species	696	62.2	33.2	4.6

[a] Because of rounding, percentages may not sum to 100.

Table 66-Distribution of 1.0–4.9-inches d.b.b. saplings by selected species group and number of damage symptoms recorded, Georgia, 1994

Species group	Sample size	Number of damage symptoms recorded			
		0	1	2	3
		Pct. of saplings sampled[a]			
Softwoods					
Longleaf pine	0	0.0	0.0	0.0	0.0
Slash pine	16	100.0	0.0	0.0	0.0
Shortleaf pine	17	100.0	0.0	0.0	0.0
Loblolly pine	126	97.6	2.4	0.0	0.0
Virginia pine	1	100.0	0.0	0.0	0.0
Other softwoods	7	100.0	0.0	0.0	0.0
All softwoods	167	98.2	1.8	0.0	0.0
Hardwoods					
White oaks	21	100.0	0.0	0.0	0.0
Red oaks	117	94.0	6.0	0.0	0.0
Maples	57	86.0	12.3	1.8	0.0
Sweetgum	79	88.6	11.4	0.0	0.0
Yellow-poplar	16	93.8	6.2	0.0	0.0
Blackgum	58	87.9	12.1	0.0	0.0
Hickories	20	95.0	5.0	0.0	0.0
Other hardwoods	161	92.5	6.8	0.6	0.0
All hardwoods	529	91.5	8.1	0.4	0.0
All species	696	93.1	6.6	0.3	0.0

[a] Because of rounding, percentages may not sum to 100.

Table 67—Distribution of damage types recorded for 1.0–4.9-inches d.b.h. saplings by selected species group, Georgia, 1994

Species group	Damages recorded	Cankers	Conks/ decay	Open wounds	Resin./ gumm.	Broken bole	Brooms on bole	Broken roots	Dead term.	Broken branch.	Crown brooms	Dam. foliage	Disc. foliage	Other
		Percent of damages recorded[a]												
Softwoods														
Longleaf pine	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Slash pine	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Shortleaf pine	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Loblolly pine	3	66.7	0.0	0.0	33.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Virginia pine	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other softwoods	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
All softwoods	3	66.7	0.0	0.0	33.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hardwoods														
White oaks	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Red oaks	7	14.3	42.9	0.0	0.0	14.3	0.0	0.0	14.3	0.0	0.0	0.0	0.0	14.3
Maples	9	0.0	0.0	22.2	0.0	11.1	0.0	0.0	44.4	11.1	0.0	0.0	0.0	11.1
Sweetgum	9	0.0	55.6	0.0	0.0	0.0	0.0	0.0	44.4	0.0	0.0	0.0	0.0	0.0
Yellow-poplar	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
Blackgum	7	0.0	57.1	0.0	0.0	0.0	0.0	0.0	42.9	0.0	0.0	0.0	0.0	0.0
Hickories	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0
Other hardwoods	13	15.4	30.8	7.7	0.0	0.0	0.0	0.0	23.1	15.4	0.0	0.0	0.0	7.7
All hardwoods	47	6.4	34.0	6.4	0.0	4.3	0.0	0.0	34.0	6.4	0.0	0.0	0.0	8.5
All species	50	10.0	32.0	6.0	2.0	4.0	0.0	0.0	32.0	6.0	0.0	0.0	0.0	8.0

[a] Because of rounding, percentages may not sum to 100.

Table 68—Number of saplings and trees sampled by selected species group and tree size, Virginia, 1994

Species group	Saplings 1.0–4.9 in. d.b.b.	Trees ≥5.0 in. d.b.h.
Softwoods		
Longleaf pine	**0**	**0**
Slash pine	**0**	**0**
Shortleaf pine	2	21
Loblolly pine	67	232
Virginia pine	18	214
Other softwoods	28	82
All softwoods	115	549
Hardwoods		
White oaks	18	437
Red oaks	40	266
Maples	92	211
Sweetgum	72	95
Yellow-poplar	30	170
Blackgum	39	35
Hickories	45	126
Other hardwoods	162	195
All hardwoods	498	1,535
All species	613	2,084

Table 69—Distribution of ≥5.0-inch d.b.h. trees by selected species group and crown-density class, Virginia, 1994

Species group	Sample size	Crown-density class: Good (>50%)	Average (21–50%)	Poor (1–20%)
		Percentage *of trees* sampled [a]		
Softwoods				
Longleaf pine	0	0.0	0.0	0.0
Slash pine	0	0.0	0.0	0.0
Shortleaf pine	21	0.0	95.2	4.8
Loblolly pine	232	7.8	90.5	1.7
Virginia pine	214	13.1	81.3	5.6
Other softwoods	82	25.6	56.1	18.3
All softwoods	549	12.2	82.0	5.8
Hardwoods				
White oaks	437	27.7	69.8	2.5
Red oaks	266	28.6	68.4	3.0
Maples	211	35.6	63.0	1.4
Sweetgum	95	46.3	52.6	1.0
Yellow-poplar	170	46.5	51.2	2.4
Blackgum	35	40.0	57.1	2.9
Hickories	126	45.2	53.2	1.6
Other hardwoods	195	32.3	61 .0	6.7
All hardwoods	1,535	34.5	62.7	2.8
All species	2,084	28.6	67.8	3.6

'Because of rounding, percentages may not sum to 100.

Table 70—Distribution of ≥5.0-inch d.b.h. trees by selected species group and foliage-transparency class, Virginia, 1994

Species group	Sample size	Foliage-transparency class: Normal (0–30%)	Moderate (31-50%)	Severe (>50%)
		-- Percentage of trees sampled [a] --		
Softwoods				
Longleaf pine	0	0.0	0.0	0.0
Slash pine	0	0.0	0.0	0.0
Shortleaf pine	21	95.2	4.8	0.0
Loblolly pine	232	99.1	0.4	0.4
Virginia pine	214	96.3	2.8	0.9
Other softwoods	82	92.7	3.7	3.7
All softwoods	549	96.9	2.0	1.1
Hardwoods				
White oaks	437	99.5	0.2	0.2
Red oaks	266	100.0	0.0	0.0
Maples	211	99.0	1.0	0.0
Sweetgum	95	99.0	0.0	1.0
Yellow-poplar	170	99.4	0.0	0.6
Blackgum	35	100.0	0.0	0.0
Hickories	126	100.0	0.0	0.0
Other hardwoods	195	96.4	2.0	1.5
All hardwoods	1,535	99.2	0.5	0.4
All species	2,084	98.6	0.9	0.6

[a] Because of rounding, percentages may not sum to 100.

Table 71-Distribution of ≥5.0-inch d.b.h. trees by selected species group and crown-dieback class, Virginia,1994

Species group	Sample size	Crown-dieback class			
		None (0–5%)	Light (6–20%)	Moderate (21–50%)	Severe (>50%)
		Percentage of trees sampled[a]			
Softwoods					
Longleaf pine	*0*	*0.0*	*0.0*	*0.0*	*0.0*
Slash pine	*0*	*0.0*	*0.0*	*0.0*	*0.0*
Shortleaf pine	*21*	100.0	0.0	0.0	0.0
Loblolly pine	*232*	*99.6*	*0.4*	*0.0*	*0.0*
Virginia pine	*214*	*93.0*	*6.1*	*0.0*	*0.9*
Other softwoods	*82*	*91.5*	*3.7*	*2.4*	*2.4*
All softwoods	*549*	*95.8*	*3.1*	*0.4*	*0.7*
Hardwoods					
White oaks	437	*92.0*	*6.6*	*0.9*	*0.5*
Red oaks	266	*74.8*	*22.2*	*2.3*	*0.8*
Maples	211	*91.0*	*6.6*	*2.4*	*0.0*
Sweetgum	95	*92.6*	*6.3*	*0.0*	1.0
Yellow-poplar	170	*96.5*	*2.9*	*0.0*	*0.6*
Blackgum	35	*88.6*	11.4	*0.0*	*0.0*
Hickories	126	*96.0*	4.0	*0.0*	*0.0*
Other hardwoods	195	*88.2*	9.2	1.0	*1.5*
All hardwoods	1.535	*89.2*	*9.1*	1.1	*0.6*
All species	*2,084*	*90.9*	*7.5*	*0.9*	*0.6*

[a] Because of rounding, percentages may not sum to 100.

Table 72—Distribution of ≥5.0-inch d.b.h. trees by selected species group and number of damage symptoms recorded, Virginia, 1994

Species group	Sample size	Number of damage symptoms recorded			
		0	1	2	3
		Percentage of trees sampled [a]			
Softwoods					
Longleaf pine	0	0.0	0.0	0.0	0.0
Slash pine	0	0.0	0.0	0.0	0.0
Shortleaf pine	21	95.2	4.8	0.0	0.0
Loblolly pine	232	99.1	0.9	0.0	0.0
Virginia pine	214	91.1	8.9	0.0	0.0
Other softwoods	82	82.9	17.1	0.0	0.0
All softwoods	549	93.4	6.6	0.0	0.0
Hardwoods					
White oaks	437	79.6	17.6	2.8	0.0
Red oaks	266	83.1	15.8	1.1	0.0
Maples	211	77.2	20.8	1.4	0.5
Sweetgum	95	84.2	14.7	1.0	0.0
Yellow-poplar	170	85.3	13.5	1.2	0.0
Blackgum	35	71.4	22.9	5.7	0.0
Hickories	126	80.2	19.0	0.8	0.0
Other hardwoods	195	81.5	16.4	2.0	0.0
All hardwoods	1,535	80.9	17.2	1.8	0.1
All species	2,084	84.2	14.4	1.3	<0.1

[a] Because of rounding, percentages may not sum to 100.

Table 73-Distribution of damage types recorded for ≥5.0-inch d.b.b. trees by selected species group, Virginia, 1994

Species group	Damages recorded	Cankers	Conks/ decay	Open wounds	Resin./ gumm.	Broken bole	Brooms on bole	Broken roots	Dead term.	Broken branch.	Crown brooms	Dam. foliage	Disc. foliage	Other
		Percent of damages recorded[a]												
Softwoods														
Longleaf pine	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Slash pine	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Shortleaf pine	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
Loblolly pine	2	50.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Virginia pine	19	52.6	10.5	15.8	5.3	0.0	0.0	0.0	5.3	10.5	0.0	0.0	0.0	0.0
Other softwoods	14	0.0	28.6	28.6	0.0	0.0	0.0	7.1	28.6	7.1	0.0	0.0	0.0	0.0
All softwoods	36	30.6	16.7	22.2	2.8	0.0	0.0	2.8	13.9	11.1	0.0	0.0	0.0	0.0
Hardwoods														
White oaks	101	16.8	18.8	18.8	0.0	0.0	0.0	0.0	11.9	8.9	0.0	24.8	0.0	0.0
Red oaks	48	22.9	20.8	14.6	0.0	0.0	0.0	0.0	10.4	14.6	0.0	14.6	0.0	2.1
Maples	53	17.0	26.4	22.6	0.0	0.0	0.0	0.0	28.3	5.7	0.0	0.0	0.0	0.0
Sweetgum	16	12.5	25.0	43.8	0.0	0.0	0.0	0.0	18.8	0.0	0.0	0.0	0.0	0.0
Yellow-poplar	27	18.5	22.2	25.9	0.0	0.0	0.0	0.0	18.5	7.4	0.0	3.7	3.7	0.0
Blackgum	12	16.7	41.7	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	16.7	0.0	0.0
Hickories	26	19.2	15.4	38.5	0.0	0.0	0.0	0.0	11.5	7.7	0.0	7.7	0.0	0.0
Other hardwoods	40	17.5	27.5	35.0	2.5	0.0	0.0	0.0	10.0	5.0	0.0	0.0	2.5	0.0
All hardwoods	323	17.3	21.7	25.1	0.3	0.0	0.0	0.0	15.5	7.7	0.0	11.5	0.6	0.3
All species	359	18.7	21.2	24.8	0.6	0.0	0.0	0.3	15.3	8.1	0.0	10.3	0.6	0.3

[a] Because of rounding, percentages may not sum to 100.

Table 74-Distribution of 1.0–4.9-inches d.b.b. saplings by selected species group and sapling-vigor class, Virginia, 1994

Species group	Sample size	Sapling-vigor class		
		Good	Average	Poor
		Pct. of saplings sampled [a]		
softwoods				
Longleaf pine	0	0.0	0.0	0.0
Slash pine	0	0.0	0.0	0.0
Shortleaf pine	2	100.0	0.0	0.0
Loblolly pine	67	62.7	37.3	0.0
Virginia pine	18	50.0	50.0	0.0
Other softwoods	28	100.0	0.0	0.0
All softwoods	115	70.4	29.6	0.0
Hardwoods				
White oak	18	55.6	**38.9**	**5.6**
Red oaks	40	65.0	**27.5**	**7.5**
Maples	92	58.7	**39.1**	**2.2**
Sweetgum	72	62.5	**31.9**	**5.6**
Yellow-poplar	30	76.7	**23.3**	**0.0**
Blackgum	39	69.2	**28.2**	**2.6**
Hickories	45	77.8	**20.0**	**2.2**
Other hardwoods	162	65.4	31.5	3.1
All hardwoods	498	65.5	31.1	3.4
All species	613	66.4	30.8	2.8

[a] Because of rounding, percentages may not sum to 100.

Table 75—Distribution of 1.0–4.9-inches d.b.h. saplings by selected species group and number of damage symptoms recorded, Virginia, 1994

Species group	Sample size	Number of damage symptoms recorded			
		0	1	2	3
		Pct. of saplings sampled[a]			
Softwoods					
Longleaf pine	*0*	*0.0*	*0.0*	*0.0*	*0.0*
Slash pine	*0*	*0.0*	*0.0*	*0.0*	*0.0*
Shot-deaf pine	*2*	100.0	0.0	0.0	0.0
Loblolly pine	*67*	*100.0*	*0.0*	*0.0*	*0.0*
Virginia pine	*18*	*94.4*	*5.6*	*0.0*	*0.0*
Other softwoods	*28*	*92.9*	*3.6*	*3.6*	*0.0*
All softwoods	115	97.4	1.7	0.9	0.0
Hardwoods					
White oaks	18	88.9	11.1	0.0	0.0
Red oaks	40	92.5	5.0	2.5	0.0
Maples	92	73.9	23.9	2.2	0.0
Sweetgum	72	88.9	11.1	0.0	0.0
Yellow-poplar	30	86.7	13.3	0.0	0.0
Blackgum	39	89.7	7.7	2.6	0.0
Hickories	45	84.4	15.6	0.0	0.0
Other hardwoods	162	82.1	16.0	1.8	0.0
All hardwoods	498	83.7	14.9	1.4	0.0
All species	613	86.3	12.4	1.3	0.0

[a] Because of rounding, percentages may not sum to 100.

Table 76—Distribution of damage types recorded for 1.0–4.9-inches d.b.h. saplings by selected species group, Virginia, 1994

Species group	Damages recorded	Cankers	Conks/ decay	Open wounds	Resin./ gumm.	Broken bole	Brooms on tree	Broken roots	Dead term.	Broken branch.	Crown brooms	Dam. foliage	Disc. foliage	Other
		Percent of damages recorded[a]												
Softwoods														
Longleaf pine	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Slash pine	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Shortleaf pine	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Loblolly pine	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Virginia pine	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0
Other softwoods	3	0.0	0.0	66.7	0.0	0.0	0.0	0.0	33.3	0.0	0.0	0.0	0.0	0.0
All softwoods	4	0.0	0.0	50.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0
Hardwoods														
White oaks	1	0.0	0.0	00	00	00	0.0	00	50.0	50.0	0.0	0.0	00	00
Red oaks	4	00	00	50.0	25.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0	00	00
Maples	26	42.3	11.5	15.4	3.8	00	0.0	0.0	19.2	3.8	0.0	0.0	3.8	00
Sweetgum	8	25.0	12.5	50.0	00	00	0.0	0.0	00	12.5	0.0	0.0	0.0	0.0
Yellow-poplar	4	0.0	0.0	00	00	00	0.0	0.0	00	25.0	0.0	75.0	0.0	0.0
Blackgum	5	20.0	20.0	40.0	00	00	0.0	00	20.0	0.0	0.0	0.0	0.0	0.0
Hickories	7	28.6	14.3	42.9	00	00	0.0	0.0	14.3	0.0	0.0	0.0	0.0	0.0
Other hardwoods	13	12.5	15.6	37.5	0.0	0.0	0.0	0.0	25.0	6.2	0.0	0.0	3.1	0.0
All hardwoods	88	22.7	12.5	30.7	2.3	00	0.0	0.0	19.3	6.8	0.0	3.4	2.3	0.0
All species	92	21.7	12.0	31.5	2.2	00	0.0	00	20.7	6.5	0.0	3.3	2.2	0.0

[a] Because of rounding, percentages may not sum to 100.

Burkman, William G.; **Vissage,** John S.; **Hoffard,** William H. **[and others].** 1998. Summary report: forest health monitoring in the South, 1993 and 1994. Resour. Bull. SRS-32. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station. 91 p.

The U.S. Department of Agriculture, Forest Service, various State forestry and agriculture agencies, and other Federal agencies launched a cooperative program, Forest Health Monitoring, to monitor the health of the Nation's forests. Several indicators have been measured on permanent plots in 17 States. This report summarizes data gathered in 1993 and 1994 from Alabama, Georgia, and Virginia. Simple proportions of crown ratings and damage data from sample plots do not suggest any widespread problems in these States, except for Virginia pine where crown conditions continue to decline. A synopsis of forest insect and disease surveys in the southern region shows that certain pests continue to cause damage and mortality.

Keywords: Crown condition rating, forest damage assessment, Forest Health Monitoring, insect and disease surveys, Virginia pine.

The Forest Service, United States Department of Agriculture (USDA), is dedicated to the principle of multiple use management of the Nation's forest resources for sustained yields of wood, water, forage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and National Grasslands, it strives-as directed by Congress-to provide increasingly greater service to a growing Nation.

The USDA prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (Voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitted Building, 14" and Independence Avenue, SW, Washington, DC 20250-94 10, or call (202) 720-5964 (voice or TDD). USDA is an equal opportunity provider and employer.