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Incidence and Impact of Damage to Louisiana's Timber, 1985

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SUMMARY

The Southern Forest Experiment Station in Starkville, MS, periodically inventories and evaluates forest resources in Alabama, Arkansas, Louisiana, Mississippi, Oklahoma, Tennessee, Texas, and Puerto Rico. Survey data were collected in 1983, 1984, and 1985 by the Forest Inventory and Analysis work unit of the Southern Forest Experiment Station as part of the fifth inventory of Louisiana's forests. Considerably more information was gathered for this inventory than in previous data collections, making possible the publication of this specialized report summarizing information on agents that damage timber in Louisiana's forests.

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INTRODUCTION

During the periodic inventory of Louisiana's forests conducted from 1983 to 1985 by the Southern Forest Experiment Station, Starkville, MS, damage to live trees was noted, and, where possible, a cause or damaging agent was specified. Since a plot is visited only once during the survey, and that visit can be at any time of the year, only agents that produce durable symptoms or signs of damage were reported.

Because the data reported here were gathered by people trained and experienced in forest inventory, not entomology or pathology, qualified people from Region 8, State and Private Forestry, Forest Pest Management, trained the field crews to use a damage-identification handbook (Anderson and others 1980) before doing the field survey assessment. Specimen kits and forms were provided to crew members for submission of damage samples they might be unable to identify in the field. During the survey, field checks were made to ensure the accuracy and consistency of the recording and collection of the data.

Agents selected for inclusion in the survey were required to be (1) easily identifiable, (2) present throughout the year, and (3) present on trees at least 1 inch in diameter at breast height (d.b.h.). Therefore, small trees with problems such as brown spot and trees of all sizes with damage such as defoliation (which is not apparent in winter) are not included in this report.

There are several reasons why this report does not completely assess the incidence and impact of all damage observed in Louisiana's forests. First, damage is caused by a wide variety of agents; some are easily recognized, others are more difficult to identify. The data presented here for damaging agents that are easily identified and persistent, such as stem and branch rust, are reliable. The data for damaging agents that are more difficult to recognize, such as root rot, are underestimated.

Second, certain types of damage can only be observed during part of the year; these have not been included in this survey in a dedicated category. For example, defoliation caused by insects is only evident at the time of year during which trees normally have leaves and insects are active. Since survey crews work throughout the year, defoliation data could not be consistently collected and was recorded only as "other insect" when observed during the summer.

Third, some damaging agents cause trees to die rapidly; these trees were recorded in a mortality (not a damage) category. For instance, trees attacked by bark beetles in summer tend to die rapidly. If the survey crew found a tree with evidence of bark beetle activity, it was probably already dead and would have been tallied as such. Thus many bark beetle damaged trees would not be recorded in the "Bark Beetle" damage category.

And finally, only a single "most damaging" agent was reported per tree. Thus there is no information presented concerning complexes such as a disease/insect/environment interaction.

Data presented in this Resource Bulletin were compiled as a separate computer run. Similarity will be seen among acres of forest types, timber removals, and mortality by species when compared to data presented in "Forest statistics for Louisiana parishes in 1984" (USDA FS 1986). Differences in accumulation, definition changes, and rounding will account for the differences in numbers presented.

In spite of these problems, the survey gives a good picture of the relative incidence of the preselected, easily recognized damage types (or agents) that persist throughout the year.

SAMPLING PROCEDURE

The sampling procedure used for this inventory was designed to provide reliable statistics on a statewide basis or for large groups of parishes. It also accurately summarizes species having a relatively large total volume in the State. However, errors associated with the sampling of relatively minor species, like cottonwood or pond cypress, exceed those for such major species as loblolly pine.

The data on forest acreage and timber volume in this report were obtained by a sampling method involving a forest-nonforest classification on aerial pho-

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tographs linked to ground measurements of trees at sample locations. The sample locations were at the intersections of a grid of lines spaced 3 miles apart. In Louisiana, 116,831 photographic classifications were made, and 6,657 ground locations were visited. The initial estimates of forest area obtained from aerial photographs were adjusted on the basis of the ground check.

A cluster of five variable-radius plots was installed at each ground sample location. Each sample tree on the variable-radius plots represented 7.50 square feet of basal area per acre. Trees less than 5.0 inches in diameter were tallied on fixed-radius plots around the plot centers. Trees on a subsample of plots were measured in detail to obtain data for calculating timber volumes.

Plots established during the fourth survey of Louisiana (Murphy 1975) were remeasured during this (the fifth) survey to determine the elements of change, and these remeasured plots are the basis for estimating growth, mortality, removals, and changes in land use.

COMPUTATION METHODS

Limits on tree size classes were: saplings, 1.0 to 4.9 inches d.b.h.; softwood poletimber, 5.0 to 8.9 inches d.b.h.; hardwood poletimber, 5.0 to 10.9 inches d.b.h.; softwood sawtimber ≥9.0 inches d.b.h.; and hardwood sawtimber ≥11.0 inches d.b.h. Volume equations based on measurements of live standing trees in Louisiana were used to compute merchantable and total cubic volume.

Percentage of species volume and total volume loss attributed to all agents damaging a species were subsequently computed. Data on percent incidence of damage do not imply total economic loss; only a part of the volume in cull would fail to qualify for some commercial use, such as firewood. Cull includes loss due to crooks, limbs, decay, missing wood, sweep, large forks, and sections of the bole too rough to be used as pulpwood or sawtimber. The volume loss was determined by totaling the volume of cull by species.

Mortality could not be attributed to specific damaging agents because it was often impossible to determine the cause of death. In many cases, a tree that had been tallied in the fourth survey 10 years ago (Murphy 1975) was simply missing. It was possible, however, to determine volume loss due to mortality for each tree species on each plot. Accumulating total volume per dead tree by tree species resulted in the total volume loss for poletimber and sawtimber by tree species. Economic impact was determined by multiplying the total wood fiber and quality loss for each tree species by the stumpage value per unit. These dollar estimates were taken from an average of a sample of timber sales in Louisiana in 1984.

INCIDENCE OF DAMAGING AGENTS

Louisiana has 13,872,600 acres of commercial forest, and most of the acreage is in the loblolly pine, oak-hickory, loblolly pine-hardwood, sweetgum-oak, and cypress-tupelo forest types. Table 1 shows the acreage in the various size classes and forest types. The remaining tables in this report show how much of the timber resource was damaged and the agents responsible for the damage. The term "damage" is used to refer to any injury the tree has suffered. A damaged tree is still living.

Tables 2 and 3 show percentage of trees damaged, by size class and tree species. Overall, hardwoods had more damage than softwoods. Red oaks, gums, and white oaks were severely affected. Hardwood sawtimber and saplings showed about the same incidence of damage, which exceeded incidence to poletimber, but more softwood saplings were damaged than poletimber or sawtimber. Loblolly, shortleaf, and slash pine are the most abundant softwood species in Louisiana. For all three species, 25 percent or more of both poletimber- and sawtimber-sized trees were damaged, with damage to saplings being greater than the damage observed in the older age classes (except for slash pine poletimber).

The percentage of saplings damaged was generally higher for hardwoods (66 percent average) than softwoods (45 percent average). In most hardwood species, 65 to 85 percent of the saplings were damaged (table 3). The most frequently damaged saplings were hard maples, with blackgum, soft maple, beech, hickory, and ash all having more than 80 percent of their seedlings damaged. Hardwood poletimber was damaged less often than saplings or sawtimber. The most frequently damaged hardwood sawtimber trees were hard and soft maples, black walnut, beech, ash, and basswood. More than 75 percent of the sawtimber trees in these species were damaged.

Table 4 shows the incidence of damage to softwood by species. The most common causes of softwood damage were suppression and stagnation in saplings and weather, logging, and form in the older age categories. Fusiform rust, caused by *Cronartium quercuum* (Berk.) Miy. & Shirai f. sp. *fusiforme,* was the most common disease-caused damage. Loblolly and slash pines, in all size classes, were affected by this disease. In these tree species, fusiform rust was the most damaging agent and was associated with high volume losses. Fusiform rust was recorded only if the gall was on or within 12 inches of the main stem. Economically, branch galls farther than 12 inches from the bole have minimal impact on the tree. If galls farther out on limbs had been recorded, the reported occurrence of fusiform rust would have been much higher.

Bark beetles are considered to be the most serious insect pests of pines in the Southeast. The reported

incidence of bark beetle damage on live softwood is very low. The main reason for this discrepancy is that this survey only reported damage to living trees; bark beetles usually kill trees, and the dead trees were recorded under the classification "mortality."

The reported incidence of damage due to insects on both hardwoods and softwoods was very low. Insect damage, however, was significantly underestimated due to the difficulty in diagnosing and evaluating many types of insect-caused damage.

Table 5 shows the incidence of damage to hardwoods by species. The most common problems associated with damage observed in hardwoods were weather caused problems, suppression and stagnation, logging, and tree form. Form damage (from various causes including genetics, environmental damage, and pest damage) had the highest incidence in mature trees. Saplings had a high incidence of damage resulting from suppression and stagnation.

MORTALITY, CULL, AND ECONOMIC IMPACT

Annual mortality of softwood poletimber is shown in table 6. Softwood poletimber mortality was about 25 percent of the annual volume of softwood poletimber removals, and hardwood poletimber mortality was 40 percent of the annual volume of hardwood poletimber removals. Softwood sawtimber mortality was approximately 9 percent of the annual softwood sawtimber removals, while hardwood sawtimber mortality was almost 33 percent of the annual hardwood sawtimber removals. The mortality figures shown in table 6 are the total for the resource and do not reflect any discounting for dead trees that represented no economic loss. Table 6 also shows the estimated volumes of cull for the major species groups in Louisiana. Annual removal figures are given to place the volume losses in perspective.

The volume lost due to cull in hardwoods was 150 percent of that in softwoods, but, considering their relative population sizes, the cull of softwood sawtimber is about two times as great as that for hardwood sawtimber. Proportioned by population, annual accumulated cull of hardwood poletimber was about 345 percent of that of softwoods, while the values for mortality in poletimber show much greater damage in both softwood categories.

The economic impact of damaging agents is greatest in softwood sawtimber, which showed an annual loss of about $42 million (table 7). The annual wood volume loss for hardwood sawtimber, although more than 123 percent of the softwood volume, is valued at about $17.9 million because hardwood stumpage value is considerably less than that of softwood. In poletimber, the $3.6 million softwood loss was 227 percent that of hardwoods despite the fact that hardwood volume loss was 170 percent of softwood loss.

Overall, 70.2 percent of all economic impact occurs in softwoods, and about 92.0 percent of the total economic impact was in sawtimber-size trees.

DAMAGING AGENTS, GROWTH DEFECTS, AND SYMPTOMS

The definitions used in the field manual prepared by Anderson, and others (1980) are presented below under the subheadings Diseases, Growth Defects, Natural Phenomena, Animals and Birds, Insects, and Human Activities.

Diseases

Fusiform Rust.—Common host species: slash, loblolly, and shortleaf pines. Symptoms and signs: spindle-shaped galls formed on the stem or on branches within 12 inches (30.5 cm) of the bole. Older galls appear as cankers with sunken, rotten centers encircled by a callus ridge. Witches' brooms are common at galls. Bright orange spores are produced on the galls in the spring.

Growth Defects

Branch Stubs.—Common host species: all tree species. Symptoms and signs: branch holes or stubs greater than 4.0 inches in diameter on stems of trees 5.0 inches d.b.h. and larger or greater than 1.0 inch in diameter on stems of trees 1.0 to 4.9 inches d.b.h.

Basal Defect.—Common host species: all tree species. Symptoms and signs: butt swelling, curls, V-shaped stump sprouts, frost seams, and low stubs below 4.5 feet.

Dieback.—Common host species: all hardwoods. Symptoms and signs: branch tips die back. Initially, only a few branches are affected, but in advanced stages, entire branches die, with the possibility of tree mortality. Dieback is frequently associated with stress caused by an unfavorable environment.

Suppression and Stagnation.—Common host species: all tree species. Symptoms and signs: poor form and small crowns. Suppressed trees are overtopped and receive indirect sunlight. Stagnated trees have thin foliage despite receiving some direct sunlight. Stagnation is usually associated with poor growing sites or overstocking.

Form (damaging).—Common host species: all tree species. Symptoms and signs: all trees 5.0 inches d.b.h. and larger that are deformed due to unknown causes.

Hardwood Cankers.—Common host species: all hardwoods. Symptoms and signs: dead, sunken area formed on the stem, frequently with annual callus ridges around the dead area.

Littleleaf Disease.—Common host species: shortleaf and loblolly pines, but shortleaf is more susceptible. Symptoms and signs: short, yellow needles; reduced shoot growth; and large crops of undersized cones. Affected trees occur in groups. Littleleaf disease usually occurs in trees growing on heavy clay soils with poor internal drainage.

Pitch Canker.—Common host species: most southern pines, but primarily slash, loblolly, and shortleaf. Symptoms and signs: flagging at branch ends, pitch flow from affected area, slight swelling on affected stems and twigs, crooks in main stem, and wilting of current candles.

Root Rots.—Common host species: all tree species. Symptoms and signs: thin, tufted crowns. Diseased trees are frequently found in groups containing dead or windthrown trees. Conks (fruiting bodies) of various fungi may be present on or near the bases of diseased trees. Root rots are more frequent in trees of reduced vigor, thinned stands, and in trees with butt or root injury. Trees with root rots are often subsequently attacked by bark beetles.

Other Diseases.—Common host species: all tree species. Symptoms and signs: all damage caused by diseases not identified in separate categories (e.g., red heart of pine, brown spot, and leaf diseases). Trees showing degrade caused by diseases are included in this category.

Natural Phenomena

Fire.—Common host species: all tree species. Symptoms and signs: fire scars, usually at the base of the stem and widespread in the stand. The scars are usually on the uphill side of the tree, and signs of charring are generally present on the stem.

Flooding.—Common host species: all tree species. Symptoms and signs: yellowing and curling downward of leaves, premature leaf fall, branch and top dieback, tree mortality, and high water and silt marks on tree boles.

Lightning.—Common host species: all tree species. Symptoms and signs: bark stripping or cracking, with damage running from the strike point to the ground in a straight or spiral line. Often the foliage will fade due to root damage or top breakage. Bark beetles often invade struck trees.

Weather.—Common host species: all tree species. Symptoms and signs: windthrow, ice, frost cracks, broken tops, broken branches, marginal leaf burn, and winter burn.

Animals and Birds

Beaver.—Common host species: all tree species. Symptoms and signs: toothmarks and removal of bark from the bole of the tree. Trees are often flooded by water impoundment, which can lead to flood damage and death.

Other Animals.—Common host species: all tree species. Symptoms and signs: branches clipped off or broken, bark removed, holes in the stem, and tears and toothmarks in the wood.

Sapsucker.—Common host species: all tree species. Symptoms and signs: horizontal rows of small holes that may encircle the tree's bole. Bark below the holes is usually streaked or stained by oozing sap.

Insects

Bark Beetles.—Common host species: all pines. Symptoms and signs: pitch tubes, bark beetle galleries on the inner bark surface and the surface of the sapwood, exit holes, and loose bark. Streaks caused by blue stain fungi are often evident in the sapwood. Foliage of infested trees gradually yellows and then turns red.

Hardwood Borers.—Common host species: all hardwoods. Symptoms and signs: initially a dark sap spot on the bark surface, often mixed with frass. Eventually, coarse boring particles appear in bark cracks and crevices beneath the point of attack. Old damage appears as knobby overgrowths or scars on the bark surface.

Terminal Shoot and Stem Borers.—Common host species: all tree species. Symptoms and signs: fresh attacks show boring dust and frass at the entrance holes, which are most often located at the base of leaf petioles and buds. Resin globs may be present at points of attack. Dieback results from larval tunneling within terminal shoots and branches. Foliage on the shoots turns yellow, red, and finally brown.

Other Insects.—Common host species: all tree species. Symptoms and signs: all damage caused by insects not identified in separate categories. Includes hardwood defoliators (e.g., orangestriped oakworm and fall cankerworm), pine defoliators (e.g., redheaded pine sawfly), and pine weevils.

Human Activities

People.—Common host species: all tree species. Symptoms and signs: initials in bark, nails in tree, burns from lanterns, stripped bark, wire around stem, and ax marks.

Logging and Related.—Common host species: all tree species. Symptoms and signs: logging scars on the stem that will form callus ridges within 1 to 2 years after wounding. Trees with logging damage are scattered in stands and show no charring. Broken limbs and scars on the stem near the crown will occur from the felling of other trees. Skid trails, stumps, or other evidence of logging will be present.

FOREST SURVEY TERMS

The following terms used by the Forest Inventory Analysis group are presented to clarify some of the constraints placed on the data collected and on subsequent data analysis.

Acceptable Trees.—Growing-stock trees of commercial species that meet specified standards of size and quality.

Annual Accumulated Cull.—Total cull divided by the intrasurvey period.

Basal Area.—The area in square feet of the cross section at breast height of a single tree or of all the trees in a stand, usually expressed in square feet per acre.

Cull Volume.—Total volume loss due to crooks, limbs, decay, missing wood, sweep, and large forks, plus the volume in sections of the bole too rough to be used as sawtimber or pulpwood.

D.b.h. (Diameter at breast height).—Tree diameter in inches, outside bark, measured at 4.5 feet above ground.

Diameter Class.—A classification of trees based on diameter outside bark at d.b.h. Two-inch diameter classes are commonly used in forest surveys, with the even numbered inch as the approximate midpoint for a class. For example, the 6-inch class includes trees 5.0 through 6.9 inches d.b.h.

Growing-Stock Trees.—Live trees of commercial species qualifying as acceptable trees; excludes rough, rotten, and dead trees.

Hardwoods.—Dicotyledonous trees, usually broad-leaved and deciduous.

Incidence.—Percentage of susceptible trees affected by a damaging agent.

Intrasurvey Period.—The number of years between the current survey and the past survey.

Mortality.—Number or sound-wood volume of live trees that died from natural causes during the intrasurvey period.

Poletimber Trees.—Live trees of commercial species, at least 5.0 inches d.b.h. but smaller than sawtimber size, of good form and vigor.

Rough and Rotten Trees.—Live trees that are currently or potentially unmerchantable for saw logs because of defect, rot, or species.

Saplings.—Live trees 1.0 to 4.9 inches d.b.h. and of good form and vigor.

Saw log.—A log meeting minimum standards of diameter, length, and defect, including logs at least 8 feet long, sound and straight, with a minimum diameter inside bark of 6.0 inches for softwoods and 8.0 inches for hardwoods.

Sawtimber Trees.—Live trees of commercial species containing at least one 12-foot saw log, or two 8-foot or longer noncontiguous saw logs, with at least one-third of the gross board-foot volume between the 1-foot stump and minimum saw log top being sound. Softwoods must be at least 9.0 inches in d.b.h. and hardwoods at least 11.0 inches in d.b.h.

Sawtimber Volume.—Net volume of the saw log portion of live sawtimber in board feet using the International rule, 1/4-inch kerf.

Softwoods.—Coniferous trees, usually evergreen, having needles or scalelike leaves.

Species Groups.—Sets of tree species pooled together for standard reporting.

- Hard maples: Florida, black, and sugar maples.
- Soft maples: Boxelder, red, and silver maples.
- Select red oaks: Cherrybark, northern red, and shumard oaks.
- Other red oaks: Scarlet, southern red, laurel, water, willow, black, and others not in select red oaks.
- Select white oaks: White, swamp white, bur, and swamp chestnut oaks.
- Other white oaks: Overcup, chestnut, post, live, and others not in select white oaks.
- Other eastern hardwoods: Buckeye, birch, hackberry, dogwood, persimmon, honeylocust, silverbell, holly, butternut, cucumber-tree, mulberry, scrub oaks, willow, and other commercial species.

Stand-size Class.—A classification of forest land based on the size class of growing-stock trees on the area.

Sawtimber stands: Stands at least 16.7 percent stocked with growing-stock trees, with half or more of the total stocking in sawtimber or poletimber trees, and sawtimber stocking at least equal to poletimber stocking.

Poletimber stands: Stands at least 16.7 percent stocked with growing-stock trees, with half or more of this stocking in poletimber and sawtimber trees, and poletimber stocking exceeding that of sawtimber.

Sapling-seedling stands: Stands at least 16.7 percent stocked with growing-stock trees, of which more than half of the stocking is saplings and seedlings.

Susceptible Trees.—All living trees. Includes acceptable trees, as well as rough and rotten trees.

Timber Removals.—The net volume of growing-stock trees removed from the inventory by harvesting or cultural operations such as timber-stand improvement, land clearing, or changes in land use.

Timberland.—Forest land producing or capable of producing crops of industrial wood and not withdrawn from timber utilization. Previously called commercial forest land.

TSI.—Timber stand improvement.

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Appendix I—Tables

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Table 1.—*Area of commercial forest land in Louisiana, by stand-size class and forest type*

Forest classification	Thousands of acres[1]
Stand-size class:	
Understock	449.0
Sapling-seedling	2,525.8
Poletimber	2,718.9
Sawtimber	8,178.9
All stand sizes	13,872.6
Forest type:	
Longleaf pine	313.2
Slash pine	619.9
Loblolly pine	3699.2
Shortleaf pine	304.2
Spruce pine	29.8
Eastern redcedar-hardwood	5.2
Longleaf pine-scrub oak	29.2
Shortleaf pine-oak	213.4
Loblolly pine-hardwood	1560.0
Slash pine-hardwood	75.7
Other oak-pine	29.8
Oak-hickory	248.4
Post oak-black oak-bear oak	27.4
White oak-red oak-hickory	1720.5
White oak	5.5
Southern scrub oak	11.1
Sweetgum-yellow poplar	73.9
Mixed hardwoods	83.8
Oak-gum-cypress	805.4
Swamp chestnut oak-cherrybark oak	18.7
Sweetgum-Nuttal oak-willow oak	1152.7
Sugarberry-American elm-green ash	737.3
Overcup oak-water hickory	391.6
Cypress-tupelo	1085.5
Sweetbay-swamp tupelo-red maple	186.3
Cottonwood	60.1
Willow	277.5
Sycamore-pecan-American elm	74.7
Nonstocked	32.3
All types	13,872.6

[1]Totals may not add due to rounding.

Table 2.—*Percentage of susceptible softwood trees damaged, by species and tree size, in Louisiana*

Host	Total population	Trees damaged			Volume of cull[1]	
		Sapling	Poletimber	Sawtimber	Poletimber	Sawtimber
	Thousands	----------	*Percent*	----------	*Mft³*	*Mfbm*
Southern redcedar	605.0	0.0	0.0	0.0	0.0	0.0
Eastern redcedar	8,899.4	38.9	54.8	100.0	0.0	218.0
Shortleaf pine	210,440.5	56.0	36.9	28.0	1,782.9	39,945.5
Slash pine	180,980.2	50.5	53.5	39.4	3,116.4	12,949.1
Spruce pine	8,666.7	100.0	69.2	45.7	0.0	12,612.2
Longleaf pine	67,521.4	36.6	18.9	23.9	182.9	10,542.3
Pond pine	47.7	0.0	0.0	100.0	0.0	477.2
Loblolly pine	1,551,547.9	43.6	34.1	30.6	11,590.9	285,441.7
Baldcypress	147,122.9	43.4	22.1	29.7	1,073.3	64,774.8
Pondcypress	10,727.4	49.1	17.2	39.9	0.0	0.0
Totals[2]	2,186,559.1	45.0	35.8	30.8	17,746.4	426,960.9

[1]Cull due to crooks, limbs, decay, missing wood, sweep, large forks, and volume in sections of bole that are too rough to be utilized as pulpwood or as sawtimber.

[2]Totals may not add due to rounding.

Table 3.—*Percentage of susceptible hardwood trees damaged, by species and tree size, in Louisiana*

Host	Total population	Trees damaged			Volume of cull[1]	
		Sapling	Poletimber	Sawtimber	Poletimber	Sawtimber
	Thousands	----------	*Percent*	----------	*Mft³*	*Mfbm*
Select white oaks[2]	154,350.9	68.6	40.8	61.3	3,054.7	21,648.5
Select red oaks[3]	71,299.4	66.3	31.5	54.3	1,052.6	20,459.7
Other white oaks	193,258.9	75.7	49.7	63.5	7,791.8	48,680.7
Other red oaks	704,545.9	65.8	43.8	58.4	19,303.8	156,115.5
Hickories	240,944.7	84.9	63.0	68.6	8,427.6	57,765.2
Hard maple	14,673.8	100.0	100.0	100.0	0.0	0.0
Soft maple	639,451.9	86.0	74.5	89.4	17,944.9	16,736.4
Beech	25,134.1	81.5	54.7	76.1	1,734.9	23,621.2
Sweetgum	1,064,409.0	70.0	51.2	66.5	25,253.7	115,162.2
Blackgum/tupelo	514,960.6	83.5	60.9	68.0	24,080.3	68,579.0
Ash	290,596.8	81.4	67.3	79.1	14,820.8	32,931.3
Cottonwood	11,479.9	67.0	49.7	53.7	172.9	12,464.4
Basswood	4,786.2	71.0	100.0	79.5	255.4	0.0
Yellow-poplar	6,070.3	65.4	45.9	63.9	103.3	4,191.9
Black walnut	317.1	0.0	100.0	100.0	0.0	0.0
Other eastern hardwoods	1,933,134.0	49.2	50.4	70.6	50,248.8	109,486.6
Noncommercial	21,018.5	8.3	0.0	0.0	3,038.6	0.0
Totals[4]	5,890,431.9	66.4	52.8	66.8	177,284.1	687,843.0

[1]Damage due to crooks, limbs, decay, missing wood, sweep, large forks, and volume in sections of bole that are too rough to be utilized as pulpwood or as sawtimber.

[2]White, swamp white, swamp chestnut, and bur oaks.

[3]Cherrybark, northern red, and shumard oaks.

[4]Totals may not add due to rounding.

Table 4.—*Approximate number of trees and percentage of damage/defect, by softwood species and damaging agent or defect, in Louisiana*

Agent	Incidence of damage		
	Saplings	Poletimber	Sawtimber
Southern redcedar	535,000	0	70,000
		No Damage Reported	
Eastern redcedar	7,913,000	879,000	107,000
Diseases—other	0.0	0.0	8.5
Fire	0.0	16.0	0.0
Inhibiting vegetation	6.3	0.0	0.0
Logging—damage	19.6	0.0	81.3
Form (live tree only)	13.0	38.9	10.2
Shortleaf pine	116,738,000	53,632,000	40,070,000
Insects—other	0.5	0.0	0.0
Bark beetles	0.0	0.4	0.0
Terminal, shoot, & stem borers	1.0	0.0	0.0
Diseases—other	0.0	0.9	1.2
Fusiform rust	1.9	0.7	1.2
Branch stubs	0.0	0.4	0.2
Basal defects	0.0	0.0	0.6
Dieback	0.5	0.5	0.6
Fire	0.4	0.0	0.0
Sapsucker	0.0	0.0	0.6
Weather—other	1.4	3.1	2.3
Flooding	0.0	0.0	0.1
Lightning	0.0	0.0	0.1
Ice	0.0	0.0	0.1
Suppression, stagnation	29.2	7.0	0.2
Inhibiting vegetation	1.3	2.0	0.4
People	0.4	0.0	0.5
Logging—damage	4.6	5.5	4.0
Form (live tree only)	14.8	16.4	15.9
Slash pine	84,958,000	66,936,000	29,085,000
Bark beetles	0.6	0.2	0.3
Terminal, shoot, & stem borers	0.0	0.2	0.0
Diseases—other	0.0	0.0	0.2
Fusiform rust	30.3	46.0	32.3
Basal defects	0.0	0.2	0.3
Fire	0.0	0.4	0.5
Weather—other	1.2	1.5	0.6
Flooding	0.6	1.2	0.4
Lightning	0.0	0.0	0.2
Ice	1.9	0.3	0.0
Suppression, stagnation	14.6	0.4	0.0
Logging—damage	1.3	1.9	2.3
Form (live tree only)	0.0	1.3	2.3
Spruce pine	3,868,000	1,322,000	3,476,000
Diseases—other	0.0	0.0	2.2
Fusiform rust	0.0	0.0	2.8
Branch stubs	0.0	0.0	6.4
Basal defects	15.5	0.0	1.5
Beaver	0.0	0.0	1.5
Weather—other	0.0	12.4	1.9
Suppression, stagnation	29.3	0.0	0.0
Inhibiting vegetation	0.0	8.3	0.0
Logging—damage	0.0	0.0	2.9
Form (live tree only)	55.1	48.5	26.6

Table 4.—*Approximate number of trees and percentage of damage/defect, by softwood species and damaging agent or defect, in Louisiana—Continued*

Agent	Incidence of damage		
	Saplings	Poletimber	Sawtimber
Longleaf pine	34,106,000	16,292,000	17,124,000
Bark beetles	1.5	0.0	0.4
Terminal, shoot, & stem borers	1.5	0.0	1.1
Diseases—other	0.0	0.0	0.1
Branch stubs	0.0	0.0	2.2
Basal defects	0.0	0.0	1.8
Fire	2.8	0.7	0.3
Sapsucker	0.0	0.0	0.9
Weather—other	0.0	0.7	3.2
Lightning	0.0	0.0	0.6
Ice	4.5	2.6	0.1
Suppression, stagnation	6.0	0.0	0.0
People	0.0	0.0	1.6
Logging—damage	3.0	2.0	2.4
Offsite tree	0.0	0.0	0.2
Form (live tree only)	15.6	7.8	7.7
Loblolly pine	1,046,706,000	294,704,000	210,138,000
Insects—other	0.2	0.0	0.0
Bark beetles	0.0	0.6	0.3
Terminal, shoot, & stem borers	1.2	1.0	0.1
Diseases—other	0.1	0.4	1.3
Fusiform rust	10.8	9.8	7.0
Branch stubs	0.0	0.0	1.0
Basal defects	0.1	0.1	0.6
Dieback	0.1	0.4	0.2
Fire	0.3	0.2	0.5
Animals	0.1	0.0	0.0
Sapsucker	0.0	0.0	0.7
Weather— other	1.5	2.7	2.0
Lightning	0.0	0.0	0.2
Tornado	0.2	0.2	0.0
Ice	0.9	0.7	0.1
Suppression, stagnation	15.6	2.6	0.1
Inhibiting vegetation	2.3	2.8	1.2
People	0.3	0.1	0.2
Logging—damage	1.5	2.2	2.7
Form (live tree only)	8.3	10.5	12.3
Baldcypress	60,074,000	34,929,000	52,120,000
Insects—other	1.7	0.0	0.2
Diseases—other	1.0	1.9	6.3
Branch stubs	0.0	0.4	1.0
Basal defects	0.0	0.0	0.9
Dieback	0.0	0.4	0.9
Sapsucker	0.0	0.0	0.1
Weather—other	2.9	1.8	2.2
Lightning	0.0	0.0	0.2
Tornado	0.0	0.0	0.1
Suppression, stagnation	18.8	1.6	0.3
Inhibiting vegetation	6.2	1.6	0.3
Logging—damage	0.0	0.0	0.2
Form (live tree only)	12.9	14.5	16.9
Pondcypress	7,157,000	3,047,000	523,000
Diseases—other	0.0	0.0	12.1
Dieback	0.0	0.0	6.0
Weather—other	0.0	0.0	19.9
Suppression, stagnation	42.1	0.0	0.0
Inhibiting vegetation	7.0	0.0	0.0
Form (live tree only)	0.0	17.2	2.0

Table 5.—*Approximate number of trees and percentage of damage/defect, by hardwood species and damaging agent or defect, in Louisiana*

Agent	Incidence of damage		
	Saplings	Poletimber	Sawtimber
Select white oaks	117,749,000	25,820,000	10,782,000
Hardwood borers	0.0	0.0	0.7
Terminal, shoot, & stem borers	1.4	0.0	0.0
Diseases—other	0.9	1.0	9.1
Hardwood cankers	0.5	0.6	0.6
Branch stubs	0.4	0.4	3.3
Basal defects	0.5	1.8	1.7
Dieback	0.4	1.1	0.3
Fire	1.4	0.0	0.8
Sapsucker	0.0	0.0	1.7
Weather—other	1.8	0.0	1.5
Flooding	0.5	0.0	0.1
Lightning	0.0	0.0	0.6
Ice	0.5	0.0	0.0
Suppression, stagnation	15.6	0.7	0.0
Inhibiting vegetation	4.7	2.6	0.5
People	1.8	0.7	0.7
Logging—damage	8.5	9.0	5.1
Form (live tree only)	29.7	22.9	34.6
Select red oaks	51,350,000	13,101,000	6,849,000
Hardwood borers	0.9	0.0	0.9
Terminal, shoot, & stem borers	1.0	1.5	0.0
Diseases—other	2.1	0.6	11.1
Hardwood cankers	0.0	0.0	0.7
Branch stubs	0.0	0.0	4.0
Basal defects	0.0	1.0	2.8
Fire	1.0	0.7	0.3
Weather—other	6.9	1.5	0.7
Flooding	1.0	0.0	0.1
Lightning	0.0	0.0	0.2
Tornado	0.0	0.0	0.1
Suppression, stagnation	17.4	2.2	0.0
Inhibiting vegetation	8.9	3.7	1.6
People	1.7	0.0	0.2
Logging—damage	8.1	8.7	2.1
Form (live tree only)	17.3	11.7	29.5
Other white oaks	141,203,000	35,125,000	16,931,000
Hardwood borers	0.0	0.0	0.4
Terminal, shoot, & stem borers	0.7	0.0	0.0
Diseases—other	2.5	5.8	13.6
Hardwood cankers	0.0	0.0	0.2
Branch stubs	0.4	1.4	6.1
Basal defects	1.1	1.8	1.0
Dieback	0.0	1.0	0.9
Fire	2.9	0.0	0.3
Sapsucker	0.0	0.0	0.8
Weather—other	2.6	2.4	2.1
Flooding	0.0	0.0	0.1
Tornado	0.0	0.0	0.2
Suppression, stagnation	20.3	0.8	0.0
Inhibiting vegetation	3.2	1.8	0.4
People	0.7	2.0	0.6
Logging—damage	8.6	6.2	2.2
Form (live tree only)	32.7	26.6	34.6

Table 5.—*Approximate number of trees and percentage of damage/defect, by hardwood species and damaging agent or defect, in Louisiana—Continued*

Agent	Incidence of damage		
	Saplings	Poletimber	Sawtimber
Other red oaks	541,384,000	111,392,000	51,770,000
Hardwood borers	0.2	0.3	1.4
Bark beetles	0.0	0.0	0.1
Terminal, shoot, & stem borers	1.0	0.1	0.0
Diseases—other	0.6	3.6	14.0
Root rots	0.0	0.0	0.2
Hardwood cankers	0.1	0.7	0.6
Branch stubs	0.6	0.6	4.3
Basal defects	0.3	1.7	1.1
Dieback	0.1	1.1	0.3
Fire	1.3	1.4	0.5
Sapsucker	0.0	0.0	0.6
Weather—other	2.6	2.0	1.4
Flooding	0.0	0.7	0.3
Lightning	0.0	0.1	0.2
Tornado	0.0	0.0	0.1
Ice	0.0	0.2	0.2
Suppression, stagnation	14.3	0.5	0.1
Inhibiting vegetation	5.3	2.3	0.8
People	0.3	0.3	0.5
Logging—damage	3.6	4.2	1.5
Form (live tree only)	35.7	24.5	30.3
Hickories	182,990,000	41,068,000	16,887,000
Insects—other	0.0	0.0	0.3
Hardwood borers	0.6	0.0	0.1
Terminal, shoot, & stem borers	5.4	0.0	0.0
Diseases—other	0.9	4.4	10.2
Root rots	0.0	0.3	0.3
Hardwood cankers	0.0	0.2	0.2
Branch stubs	0.3	0.7	3.3
Basal defects	0.3	2.2	1.8
Dieback	0.3	2.4	2.1
Fire	0.3	0.0	0.5
Animals	0.0	0.6	0.0
Sapsucker	0.0	0.0	3.6
Weather—other	1.7	2.5	1.9
Flooding	0.3	0.0	0.1
Suppression, stagnation	22.7	4.1	0.1
Inhibiting vegetation	8.6	7.3	1.4
People	0.3	1.1	0.4
Logging— damage	7.0	1.1	1.9
Form (live tree only)	36.2	36.1	40.4
Hard maple	13,863,000	592,000	219,000
Sapsucker	0.0	0.0	25.3
Weather—other	0.0	0.0	25.7
Suppression, stagnation	27.2	0.0	0.0
Inhibiting vegetation	4.2	0.0	0.0
Logging—damage	18.5	0.0	0.0
Form (live tree only)	50.2	100.0	49.1
Soft maple	577,437,000	54,263,000	7,751,000
Terminal, shoot, & stem borers	1.2	0.0	0.0
Diseases—other	1.4	8.0	33.3
Hardwood cankers	0.3	1.5	2.6
Branch stubs	0.5	1.2	1.0
Basal defects	0.8	2.0	2.7

Table 5.—*Approximate number of trees and percentage of damage/defect, by hardwood species and damaging agent or defect, in Louisiana—Continued*

Agent	Incidence of damage		
	Saplings	Poletimber	Sawtimber
Soft maple—Continued			
Dieback	0.8	3.4	2.6
Fire	0.7	0.0	0.0
Weather—other	3.6	4.5	3.5
Flooding	0.3	1.3	1.6
Tornado	0.0	0.1	0.0
Suppression, stagnation	15.4	0.9	0.0
Inhibiting vegetation	4.0	0.9	0.0
People	0.4	0.3	0.0
Logging—damage	5.0	3.1	1.6
Form (live tree only)	51.6	47.5	40.6
Beech	14,740,000	3,975,000	6,419,000
Diseases—other	0.0	2.0	37.0
Branch stubs	0.0	0.0	1.4
Basal defects	0.0	2.3	1.6
Dieback	3.8	0.0	0.8
Fire	5.8	1.8	0.0
Beaver	0.0	0.0	0.5
Weather—other	3.4	0.0	1.7
Flooding	0.0	0.0	1.3
Suppression, stagnation	21.6	2.1	0.0
Inhibiting vegetation	10.4	0.0	0.0
People	0.0	6.8	1.4
Logging—damage	7.3	18.4	0.8
Form (live tree only)	29.2	21.3	29.7
Sweetgum	873,696,000	152,026,000	38,687,000
Insects—other	0.1	0.0	0.0
Terminal, shoot, & stem borers	0.6	0.0	0.0
Diseases—other	0.8	3.7	11.8
Hardwood cankers	0.0	0.1	0.1
Branch stubs	0.1	0.3	2.1
Basal defects	1.1	1.9	2.5
Dieback	0.2	1.9	1.5
Fire	1.3	0.8	0.5
Beaver	0.1	0.5	1.2
Sapsucker	0.0	0.0	0.3
Weather—other	1.5	2.7	2.2
Flooding	0.0	0.3	0.6
Lightning	0.0	0.0	0.1
Tornado	0.1	0.3	0.3
Ice	0.3	0.0	0.0
Suppression, stagnation	20.0	2.7	0.1
Inhibiting vegetation	11.5	4.8	3.3
People	0.3	0.2	0.6
Logging—damage	4.2	4.9	3.2
Form (live tree only)	28.1	25.9	36.5
Blackgum-tupelo	365,061,000	105,072,000	44,828,000
Hardwood borers	0.1	0.0	0.1
Terminal, shoot, & stem borers	3.1	0.2	0.0
Diseases—other	1.5	5.4	10.7
Root rots	0.0	0.1	0.0
Hardwood cankers	0.0	0.4	0.5
Branch stubs	0.6	0.7	1.1
Basal defects	0.5	1.8	1.0
Dieback	1.2	9.1	12.5

Table 5.—*Approximate number of trees and percentage of damage/defect, by hardwood species and damaging agent or defect, in Louisiana—Continued*

Agent	Incidence of damage		
	Saplings	Poletimber	Sawtimber
Blackgum-tupelo—Continued			
Fire	1.3	0.2	0.0
Beaver	0.2	0.2	0.0
Weather—other	3.9	3.6	2.9
Flooding	0.0	0.6	0.1
Lightning	0.0	0.0	0.1
Tornado	0.0	0.1	0.5
Suppression, stagnation	25.8	2.2	0.0
Inhibiting vegetation	3.3	1.3	0.3
People	0.8	1.2	0.3
Logging–damage	7.1	1.1	0.1
Offsite tree	0.4	1.3	0.3
Form (live tree only)	33.5	31.6	37.6
Ash	232,894,000	42,645,000	15,059,000
Hardwood borers	0.0	0.0	0.3
Terminal, shoot, & stem borers	1.6	0.0	0.0
Diseases—other	1.9	9.4	18.3
Hardwood cankers	0.4	0.2	0.4
Branch stubs	0.5	0.0	1.1
Basal defects	0.0	1.7	0.8
Dieback	2.8	7.1	3.6
Fire	0.4	0.0	1.3
Beaver	0.5	0.4	0.0
Sapsucker	0.0	0.2	1.6
Weather—other	4.5	2.1	4.4
Flooding	0.9	2.7	0.9
Suppression, stagnation	18.9	0.0	0.0
Inhibiting vegetation	5.6	1.8	0.3
People	0.2	0.0	0.0
Logging—damage	1.6	1.4	1.2
Form (live tree only)	41.7	40.4	45.0
Cottonwood	3,292,000	5,394,000	2,794,000
Diseases—other	0.0	12.9	4.6
Branch stubs	0.0	0.0	8.6
Basal defects	0.0	0.0	0.3
Weather—other	16.3	7.6	4.4
Suppression, stagnation	17.1	0.0	0.0
Inhibiting vegetation	0.0	5.8	0.0
Form (live tree only)	33.6	23.5	35.8
Basswood	3,642,000	934,000	210,000
Diseases—other	0.0	0.0	49.8
Weather—other	14.1	0.0	0.0
Suppression, stagnation	14.8	0.0	0.0
People	0.0	8.4	0.0
Logging—damage	28.3	0.0	0.0
Form (live tree only)	13.8	91.6	29.7
Yellow-popular	3,369,000	1,273,000	1,429,000
Diseases—other	0.0	0.0	22.9
Branch stubs	0.0	0.0	1.0
Basal defects	0.0	0.0	4.5
Sapsucker	0.0	0.0	6.1
Weather—other	15.7	7.5	2.9
Suppression, stagnation	15.8	0.0	0.0
Inhibiting vegetation	15.8	0.0	0.0
Logging—damage	0.0	16.3	0.0
Form (live tree only)	18.0	22.1	26.5

Table 5.—*Approximate number of trees and percentage of damage/defect, by hardwood species and damaging agent or defect, in Louisiana—Continued*

Agent	Incidence of damage		
	Saplings	Poletimber	Sawtimber
Black walnut	0	304,000	14,000
Diseases—other	0.0	100.0	100.0
Other eastern hardwoods	1,705,991,000	180,509,000	46,634,000
Insects—other	0.0	0.2	0.1
Hardwood borers	0.0	0.0	0.1
Terminal, shoot, & stem borers	0.2	0.0	0.0
Diseases—other	0.5	5.1	15.4
Root rots	0.0	0.2	0.0
Hardwood cankers	0.1	0.0	0.1
Branch stubs	0.2	0.9	3.4
Basal defects	0.1	0.5	0.6
Dieback	0.2	1.6	1.7
Fire	0.5	0.2	0.5
Beaver	0.1	0.0	0.1
Sapsucker	0.0	0.4	0.8
Weather—other	1.8	2.1	3.0
Flooding	0.1	0.4	0.7
Ice	0.0	0.1	0.4
Suppression, stagnation	10.1	1.1	0.1
Inhibiting vegetation	4.5	2.7	0.6
People	0.3	0.3	0.5
Logging—damage	3.3	2.3	0.7
Form (live tree only)	27.0	32.4	41.9
Noncommercial	7,238,000	13,517,000	263,000
Suppression, stagnation	8.3	0.0	0.0

Table 6.—*Poletimber and sawtimber removals and wood losses in Louisiana*

Species	Annual timber removals		Volume loss			
			Annual mortality		Annual accumulated cull[1]	
	Poletimber	Sawtimber	Poletimber	Sawtimber	Poletimber	Sawtimber
	Mft^3	*Mfbm*	*Mft*^{3}	*Mfbm*	*Mft*^{3}	*Mfbm*
Softwoods						
Eastern redcedar	0.0	0.0	0.0	581.4	0.0	21.1
Shortleaf pine	12,915.3	351,817.5	3,999.0	47,747.0	178.0	3,929.6
Slash pine	28,455.4	93,504.3	6,612.2	16,334.2	325.3	1,320.1
Spruce pine	462.7	16,407.5	344.1	968.6	0.0	1,361.8
Longleaf pine	3,055.8	129,213.1	0.0	14,529.9	18.0	1,024.3
Pond pine	0.0	0.0	0.0	0.0	0.0	47.7
Loblolly pine	50,887.1	1,775,069.5	12,751.7	143,486.0	1,142.2	28,362.1
Baldcypress	413.2	24,881.5	173.3	3,473.9	104.6	6,022.8
Pondcypress	0.0	795.5	0.0	0.0	0.0	0.0
Totals	96,189.5	2,391,688.8	23,880.2	227,120.8	1,768.1	42,089.6
Hardwoods						
Select white oaks	3,761.4	53,292.3	525.7	4,854.1	300.6	2,108.1
Select red oaks	1,178.4	23,472.6	840.4	6,752.0	98.8	2,005.1
Other white oaks	6,366.8	79,406.6	1,779.5	21,032.5	755.5	4,676.4
Other red oaks	18,516.4	225,512.5	4,804.7	39,982.2	1,877.3	14,887.9
Hickories	4,764.1	76,506.6	1,168.1	21,067.3	790.3	5,496.3
Soft maple	937.6	2,371.8	1,633.8	6,589.1	1,660.1	1,503.7
Beech	203.5	21,713.2	82.4	2,373.9	172.2	2,277.4
Sweetgum	14,891.5	148,351.9	4,136.1	42,368.7	2,427.7	11,122.1
Blackgum/tupelo	2,779.0	41,762.6	3,254.1	36,090.2	2,366.9	6,538.2
Ash	2,889.9	31,172.9	1,792.7	10,997.9	1,357.9	3,076.1
Cottonwood	501.2	12,374.1	544.0	6,214.6	16.7	1,209.9
Basswood	127.1	803.1	0.0	0.0	26.0	0.0
Yellow-poplar	0.0	2,435.3	0.0	0.0	11.4	437.6
Other eastern hardwoods	9,078.2	89,358.9	5,889.0	67,607.9	4,853.7	10,264.5
Noncommercial	0.0	0.0	0.0	0.0	297.4	0.0
Totals	65,995.0	808,534.3	26,450.5	265,930.6	17,012.4	65,603.3

[1]Cull due to crooks, limbs, decay, missing wood, sweep, large forks, and volume in sections of bole that is too rough to be utilized as pulpwood or sawtimber.

Table 7.—*Annual economic impact of damage on the timber resource in Louisiana*

Species	Annual volume wood fiber loss	Stumpage value per unit	Annual loss
		Dollars	
Softwoods			
Poletimber (*Mft*^{3})	25,648.3	141.90	3,639,496.45
Sawtimber (*Mfbm*)	269,210.3	157.00	42,266,022.75
Hardwoods			
Poletimber (*Mft*^{3})	43,463.0	36.90	1,603,783.00
Sawtimber (*Mfbm*)	331,533.9	54.00	17,902,831.68
All species			
Poletimber (*Mft*^{3})	69,111.3		5,243,279.45
Sawtimber (*Mfbm*)	600,744.3		60,168,854.43
Total			65,412,133.88

Appendix II—Scientific Names of Tree Species Mentioned

Common Name	Scientific Name
American elm	*Ulmus americana* L.
Ash	*Fraxinus* spp.
Baldcypress	*Taxodium distichum* (L.) Rich.
Basswood	*Tilia americana* L.
Bear oak	*Quercus ilicifolia* Wangenh.
Beech	*Fagus grandifolia* Ehrh.
Birch	*Betula* spp.
Black maple	*Acer nigrum* Michx. f.
Black oak	*Quercus velutina* Lam.
Black walnut	*Juglans nigra* L.
Blackgum	*Nyssa sylvatica* Marsh.
Boxelder	*Acer negundo* L.
Buckeye	*Aesculus* spp.
Bur oak	*Quercus macrocarpa* Michx.
Cherrybark oak	*Quercus falcata* var. *pagodifolia* Ell.
Chestnut oak	*Quercus prinus* L.
Cottonwood	*Populus deltoides* Bartr. ex Marsh.
Cypress	*Cupressus* spp.
Dogwood	*Cornus florida* L.
Eastern redcedar	*Juniperus virginiana* L.
Florida maple	*Acerbarbatum* Michx.
Green ash	*Fraxinus pennsylvanica* Marsh.
Gums	see.. Tupelo
Hackberry	*Celtis occidentalis* L.
Hickories	*Carya* spp.
Honeylocust	*Gleditsia triacanthos* L.
Laurel oak	*Quercus laurifolia* Michx.
Live oak	*Quercus virginiana* Mill.
Loblolly pine	*Pinus taeda* L.
Longleaf pine	*Pinus palustris* Mill.
Maples (soft or hard)	*Acer* spp.
Northern red oak	*Quercus rubra* L.
Nuttall oak	*Quercus nuttallii* Palmer
Oaks (red, white, or scrub)	*Quercus* spp.
Overcup oak	*Quercus lyrata* Walt.
Pecan	*Carya illinoensis* (Wangenh.) K. Koch.
Persimmon	*Diospyros virginiana* L.
Pines	*Pinus* spp.
Pond pine	*Pinus serotina* Michx.
Pondcypress	*Taxodium distichum* var. *nutans* (Ait.) Sweet
Post oak	*Quercus stellata* Wangenh.
Red maple	*Acer rubrum* L.
Scarlet oak	*Quercus coccinea* Muenchh.
Scrub oak	see.. Oaks (red, white or scrub)
Shortleaf pine	*Pinus echinata* Mill.
Shumard oak	*Quercus shumardii* Buckl.
Silver maple	*Acer saccharinum* L.
Slash pine	*Pinus elliottii* Engelm.
Southern red oak	*Quercus falcata* Michx.

Appendix II—Scientific Names of Tree Species Mentioned—Continued

Common Name	Scientific Name
Southern redcedar	*Juniperus silicola* (Small) Bailey
Spruce pine	*Pinus glabra* Walt.
Sugar maple	*Acer saccharum* Marsh.
Sugarberry	*Celtis laevigata* Willd.
Swamp chestnut oak	*Quercus michauxii* Nutt.
Swamp white oak	*Quercus bicolor* Willd.
Sweetbay	*Magnolia virginiana* L.
Sweetgum	*Liquidambar styraciflua* L.
Sycamore	*Platanus occidentalis* L.
Tupelo	*Nyssa* spp.
Water hickory	*Carya aquatica* (Michx. f.) Nutt.
Water oak	*Quercus nigra* L.
Water tupelo	*Nyssa aquatica* L.
White oak	*Quercus alba* L.
Willow	*Salix* spp.
Willow oak	*Quercus phellos* L.
Yellow-poplar	*Liriodendron tulipifera* L.

Mistretta, Paul A.; Bylin, Carl. Incidence and Impact of Damage to Louisiana's Timber, 1985. Resour. Bull. SO-117. New Orleans, LA: U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station: 1987. 19 p.

Data collected during a 1983-85 survey of Louisiana's forests are tabulated and discussed.

Additional keywords: forest resources, injury, insect, disease, survey.

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