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Forest Resources of Louisiana, 1991

James F. Rosson, Jr.



FOREWORD

The USDA Forest Service, Southern Forest Experiment Station's Forest Inventory and Analysis (SO-FIA) unit headquartered at Starkville, Mississippi, inventories the forests in the States of Alabama, Arkansas, Louisiana, Mississippi, Oklahoma, Tennessee, and Texas and the U.S. Commonwealth of Puerto Rico. The SO-FIA mission is to develop, analyze, and maintain forest resource information essential for the formulation of forest policies and programs.

The SO-FIA forest inventories are part of a nationwide effort originally authorized by the McSweeney-McNary Act of 1928. More recent legislation pertinent to the SO-FIA mission includes the Forest and Rangeland Renewable Resources Planning Act of 1974, the National Forest Management Act of 1976, and the Forest and Rangeland Renewable Resources Research Act of 1978.

ACKNOWLEDGMENTS

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HIGHLIGHTS

Important findings of the sixth Louisiana forest survey are presented below. Comparisons, unless otherwise noted, are based on estimates for January 1, 1984, and January 1, 1991.

- Timberland area decreased by only 89,600 acres. Louisiana currently has 13,783,000 acres of timberland.
- The predominant forest type group is still oak-gum-cypress, 4,349,900 acres. The loblolly-shortleaf pine type is continuing to close the gap.
- Sawtimber stands occupy 59 percent of Louisiana's timberland. Currently, 3,403,400 acres are in sapling-seedling, 2,161,500 acres are in poletimber, and 8,148,100 acres are in sawtimber stands.
- Some 248,200 acres of sapling-seedling stands, 122,200 acres of poletimber stands, and 344,100 acres of sawtimber stands are understocked. (Adequacy of stocking is based on the numbers and sizes of all live trees.)
- Softwood live-tree volume decreased by 9 percent since 1984. The current volume is 10,122.2 million cubic feet (ft³).
- Hardwood live-tree volume increased only slightly (1 percent) since 1984 to 10,616.1 million ft³.
- Softwood live-tree net growth decreased by 11 percent since 1984. Current net growth is 524.8 million ft³ per year. Removals have increased dramatically, leaving a removal-to-growth ratio of 1.27 to 1. Current removals are 669.0 million ft³ per year, up 49 percent since 1984.
- Hardwood live-tree net growth increased 8 percent since 1984. Current net growth is 325.4 million ft³. Hardwood removals increased 18 percent.

- Plantations occupy 2,735,700 acres of timberland, 16 percent more than 1984.
- Twenty-three percent of Louisiana's live-tree softwood volume (2,314.2 million ft³) is in plantations.
- A total of 4,373,500 acres of timberland underwent some form of commercial harvest since 1984. This is 32 percent of all Louisiana timberland.
- Louisiana had 2,402,500 acres that underwent some form of intermediate stand treatment, a 452,600-acre increase over that reported for 1984.

INTRODUCTION

The findings of the sixth Louisiana forest survey are summarized in this report. The survey is administered by the U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station, headquartered in New Orleans, Louisiana. The Forest Inventory and Analysis (SO-FIA) work unit located in Starkville, Mississippi, is responsible for conducting the surveys. The following seven Midsouth States are under the administration of the Southern Forest Experiment Station (listed in the order the surveys are conducted): Alabama, Louisiana, Texas, Oklahoma, Mississippi, Arkansas, and Tennessee.

Louisiana is subdivided into five forest survey units (fig. 1): North Delta (Unit 1), South Delta (Unit 2), Southwest (Unit 3), Southeast (Unit 4), and Northwest (Unit 5). These divisions facilitate field work and data analysis because the unit boundaries are correlated fairly closely with the physiographic and vegetative regions of the State.

Tables and figures present data for January 1, 1991, as well as estimates of trends. Comparisons, unless otherwise noted, are made between estimates for January 1, 1984, and January 1, 1991. The appendix describes survey methods and data reliability, defines terms, lists common tree species, and provides 22 standard tables.

Numerous publications about the sixth Louisiana survey have already been published: five forest sur-

vey unit reports (Rosson and others 1991a, 1991b, 1991c, 1991d, 1992), a parish statistical report (Vissage and others 1992), a biomass report (Rosson 1993), a harvesting Research Paper (Rosson 1994a), and a Research Paper addressing the status of softwood trees of less than commercial size (Rosson 1994b). The five previous forest surveys of Louisiana were conducted in 1936 (Winters and others 1943), 1954 (USDA FS 1955), 1964 (Sternitzke 1965), 1974 (Murphy 1975), and 1984 (Rosson and others 1988).

The McSweeney-McNary Act of 1928 directed the Forest Service to conduct periodic assessments of the Nation's forest resources. The survey mission was to estimate forest area, timber volume, timber growth, and cut. The survey was charged with reporting the findings and aiding in formulating guiding principles and policies for sustained forest use. Recently, the mission was expanded by three major legislative actions: (1) the Forest and Rangeland Renewable Resources Planning Act of 1974, (2) the National Forest Management Act of 1976, and (3) the Forest and Rangeland Renewable Resources Research Act of 1978. The current mission includes all of the original McSweeney-McNary objectives plus the measurement of additional tangible items (such as wildlife and ecological parameters) and intangible items (such as esthetics, recreation, and human impact). These acts ensure the availability of adequate data for determining ways to balance the supply of and demand for forest land resources for the benefit and use of the American people.

Questions about the survey and requests for additional information may be directed to:

Forest Inventory and Analysis
Southern Forest Experiment Station
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FOREST AREA

Louisiana has 29,312,500 acres of land. Because the focus here is on timberland, the forest survey excluded Cameron, Jefferson, Orleans, Plaquemines, and St. Bernard Parishes, where timberland is very rare. These exclusions reduced the total land base for this forest survey to 26,265,400 acres.

Of this total, 13,791,700 acres are classed as forest and 12,473,700 acres as nonforest land. Nonforest land uses include agricultural, urban, residential, and industrial sites; highways and other rights of way; water; and small wooded lots or wooded strips too small or narrow to meet forest survey definitions. Also excluded from the timberland total are 8,700 acres of

potentially productive public forests on which timber harvest is legally prohibited. The remaining 13,783,000 acres of forest land in Louisiana are classed as timberland.

The 1991 timberland estimate is only 89,600 acres below that of 1984. Historically, Louisiana has lost 2,372,900 acres of timberland since the first survey in 1936. Most of the loss (2,271,200 acres) was in the North Delta and South Delta units (table I). The latest survey shows timberland area stabilizing in all but the South Delta unit. There, 166,500 acres of timberland have been lost since 1984.

The net loss in timberland acreage does not reflect the dynamic changes in land use that have occurred over the last 7 years. Although timberland acreage decreased only slightly, a total of 921,600 acres shifted between forest and nonforest uses. Some 505,600 acres moved from a forest to a nonforest class, and 416,000 acres reverted to timberland from a nonforest class (table II). The majority of diversions went to non-agricultural uses (64 percent), whereas most of the new forest land had been agriculture land previously (73 percent).

Since the 1984 survey, only two units, the South Delta and Southwest, have lost timberland acreage. For the first time since the first survey, the Northwest unit has surpassed the Southwest unit in timberland acreage. Over the last 50 years, timberland in the Southwest unit has decreased whereas that in the Northwest unit has increased.

Four parishes each gained more than 20,000 acres of timberland since 1984 (fig. 2). Richland Parish had the highest gain, 35,600 acres. Six parishes lost more than 20,000 acres of timberland. Beauregard Parish had the largest loss of timberland, 52,700 acres, or 9 percent of its total.

The 1991 survey shows that the amount of land cleared for agriculture in the Mississippi Delta is declining. Only 31,000 acres of timberland in the North Delta unit were cleared since 1984. In the South Delta unit, most of the lost timberland (130,200 acres) went into nonagricultural land uses. Reversions in the North Delta unit resulted in a 32,000-acre net increase in timberland. There were fewer reversions in the South Delta unit, in which the area of timberland decreased by 166,500 acres. Large-scale clearing of delta timberland for agriculture peaked in the 1960's and early 1970's and appears to have settled into localized land-use shifts. This situation is expected to continue unless extreme shifts in agriculture markets or changes in land-use legislation encourage renewed land clearing.

Overall, 52 percent of the land in the surveyed parishes is timberland. Nineteen parishes have 61 to 80 percent of their land area in timberland (fig. 3). Nine parishes have less than 20 percent and eight have more than 80 percent of their land in timberland.

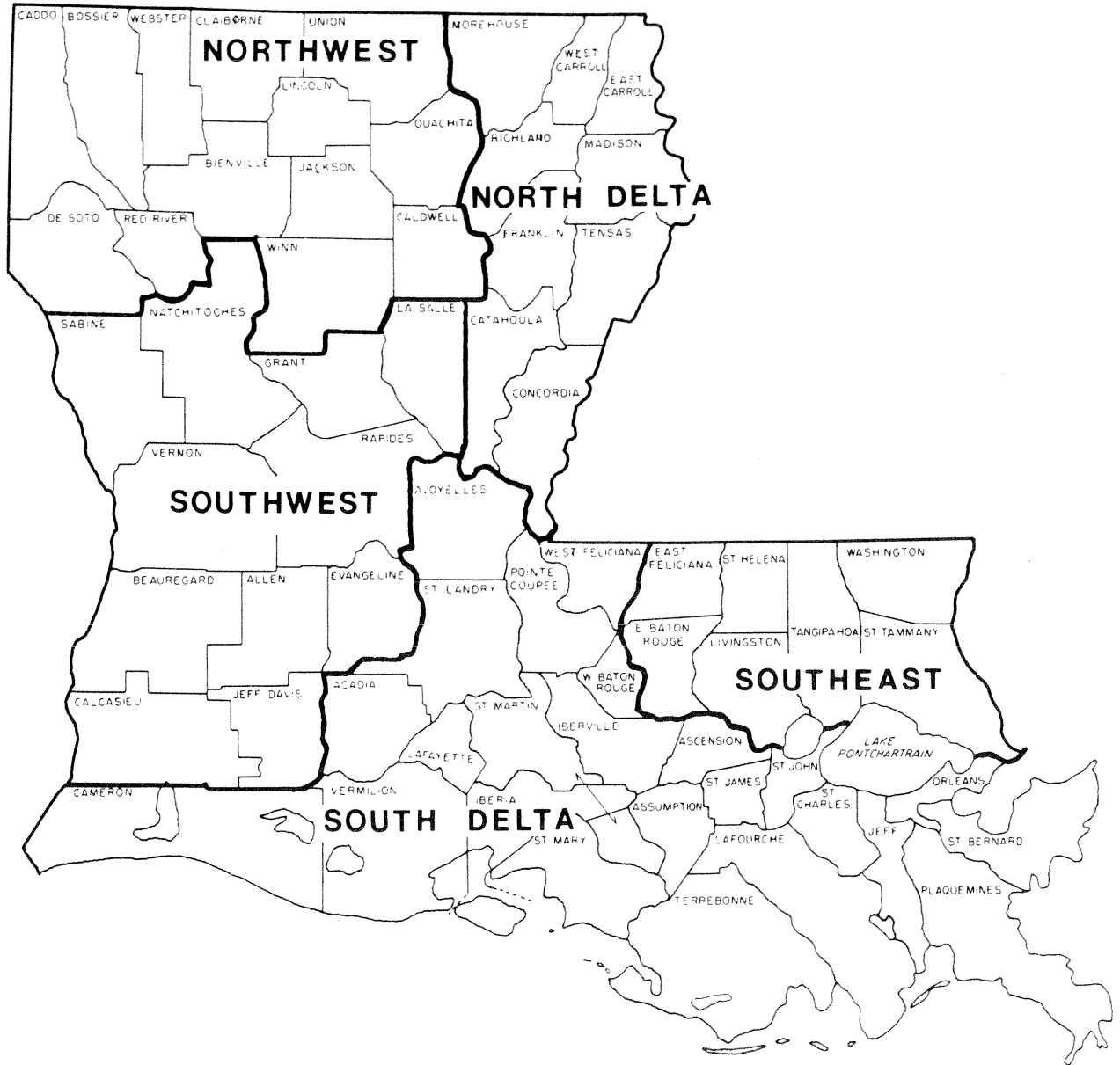


Figure 1.— Forest survey units of Louisiana.

Table I.—*Timberland area, Louisiana, 1936 to 1991**

| Forest survey unit | Survey date | | | | | |
|-----------------------|--------------------------|----------|----------|----------|----------|----------|
| | 1936 | 1954 | 1964 | 1974 | 1984 | 1991 |
| | -----Thousand acres----- | | | | | |
| North Delta | 2,440.3 | 2,171.3 | 1,894.8 | 1,178.4 | 913.5 | 945.5 |
| South Delta | 3,001.2 | 2,819.6 | 2,750.9 | 2,573.1 | 2,391.3 | 2,224.8 |
| Southwest | 4,972.0 | 4,874.5 | 4,822.3 | 4,538.4 | 4,416.8 | 4,378.6 |
| Southeast | 2,086.1 | 2,002.8 | 1,884.4 | 1,786.3 | 1,751.2 | 1,763.7 |
| Northwest | 3,656.3 | 4,169.8 | 4,684.1 | 4,450.4 | 4,399.9 | 4,470.5 |
| All units | 16,155.9 | 16,038.0 | 16,036.5 | 14,526.6 | 13,872.6 | 13,783.0 |

*Numbers in columns may not sum to totals due to rounding.



Figure 2. — *Louisiana parishes with gains and losses in timberland, 1984 to 1991.*

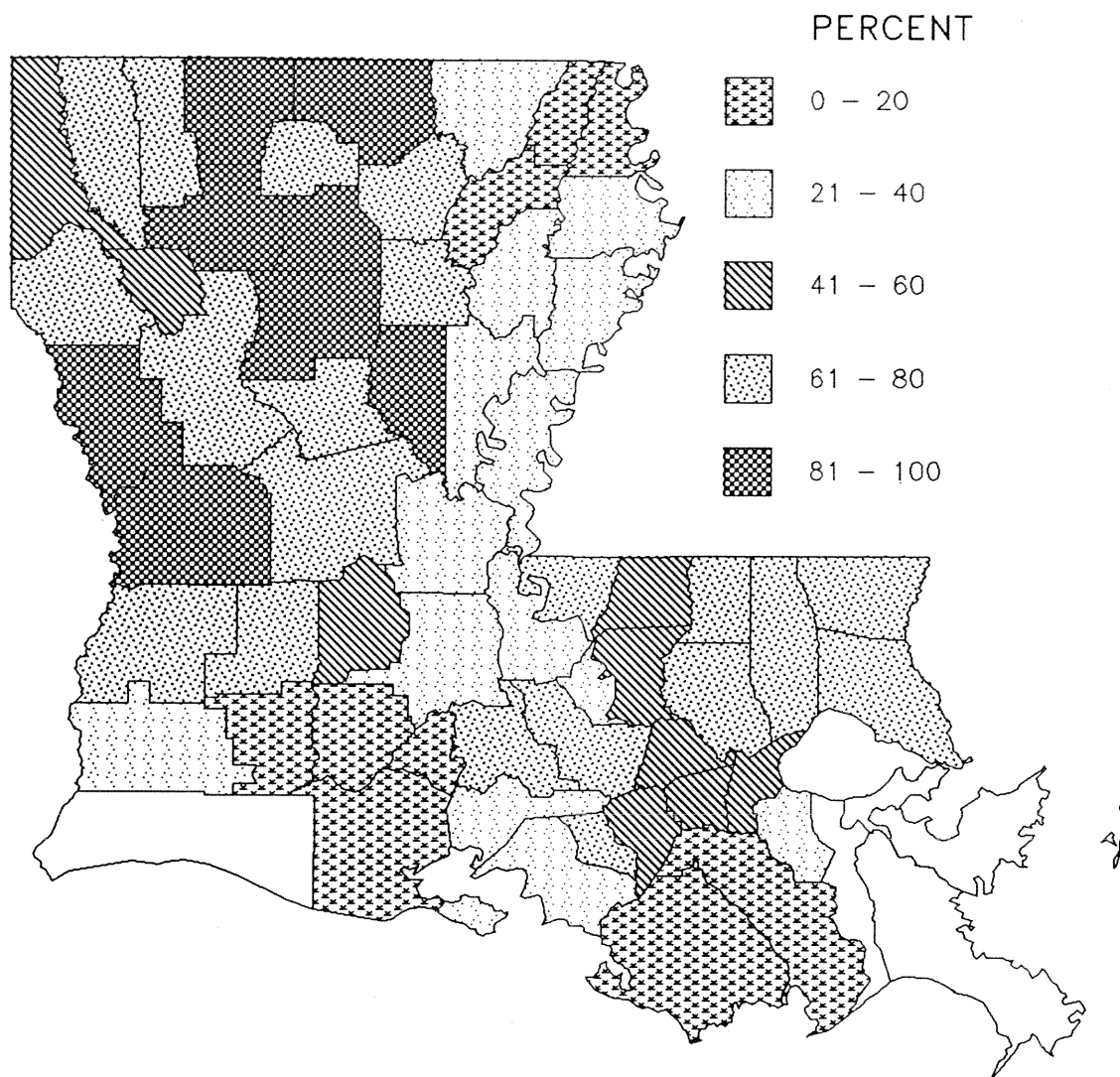


Figure 3. — *Percentage of parish area in timberland, Louisiana, 1991. Parishes in white were not included in the survey.*

Ownership

Nonindustrial private forest (NIPF) owners continue to be the dominant class of owners in the State. The NIPF category includes farmers, individuals, and corporations (see the appendix for definitions of these categories). The 1991 survey shows 8,578,400 acres of NIPF land, a 4-percent decrease since the 1984 survey (table III). Nevertheless, NIPF owners hold 62 percent of all timberland in the State (fig. 4). Regionally, the highest proportions of NIPF ownership are 83 percent in the South Delta and 70 percent in the Southeast unit. The lowest proportion of NIPF ownership is 49 percent in the Southwest unit.

In 26 parishes, more than 80 percent of timberland is in the NIPF category (fig. 5). In contrast, only one surveyed parish has less than 20 percent of timberland in the NIPF category.

Forest industry currently has 3,898,300 acres of timberland—28 percent of the State total. Its holdings increased by 295,200 acres since 1984. The greatest concentration of forest industry holdings is in the Southwest unit. There, 37 percent of timberland is held by forest industry. The other unit with large forest industry holdings is the Northwest where they cover 1,280,900 acres or 29 percent of the timberland. In 13 parishes, more than 40 percent of timberland is owned by forest industry (fig. 6).

The public owns 1,306,300 acres or 9 percent of all timberland in Louisiana. A large portion of this timberland (568,500 acres) is in national forests. All of the national forest acreage is in the Southwest and Northwest units—427,000 and 141,500 acres, respectively. There are six ranger districts on one national forest, the Kisatchie, in Louisiana. National forest timberland acreage was obtained differently in 1991 than

Table II.—Changes in timberland by forest survey unit, Louisiana, 1984 to 1991*

| Forest survey unit | Total land [†] | Timberland | Change | Additions | | | Diversions | | |
|--------------------------|-------------------------|------------|--------|-----------|-------------|--------------------|------------|-------------|--------------------|
| | | | | Total | Agriculture | Other [‡] | Total | Agriculture | Other [‡] |
| -----Thousand acres----- | | | | | | | | | |
| North Delta | 3,515.5 | 945.5 | 32.0 | 83.6 | 57.9 | 25.7 | 51.6 | 31.0 | 20.6 |
| South Delta | 7,398.9 | 2,224.8 | -166.5 | 28.7 | 23.0 | 5.7 | 195.2 | 65.1 | 130.2 |
| Southwest | 6,667.5 | 4,378.6 | -38.4 | 72.1 | 61.0 | 11.1 | 110.2 | 28.8 | 81.5 |
| Southeast | 2,762.6 | 1,763.7 | 12.5 | 113.2 | 89.4 | 23.8 | 100.7 | 33.6 | 67.2 |
| Northwest | 5,920.6 | 4,470.5 | 70.6 | 118.4 | 73.3 | 45.1 | 47.8 | 23.9 | 23.9 |
| All units | 26,265.4 | 13,783.0 | -89.6 | 416.0 | 304.5 | 111.5 | 505.6 | 182.3 | 323.3 |

*Numbers in rows and columns may not sum to totals due to rounding.

[†]United States Department of Commerce, Bureau of the Census, 1980 (issued October 1981). The following parishes, totaling 3,047.1 thousand acres of total land, were not included in the sixth Louisiana forest survey because of the infrequent occurrence of timberland: Cameron, Jefferson, Orleans, Plaquemines, and St. Bernard.

[‡]Includes urban, industrial, highway, noncommercial forest, water, rights-of-way, and other land uses.

in 1984. In 1984, the national forest area was derived from sampling estimates and a standard error was assigned. The 1991 survey used census figures supplied by the Southern Region of the National Forest System. These figures for timberland on the Kisatchie National Forest were the most current and, for our purposes, they are assumed to be free of error. Therefore, 1984 and 1991 figures for national forest timberland are not directly comparable.

The other 737,800 acres of public holdings (other Federal, State, parish, and municipal timberland) are distributed fairly evenly across the State. The Northwest unit has the most acreage (fig. 4). The area with the highest proportion of timberland in other public holdings is the North Delta unit with 17 percent.

Forest Type Groups

The SO-FIA unit aggregates forest types into forest type groups (FTG's) to facilitate reporting of results. See Eyre (1980) for a discussion and listing of the forest types that are categorized into these SO-FIA forest type groups (also called major forest types in the Eyre publication). The forest survey assigns a Society of American Foresters (SAF) forest type name (Eyre 1980) based on the predominance of one, two,

or sometimes three tree species according to the relative species majority (or plurality if a species majority is not present) in the stand sample. The SAF guidelines suggest using basal area as the importance value in assigning forest type (Eyre 1980). In this instance, however, SO-FIA uses the relative stocking contributed by each tree to determine the degree of species importance on each sample plot.

The predominant FTG in Louisiana is still oak-gum-cypress, but the gap between it and the loblolly-shortleaf pine type is narrowing (table IV). The bottomland types (oak-gum-cypress and elm-ash-cottonwood) are the predominant FTG's in the North Delta and South Delta units (fig. 7). Even in the other three units, the bottomland types occupy a substantial proportion of timberland.

Second in dominance is the loblolly-shortleaf pine FTG; it is predominant in the Southwest and Northwest units. More than 82 percent of Louisiana's loblolly-shortleaf pine type is in these two units (fig. 7). The longleaf-slash pine FTG continues to decline, losing another 63,500 acres since the last survey. The Southwest unit has more than 83 percent of the State's longleaf-slash pine FTG.

The oak-hickory FTG declined by 63,300 acres since the last survey. A large decline in the Northwest unit

Table III.—Area of timberland by forest survey unit, ownership, and change, Louisiana, 1984 to 1991*

| Forest survey unit | All owners | Public | Change | Forest industry | Change | Nonindustrial private [†] | Change |
|--------------------|--------------------------|---------|--------|-----------------|--------|------------------------------------|--------|
| | -----Thousand acres----- | | | | | | |
| North Delta | 945.5 | 158.1 | -10.1 | 248.0 | -111.6 | 539.4 | 153.7 |
| South Delta | 2,224.8 | 118.7 | -18.9 | 258.4 | 122.2 | 1,847.7 | -269.9 |
| Southwest | 4,378.6 | 611.4 | -27.7 | 1,639.5 | 269.0 | 2,127.7 | -279.4 |
| Southeast | 1,763.7 | 53.1 | 10.9 | 471.5 | 6.5 | 1,239.1 | -4.9 |
| Northwest | 4,470.5 | 365.0 | 26.9 | 1,280.9 | 9.1 | 2,824.6 | 34.6 |
| All units | 13,783.0 | 1,306.3 | -18.9 | 3,898.3 | 295.2 | 8,578.4 | -365.9 |

*Numbers in rows and columns may not sum to totals due to rounding.

[†]Includes 524,200 acres leased to forest industry.

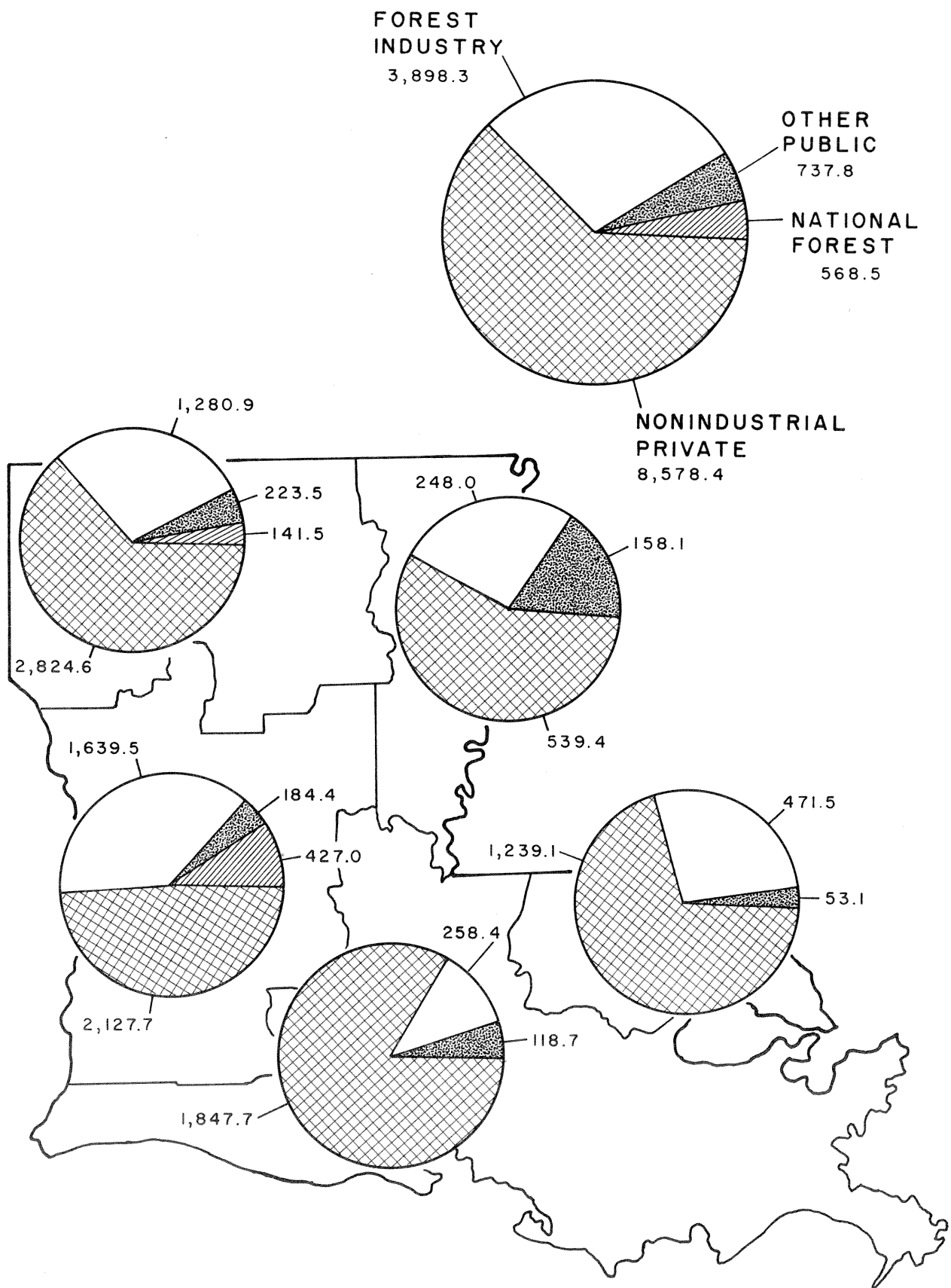


Figure 4. — Proportion of timberland, in thousand acres, by ownership, Louisiana, 1991.

Table IV.—Area of timberland by forest survey unit, forest type group, and change, Louisiana, 1984 to 1991*

| Forest survey unit | All types | Longleaf-slash | Loblolly-shortleaf | | Oak-pine | | Oak-hickory | | Oak-gum-cypress | | Elm-ash-cottonwood | | Change | Nontyped ¹ |
|--------------------------|-----------|----------------|--------------------|---------|----------|---------|-------------|---------|-----------------|---------|--------------------|-------|--------|-----------------------|
| | | | Change | | Change | | Change | | Change | | Change | | | |
| -----Thousand acres----- | | | | | | | | | | | | | | |
| North Delta | 945.5 | 0.0 | -6.1 | 147.3 | 49.2 | 53.5 | -27.5 | 37.4 | -18.1 | 614.9 | 59.1 | 92.3 | -16.5 | 0.0 |
| South Delta | 2,224.8 | 0.0 | 0.0 | 31.2 | -24.6 | 26.2 | 14.7 | 108.2 | 13.4 | 1,786.0 | -191.7 | 268.7 | 25.3 | 4.5 |
| Southwest | 4,378.6 | 722.5 | -56.9 | 1,566.4 | 18.6 | 666.2 | -0.2 | 717.5 | 44.7 | 694.9 | -27.6 | 11.1 | -16.7 | 0.0 |
| Southeast | 1,763.7 | 123.9 | -7.5 | 566.7 | 2.4 | 188.0 | -72.1 | 375.1 | 24.1 | 492.9 | 53.9 | 6.7 | 6.7 | 10.4 |
| Northwest | 4,470.5 | 23.3 | 7.0 | 1,841.9 | 45.7 | 952.7 | 75.2 | 868.9 | -127.4 | 761.3 | 95.6 | 22.4 | -14.7 | 0.0 |
| All units | 13,783.0 | 869.7 | -63.5 | 4,153.6 | 91.2 | 1,886.6 | -10.0 | 2,107.2 | -63.3 | 4,349.9 | -10.7 | 401.3 | -15.9 | 14.9 |

*Numbers in rows and columns may not sum to totals due to rounding.

†No live trees, saplings, or seedlings.

was partially offset by gains in the South Delta, Southwest, and Southeast units. The oak-pine FTG has changed little at the State level because a 72,100-acre loss in the Southeast unit was offset by a 75,200-acre gain in the Northwest unit.

Figure 8 (a through e) illustrates the species that are dominant in the SO-FIA FTG's, ranked by dominance according to volume of all trees ≥ 1.0 inch in diameter at breast height (d.b.h.). In the longleaf-slash pine FTG, slash pine clearly dominates in the three survey units where the type occurs (fig. 8, c through d). Longleaf pine contributes less than 30 percent of total volume for the type in all three units.

The loblolly-shortleaf pine FTG occurs in all five of Louisiana's forest survey units. Loblolly pine is dominant in the type in all five units, containing more than 60 percent of the volume. Shortleaf pine occurrence is substantial only in the Northwest survey unit, where it makes up slightly more than 14 percent of the volume in the type.

Loblolly pine also dominates the oak-pine FTG in all five forest survey units. Sweetgum is a major member of this type in all the units.

Sweetgum is dominant in the oak-hickory FTG in the South Delta, Southeast, and Northwest units. Loblolly pine is dominant in the North Delta and water oak, in the Southeast unit. Even in these units, sweetgum is an important contributor to volume in this type.

In the bottomland hardwood FTG's, sweetgum is dominant in three of the five survey units (North Delta, Southwest, and Northwest). Baldcypress is dominant in the South Delta and Southeast units.

STAND VOLUME

Timber volume in all live trees ≥ 5.0 inches in d.b.h. totals 20,738.3 million ft^3 . This total is 876.6 million ft^3 (4 percent) less than in 1984. All of the inventory decline was softwood. Fifty-nine percent of the timber inventory is in the Southwest and Northwest units.

Ninety-one percent of the timber is in growing-stock trees (18,844.4 million ft^3). Of total growing-stock volume, 4,185.5 million ft^3 are in poletimber trees, and 14,659.0 million ft^3 are in sawtimber trees. Sixty-four percent of the growing-stock volume (12,161.3 million ft^3) is on NIPF land. Forest industry owns 4,633.1 million ft^3 , and the public owns 2,050.0 million ft^3 (25 and 11 percent of total growing-stock volume, respectively).

Sawtimber volume totals 75,526 million board feet (fbm). Sixty-four percent of this volume is on NIPF land; the remaining 23 and 13 percent are on forest industry and public land, respectively. The ownership proportions of sawtimber volume are approximately the same as the ownership of growing-stock volume.

Sound wood in cull trees totals 1,894.0 million ft³. An additional 33.2 million ft³ of sound wood are in salvable dead trees. Cull tree and salvable dead volumes, together, represent only 9 percent of the State's gross volume of 20,771.7 million ft³.

Louisiana's timberland contains 239.1 million dry tons of softwood and 411.1 million dry tons of hardwood woody biomass in live trees. Eighty-five percent of the softwood biomass is in the stem portion of trees, whereas 74 percent of the hardwood biomass is in hardwood stems. For a more detailed analysis of the biomass on Louisiana's timberland see Rosson (1993).

Softwood Volume

The softwood live tree inventory in Louisiana is 10,122.2 million ft³ (table V). This total is 965.7 million ft³ (9 percent) less than in 1984. The largest decreases were in the Southwest (442.5 million ft³) and Northwest (320.9 million ft³) survey units. These two

Table V.—Change in live-tree volume by forest survey unit, Louisiana, 1984 to 1991*

| Forest survey unit | Softwood | | Hardwood | |
|--------------------------------|----------|--------|----------|--------|
| | Volume | Change | Volume | Change |
| ----- Million cubic feet ----- | | | | |
| North Delta | 272.3 | 26.1 | 1,203.6 | 7.1 |
| South Delta | 1,293.5 | -79.5 | 3,265.8 | -32.8 |
| Southwest | 3,541.9 | -442.5 | 2,208.0 | 150.0 |
| Southeast | 1,270.6 | -148.9 | 1,286.3 | 151.8 |
| Northwest | 3,744.0 | -320.9 | 2,652.3 | -187.0 |
| All units | 10,122.2 | -965.7 | 10,616.1 | 89.1 |

*Numbers in columns may not sum to totals due to rounding.

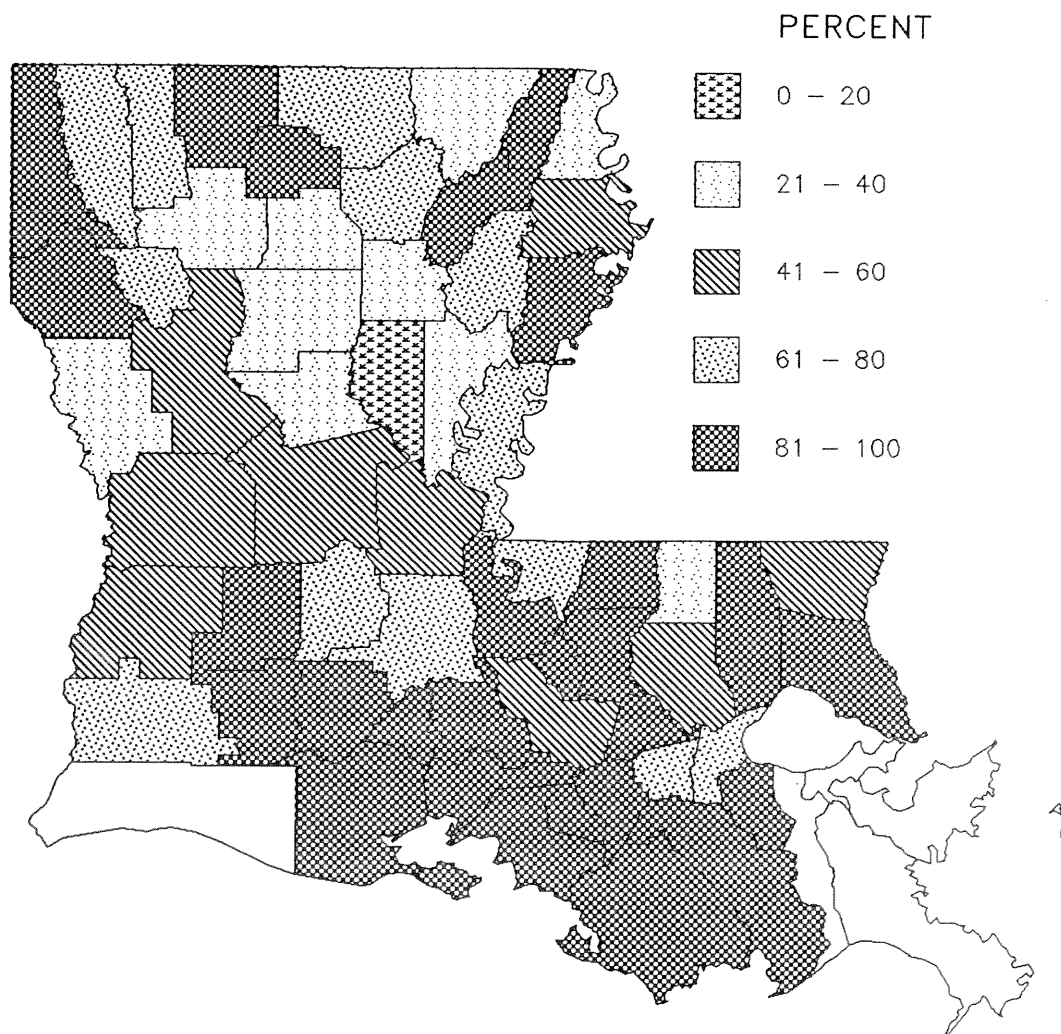
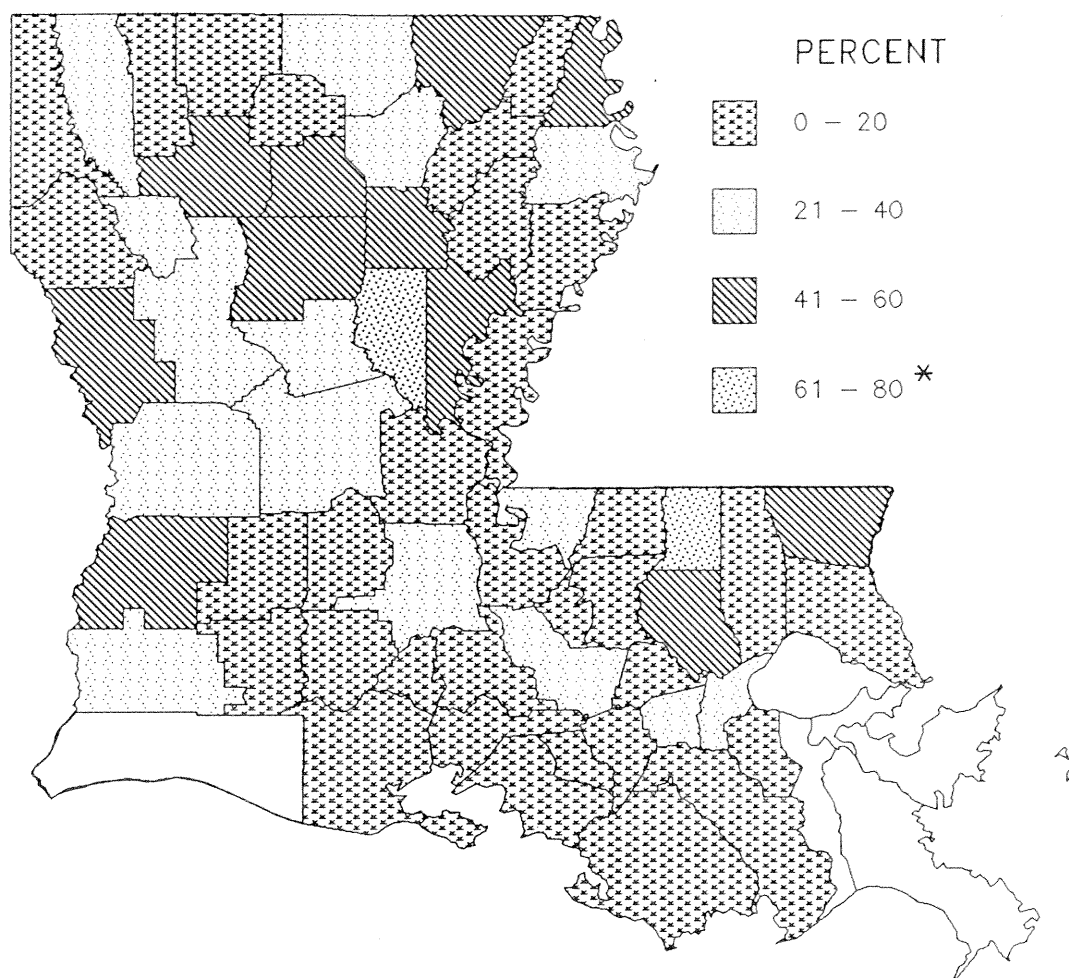


Figure 5.—Percentage of parish timberland held by nonindustrial private forest landowners, Louisiana, 1991. Parishes in white were not included in the survey.



* THERE WERE NO PARISHES WITH MORE THAN 78 PERCENT OF
TIMBERLAND IN FOREST INDUSTRY OWNERSHIP.

Figure 6. —Percentage of parish timberland held by forest industries, Louisiana, 1991. Parishes in white were not included in the survey.

units account for 79 percent of the softwood inventory decline.

A striking contrast to the 1984 Louisiana survey is that softwoods are no longer the predominant species group (fig. 9). Because of high amounts of softwood removals, hardwoods now make up 51 percent of live-tree volume. Together, the Southwest and Northwest units hold 72 percent of the State's softwood volume.

The decrease in softwood volume is spread across the entire range of diameter classes (fig. 10), but the biggest decreases are in the 10- through 16-inch diameter classes. This pattern may translate into a decline in the supply of large sawlogs in the next 10 to 20 years.

Loblolly pine is the dominant softwood in the State, with 6,350.0 million ft³ (fig. 11). Ranked second is baldcypress, with 1,597.1 million ft³. Baldcypress was predominant early in this century, but the old-growth stands were cut long ago. Baldcypress is still dominant in the South Delta unit. All the pine species have either declined in volume or held even since the 1984 survey (fig. 11).

The majority of the softwood volume (61 percent) is held by NIPF owners (table VI). Forest industry owns 28 percent, and the public owns the remaining 11 percent. These proportions do not carry over to the decline in softwood volume (table VI). Here, 96 percent of the softwood decline was on NIPF timberland. Only

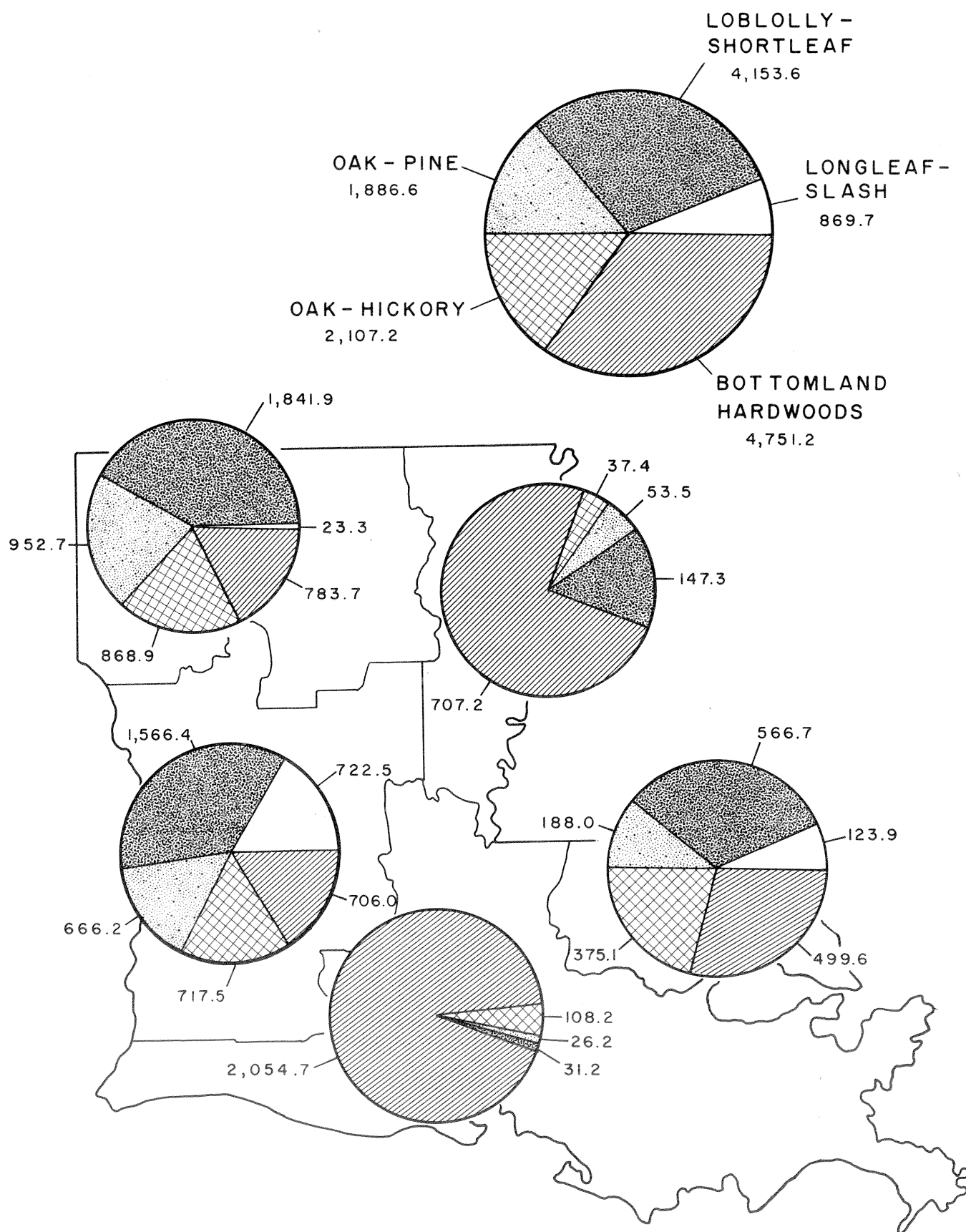


Figure 7. — Proportion of timberland, in thousand acres, by forest type group, Louisiana, 1991. Bottomland hardwoods include the oak-gum-cypress and elm-ash-cottonwood forest type groups.

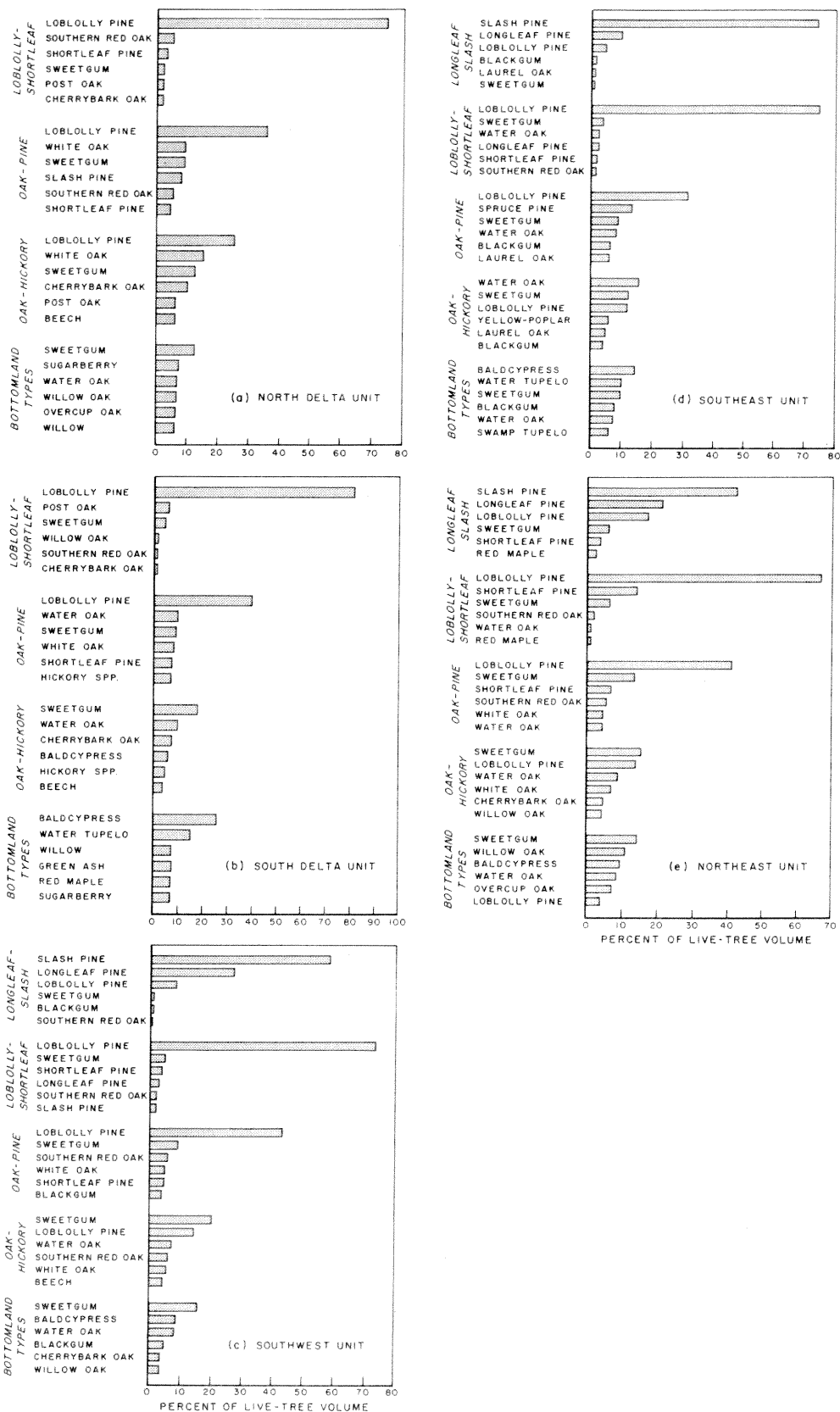


Figure 8. — Relative species importance by forest type group, based on species volume, Louisiana, 1991.

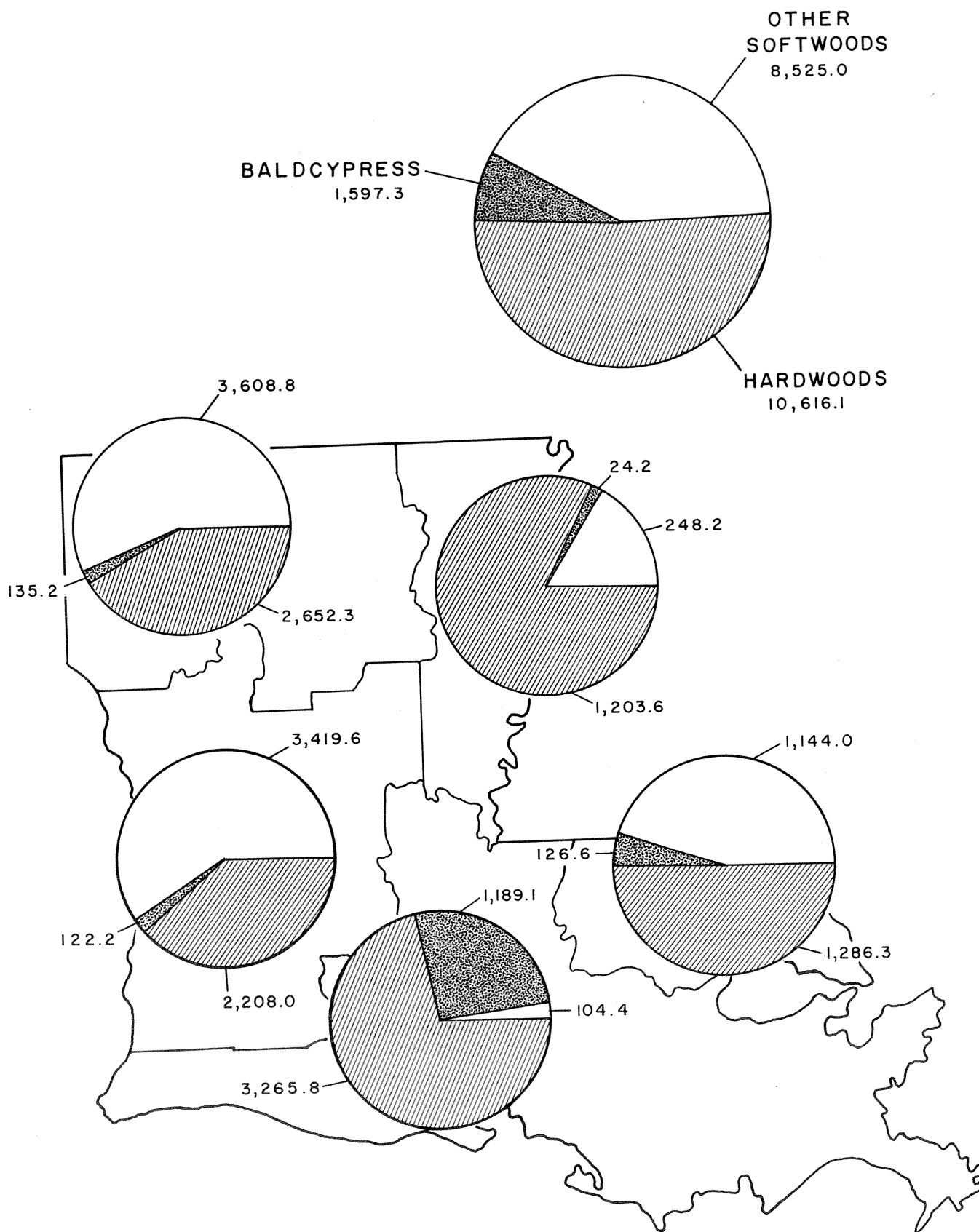


Figure 9. — Proportion of live-tree volume, in million cubic feet, by species group (and baldcypress), Louisiana, 1991.

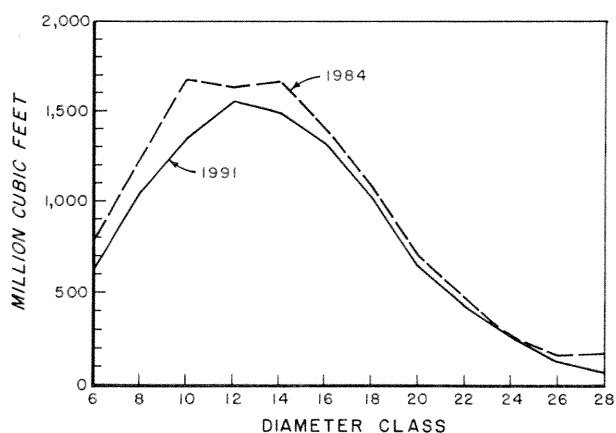


Figure 10. — Softwood live-tree volume by diameter class, Louisiana, 1984 and 1991.

other public timberland showed an increase in softwood inventory since the 1984 survey.

One way to illustrate the spatial distribution of softwood volume is by the amount of timberland acreage in arbitrarily defined yield classes (fig. 12, a through f). There is a trend that is noticeable across all survey units and at the State level (fig. 12f). A large proportion of Louisiana timberland has less than 500 ft³/acre in softwood volume. A total of 7,643,800 acres are in such a condition for reasons ranging from recovery since harvesting (small trees that have not yet crossed the 5.0-inch volume threshold) to poor stocking levels (lack of measures to ensure adequate regeneration, especially after harvest). Only 8 percent of Louisiana's softwood volume is in this class of timberland. In contrast, 1,507,800 acres of timberland (11 percent) have

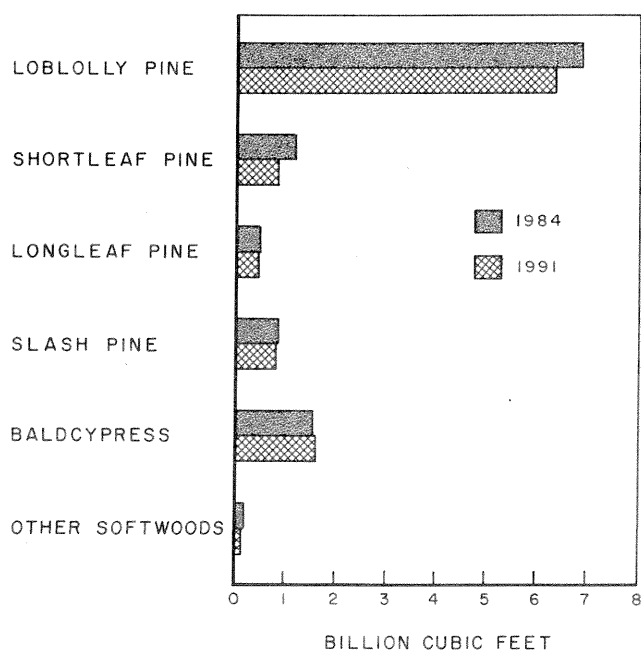


Figure 11. — Softwood live-tree volume by species, Louisiana, 1984 and 1991.

more than 2,000 ft³ of softwood volume per acre. Forty-one percent of Louisiana's softwood volume is in this class of timberland. Figure 12f shows that Louisiana's softwood volume is not evenly distributed across the State's timberland. Rather, 41 percent of the State's softwood volume is situated on only 11 percent of its timberland.

Softwood Sawtimber

Slightly over half of Louisiana's sawtimber is pine (fig. 13), and another 9 percent is baldcypress. Eighty-two percent of the pine sawtimber is in the Southwest and Northwest units, and 75 percent of the baldcypress sawtimber is in the South Delta unit.

Louisiana's softwood sawtimber inventory currently

Table VI. — Change in live-tree volume by ownership, Louisiana, 1984 to 1991*

| Ownership | Softwood | | Hardwood | |
|--------------------------------|----------|--------|----------|--------|
| | Volume | Change | Volume | Change |
| ----- Million cubic feet ----- | | | | |
| National forest | 742.4 | -66.4 | 362.5 | -29.4 |
| Other public | 354.0 | 73.2 | 769.8 | 44.9 |
| Forest industry | 2,891.7 | -42.1 | 2,093.8 | 117.6 |
| Nonindustrial private | 6,134.1 | -930.3 | 7,390.0 | -44.0 |
| All owners | 10,122.2 | -965.7 | 10,616.1 | 89.1 |

*Numbers in columns may not sum to totals due to rounding.

totals 44,944.2 million fbm, 3,255.2 million fbm less than in 1984 (table VII). Fifty-two percent of the softwood decline was in the Southwest unit, and another 43 percent was in the Northwest unit. The majority of softwood sawtimber (62 percent) is in NIPF ownership (table VIII), but 78 percent of the softwood sawtimber inventory decline was on NIPF land.

Sixty-three percent of Louisiana's softwood sawtimber volume, 28,292 million fbm, is loblolly pine. Baldcypress ranks second with 6,620 million fbm or 15 percent of the softwood sawtimber inventory. Following closely are shortleaf pine, slash pine, and longleaf pine representing 9, 7, and 5 percent of the softwood sawtimber resource.

Over half of the State's timberland contains less than 1,000 fbm/acre of softwood sawtimber (fig. 14, a through f). In contrast, the majority of Louisiana's softwood sawtimber volume (22,850 million fbm) occurs on about 12

Table VII. — Change in sawtimber volume by forest survey unit, Louisiana, 1984 to 1991*

| Forest survey unit | Softwood | | Hardwood | |
|---|----------|----------|----------|---------|
| | Volume | Change | Volume | Change |
| ----- Million board feet [†] ----- | | | | |
| North Delta | 1,214.5 | 148.7 | 4,074.2 | 183.2 |
| South Delta | 5,540.0 | 404.1 | 9,113.0 | 853.8 |
| Southwest | 15,677.5 | -1,692.2 | 6,540.1 | 1,259.3 |
| Southeast | 5,657.2 | -716.6 | 3,537.6 | 944.9 |
| Northwest | 16,854.9 | -1,399.3 | 7,316.4 | -260.5 |
| All units | 44,944.2 | -3,255.2 | 30,581.4 | 2,980.7 |

*Numbers in columns may not sum to totals due to rounding.

[†]International 1/4-inch Rule.

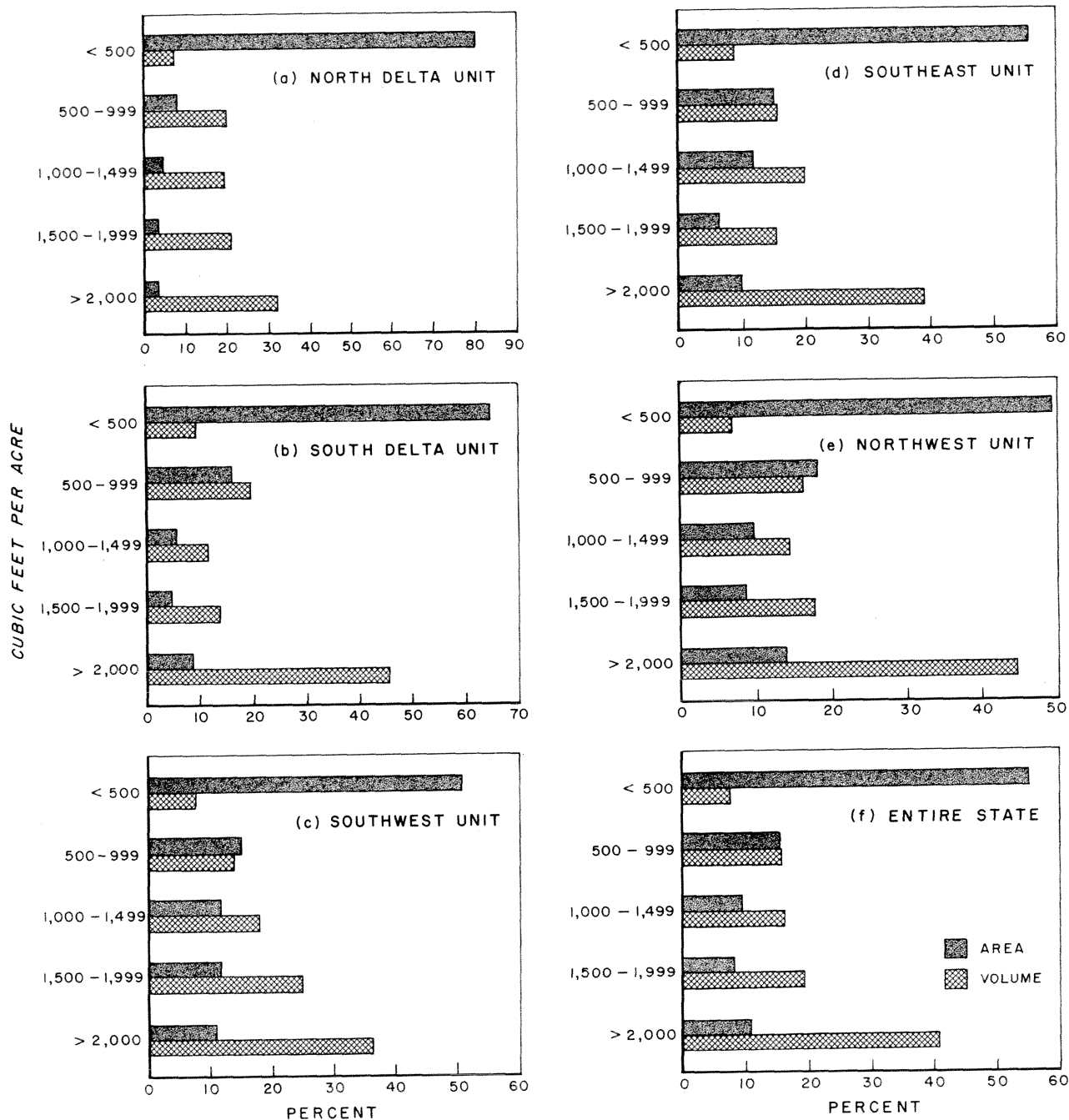


Figure 12. — Timberland area and live-tree volume of softwoods by stand volume class, Louisiana, 1991.

percent of timberland. These are stands that are averaging more than 9,000 fbm/acre. This pattern of volume distribution is similar for all the survey units.

Hardwood Volume

The hardwood live-tree inventory in Louisiana is 10,616.1 million ft^3 ; the total is slightly higher than the softwood inventory (table V). Whereas the majority of softwood is in the Southwest and Northwest units, the South Delta unit holds the most hardwood

volume (31 percent). The Northwest and Southwest units also contribute sizeable amounts—25 and 21 percent, respectively. These three units account for 77 percent of the hardwood resource in Louisiana.

Moderate gains in the hardwood inventory in the Southwest and Southeast units were offset by losses in the South Delta and Northwest units (table V). Overall, the inventory increased by 89.1 million ft^3 since 1984. Most of the inventory losses were in small diameter classes; all the larger diameter classes had slight gains (fig. 15).

The predominant hardwood species group in Louisiana is "other red oaks," which include scarlet, southern red, shingle, laurel, water, Nuttall, pin, willow, and black oaks. Trees of these species contain 2,235.0 million ft³ (fig. 16); and this group's volume increased since the 1984 survey. Among the 11 species groups illustrated in figure 16, total volumes for 6 decreased since 1984. The most common hardwood species in Louisiana is sweetgum with 1,811.2 million ft³ or 17 percent of hardwood volume. Together, seven species account for just over 50 percent of Louisiana's hardwood live-tree volume: sweetgum, water oak, water tupelo, green ash, willow, southern red oak, and sugarberry, with 1,811.2, 937.6, 862.5, 487.4, 433.9, 430.9, and 421.7 million ft³, respectively.

Seventy percent of live-tree hardwood volume is on NIPF land (table VI). Twenty percent is held by forest industry and the remaining 10 percent by the public. On both national forest and NIPF holdings, volumes decreased slightly since 1984. These losses were offset by gains on forest industry and other public timberland.

Figure 17 (a through f) illustrates spatial distribution of the hardwood volume according to yield class. The State-level figure (fig. 17f) shows the same general characteristic as that for softwoods—a large proportion of hardwood timberland (50 percent) supports less than 500 ft³/acre, whereas a large proportion of the hardwood inventory (34 percent) is in stands that have more than 2,000 ft³/acre. However, all the survey units do not show the same characteristic. The North Delta and South Delta units do not have large proportions of their timberland supporting less than 500 ft³/acre (fig. 17, a and b). Only 27 percent of timberland in the North Delta and 14 percent in the South Delta units are in this class. This pattern is markedly different from those in other parts of the State, but the patterns in these two survey units were not enough to offset the overall averages at the State level (fig. 17f).

Hardwood Sawtimber

Louisiana's hardwood sawtimber inventory of 30,581 million fbm is 11 percent higher than in 1984 (table VII). Thirty percent of the hardwood sawtimber volume is in the South Delta unit, 21 percent is in the Southwest unit, and 24 percent is in the Northwest unit. Together, these three survey units have three-fourths of Louisiana's hardwood sawtimber. Since 1984, volumes increased in all but the Northwest unit. There, hardwood sawtimber decreased by 261 million fbm or slightly more than 3 percent.

Sixty-seven percent of the hardwood sawtimber volume is on NIPF land (table VIII). Forest industry owns 20 percent, and the public owns the remaining 13 percent. All classes of ownership had increases in sawtimber volume since 1984, with the largest increase (10 percent) on NIPF land.

Table VIII.—*Change in sawtimber volume by ownership, Louisiana, 1984 to 1991**

| Ownership | Softwood | | Hardwood | |
|---|----------|----------|----------|---------|
| | Volume | Change | Volume | Change |
| ----- Million board feet [†] ----- | | | | |
| National forest | 4,063.2 | -173.4 | 1,247.3 | 175.0 |
| Other public | 1,699.7 | 432.2 | 2,589.1 | 443.1 |
| Forest industry | 11,423.7 | -967.4 | 6,137.7 | 550.9 |
| Nonindustrial private | 27,757.5 | -2,546.6 | 20,607.2 | 1,811.7 |
| All owners | 44,944.2 | -3,255.2 | 30,581.4 | 2,980.7 |

*Numbers in columns may not sum to totals due to rounding.

[†]International 1/4-inch Rule.

The spatial distributions of hardwood sawtimber volume by survey unit are shown in figure 18 (a through f). Fifty-four percent of Louisiana timberland has less than 1,000 fbm of hardwood sawtimber per acre. A relatively small proportion of timberland (16 percent) supports volumes greater than 5,000 fbm/acre, but 59 percent of all hardwood sawtimber volume is in these stands.

STAND STRUCTURE

Stand Size

Most of Louisiana's timberland is in sawtimber stands (59 percent). Every survey unit is dominated by sawtimber stands in proportions ranging from a high of 84 percent in the South Delta unit to a low of 53 percent in each of the Southwest, Southeast, and Northwest units (fig. 19).

The shifts in stand-size classes can be complex. Some poletimber stands grew into sawtimber size while some reverted to sapling-seedling stands through cutting. Likewise, some sawtimber stands may have reverted to poletimber through a thinning practice or to sapling-seedling through a clearcut harvest. Of course, many stands remained in the same stand-size class that they were in during the previous survey. It is important to know that many stands may shift into another size class without showing an increase or decrease in acreage between size classes because, as one stand moves into another size class (either through growth or attrition), a stand from a different size class may take its place.

The most dramatic shift of acreage in stand-size classes was in poletimber and sapling-seedling stands (table IX). Poletimber stands lost 357,200 acres whereas sapling-seedling stands gained 191,200 acres since 1984. The largest loss of poletimber stands was in the Southwest unit, whereas both the Southwest and Northwest units gained substantial acres of sapling-seedling timberland. Little change was noted in

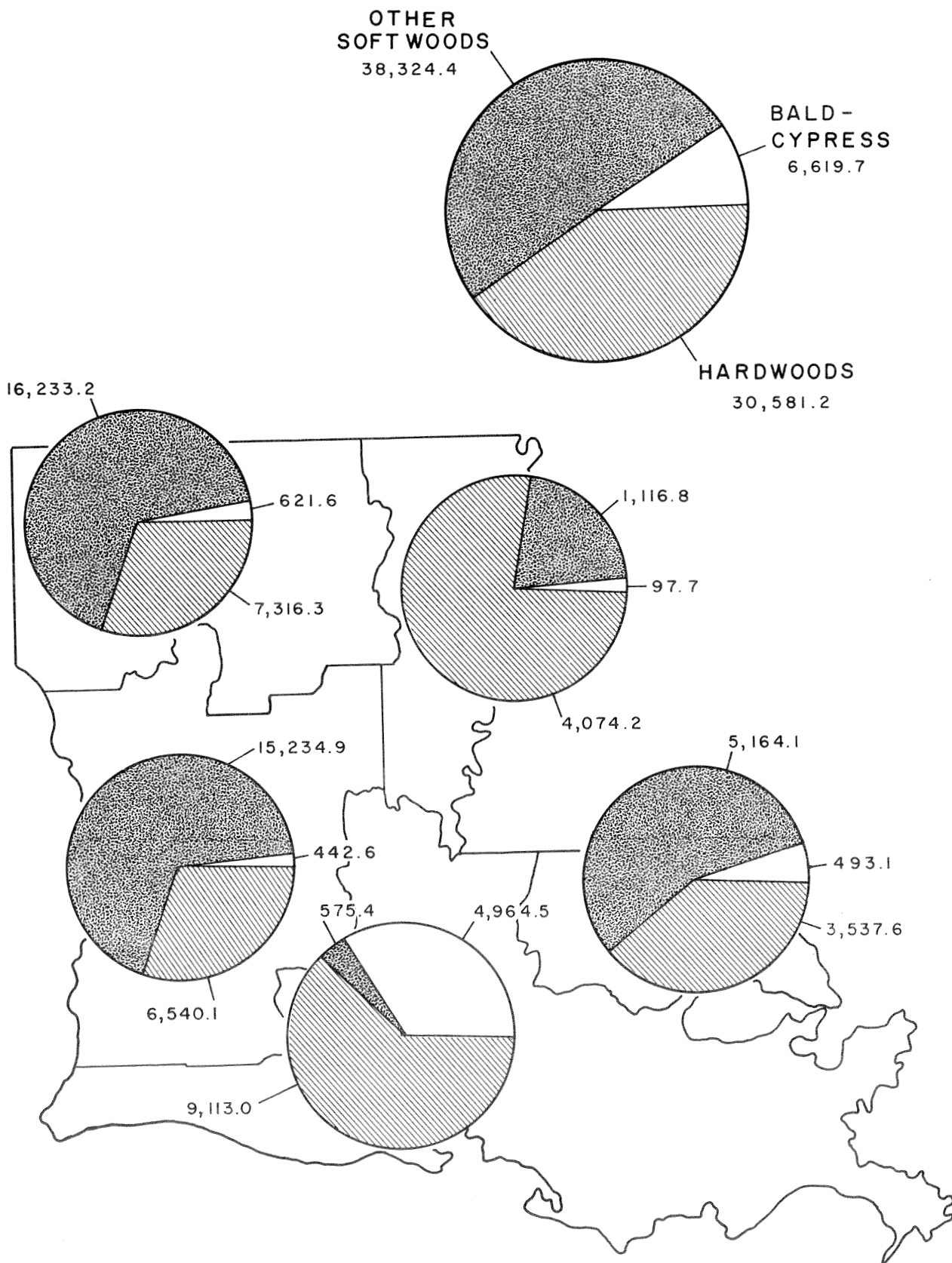


Figure 13. — Proportion of sawtimber volume, in million board feet, by species group (and baldcypress), Louisiana, 1991.

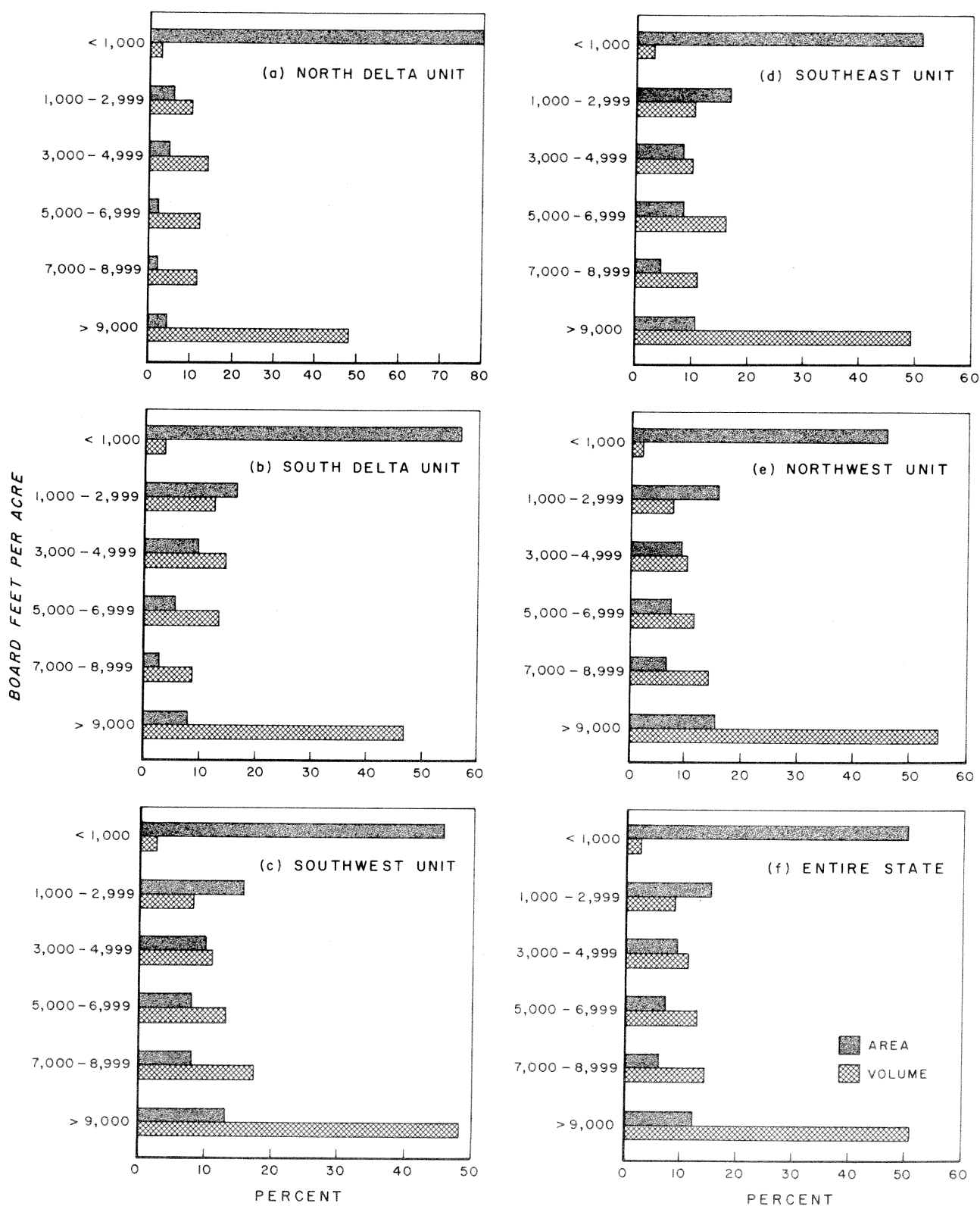


Figure 14. — Timberland area and sawtimber volume of softwoods by stand volume class, Louisiana, 1991.

sawtimber stands; they increased by only 95,200 acres, and there were no substantial shifts in any one survey unit.

Nonindustrial private forest owners hold 66 percent of the sawtimber stands, or 5,350,400 acres. Forest industry has 22 percent, and the public has the remaining 12 percent (table X). A 200,600-acre gain in sawtimber stands on forest industry land offset a 172,900-acre loss on NIPF land.

The difference in acreage of poletimber stands between NIPF and forest industry timberland is not as great as with sawtimber stands. With poletimber stands, 56 percent are on NIPF land and 39 percent are on forest industry land (versus 66 and 22 percent for sawtimber stands). Most of the decrease in poletimber stands can be accounted for by the 424,200-acre decline of NIPF land (table X).

Fifty-seven percent of the sapling and seedling acreage is on NIPF timberland, and 37 percent is on forest industry timberland. All of the increase in sapling-seedling stands was on NIPF timberland (table X).

Basal Area

The basal area of all live trees on all timberland in Louisiana averages 85.4 ft²/acre. This average is 5 percent lower than that reported in 1984. Most of the decline was in softwood sawtimber (49 percent) and hardwood poletimber (38 percent). Additionally, the majority of the basal-area decrease at the State level was on NIPF land.

Stand basal areas for all species combined are shown by diameter class and survey unit in figure 20 (a through f). Thirty-one percent of the State's basal area is in stems 15.0 inches in d.b.h. and larger. While 62 percent is in stems 3.0 to 14.9 inches in d.b.h., there were substantial decreases in basal area in the 6-through 14-inch diameter classes since the 1984 survey (fig. 20f).

All the survey units had decreases in basal area. The North Delta unit lost basal area in the larger diameter classes. Overall, the unit average dropped from 88.8 to 85.1 ft²/acre. The South Delta unit made substantial gains in the larger diameter classes but lost basal area in the 6- through 14-inch diameter classes; the overall change was from 117.5 to 115.1 ft²/acre. The Southwest unit average dropped from 79.1 to 75.5 ft²/acre. Most of the decreases were in the 6- to 18-inch diameter class range. The Southeast unit dropped from 87.9 to 82.1 ft²/acre. Every diameter class up to 20 inches had a decrease in basal area. The Northwest unit average dropped from 87.0 to 81.7 ft²/acre. All diameter classes from 4 inches to 18 inches had declines. The 10-, 12-, and 14-inch diameter classes had the sharpest declines.

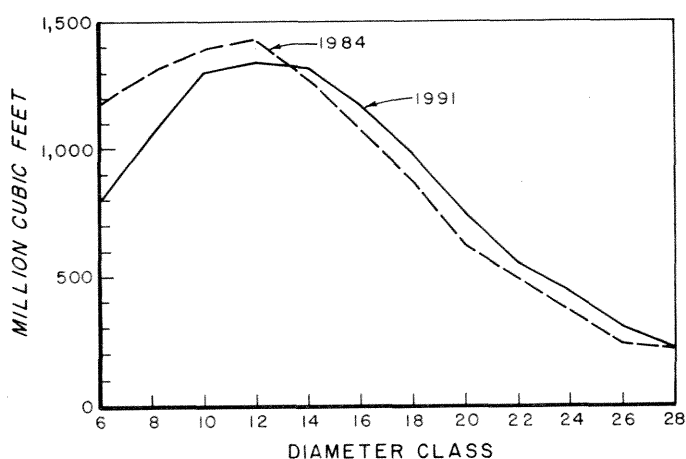


Figure 15. — Hardwood live-tree volume by diameter class, Louisiana, 1984 and 1991.

Basal areas in the important pine-producing areas are lower than the State average. The high basal areas for the Delta units pull up the State average. Averages for the Southwest, Northwest, and Southeast units are 75.5, 81.7, and 82.1 ft²/acre, respectively.

Tables XI through XIV illustrate the trends and shifts in timberland area by stand basal-area class and survey unit, ownership, stand size, and forest type, respectively. The most substantial change was a decrease in stands with more than 120 ft²/acre. The acre-

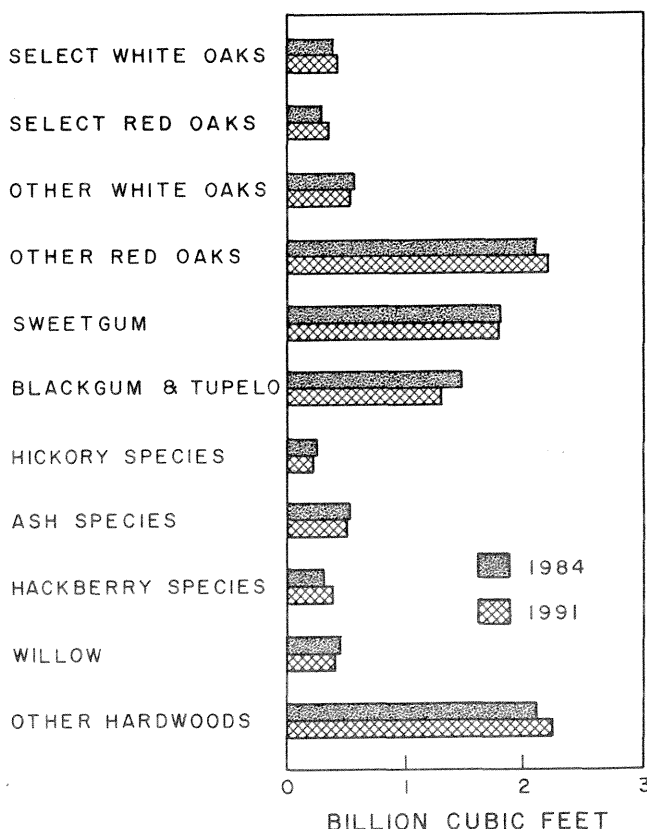


Figure 16. — Hardwood live-tree volume by species, Louisiana, 1984 and 1991.

Table IX.—Change in timberland by forest survey unit and stand size, Louisiana, 1984 to 1991*

| Forest survey unit | Sawtimber | | Poletimber | | Sapling and seedling | | Nonstocked | |
|--------------------------|-----------|--------|------------|--------|----------------------|--------|------------|--------|
| | Area | Change | Area | Change | Area | Change | Area | Change |
| -----Thousand acres----- | | | | | | | | |
| North Delta | 622.7 | 55.9 | 155.0 | -9.1 | 162.3 | -4.0 | 5.4 | -10.8 |
| South Delta | 1,879.2 | -1.9 | 226.9 | -107.3 | 114.3 | -47.7 | 4.5 | -9.6 |
| Southwest | 2,340.9 | 29.5 | 652.2 | -227.5 | 1,367.4 | 159.9 | 18.1 | -0.1 |
| Southeast | 940.1 | 51.2 | 366.1 | 4.6 | 425.6 | -51.5 | 31.8 | 8.2 |
| Northwest | 2,365.3 | -39.4 | 761.3 | -17.9 | 1,333.7 | 134.4 | 10.2 | -6.5 |
| All units | 8,148.1 | 95.2 | 2,161.5 | -357.2 | 3,403.4 | 191.2 | 70.0 | -18.8 |

*Numbers in columns may not sum to totals due to rounding.

age in these stands dropped by 739,400 acres, most shifting to the 0- to 20-ft²/acre class or to the classes ranging between 80 to 120 ft²/acre. Fifty-seven percent of the decrease occurred in the Southwest and Northwest survey units (table XI).

Almost four-fifths of the 739,400-acre decrease in high basal area stands occurred on NIPF timberland (table XII). Eighty-three percent of the decrease was in sawtimber stands (table XIII). Some of this acreage (271,100 acres) converted to sapling-seedling stands because of harvesting, but most of the acreage shifted to the 80- to 120-ft²/acre classes.

Most of the timberland stands with more than 120 ft²/acre basal area are occupied by mature bottomland hardwoods and the loblolly-shortleaf pine FTG, 1,528,000 and 1,003,000 acres, respectively (table XIV). These two types account for 84 percent of the timberland area in this high basal area range. Although the majority of acreage (51 percent) is in the bottomland hardwood types, most of the decrease in this high basal area range was in the loblolly-shortleaf pine FTG, 390,700 acres (53 percent).

Trend in volumes by basal area class and forest survey unit are shown in tables XV and XVI. Volumes decreased in the high basal area classes and increased in the midrange classes (40 to 120 ft²/acre). Specifically, the largest decrease was in the >140-ft²/acre class (1,828.1 million ft³ or 6,186 million fbm), while the greatest increase was in the 101- to 120-ft²/acre class

(923.7 million ft³ or 3,909 million fbm). Despite the loss of acreage in stands with more than 140 ft²/acre of basal area, 46 percent of all live-tree volume and 46 percent of all sawtimber volume occur in stands with more than 100 ft² of basal area.

Species Distribution

The spatial distribution of individual species across the State varies because of regional differences in ecological conditions. Occurrences of important southern pines are illustrated in figure 21. Loblolly pine has the widest ecological amplitude of the four predominant southern pines in Louisiana. It survives and grows well across all portions of the Southwest, Southeast, and Northwest survey units. The other three southern pines are not as widely distributed. Shortleaf, whose numbers and volume are declining, is most common in the Northwest survey unit (fig. 21). Longleaf and slash pine ranges overlap, and the Southwest unit is most favorable for these two species.

The oaks are a very important component of the hardwood resource in Louisiana. The volume distributions of the five most dominant oaks are illustrated in figure 22. Ecological requirements of oaks vary widely. Water oak and cherrybark oak volumes are concentrated in the southeast area of the State, and willow oak, in the north-central area.

Table X.—Change in timberland by ownership and stand size, Louisiana, 1984 to 1991*

| Ownership | Sawtimber | | Poletimber | | Sapling and seedling | | Nonstocked | |
|--------------------------|-----------|--------|------------|--------|----------------------|--------|------------|--------|
| | Area | Change | Area | Change | Area | Change | Area | Change |
| -----Thousand acres----- | | | | | | | | |
| National forest | 400.1 | -12.6 | 36.7 | -14.8 | 131.7 | -19.5 | 0.0 | 0.0 |
| Other public | 597.9 | 80.2 | 58.3 | -27.4 | 81.6 | -24.9 | 0.0 | 0.0 |
| Forest industry | 1,799.8 | 200.6 | 845.8 | 109.1 | 1,242.5 | 0.4 | 10.2 | -14.9 |
| Nonindustrial private | 5,350.4 | -172.9 | 1,220.7 | -424.2 | 1,947.6 | 235.2 | 59.8 | -3.9 |
| All owners | 8,148.1 | 95.2 | 2,161.5 | -357.2 | 3,403.4 | 191.2 | 70.0 | -18.8 |

*Numbers in columns may not sum to totals due to rounding.

Species Importance

In terms of volume, loblolly pine is the most dominant tree species in Louisiana (table XVII). It is the most dominant species in all but the South Delta unit. Statewide, loblolly makes up 30 percent of the volume in all live trees ≥ 1.0 inch in d.b.h. (saplings are included in this instance to reflect total stand at-

tributes). In the Northwest survey unit, loblolly accounts for 43 percent of total volume.

The second most dominant tree species in Louisiana is sweetgum. It ranks second behind loblolly pine in the North Delta, Southeast, and the Northwest survey units. Statewide, sweetgum contributes 9 percent of live-tree volume.

Baldcypress and water oak are two other species in

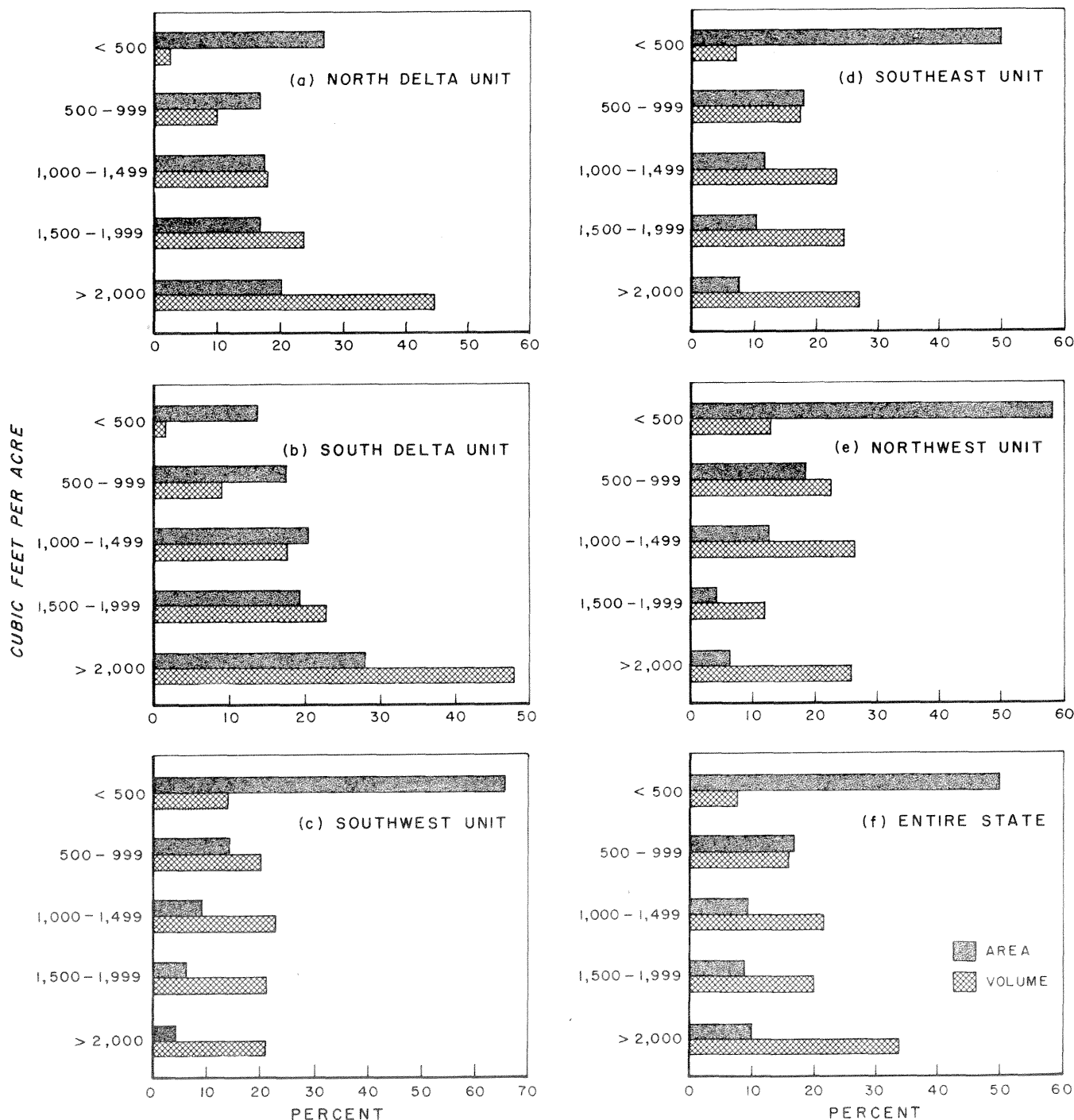


Figure 17. — Timberland area and live-tree volume of hardwoods by stand volume class, Louisiana, 1991.

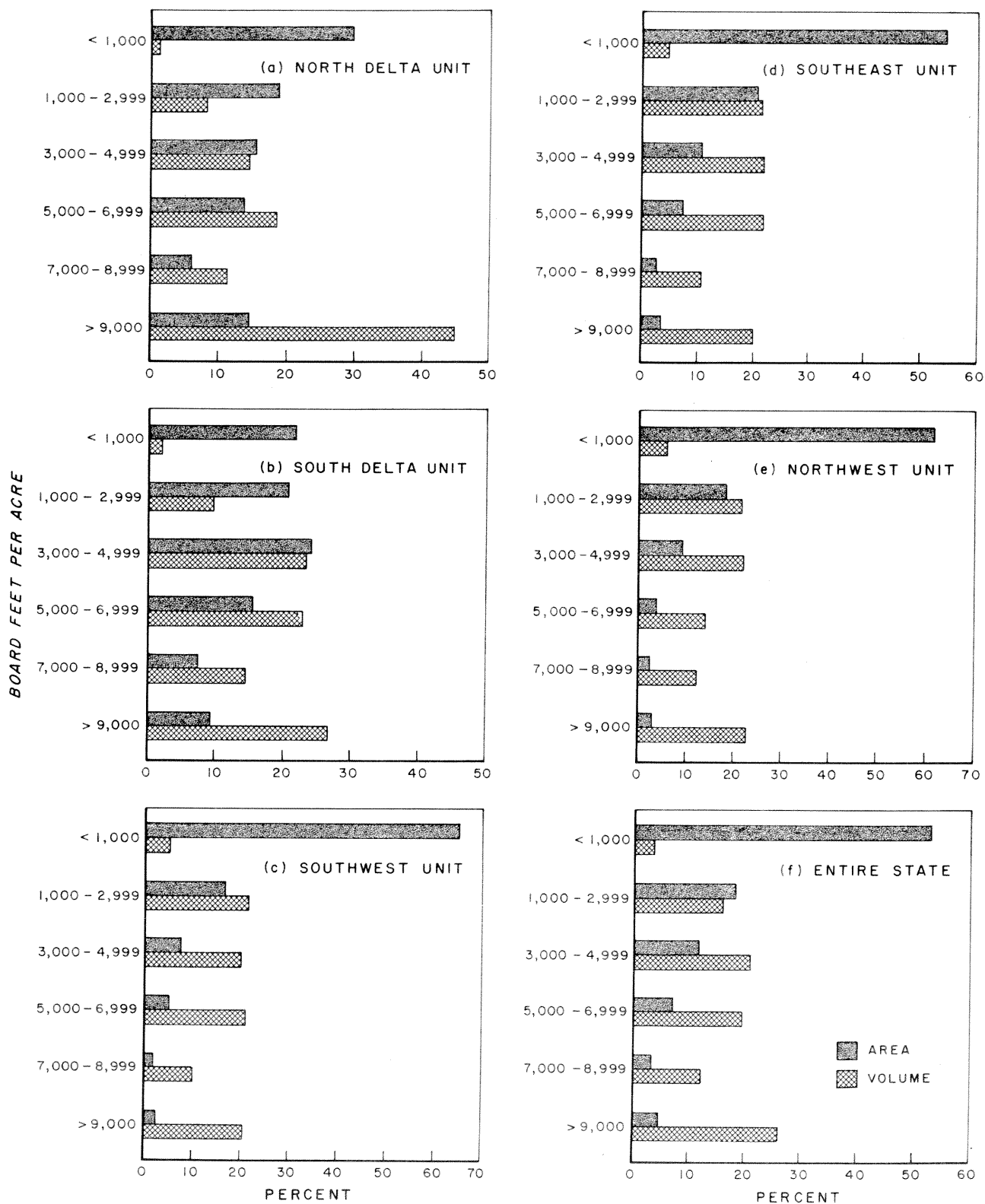


Figure 18. — Timberland area and sawtimber volume of hardwoods by stand volume class, Louisiana, 1991.

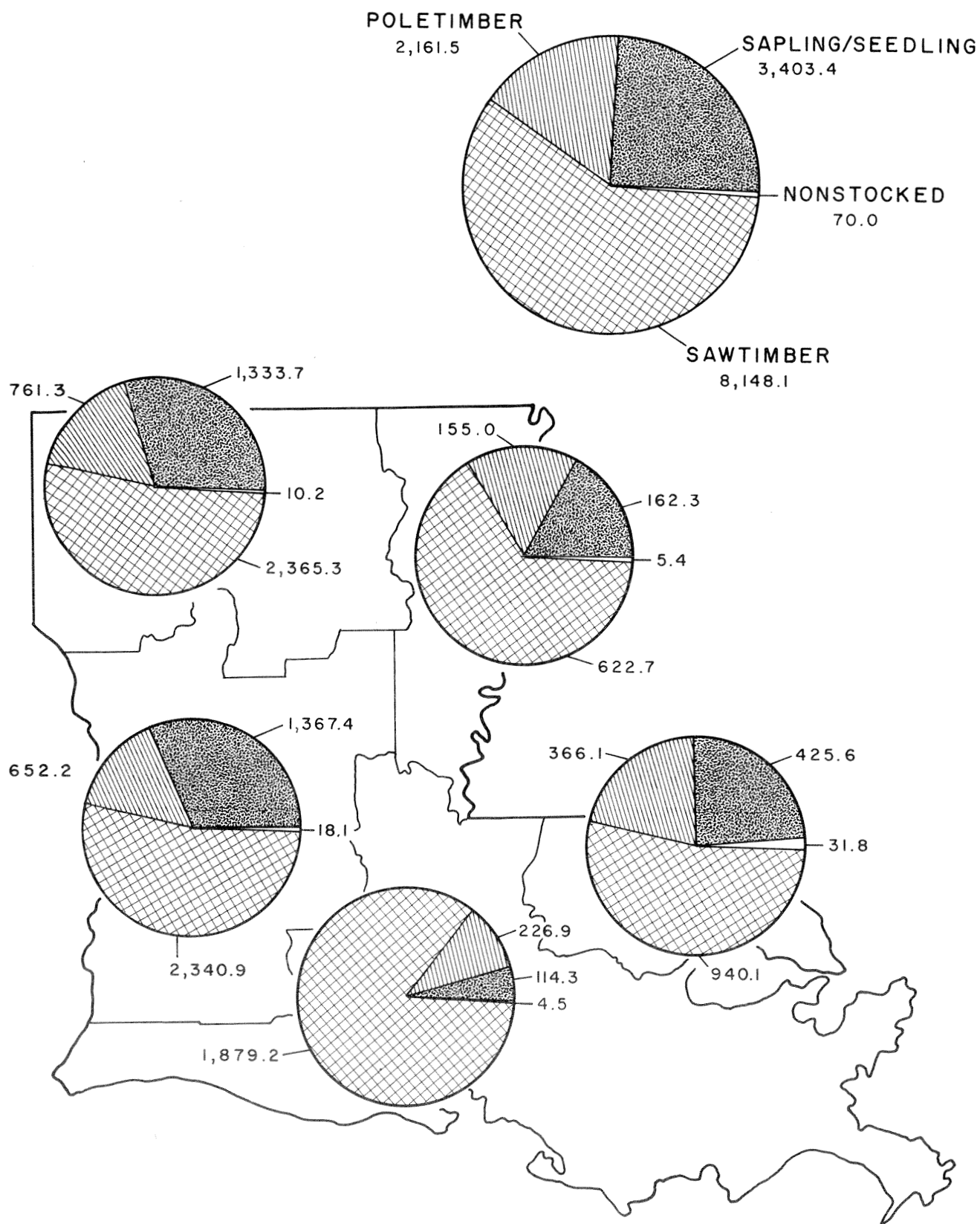


Figure 19. — Proportion of timberland, in thousand acres, by stand size class, Louisiana, 1991.

Table XI.—Area of timberland by forest survey unit and basal area class of live trees, Louisiana, 1984 and 1991*

| Forest survey unit | Basal area class (Square feet per acre) | | | | | | | | | | | | | | | |
|--------------------|---|---------|-----------|---------|-----------|---------|----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| | >140 | | 121 - 140 | | 101 - 120 | | 81 - 100 | | 61 - 80 | | 41 - 60 | | 21 - 40 | | 0 - 21 | |
| | 1984 | 1991 | 1984 | 1991 | 1984 | 1991 | 1984 | 1991 | 1984 | 1991 | 1984 | 1991 | 1984 | 1991 | 1984 | 1991 |
| | <i>Thousand acres</i> | | | | | | | | | | | | | | | |
| North Delta | 121.1 | 60.4 | 100.6 | 137.9 | 143.9 | 145.7 | 198.9 | 228.5 | 103.9 | 131.0 | 129.7 | 109.5 | 57.9 | 24.3 | 57.4 | 108.2 |
| South Delta | 776.0 | 630.7 | 349.6 | 337.5 | 287.9 | 429.2 | 344.5 | 359.4 | 346.6 | 244.8 | 133.5 | 94.8 | 117.3 | 82.8 | 35.9 | 45.5 |
| Southwest | 393.1 | 297.7 | 456.7 | 371.0 | 601.0 | 617.7 | 735.9 | 754.0 | 768.2 | 804.1 | 507.2 | 509.9 | 442.0 | 434.2 | 512.7 | 590.0 |
| Southeast | 265.2 | 187.3 | 217.4 | 160.5 | 216.7 | 294.8 | 284.2 | 312.7 | 258.9 | 208.3 | 141.5 | 184.5 | 186.2 | 179.4 | 181.1 | 236.1 |
| Northwest | 533.9 | 400.0 | 545.9 | 437.0 | 679.3 | 770.1 | 713.3 | 780.1 | 719.7 | 708.4 | 483.8 | 547.1 | 325.4 | 356.4 | 398.5 | 471.4 |
| All units | 2,089.3 | 1,576.1 | 1,670.1 | 1,443.9 | 1,928.9 | 2,257.5 | 2,276.8 | 2,434.7 | 2,197.3 | 2,096.8 | 1,395.8 | 1,445.8 | 1,128.9 | 1,077.0 | 1,185.7 | 1,451.2 |

*Numbers in columns may not sum to totals due to rounding.

Table XII.—Area of timberland by ownership and basal area class of live trees, Louisiana, 1984 and 1991*

| Ownership | Basal area class (Square feet per acre) | | | | | | | | | | | | | | | |
|-----------------------|---|---------|-----------|---------|-----------|---------|----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| | >140 | | 121 - 140 | | 101 - 120 | | 81 - 100 | | 61 - 80 | | 41 - 60 | | 21 - 40 | | 0 - 21 | |
| | 1984 | 1991 | 1984 | 1991 | 1984 | 1991 | 1984 | 1991 | 1984 | 1991 | 1984 | 1991 | 1984 | 1991 | 1984 | 1991 |
| | <i>Thousand acres</i> | | | | | | | | | | | | | | | |
| Public | 135.4 | 89.2 | 185.5 | 157.3 | 178.2 | 225.9 | 240.7 | 317.4 | 245.0 | 256.3 | 150.8 | 102.7 | 91.4 | 86.0 | 98.4 | 71.5 |
| Forest industry | 395.5 | 323.9 | 369.6 | 362.8 | 477.3 | 549.8 | 623.2 | 727.9 | 472.6 | 593.1 | 457.4 | 467.4 | 340.9 | 333.4 | 466.5 | 540.2 |
| Nonindustrial private | 1,558.4 | 1,163.0 | 1,114.9 | 923.9 | 1,273.4 | 1,481.7 | 1,412.8 | 1,389.5 | 1,479.7 | 1,247.4 | 787.6 | 875.7 | 696.6 | 657.7 | 620.9 | 839.5 |
| All owners | 2,089.3 | 1,576.1 | 1,670.1 | 1,443.9 | 1,928.9 | 2,257.5 | 2,276.8 | 2,434.7 | 2,197.3 | 2,096.8 | 1,395.8 | 1,445.8 | 1,128.9 | 1,077.0 | 1,185.7 | 1,451.2 |

*Numbers in columns may not sum to totals due to rounding.

Table XIII.—Area of timberland by size class and basal area class of live trees, Louisiana, 1984 and 1991*

| Size class | Basal area class (Square feet per acre) | | | | | | | | | | | | | | | |
|----------------------|---|---------|-----------|---------|-----------|---------|----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| | >140 | | 121 - 140 | | 101 - 120 | | 81 - 100 | | 61 - 80 | | 41 - 60 | | 21 - 40 | | 0 - 21 | |
| | 1984 | 1991 | 1984 | 1991 | 1984 | 1991 | 1984 | 1991 | 1984 | 1991 | 1984 | 1991 | 1984 | 1991 | 1984 | 1991 |
| | <i>Thousand acres</i> | | | | | | | | | | | | | | | |
| Sapling and seedling | 12.2 | 5.5 | 55.0 | 44.9 | 65.3 | 51.5 | 190.1 | 194.7 | 382.1 | 322.7 | 584.1 | 615.0 | 837.5 | 812.2 | 1,085.8 | 1,356.9 |
| Poletimber | 270.6 | 195.6 | 262.3 | 230.3 | 444.8 | 440.1 | 588.5 | 477.9 | 497.0 | 458.7 | 292.4 | 261.2 | 157.5 | 84.7 | 5.7 | 13.0 |
| Sawtimber | 1,806.4 | 1,375.0 | 1,352.8 | 1,168.7 | 1,418.8 | 1,765.9 | 1,498.2 | 1,762.1 | 1,318.1 | 1,315.3 | 519.3 | 569.6 | 133.9 | 180.1 | 5.4 | 11.3 |
| Nonstocked | 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 | 0.0 | 88.8 | 70.0 |
| All classes | 2,089.3 | 1,576.1 | 1,670.1 | 1,443.9 | 1,928.9 | 2,257.5 | 2,276.8 | 2,434.7 | 2,197.3 | 2,096.8 | 1,395.8 | 1,445.8 | 1,128.9 | 1,077.0 | 1,185.7 | 1,451.2 |

*Numbers in columns may not sum to totals due to rounding.

Louisiana with individual volumes of over 1.0 billion ft³. Baldcypress is most dominant in the South Delta unit, where 74 percent of its total State volume is concentrated. Water oak is not dominant in any one unit but contributes substantially to the volume of all the units. This even distribution results in water oak ranking fourth in volume at the State level.

Species rankings for individual units and for the State as a whole are shown in table XVII. Only a few species are important in making up most of the volume in the State, however. Loblolly pine, sweetgum, baldcypress, and water oak make up half of the total volume of all live trees ≥ 1.0 inch in d.b.h.

Change in Number of Trees

The number of softwood trees 5.0 to 23.0 inches in d.b.h. declined substantially since 1984 (fig. 23). However, the number of softwood trees in the 2- and 4-inch diameter classes increased. These changes reflect harvesting and subsequent regeneration activity in the smaller diameters.

The number of hardwoods decreased across all diameter classes up to 20 inches. This change also reflects harvesting, but, in contrast to the softwoods, hardwoods are not favored in regeneration schemes. That is why numbers in the 2- and 4-inch diameter classes have declined.

There has been some concern in recent years about the fate of hardwood stands in regard to conversions to pine stands. Since the 1984 survey, no appreciable decline has occurred. In fact, timberland with 90 to 100 percent of stand basal area in pines or 90 to 100 percent of stand basal area in hardwoods have both declined (fig. 24). Respective hardwood stands dropped by 4 percent while pine stands dropped 8 percent.

Much of the State's timberland (4,146,000 acres) is in stands composed of 90 to 100 percent hardwoods. This total is high because of the predominance of the bottomland types. Figure 25 shows trends for upland sites where pines are most likely to be planted. On such sites, stands with 90 to 100 percent of basal area in hardwoods decreased slightly since 1984 as did stands with 90 to 100 percent of basal area in pines (8 percent).

Where hardwoods are more than 50 percent of stand basal area, two decile classes decreased and three decile classes increased in acreage since the 1984 survey (fig. 25). For stands with softwood plurality, two classes decreased and three classes increased. However, the classes that decreased did so by large margins. The net change for Louisiana is a 95,800-acre increase of upland stands with a hardwood majority and a 176,100-acre decrease of upland stands with a softwood majority.

GROWTH, REMOVALS, AND MORTALITY

In these forest inventories, three major components of change in timber volume are monitored: growth, removals, and mortality. Complex interactions among these components result in a decrease or increase in the inventory volume. Because of the dynamic nature of these components, estimates are given as the periodic annual average; i.e., the average over the survey period and not over the life of the trees being sampled.

Softwoods

Growth of live softwoods has decreased slightly since the last survey. Gross growth is 612.8 million ft³/yr and net growth is 524.8 million ft³/yr. These values have decreased by 5 and 11 percent, respectively, since 1984. The most dramatic change in Louisiana's inventory balance, however, was in the removals category. Softwood removals increased from 450.3 million to 669.0 million ft³/yr. This 49-percent increase resulted in a removal-to-growth ratio of 1.27 to 1 and a net change in softwood inventory of -144.4 million ft³/yr (table XVIII). Most of the gross growth (49 percent) came from the nongrowth trees (see definitions in the appendix). Other components contributing substantially to gross growth were growth on cut trees (19 percent) and growth on survivor trees (13 percent). The majority of gross growth came from the Southwest and Northwest survey units, 39 and 41 percent of the State's growth, respectively. Likewise, most of the State's removals (82 percent) came from these two survey units.

Softwood mortality is 88.0 million ft³/yr for the survey period. The Southwest and Northwest units, together, account for 80 percent of softwood mortality. Most of the mortality (62 percent) was on NIPF land. Additionally, 17 percent of mortality was in plantations.

Fifty-five percent of the State's gross growth and 55 percent of its removals were on NIPF land (table XIX). Forest industry land provided 39 percent of gross growth, and public land, 6 percent.

Gross growth in softwood plantations is 217.9 million ft³/yr, net growth is 202.9 million ft³/yr, and net change is -54.7 million ft³/yr (table XX). Approximately one-third of Louisiana's softwood gross growth is in plantations. Fifty-nine percent of gross growth is on forest industry land followed by 37 percent on NIPF land. Only 4 percent of softwood gross growth from plantations is on public land.

Approximately 39 percent of Louisiana's total softwood removals came from plantations. More than half of plantation removals (54 percent) were from forest industry land. Forty-one percent came from NIPF land and 5 percent from public land.

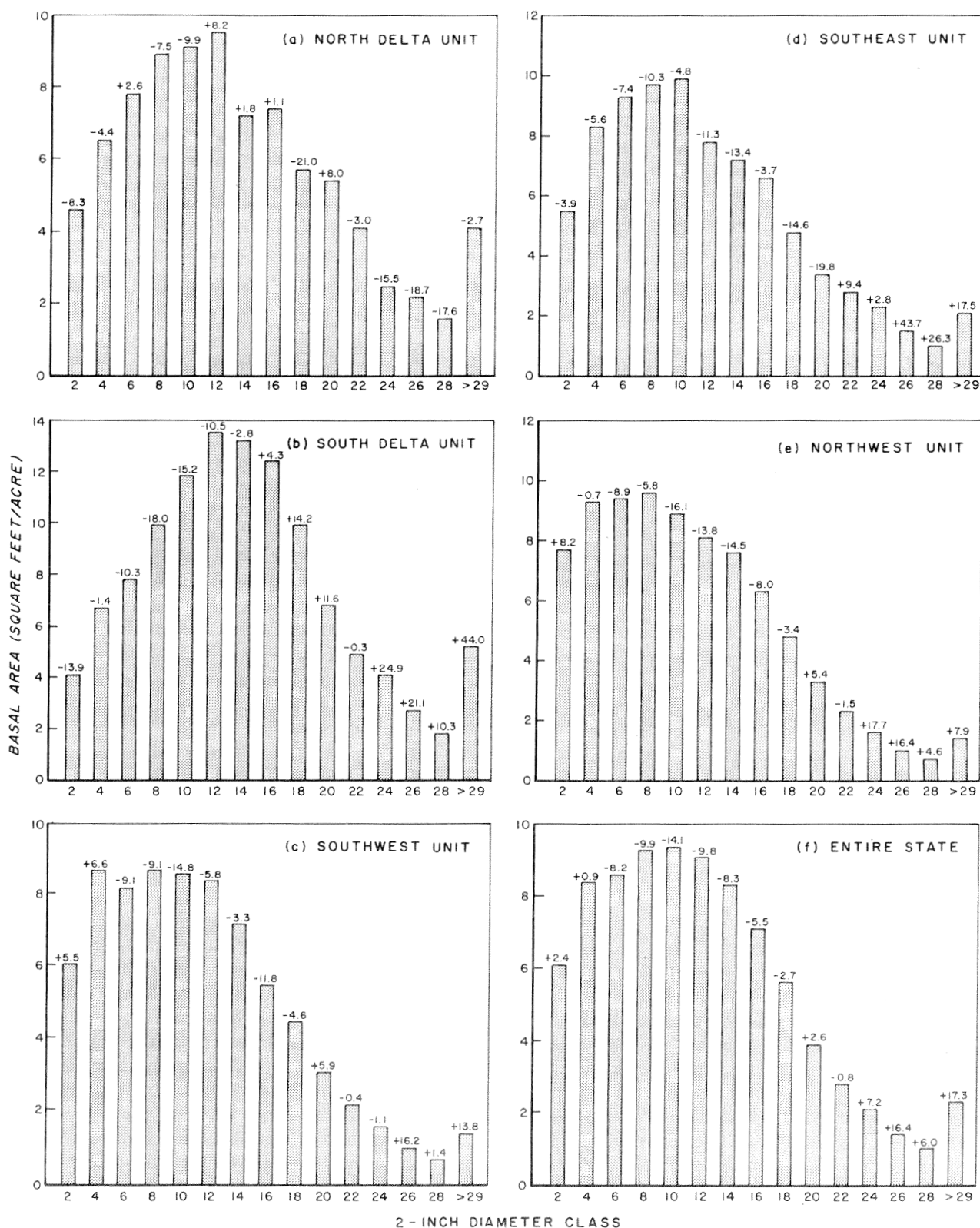


Figure 20. — Basal area of all live trees by diameter class, Louisiana, 1991. Numbers above bars are percentage changes since the 1984 survey.

Table XIV.—Area of timberland by forest type group and basal area class of live trees, Louisiana, 1984 and 1991*

| Forest type group | Basal area class (Square feet per acre) | | | | | | | | | |
|--------------------------|---|---------|-----------|---------|-----------|---------|----------|---------|---------|---------|
| | >140 | | 121 - 140 | | 101 - 120 | | 81 - 100 | | 61 - 80 | |
| | 1984 | 1991 | 1984 | 1991 | 1984 | 1991 | 1984 | 1991 | 1984 | 1991 |
| -----Thousand acres----- | | | | | | | | | | |
| Longleaf-slash | 29.2 | 15.8 | 65.6 | 20.3 | 94.9 | 76.7 | 166.8 | 193.0 | 185.6 | 184.8 |
| Loblolly-shortleaf | 698.5 | 464.2 | 695.2 | 538.8 | 582.4 | 741.6 | 631.9 | 686.0 | 602.6 | 633.3 |
| Oak-pine | 152.7 | 132.8 | 205.8 | 179.4 | 279.9 | 266.1 | 356.1 | 316.0 | 319.3 | 387.0 |
| Oak-hickory | 89.1 | 59.8 | 105.6 | 81.1 | 266.8 | 333.2 | 355.3 | 350.2 | 352.8 | 282.7 |
| Oak-gum-cypress† | 1,119.8 | 903.6 | 597.7 | 624.4 | 704.8 | 839.8 | 766.6 | 889.5 | 736.9 | 608.9 |
| All types | 2,089.3 | 1,576.1 | 1,670.1 | 1,443.9 | 1,928.9 | 2,257.5 | 2,276.8 | 2,434.7 | 2,197.3 | 2,096.8 |
| | | | | | | | | | 1,395.8 | 1,445.8 |
| | | | | | | | | | 1,128.9 | 1,077.0 |
| | | | | | | | | | 110.8 | 109.1 |
| | | | | | | | | | 255.2 | 338.3 |
| | | | | | | | | | 379.2 | 472.6 |
| | | | | | | | | | 131.1 | 235.0 |
| | | | | | | | | | 153.5 | 81.9 |
| | | | | | | | | | 240.9 | 391.7 |
| | | | | | | | | | 248.7 | 255.1 |
| | | | | | | | | | 304.1 | 207.1 |
| | | | | | | | | | 310.4 | 273.4 |
| | | | | | | | | | 1,185.7 | 1,451.2 |

*Numbers in columns may not sum to totals due to rounding.

†Includes elm-ash-cottonwood type.

Table XV.—Volume of all live trees by forest survey unit and basal area class of live trees, Louisiana, 1984 and 1991*

| Forest survey unit | Basal area class (Square feet per acre) | | | | | | | | | |
|------------------------------|---|---------|-----------|---------|-----------|---------|----------|---------|---------|---------|
| | >140 | | 121 - 140 | | 101 - 120 | | 81 - 100 | | 61 - 80 | |
| | 1984 | 1991 | 1984 | 1991 | 1984 | 1991 | 1984 | 1991 | 1984 | 1991 |
| -----Million cubic feet----- | | | | | | | | | | |
| North Delta | 364.5 | 188.0 | 262.8 | 354.4 | 280.8 | 287.3 | 291.9 | 373.6 | 130.1 | 158.2 |
| South Delta | 2,551.4 | 2,036.9 | 708.3 | 788.2 | 490.9 | 840.5 | 433.5 | 529.3 | 328.1 | 264.8 |
| Southwest | 1,260.3 | 844.9 | 1,100.5 | 865.3 | 1,163.2 | 1,285.2 | 1,135.1 | 1,170.6 | 817.9 | 1,020.9 |
| Southeast | 835.5 | 597.4 | 489.3 | 381.0 | 390.4 | 598.2 | 387.7 | 521.5 | 287.1 | 245.2 |
| Northwest | 1,715.1 | 1,231.3 | 1,414.2 | 1,005.6 | 1,372.4 | 1,610.2 | 1,114.5 | 1,217.5 | 830.8 | 814.7 |
| All units | 6,726.7 | 4,898.6 | 3,975.0 | 3,394.5 | 3,697.7 | 4,621.4 | 3,382.8 | 3,812.6 | 2,394.1 | 2,503.8 |
| | | | | | | | | | 980.1 | 1,054.4 |
| | | | | | | | | | 398.5 | 362.9 |
| | | | | | | | | | 22.0 | 10.7 |
| | | | | | | | | | 40.7 | 28.8 |
| | | | | | | | | | 175.9 | 143.3 |
| | | | | | | | | | 54.5 | 57.2 |
| | | | | | | | | | 105.5 | 122.8 |
| | | | | | | | | | 60.0 | 90.2 |

*Numbers in columns may not sum to totals due to rounding.

Table XVI.—Volume of all sawtimber by forest survey unit and basal area class of live trees, Louisiana, 1984 and 1991*

| Forest survey unit | Basal area class (Square feet per acre) | | | | | | | | | | | | | | | |
|------------------------------|---|----------|-----------|----------|-----------|----------|----------|----------|---------|---------|---------|---------|---------|---------|--------|-------|
| | >140 | | 121 - 140 | | 101 - 120 | | 81 - 100 | | 61 - 80 | | 41 - 60 | | 21 - 40 | | 0 - 21 | |
| | 1984 | 1991 | 1984 | 1991 | 1984 | 1991 | 1984 | 1991 | 1984 | 1991 | 1984 | 1991 | 1984 | 1991 | 1984 | 1991 |
| -----Million board feet----- | | | | | | | | | | | | | | | | |
| North Delta | 1,503.3 | 788.4 | 871.2 | 1,283.5 | 916.7 | 997.0 | 874.6 | 1,263.0 | 504.4 | 564.2 | 221.9 | 343.4 | 52.3 | 30.8 | 12.3 | 18.4 |
| South Delta | 7,596.8 | 6,672.0 | 2,031.9 | 2,627.1 | 1,457.0 | 2,722.4 | 1,206.4 | 1,669.6 | 747.6 | 700.3 | 287.6 | 1,811.0 | 67.7 | 76.8 | 0.0 | 3.8 |
| Southwest | 5,184.5 | 3,166.4 | 4,371.1 | 3,509.8 | 4,245.5 | 4,981.3 | 3,986.6 | 4,684.3 | 3,007.2 | 4,015.3 | 1,235.1 | 1,519.9 | 532.1 | 433.4 | 88.3 | 75.3 |
| Southeast | 2,913.9 | 2,245.4 | 1,849.1 | 1,314.6 | 1,431.5 | 2,053.7 | 1,169.9 | 2,018.7 | 1,058.4 | 861.6 | 382.3 | 464.8 | 147.9 | 175.9 | 13.5 | 60.0 |
| Northwest | 6,680.6 | 4,821.0 | 5,585.9 | 3,953.0 | 5,112.8 | 6,318.7 | 4,193.5 | 4,481.2 | 2,987.9 | 3,020.4 | 966.1 | 1,148.8 | 221.1 | 386.5 | 82.9 | 41.5 |
| All units | 23,879.1 | 17,693.2 | 14,709.2 | 12,688.0 | 13,163.6 | 17,073.0 | 11,431.0 | 14,116.9 | 8,305.6 | 9,161.8 | 3,093.0 | 3,489.9 | 1,021.2 | 1,103.4 | 197.0 | 199.0 |

Hardwoods

Growth of live hardwood trees has changed only slightly since the 1984 survey. Gross growth is up 2 percent to 471.5 million ft³/yr, and net growth is up 8 percent to 325.4 million ft³/yr. Most of the State's gross growth is in the Northwest (29 percent) and South Delta (26 percent) survey units (table XVIII).

The net change in inventory volume has decreased since the 1984 survey from +60.3 to +39.8 million ft³/yr. The result is a growth-to-removal ratio of 1.14 to 1 versus 1.25 to 1 for the 1984 survey. This difference was because net growth increased by only 9 percent while removals increased by 18 percent. Two-fifths of the hardwood removals were from the Northwest survey unit.

Seventy percent of gross growth, 69 percent of net growth, and 66 percent of removals occur on NIPF land. Forest industry had a net change in inventory of -16.8 million ft³/yr, most likely a result of management favoring pines over hardwoods. The contrast between NIPF land and forest industry land is obvious. Growth is balanced between softwoods and hardwoods on NIPF land, whereas growth on forest industry land is primarily softwood. The majority of removals on both forest industry and NIPF land are softwood.

Hardwood mortality for the survey period was 146.1 million ft³/yr. The South Delta unit accounted for 39 percent of all hardwood mortality in the State. Seventy percent of mortality was on NIPF land.

Hardwood Sawtimber

Gross growth of hardwood sawtimber is 1,386 million fbm/yr, net growth is 1,166 million fbm/yr, and net change is +304.0 million fbm/yr. Twenty-five percent of the net growth is in the South Delta unit, 22 percent is in the Northwest unit, and 21 percent is in the Southwest unit (table XXI).

Since 1984, 69 percent of Louisiana's hardwood sawtimber growth—806.5 million fbm/yr—has occurred on NIPF land (table XXII). Forest industry land accounted for 21 percent of hardwood net growth, and public land, for 10 percent. The share of hardwood growth from forest industry land is well below the percentage for softwood sawtimber net growth. The difference demonstrates forest industry's emphasis on softwood production.

PLANTATIONS

Plantations were analyzed for the 1991 survey by examining sample plots classified as plantations in the 1984 survey and had no commercial harvesting

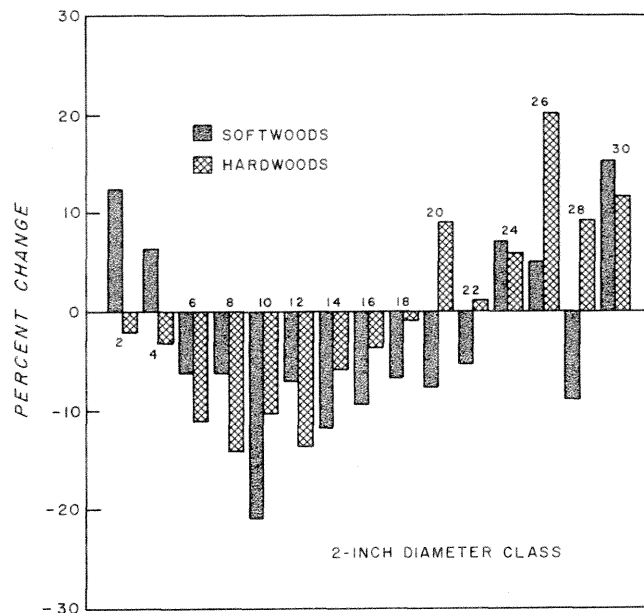


Figure 23. — Percentage change in number of live trees between 1984 and 1991, Louisiana.

activity between 1984 and 1991. This method was used so that failed plantations (those with low stocking) would be identified. Otherwise, only the successful plantations would have been included in the analysis. Additionally, sample plots that had changed to a plantation status (from either land use reversions to timberland or previously harvested natural stands) by the time of the 1991 survey were also included in the analysis.

Area

Currently, Louisiana has 2,735,700 acres of timberland in plantations (20 percent of all timberland in the State) (table XXIV). New plantation acreage from land use reversions to timberland was only 96,600 acres, some of this probably coming from the Conservation Reserve Program. Additionally, 24,900 acres of plantations were lost to diversions of timberland to other land uses. Overall, after accounting for additional timberland shifts to and from plantation status, there was a 386,700-acre increase (16 percent) of timberland in plantations over that reported for 1984.

More than half of the plantation area (1,534,300 acres) is on forest industry land (table XXIV). Plantations account for 39 percent of all forest industry timberland. They occupy only 12 percent of NIPF timberland.

The loblolly-shortleaf pine FTG is the prevailing type on plantation timberland (table XXIV). Loblolly pine is planted on most of the 1,644,500 acres in this type. The longleaf-slash pine FTG occupies 600,600

Table XVII.—*Ranking of tree species* (by volume) for each forest survey unit and the State, Louisiana, 1991*

| North Delta | | South Delta | |
|---------------------------------|---------------------|---------------------------------|---------------------|
| Species | Volume [†] | Species | Volume [†] |
| Loblolly pine | 259.1 | Baldcypress | 1,208.3 |
| Sweetgum | 229.1 | Water tupelo | 706.8 |
| Sugarberry | 95.8 | Green ash | 358.9 |
| Water oak | 93.9 | Willow | 355.6 |
| Willow oak | 89.1 | Red maple | 344.9 |
| Overcup oak | 82.2 | Sugarberry | 335.8 |
| Willow | 81.1 | Sweetgum | 315.7 |
| Water hickory | 76.9 | Water oak | 181.5 |
| Green ash | 62.6 | Water hickory | 128.8 |
| Cottonwood | 56.2 | American elm | 123.0 |
| Nuttall oak | 49.5 | Nuttall oak | 109.0 |
| Cedar elm | 43.0 | Loblolly pine | 101.4 |
| American elm | 40.1 | Boxelder | 81.9 |
| Cherrybark oak | 27.9 | Cottonwood | 71.0 |
| Pecan | 27.7 | Overcup oak | 63.1 |
| Southern red oak | 27.6 | American sycamore | 53.6 |
| American sycamore | 26.3 | Pecan | 39.1 |
| Baldcypress | 24.3 | Blackgum | 31.3 |
| White oak | 22.7 | Slippery elm | 29.7 |
| Winged elm | 21.5 | Cherrybark oak | 26.8 |
| Boxelder | 19.4 | Swamp tupelo | 22.1 |
| Honeylocust | 18.7 | Laurel oak | 20.3 |
| Water tupelo | 17.4 | Hickory spp. | 19.6 |
| Shortleaf pine | 15.2 | Willow oak | 17.1 |
| Post oak | 10.0 | Other species [†] | 14.8 |
| Slippery elm | 9.9 | Chinese tallowtree | 14.6 |
| Hickory spp. | 9.1 | Honeylocust | 14.6 |
| Laurel oak | 8.7 | Winged elm | 14.5 |
| American beech | 8.5 | Live oak | 13.4 |
| White ash | 8.1 | Water-elm | 12.6 |
| Delta post oak | 7.7 | Blue-beech | 12.3 |
| Slash pine | 7.0 | Swamp chestnut oak | 9.5 |
| Ironwood | 6.8 | Common persimmon | 9.3 |
| Waterlocust | 5.0 | White ash | 9.2 |
| Common persimmon | 4.7 | American beech | 9.0 |
| Blackgum | 4.7 | Waterlocust | 8.7 |
| Flowering dogwood | 4.4 | Hawthorn | 7.4 |
| Blue-beech | 4.2 | White oak | 7.3 |
| Swamp chestnut oak | 3.7 | Shortleaf pine | 5.9 |
| Red maple | 2.6 | Post oak | 5.7 |
| Hawthorn | 2.5 | Yellow-poplar | 5.6 |
| Shumard oak | 1.9 | Shumard oak | 4.3 |
| Water-elm | 1.8 | Ironwood | 4.1 |
| Black oak | 1.8 | Southern magnolia | 3.8 |
| Florida maple | 1.1 | Southern red oak | 2.6 |
| Black cherry | 1.0 | Spruce pine | 2.4 |
| Yellow-poplar | 0.9 | Florida maple | 2.3 |
| Sourwood | 0.9 | Flowering dogwood | 2.2 |
| Other species [†] | 0.8 | Red mulberry | 2.1 |
| Swamp tupelo | 0.6 | Redbay | 1.7 |
| Sassafras | 0.6 | Northern red oak | 1.7 |
| Turkey oak | 0.5 | Sourwood | 1.6 |
| Chinaberry | 0.4 | Cedar elm | 1.3 |
| Red mulberry | 0.3 | Hackberry | 1.1 |
| Serviceberry | 0.2 | Black locust | 1.1 |
| Blackjack oak | 0.2 | Black cherry | 0.9 |
| Plums and cherries [§] | 0.1 | Black oak | 0.9 |
| Eastern redbud | † | Sassafras | 0.7 |
| American holly | † | Pin oak | 0.5 |
| Osage-orange | † | River birch | 0.4 |
| Sparkleberry | † | American holly | 0.4 |
| White mulberry | † | Plums and cherries [§] | 0.3 |
| | | Durand oak | 0.3 |
| | | White mulberry | 0.2 |
| | | Turkey oak | 0.2 |
| | | Sweetbay | † |
| | | Serviceberry | † |

Table XVII.—*Ranking of tree species* (by volume) for each forest survey unit and the State, Louisiana, 1991—Continued*

| Southwest | | Southeast | |
|--------------------|---------------------|----------------------------|---------------------|
| Species | Volume [†] | Species | Volume [†] |
| Loblolly pine | 2,496.6 | Loblolly pine | 940.1 |
| Slash pine | 682.1 | Sweetgum | 224.2 |
| Sweetgum | 600.4 | Water oak | 203.8 |
| Longleaf pine | 384.1 | Baldcypress | 139.3 |
| Water oak | 229.0 | Blackgum | 136.5 |
| Southern red oak | 186.0 | Slash pine | 123.6 |
| Blackgum | 176.8 | Laurel oak | 106.6 |
| Shortleaf pine | 171.2 | Water tupelo | 99.4 |
| White oak | 154.8 | Spruce pine | 92.5 |
| Baldcypress | 131.6 | Swamp tupelo | 66.1 |
| Cherrybark oak | 111.9 | Red maple | 61.1 |
| Post oak | 103.9 | Yellow-poplar | 55.1 |
| American beech | 100.7 | Cherrybark oak | 52.7 |
| Hickory spp. | 87.2 | Blue-beech | 44.6 |
| Laurel oak | 85.3 | Longleaf pine | 41.5 |
| Red maple | 83.5 | Sweetbay | 38.7 |
| Willow oak | 72.9 | Southern red oak | 35.3 |
| Blue-beech | 62.4 | Shortleaf pine | 33.6 |
| Green ash | 58.4 | American beech | 32.9 |
| Water tupelo | 48.7 | White oak | 29.8 |
| Sweetbay | 44.2 | Swamp chestnut oak | 29.6 |
| Overcup oak | 43.3 | Post oak | 25.3 |
| Water hickory | 39.9 | Southern magnolia | 24.7 |
| Flowering dogwood | 38.6 | Green ash | 24.5 |
| Swamp chestnut oak | 36.9 | Hickory spp. | 23.6 |
| Nuttall oak | 31.3 | Willow oak | 19.6 |
| Winged elm | 31.2 | American elm | 17.9 |
| Ironwood | 26.0 | Water hickory | 16.9 |
| American elm | 22.8 | Flowering dogwood | 12.8 |
| Hawthorn | 20.3 | Black cherry | 12.8 |
| Pecan | 20.1 | Winged elm | 11.0 |
| Blackjack oak | 19.6 | American sycamore | 10.0 |
| Sugarberry | 18.9 | Overcup oak | 9.1 |
| Chinese tallowtree | 17.2 | Chinese tallowtree | 8.8 |
| American holly | 16.8 | Sourwood | 8.0 |
| Southern magnolia | 15.4 | Ironwood | 6.9 |
| Slippery elm | 14.0 | Willow | 6.8 |
| Honeylocust | 12.6 | American holly | 5.9 |
| Shumard oak | 11.1 | Live oak | 5.8 |
| Sourwood | 8.5 | Other species [†] | 4.3 |
| Black cherry | 8.5 | Redbay | 3.8 |
| Swamp tupelo | 7.7 | River birch | 3.7 |
| White ash | 7.0 | Honeylocust | 3.5 |
| Redbay | 6.9 | Slippery elm | 3.4 |
| American sycamore | 6.8 | Nuttall oak | 3.2 |
| Common persimmon | 6.8 | Blackjack oak | 3.0 |
| Sassafras | 6.3 | Sassafras | 2.8 |
| Willow | 5.4 | Pecan | 2.8 |
| Black oak | 5.3 | Hawthorn | 2.7 |
| Water-elm | 4.7 | Common persimmon | 2.6 |

acres of plantation timberland. These plantations account for 69 percent of the total longleaf-slash pine acreage in the State. Table XXIV shows 490,600 acres in the oak-pine, oak-hickory, and bottomland hardwood types. Most of this acreage was probably intended to be pine plantations, but the hardwood stocking component was so dominant that the samples were classified as hardwood types.

Fifty-eight percent of Louisiana's plantations are less than 20 years old (table XXV). Very few plantations are over 40 years old. Among plantations classed as sawtimber stands, 372,700 acres are on forest industry land and 257,400 acres are on NIPF land.

Unfortunately, 584,800 acres of plantations in Louisiana have low softwood stocking (<60 percent stocked) (table XXVI). Most of this acreage (53 percent) is on

forest industry land. It is important to note that 2,150,900 acres of Louisiana's plantation timberland (79 percent) are adequately stocked.

Softwood Volume

Twenty-three percent of Louisiana's total live-tree softwood volume (2,314.2 million ft³) is on plantation timberland. Forest industry has 52 percent of this volume, NIPF owners have 40 percent, and the public has 8 percent (table XXVII).

Most of the plantation volume (1,898.5 million ft³) is in poletimber and small sawtimber trees. Only 71.0 million ft³ are in trees >20.0 inches in d.b.h. (table XXVII). Information about softwood growth on plan-

Table XVII.—*Ranking of tree species* (by volume) for each forest survey unit and the State, Louisiana, 1991—Continued*

| Southwest | | Southeast | |
|---------------------------------|---------------------|---------------------------------|---------------------|
| Species | Volume [†] | Species | Volume [†] |
| Florida maple | 3.8 | Water-elm | 2.5 |
| Red mulberry | 3.6 | Sugarberry | 2.5 |
| Yellow-poplar | 3.3 | Plums and cherries [§] | 2.4 |
| Sparkleberry | 3.2 | Shumard oak | 2.2 |
| American basswood | 3.0 | Black oak | 2.1 |
| Eastern redcedar | 2.8 | Tung-oil-tree | 1.6 |
| Bluejack oak | 2.4 | Turkey oak | 0.9 |
| Other species [†] | 2.2 | Boxelder | 0.9 |
| River birch | 2.1 | Cottonwood | 0.8 |
| Scarlet oak | 1.9 | Apple | 0.6 |
| Northern red oak | 1.9 | Black walnut | 0.6 |
| Waterlocust | 1.8 | Pin oak | 0.6 |
| Chestnut oak | 1.8 | Scarlet oak | 0.5 |
| Plums and cherries [§] | 1.7 | White ash | 0.5 |
| Black locust | 1.1 | Chestnut oak | 0.4 |
| White mulberry | 0.9 | Cucumbertree | 0.4 |
| Swamp white oak | 0.8 | Sparkleberry | 0.4 |
| Serviceberry | 0.8 | Northern red oak | 0.4 |
| Chinaberry | 0.7 | Royal paulownia | 0.3 |
| Black walnut | 0.6 | Hackberry | † |
| Delta post oak | 0.5 | White basswood | † |
| Bigleaf magnolia | 0.5 | | |
| Osage-orange | 0.5 | | |
| Chinkapin oak | 0.4 | | |
| Live oak | 0.3 | | |
| Boxelder | 0.3 | | |
| Durand oak | 0.3 | | |
| Turkey oak | 0.2 | | |
| Eastern redbud | 0.1 | | |
| Chinkapin | 0.1 | | |
| Hackberry | 0.1 | | |
| Pin oak | † | | |
| Allegheny chinkapin | † | | |
| September elm | † | | |
| Cucumbertree | † | | |
| White basswood | † | | |

tations can be found in the growth, removals, and mortality section of this paper.

Harvesting and Stand Treatment

A total of 711,700 acres of Louisiana plantations underwent a commercial harvest between 1984 and 1991 (table XXVIII). Sixteen percent of all commercial harvests in the State took place on plantation timberland. This harvesting activity was evenly divided between NIPF and forest industry timberland. There was very little harvesting in publicly owned plantations.

Stand treatments, other than final harvests, were imposed on 629,100 acres of Louisiana plantations between 1984 and 1991 (table XXVIII). Such treatments include thinnings and timber stand improvement efforts. Fifty-five percent of this activity was on forest industry timberland, 38 percent was on NIPF timberland, and 7 percent was on public timberland.

DISTURBANCE

Harvesting

A total of 4,373,500 acres of timberland underwent

some form of commercial harvest between 1984 and 1991 (table XXIX). Most of the harvesting activity consisted of partial harvests (2,844,700 acres). Included in this category are group-selection methods, single-tree selection, and diameter-limit cutting. Some of this timberland will undergo site preparation and be planted in pine. Out of 2,383,900 acres classed as partial harvest in 1984, 311,500 acres were planted by 1991. Field crews visit the sample plots on a single day during the survey, which may be at the beginning or end of harvesting, during site preparation, or during planting. Therefore, final disposition of some plots may not be known until the next survey period.

At their best, partial cut strategies can improve species composition and tree quality in uneven-aged stand management. In contrast, partial cut strategies may result in only the best and highest quality species being harvested and leaving inferior trees to make up the next stand generation.

Forty-two percent of the partial cutting was in the loblolly-shortleaf pine FTG. Another 18 percent was in the oak-pine FTG, and 15 percent was in bottom-land hardwood types.

A total of 1,646,200 acres of partial harvesting (58 percent of the total) was done on NIPF land. Almost 1

Table XVII. —*Ranking of tree species* (by volume) for each forest survey unit and the State, Louisiana, 1991—Continued*

| Northwest | | | |
|--------------------|---------------------|---------------------------------|---------------------|
| Species | Volume [†] | Species | Volume [†] |
| Loblolly pine | 3,209.3 | Water-elm | 8.1 |
| Sweetgum | 775.4 | Eastern redcedar | 7.3 |
| Shortleaf pine | 641.4 | Honeylocust | 7.2 |
| Water oak | 318.8 | Florida maple | 7.2 |
| Willow oak | 238.8 | Slippery elm | 7.1 |
| Southern red oak | 224.0 | Red mulberry | 6.3 |
| White oak | 193.9 | Pecan | 5.6 |
| Cherrybark oak | 143.9 | Boxelder | 5.4 |
| Baldcypress | 139.2 | Plums and cherries [§] | 5.2 |
| Hickory spp. | 125.6 | Blackjack oak | 4.2 |
| Red maple | 117.8 | Yellow-poplar | 4.1 |
| Post oak | 114.2 | White basswood | 3.9 |
| Overcup oak | 113.3 | Black locust | 3.6 |
| Blackgum | 103.3 | Sourwood | 3.6 |
| Winged elm | 85.0 | Northern red oak | 3.3 |
| American beech | 77.6 | Other species [†] | 3.3 |
| Water hickory | 66.6 | Delta post oak | 3.0 |
| Blue-beech | 63.1 | River birch | 3.0 |
| Green ash | 54.4 | American basswood | 2.9 |
| Ironwood | 49.5 | Chinaberry | 2.2 |
| Flowering dogwood | 42.8 | Waterlocust | 2.0 |
| Slash pine | 36.5 | Sparkleberry | 1.9 |
| Laurel oak | 34.0 | Scarlet oak | 1.8 |
| Longleaf pine | 30.2 | Redbay | 1.8 |
| Sugarberry | 30.0 | Black walnut | 1.2 |
| American elm | 29.0 | Swamp white oak | 1.1 |
| Nuttall oak | 23.6 | Southern magnolia | 1.0 |
| Water tupelo | 20.7 | Bluejack oak | 0.8 |
| American holly | 20.0 | Butternut | 0.5 |
| Sweetbay | 19.3 | Chestnut oak | 0.5 |
| Cedar elm | 19.2 | Eastern redbud | 0.4 |
| Black cherry | 18.5 | Sugar maple | 0.4 |
| White ash | 17.1 | Southern redcedar | 0.4 |
| Black oak | 16.5 | White mulberry | 0.2 |
| Swamp chestnut oak | 14.6 | Bigleaf magnolia | 0.2 |
| Cottonwood | 13.2 | Chinkapin oak | 0.2 |
| Willow | 12.4 | Catalpa | 0.2 |
| Swamp tupelo | 11.9 | Hackberry | 0.2 |
| American sycamore | 11.6 | September elm | 0.1 |
| Hawthorn | 11.1 | Osage-orange | 0.1 |
| Sassafras | 10.2 | Serviceberry | † |
| Common persimmon | 9.6 | Kentucky coffeetree | † |
| Shumard oak | 8.7 | | |

million acres of forest industry lands were partially harvested.

Since 1984, 1,528,800 acres of Louisiana timberland have been clearcut (table XXIX). Forty percent of that clearcut acreage is in the loblolly-shortleaf pine FTG. Nonindustrial private forest owners held 53 percent and forest industry held 43 percent of the clearcut acreage.

The high level of harvesting activity initiated a special study that analyzed harvesting since 1975 (Rosson 1994a). A total of 6,888,000 acres of timberland has undergone some form of commercial harvest since 1975. Of this, 4,106,100 acres were partially harvested (Rosson 1994a). During the recent survey period, the majority of commercial harvesting was done between 1987 and 1990 (table XXX). During the peak year of 1989, 62 percent of commercial harvests took place on NIPF land.

Since 1975, 2,781,900 acres of Louisiana's upland timberland have been clearcut (Rosson 1994a). The heaviest clearcut harvesting since the 1984 survey was

from 1987 through 1990, with the highest amount of clearcut harvested acreage peaking in 1990 at 295,800 acres (table XXXI). Most of the clearcut acreage in 1990 was in the loblolly-shortleaf pine FTG.

Management

A total of 3,092,700 acres of Louisiana timberland underwent some form of stand treatment or site preparation between 1984 and 1991. Table XXXII shows the acreage distribution of treatments by forest type and ownership. Thinning operations include commercial and precommercial thinning. Stand improvement totals are for cleaning, release and other intermediate cuttings, and girdling, poisoning, or burning in existing stands to remove undesirable trees or other inhibiting vegetation. Site preparation includes clearing, burning, draining, chopping, disking, girdling, poisoning, or other practices designed to prepare a site for future artificial or natural regeneration.

Table XVII.—*Ranking of tree species* (by volume) for each forest survey unit and the State, Louisiana, 1991—Continued*

| State | | | |
|--------------------|---------------------|---------------------------------|---------------------|
| Species | Volume [†] | Species | Volume [†] |
| Loblolly pine | 7,006.4 | Shumard oak | 28.3 |
| Sweetgum | 2,144.8 | Blackjack oak | 27.0 |
| Baldcypress | 1,642.6 | Black oak | 26.5 |
| Water oak | 1,026.9 | Other species [‡] | 25.3 |
| Water tupelo | 893.0 | Sourwood | 22.6 |
| Shortleaf pine | 867.3 | Sassafras | 20.6 |
| Slash pine | 849.2 | Live oak | 19.6 |
| Red maple | 609.9 | Waterlocust | 17.4 |
| Green ash | 558.7 | Florida maple | 14.4 |
| Sugarberry | 483.0 | Redbay | 14.1 |
| Southern red oak | 475.5 | Red mulberry | 13.2 |
| Willow | 461.3 | Delta post oak | 11.3 |
| Longleaf pine | 455.8 | Eastern redcedar | 10.1 |
| Blackgum | 452.6 | Plums and cherries [§] | 9.7 |
| Willow oak | 437.6 | River birch | 9.2 |
| White oak | 408.5 | Northern red oak | 7.2 |
| Cherrybark oak | 363.3 | American basswood | 5.8 |
| Water hickory | 329.1 | Black locust | 5.7 |
| Overcup oak | 311.0 | Sparkleberry | 5.5 |
| Hickory spp. | 265.2 | Scarlet oak | 4.3 |
| Post oak | 259.2 | White basswood | 3.9 |
| Laurel oak | 254.9 | Chinaberry | 3.3 |
| American elm | 232.8 | Bluejack oak | 3.3 |
| American beech | 228.6 | Chestnut oak | 2.7 |
| Nuttall oak | 216.5 | Black walnut | 2.4 |
| Blue-beech | 186.7 | Swamp white oak | 1.9 |
| Winged elm | 163.3 | Turkey oak | 1.9 |
| Cottonwood | 141.2 | Tung-oil-tree | 1.6 |
| Swamp tupelo | 108.4 | Hackberry | 1.3 |
| American sycamore | 108.3 | White mulberry | 1.3 |
| Boxelder | 107.9 | Pin oak | 1.1 |
| Sweetbay | 102.3 | Serviceberry | 1.0 |
| Flowering dogwood | 100.9 | Bigleaf magnolia | 0.7 |
| Pecan | 95.3 | Apple | 0.6 |
| Spruce pine | 95.0 | Durand oak | 0.6 |
| Swamp chestnut oak | 94.3 | Eastern redbud | 0.6 |
| Ironwood | 93.3 | Osage-orange | 0.6 |
| Yellow-poplar | 69.0 | Chinkapin oak | 0.6 |
| Slippery elm | 64.1 | Butternut | 0.5 |
| Cedar elm | 63.5 | Cucumbertree | 0.4 |
| Honeylocust | 56.6 | Sugar maple | 0.4 |
| Southern magnolia | 44.9 | Southern redcedar | 0.4 |
| Hawthorn | 44.0 | Royal paulownia | 0.3 |
| American holly | 43.2 | Catalpa | 0.2 |
| White ash | 41.8 | September elm | 0.1 |
| Black cherry | 41.7 | Chinkapin | 0.1 |
| Chinese tallowtree | 40.6 | Allegheny chinkapin | † |
| Common persimmon | 32.9 | Kentucky coffeetree | † |
| Water-elm | 29.6 | | |

*Scientific names can be cross referenced in species list in appendix.

[†]Values are net cubic-foot volume in million cubic feet for all live trees ≥ 1.0 inch in diameter at breast height.

[‡]Other species includes noncommercial and unidentified species.

[§]Other than black cherry.

[†]Volume >0.0 but <0.1 million cubic feet.

More than half of the thinning (350,500 acres) was done on forest industry land, and 86 percent of these forest industry thinnings were in the loblolly-shortleaf and longleaf-slash pine FTG's (table XXXII). Since 1984, therefore, forest industry had thinned a higher portion of its timberland (9 percent) than NIPF or public land managers (3 and 4 percent, respectively).

Stands were improved on 1,739,400 acres. Again, forest industry led with 43 percent of the improved acreage. Nonindustrial private forest owners had 40 percent and the public had 17 percent of the improved stands. The longleaf-slash, loblolly-shortleaf, and

oak-pine FTG's together had 71 percent of the stand improvement operations.

Between 1984 and 1991, 690,200 acres of timberland were treated to prepare them for regeneration. Again, forest industry led with 56 percent of the site-prepared acreage. The loblolly-shortleaf pine FTG contained 44 percent of the prepared sites. Since 1984, however, 19 percent of site preparation has been in the oak-pine and 20 percent has been in the oak-hickory FTG. The obvious purpose was to greatly increase the pine component of new stands after harvests. Approximately 45 percent of the timberland

Table XVIII.—Components of annual change in the volume of live trees by forest survey unit and species group, Louisiana, 1984 to 1991*

| Forest survey unit | Species group | Growth component | | | | | | | Net change [§] |
|--------------------|---------------|------------------------------|-----------------------|--------------------|---------------------|-----------|---------------------|------------------------|-------------------------|
| | | Survivor growth [†] | Ingrowth [‡] | Growth on removals | Growth on mortality | Mortality | Timberland removals | Land-clearing removals | |
| North Delta | | -----Million cubic feet----- | | | | | | | |
| | Softwood | 11.4 | 2.3 | 1.7 | 0.6 | 2.4 | 10.7 | 0.2 | 2.8 |
| | Hardwood | 51.8 | 4.9 | 4.7 | 1.8 | 12.7 | 38.6 | 3.8 | 8.2 |
| | Total | 63.2 | 7.1 | 6.4 | 2.4 | 15.1 | 49.2 | 3.9 | 11.0 |
| South Delta | | | | | | | | | |
| | Softwood | 19.3 | 0.8 | 1.4 | 0.5 | 4.6 | 10.1 | 4.6 | 2.7 |
| | Hardwood | 102.8 | 10.0 | 2.5 | 5.8 | 56.9 | 33.8 | 16.9 | 13.5 |
| | Total | 122.0 | 10.8 | 3.9 | 6.3 | 61.5 | 43.9 | 21.4 | 16.2 |
| Southwest | | | | | | | | | |
| | Softwood | 143.0 | 26.8 | 57.7 | 9.8 | 37.5 | 257.6 | 14.9 | -72.7 |
| | Hardwood | 71.9 | 11.0 | 7.7 | 4.8 | 24.4 | 58.4 | 3.2 | 9.4 |
| | Total | 214.9 | 37.8 | 65.5 | 14.6 | 61.9 | 316.0 | 18.1 | -63.3 |
| Southeast | | | | | | | | | |
| | Softwood | 49.3 | 10.5 | 24.5 | 3.2 | 10.3 | 93.9 | 3.7 | -20.3 |
| | Hardwood | 45.4 | 5.5 | 2.4 | 2.6 | 17.5 | 14.3 | 3.5 | 20.7 |
| | Total | 94.7 | 16.1 | 26.9 | 5.8 | 27.7 | 108.2 | 7.2 | 0.4 |
| Northwest | | | | | | | | | |
| | Softwood | 157.9 | 33.2 | 51.7 | 6.9 | 33.3 | 271.8 | 1.6 | -56.9 |
| | Hardwood | 99.9 | 14.0 | 17.0 | 4.9 | 34.6 | 111.2 | 2.1 | -12.0 |
| | Total | 257.8 | 47.2 | 68.8 | 11.9 | 67.9 | 383.0 | 3.6 | -68.9 |
| All units | | | | | | | | | |
| | Softwood | 381.0 | 73.6 | 137.2 | 21.0 | 88.0 | 644.2 | 24.8 | -144.4 |
| | Hardwood | 371.8 | 45.4 | 34.3 | 20.0 | 146.1 | 256.2 | 29.4 | 39.8 |
| | Total | 752.7 | 119.0 | 171.5 | 41.0 | 234.1 | 900.4 | 54.3 | -104.5 |

*Numbers in columns may not sum to totals due to rounding.

[†]Includes nongrowth trees.[‡]Includes ongrowth trees.[§]Net change = (survivor growth + ingrowth + growth on removals + growth on mortality) - (mortality + timberland removals + land-clearing removals).

Table XIX.—Components of annual change in the volume of live trees by ownership and species group, Louisiana, 1984 to 1991*

| Ownership | Species group | Growth component | | | | | | | Net change [§] |
|------------------------------|---------------|------------------------------|-----------------------|--------------------|---------------------|-----------|---------------------|------------------------|-------------------------|
| | | Survivor growth [†] | Ingrowth [‡] | Growth on removals | Growth on mortality | Mortality | Timberland removals | Land-clearing removals | |
| -----Million cubic feet----- | | | | | | | | | |
| Public | | | | | | | | | |
| | Softwood | 27.5 | 4.7 | 5.7 | 1.6 | 7.0 | 34.5 | 0.0 | -2.1 |
| | Hardwood | 37.9 | 3.5 | 1.4 | 2.2 | 16.8 | 9.9 | 0.1 | 18.4 |
| | Total | 65.4 | 8.2 | 7.1 | 3.8 | 23.8 | 44.4 | 0.1 | 16.3 |
| Forest industry | | | | | | | | | |
| | Softwood | 130.1 | 41.1 | 60.8 | 5.9 | 26.2 | 258.9 | 7.2 | -54.5 |
| | Hardwood | 71.7 | 10.5 | 12.1 | 4.3 | 26.8 | 87.8 | 0.9 | -16.8 |
| | Total | 202.9 | 51.6 | 72.9 | 10.2 | 53.1 | 346.7 | 8.1 | -71.3 |
| Nonindustrial private | | | | | | | | | |
| | Softwood | 223.4 | 27.8 | 70.7 | 13.5 | 54.8 | 350.7 | 17.7 | -87.8 |
| | Hardwood | 262.1 | 31.3 | 20.9 | 13.5 | 102.5 | 158.6 | 28.5 | 38.3 |
| | Total | 485.5 | 59.1 | 91.6 | 27.0 | 157.3 | 509.3 | 46.1 | -49.5 |
| All owners | | | | | | | | | |
| | Softwood | 381.0 | 73.6 | 137.2 | 21.0 | 88.0 | 644.2 | 24.8 | -144.4 |
| | Hardwood | 371.8 | 45.4 | 34.3 | 20.0 | 146.1 | 256.2 | 29.4 | 39.8 |
| | Total | 752.7 | 119.0 | 171.5 | 41.0 | 234.1 | 900.4 | 54.3 | -104.5 |

*Numbers in columns may not sum to totals due to rounding.

[†]Includes nongrowth trees.[‡]Includes ongrowth trees.[§]Net change = (survivor growth + ingrowth + growth on removals + growth on mortality) - (mortality + timberland removals + land-clearing removals).

Table XX.—Components of annual change in the volume of live trees in plantations by ownership and species group, Louisiana, 1984 to 1991*

| Ownership | Species group | Growth component | | | | | | | Net change [§] |
|-----------------------|---------------|------------------------------|-----------------------|--------------------|---------------------|-----------|---------------------|------------------------|-------------------------|
| | | Survivor growth [†] | Ingrowth [‡] | Growth on removals | Growth on mortality | Mortality | Timberland removals | Land-clearing removals | |
| Public | | -----Million cubic feet----- | | | | | | | |
| | Softwood | 5.2 | 1.7 | 2.0 | 0.1 | 0.4 | 14.2 | 0.0 | -5.4 |
| | Hardwood | 0.9 | 0.1 | 0.4 | 0.1 | 0.5 | 2.3 | 0.0 | -1.3 |
| | Total | 6.1 | 1.9 | 2.4 | 0.2 | 0.8 | 16.4 | 0.0 | -6.7 |
| Forest industry | | | | | | | | | |
| | Softwood | 64.2 | 27.9 | 34.2 | 2.6 | 8.7 | 138.6 | 0.0 | -18.4 |
| | Hardwood | 6.9 | 1.6 | 3.5 | 0.2 | 1.0 | 26.3 | 0.0 | -15.2 |
| | Total | 71.0 | 29.5 | 37.7 | 2.8 | 9.7 | 164.9 | 0.0 | -33.6 |
| Nonindustrial private | | | | | | | | | |
| | Softwood | 44.5 | 11.7 | 22.7 | 1.6 | 5.9 | 105.4 | 0.0 | -30.8 |
| | Hardwood | 5.8 | 2.1 | 2.7 | 0.1 | 0.8 | 18.7 | 0.0 | -8.8 |
| | Total | 50.3 | 13.8 | 25.4 | 1.7 | 6.7 | 124.1 | 0.0 | -39.6 |
| All owners | | | | | | | | | |
| | Softwood | 113.9 | 41.3 | 58.4 | 4.3 | 15.0 | 258.2 | 0.0 | -54.7 |
| | Hardwood | 13.5 | 3.8 | 6.5 | 0.4 | 2.3 | 47.3 | 0.0 | -25.3 |
| | Total | 127.5 | 45.1 | 65.0 | 4.7 | 17.3 | 305.5 | 0.0 | -80.0 |

*Numbers in columns may not sum to totals due to rounding.

[†]Includes nongrowth trees.[‡]Includes ongrowth trees.[§]Net change = (survivor growth + ingrowth + growth on removals + growth on mortality) - (mortality + timberland removals + land-clearing removals).

Table XXI.—Components of annual change in the volume of sawtimber by forest survey unit and species group, Louisiana, 1984 to 1991*

| Forest survey unit | Species group | Growth component | | | | | | | Net change [§] | |
|--|---------------|------------------------------|-----------------------|--------------------|---------------------|----------------|-----------|---------------------|-------------------------|------------------------|
| | | Survivor growth [†] | Ingrowth [‡] | Growth on removals | Growth on mortality | Cull increment | Mortality | Timberland removals | | Land-clearing removals |
| -----Million board feet [¶] ----- | | | | | | | | | | |
| North Delta | | 50.8 | 11.3 | 11.8 | 0.9 | -3.2 | 1.8 | 55.7 | 0.0 | 20.4 |
| | Softwood | 113.9 | 70.7 | 21.7 | 2.5 | -25.0 | 21.1 | 159.2 | 6.3 | 47.3 |
| | Hardwood | 164.7 | 82.0 | 33.5 | 3.4 | -28.2 | 22.9 | 214.9 | 6.3 | 67.6 |
| South Delta | | 84.7 | 12.0 | 7.0 | 1.6 | -26.5 | 12.9 | 39.6 | 14.2 | 65.0 |
| | Softwood | 208.5 | 93.6 | 13.4 | 10.4 | -39.9 | 70.9 | 133.5 | 40.6 | 120.9 |
| | Hardwood | 293.2 | 105.6 | 20.4 | 12.0 | -66.4 | 83.7 | 173.1 | 54.8 | 185.9 |
| Southwest | | 576.1 | 256.5 | 236.6 | 32.6 | -9.2 | 127.8 | 1,063.2 | 68.9 | -148.9 |
| | Softwood | 160.0 | 64.6 | 24.9 | 3.7 | -24.3 | 35.2 | 167.5 | 2.4 | 72.3 |
| | Hardwood | 736.1 | 321.1 | 261.4 | 36.3 | -33.4 | 163.1 | 1,230.7 | 71.3 | -76.6 |
| Southeast | | 184.3 | 103.1 | 111.5 | 7.1 | -3.5 | 30.8 | 435.1 | 18.8 | -75.2 |
| | Softwood | 109.0 | 32.5 | 6.5 | 3.3 | -27.7 | 23.9 | 40.8 | 5.5 | 108.6 |
| | Hardwood | 293.3 | 135.6 | 118.0 | 10.4 | -31.2 | 54.7 | 475.9 | 24.3 | 33.6 |
| Northwest | | 610.9 | 233.5 | 254.0 | 21.7 | -12.0 | 124.3 | 1,227.8 | 6.1 | -226.0 |
| | Softwood | 177.4 | 92.0 | 57.2 | 8.3 | +5.0 | 68.4 | 303.4 | 3.3 | -45.1 |
| | Hardwood | 788.4 | 325.5 | 311.3 | 30.0 | -7.0 | 192.8 | 1,531.3 | 9.3 | -271.2 |
| All units | | 1,506.8 | 616.4 | 620.9 | 63.9 | -54.4 | 297.7 | 2,821.5 | 108.0 | -364.7 |
| | Softwood | 768.8 | 353.4 | 123.7 | 28.1 | -111.9 | 219.5 | 804.5 | 58.0 | 304.0 |
| | Hardwood | 2,275.6 | 969.8 | 744.7 | 92.0 | -166.3 | 517.1 | 3,626.0 | 166.0 | -60.7 |

*Numbers in columns may not sum to totals due to rounding.

[†]Includes nongrowth trees.[‡]Includes ongrowth trees.[§]Net change = (survivor growth + ingrowth + growth on removals + growth on mortality) - (cull increment + mortality + timberland removals + land-clearing removals).[¶]International 1/4-inch Rule.

Table XXII.—Components of annual change in the volume of sawtimber by ownership and species group, Louisiana, 1984 to 1991*

| Ownership | Species group | Growth component | | | | | | | | Net change [§] |
|-----------------------|---------------|---|-----------------------|--------------------|---------------------|----------------|-----------|---------------------|------------------------|-------------------------|
| | | Survivor growth [†] | Ingrowth [‡] | Growth on removals | Growth on mortality | Cull increment | Mortality | Timberland removals | Land-clearing removals | |
| Public | | ----- Million board feet [¶] ----- | | | | | | | | |
| | Softwood | 135.6 | 37.6 | 26.8 | 7.1 | -3.5 | 26.8 | 171.8 | 0.0 | 12.0 |
| | Hardwood | 82.6 | 31.4 | 4.5 | 3.6 | -19.1 | 25.7 | 31.1 | 0.0 | 84.5 |
| | Total | 218.2 | 69.0 | 31.3 | 10.7 | -22.6 | 52.4 | 202.9 | 0.0 | 96.5 |
| Forest industry | | | | | | | | | | |
| | Softwood | 419.8 | 241.5 | 226.6 | 15.3 | -8.4 | 95.1 | 1,043.9 | 34.1 | -261.4 |
| | Hardwood | 140.3 | 79.5 | 38.0 | 4.7 | -28.5 | 46.7 | 268.2 | 2.1 | -25.9 |
| | Total | 560.1 | 321.0 | 264.6 | 20.0 | -36.9 | 141.8 | 1,312.0 | 36.2 | -287.4 |
| Nonindustrial private | | | | | | | | | | |
| | Softwood | 951.4 | 337.2 | 367.5 | 41.6 | -42.5 | 175.7 | 1,605.8 | 74.0 | -115.3 |
| | Hardwood | 545.8 | 242.5 | 81.2 | 19.8 | -64.3 | 147.1 | 505.2 | 55.9 | 245.5 |
| | Total | 1,497.3 | 579.8 | 448.7 | 61.4 | -106.8 | 322.9 | 2,111.0 | 129.9 | 130.1 |
| All owners | | | | | | | | | | |
| | Softwood | 1,506.8 | 616.4 | 620.9 | 63.9 | -54.4 | 297.7 | 2,821.5 | 108.0 | -364.7 |
| | Hardwood | 768.8 | 353.4 | 123.7 | 28.1 | -111.9 | 219.5 | 804.5 | 58.0 | 304.0 |
| | Total | 2,275.6 | 969.8 | 744.7 | 92.0 | -166.3 | 517.1 | 3,626.0 | 166.0 | -60.7 |

*Numbers in columns may not sum to totals due to rounding.

[†]Includes nongrowth trees.[‡]Includes ongrowth trees.[§]Net change = (survivor growth + ingrowth + growth on removals + growth on mortality) - (cull increment + mortality + timberland removals + land-clearing removals).[¶]International 1/4-inch Rule.

Table XXIII.—Components of annual change in the volume of sawtimber in plantations by ownership and species group, Louisiana, 1984 to 1991*

| Ownership | Species group | Growth component | | | | | | | | Net change [§] |
|-----------------------|---------------|---|-----------------------|--------------------|---------------------|----------------|-----------|---------------------|------------------------|-------------------------|
| | | Survivor growth [†] | Ingrowth [‡] | Growth on removals | Growth on mortality | Cull increment | Mortality | Timberland removals | Land-clearing removals | |
| Public | | ----- Million board feet [¶] ----- | | | | | | | | |
| | Softwood | 25.7 | 5.7 | 8.9 | 0.7 | 0.0 | 1.4 | 73.5 | 0.0 | -33.9 |
| | Hardwood | 2.4 | 0.0 | 0.6 | 0.5 | -0.5 | 0.8 | 3.1 | 0.0 | 0.1 |
| | Total | 28.1 | 5.7 | 9.6 | 1.2 | -0.5 | 2.2 | 76.6 | 0.0 | -33.8 |
| Forest industry | | | | | | | | | | |
| | Softwood | 143.8 | 148.5 | 123.5 | 5.7 | -1.8 | 21.3 | 506.4 | 0.0 | -104.3 |
| | Hardwood | 8.5 | 12.6 | 9.0 | 0. | +0.6 | 0.6 | 58.8 | 0.0 | -30.0 |
| | Total | 152.3 | 161.1 | 132.6 | 5.7 | -1.1 | 21.9 | 565.2 | 0.0 | -134.4 |
| Nonindustrial private | | | | | | | | | | |
| | Softwood | 141.4 | 94.0 | 111.7 | 4.1 | -1.8 | 16.3 | 421.0 | 0.0 | -84.2 |
| | Hardwood | 11.6 | 3.0 | 10.2 | 0.5 | -0.5 | 1.5 | 41.9 | 0.0 | -17.7 |
| | Total | 153.0 | 97.0 | 121.9 | 4.6 | -2.3 | 17.8 | 462.9 | 0.0 | -101.9 |
| All owners | | | | | | | | | | |
| | Softwood | 311.0 | 248.2 | 244.2 | 10.5 | -3.6 | 39.0 | 1,000.9 | 0.0 | -222.5 |
| | Hardwood | 22.4 | 15.5 | 19.9 | 1.0 | -0.4 | 2.9 | 103.9 | 0.0 | -47.6 |
| | Total | 333.4 | 263.7 | 264.1 | 11.5 | -3.9 | 41.9 | 1,104.7 | 0.0 | -270.1 |

*Numbers in columns may not sum to totals due to rounding.

[†]Includes nongrowth trees.[‡]Includes ongrowth trees.[§]Net change = (survivor growth + ingrowth + growth on removals + growth on mortality) - (cull increment + mortality + timberland removals + land-clearing removals).[¶]International 1/4-inch Rule.

clearcut since 1984 underwent site preparation by the time of the 1991 survey. This estimate is conservative because an unknown acreage that was harvested before SO-FIA field crews arrived was prepared for regeneration after the crews had completed the sample.

Hurricane Andrew

Approximately 8 months after field work was completed, Hurricane Andrew struck south Louisiana on August 26, 1992. An aerial video survey conducted by SO-FIA revealed only 127,000 acres of timberland with moderate or severe damage. There were, however, 1,100,000 acres with some damage (Kelly 1993). Most of the damage was in the Atchafalaya River Basin, and hardwoods received the most damage. Overall, approximately 10 percent of live-tree volume was downed and expected to die. The inventory decline in this 1,100,000-acre area was estimated to be 378.7 million ft³ (Kelly 1993).

TREATMENT OPPORTUNITIES

Possible treatment opportunities for Louisiana's timberland are given in table XXXIII. These estimates are derived solely from the 1991 survey data by use of a computer algorithm. Plot-level parameters important in making these estimates are: stocking level of growing stock, amount of cull, species groups, stand size class, amount of volume, and amount of damage. The threshold levels for the various treatment classes are subjective but do help to give an indication of the stand conditions of Louisiana's timberland resource.

In terms of affected area, the largest need is for stand regeneration of 2,316,700 acres. The majority of this area is on NIPF land in oak-hickory and bottomland forest types. This area includes all stands less than 50 percent stocked with growing-stock trees, or all stands >50 but <60 percent stocked with growing-stock trees and in which the stocking of rough and rotten trees is more than 30 percent. The stocking condition is based on all growing-stock trees.

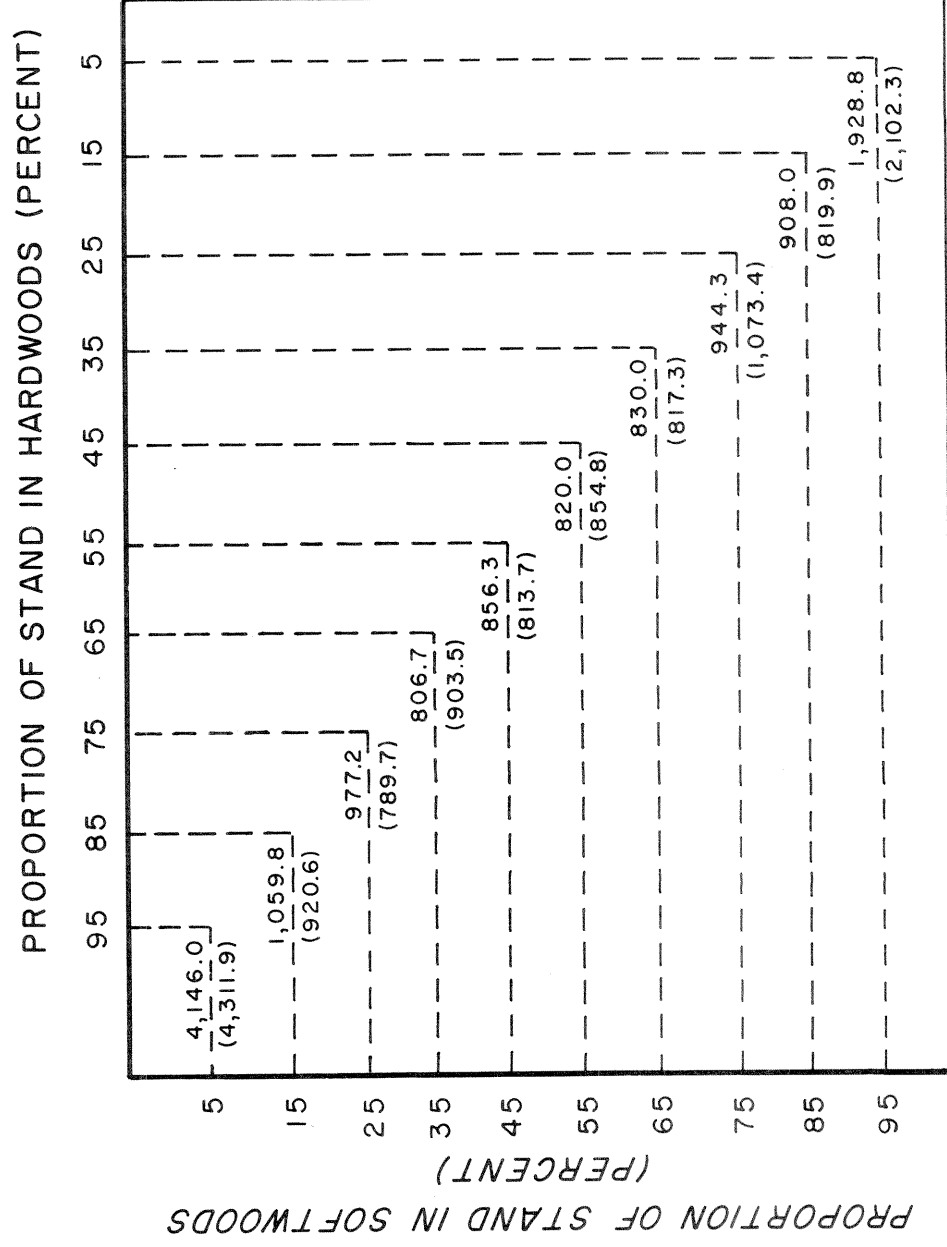


Figure 24. — Area of timberland by proportion of stand in softwoods and hardwoods, Louisiana, 1991. The percentage values are the midpoints of the deciles. Thus, 85 percent includes values ≥80 but <90 percent. Area is in thousand acres; the acreage enclosed in parentheses is from the 1984 survey. Proportions are based on basal area, and only stands with trees ≥1.0 inch in diameter at breast height are included.

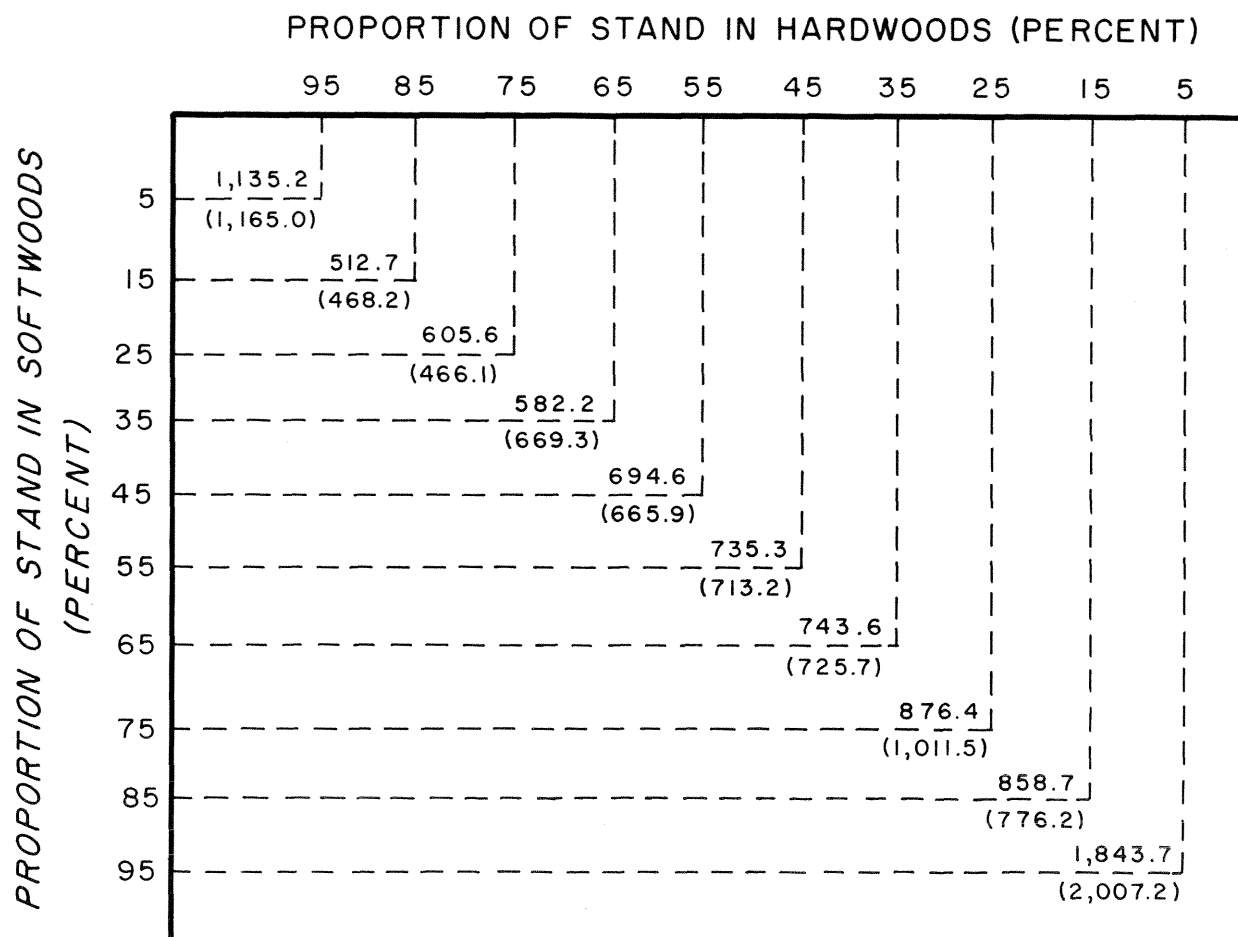


Figure 25. — Area of upland timberland by proportion of stand in softwoods and hardwoods, Louisiana, 1991. The percentage values are the midpoints of the deciles. Thus, 85 percent includes values ≥ 80 but < 90 percent. Area is in thousand acres; the acreage enclosed in parentheses is from the 1984 survey. Proportions are based on basal area, and only upland stands with trees ≥ 1.0 inch in diameter at breast height are included.

Three categories of intermediate treatment were considered: sapling-seedling or precommercial thinnings, poletimber thinnings, and other stocking controls. Sapling-seedling stands more than 150 percent stocked with growing-stock trees were judged to need thinning. Louisiana has 50,400 acres in this condition. Poletimber stands with more than 110-percent stocking were classed as poletimber thinning opportunities; 418,700 acres are in this class. The other stocking control category includes all sapling-seedling and poletimber stands with more than 110-percent stocking and more than 30 percent of stocking in rough and rotten trees. Louisiana has 713,000 acres in this class.

Final harvest treatments include both regeneration cuts and salvage cuts. Timberland on which the trees are sawlog sized, with more than 110-percent stocking in growing-stock trees, and with more than 5,000 fbm/acre qualifies for a regeneration cut. Currently, Louisiana has 1,276,100 acres in this category. Sixty-nine percent of the opportunities for regeneration cuts

are on NIPF land; most are in the loblolly-shortleaf pine and bottomland hardwood FTG's. Salvage cuts are in poletimber and sawtimber stands where more than 80 percent of the stocking is made up of trees with a cull deduction due to disease, insect, or other naturally occurring injury. Only 140,000 acres of Louisiana timberland fell into this category, but the totals were compiled before Hurricane Andrew struck.

TIMBER PRODUCTS OUTPUT

A total of 122 primary wood-using plants was reported in operation in Louisiana in 1991 (fig. 26). Sixty of these are sawmills; 17 are panel plants; 23 are plants for treating ties, poles, and lumber; 11 are chipping mills; and 11 are pulp and paper mills. The largest concentration of plants is in the northwest portion of the state.

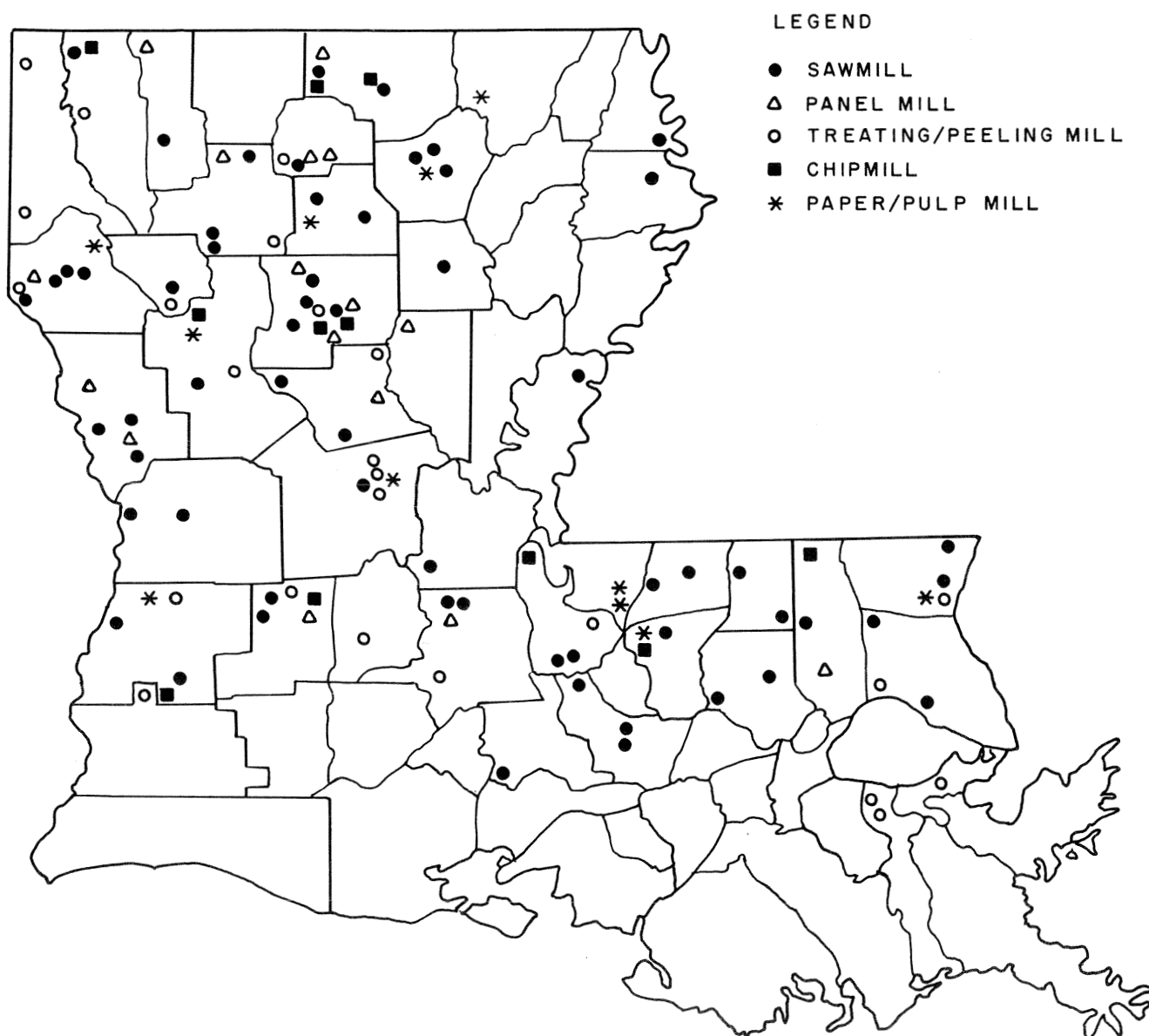


Figure 26. — Primary wood-using plants in Louisiana, 1991. Information supplied by the Louisiana Department of Agriculture and Forestry, Office of Forestry.

Table XXIV.—Area of timberland on plantations by ownership and forest type group, Louisiana, 1991*

| Ownership | Forest type group | | | | | |
|-----------------------|--------------------------|----------------|--------------------|----------|-------------|-----------------------------------|
| | All types | Longleaf-slash | Loblolly-shortleaf | Oak-pine | Oak-hickory | Bottomland hardwoods [†] |
| | -----Thousand acres----- | | | | | |
| Public | 179.0 | 39.6 | 109.2 | 11.5 | 15.0 | 3.8 |
| Forest industry | 1,534.3 | 308.6 | 980.2 | 166.6 | 73.4 | 5.4 |
| Nonindustrial private | 1,022.4 | 252.5 | 555.1 | 146.5 | 40.3 | 28.0 |
| All owners | 2,735.7 | 600.6 | 1,644.5 | 324.6 | 128.7 | 37.3 |

*Numbers in rows and columns may not sum to totals due to rounding.

†Includes oak-gum-cypress and elm-ash-cottonwood types.

Table XXV.—Area of timberland on plantations by ownership and age class, Louisiana, 1991*

| Ownership | All classes | Age class (Years) [†] | | | | | | Mixed age [‡] |
|--------------------------|-------------|--------------------------------|-------|-------|-------|------|-------|------------------------|
| | | 5 | 15 | 25 | 35 | 45 | 46-92 | |
| -----Thousand acres----- | | | | | | | | |
| Public | 179.0 | 65.2 | 29.0 | 4.7 | 8.3 | 17.0 | 20.1 | 34.7 |
| Forest industry | 1,534.3 | 567.4 | 384.2 | 181.6 | 180.2 | 10.9 | 0.0 | 210.0 |
| Nonindustrial private | 1,022.4 | 363.9 | 189.2 | 112.6 | 123.3 | 21.5 | 5.6 | 206.2 |
| All owners | 2,735.7 | 996.6 | 602.5 | 298.8 | 311.8 | 49.4 | 25.7 | 451.0 |

*Numbers in rows and columns may not sum to totals due to rounding.

†Values are midpoints of 10-year ranges, i.e., 5 = 0–10 years, 15 = 11–20 years, etc.

‡Stand structure disturbed to the point where no single age class could be defined, i.e., two or more strata >10 years difference in age.

Table XXVI.—Softwood stocking on plantations by ownership, Louisiana, 1991*

| Ownership | All classes | Stocking class (Percent) | | | | |
|--------------------------|-------------|--------------------------|-------|-------|--------|-------|
| | | <30 | 30-59 | 60-89 | 90-119 | ≥120 |
| -----Thousand acres----- | | | | | | |
| Public | 179.0 | 7.7 | 26.8 | 56.3 | 61.8 | 26.5 |
| Forest industry | 1,534.3 | 77.2 | 231.4 | 489.4 | 528.8 | 207.5 |
| Nonindustrial private | 1,022.4 | 57.1 | 184.6 | 356.9 | 341.0 | 82.8 |
| All owners | 2,735.7 | 142.0 | 442.8 | 902.6 | 931.6 | 316.7 |

*Numbers in rows and columns may not sum to totals due to rounding.

Table XXVII.—Softwood live-tree volume on plantations by ownership and diameter class, Louisiana, 1991*

| Ownership | All classes | Diameter class (<i>Inches at breast height</i>) | | | |
|---------------------------------------|----------------|---|---------------|---------------|------|
| | | 5.0- 9.9 | 10.0- 14.9 | 15.0- 19.9 | ≥20 |
| ----- <i>Million cubic feet</i> ----- | | | | | |
| Public | 191.4 | 26.9 | 79.4 | 70.4 | 14.6 |
| Forest industry | 1,207.3 | 577.3 | 488.7 | 126.7 | 14.7 |
| Nonindustrial private | 915.5 | 304.0 | 422.3 | 147.5 | 41.7 |
| All owners | 2,314.2 | 908.1 | 990.4 | 344.6 | 71.0 |

*Numbers in rows and columns may not sum to totals due to rounding.

Table XXVIII.—Area of timberland on plantations by ownership and treatment class, Louisiana, 1991*

| Ownership | Treatment | | |
|--------------------------|----------------|---------------------------------|---|
| | All treatments | Commercial harvest [†] | Thinning/stand improvement [‡] |
| -----Thousand acres----- | | | |
| Public | 50.9 | 8.0 | 43.0 |
| Forest industry | 691.7 | 347.7 | 344.0 |
| Nonindustrial private | 598.2 | 356.1 | 242.1 |
| All owners | 1,340.7 | 711.7 | 629.1 |

*Numbers in rows and columns may not sum to totals due to rounding.

[†]Includes all types of commercial harvests.

[‡]Includes all types of stand treatment except stand conversions and natural disturbance.

Pulpwood

Louisiana reported 1,815.9 million ft³ of pine pulpwood subject to severance tax from 1985 through 1991 (table XXXIV). After increasing from 1985 to 1986,

output remained fairly steady for the remainder of the period.

A total of 796.9 million ft³ of hardwood pulpwood was reported for the survey period. After peaking in 1989, production decreased slightly by 1991.

In 1991, pulping capacity of Louisiana mills was 15,085 tons per day (Howell 1993), an increase of 1,085 tons from 1985 (Hutchins 1987). Totals are for all pulping processes combined. The majority (84 percent) of Louisiana's capacity is in the sulfate process.

Sawlog Products

From 1985 through 1991, Louisiana produced 2,557.8 million ft³ of pine sawlogs (table XXXIV). Eight-six percent of all logs produced during the period were pine. Production of pine sawlogs increased from 311.2 million ft³ in 1985 to a high of 391.7 million ft³ in 1990.

Table XXIX.—Area of timberland by forest type group prior to harvesting, ownership, and harvesting activity, Louisiana, 1991*

| Forest type group and ownership | Commercial harvesting activity | | | | |
|------------------------------------|--------------------------------|---------|----------------------|--------------|-----------------------|
| | All classes | None | Partial [†] | Clearcut | |
| | | | | Merchantable | Complete [‡] |
| | -----Thousand acres----- | | | | |
| Longleaf-slash pine | | | | | |
| Public | 183.6 | 139.1 | 34.1 | 0.0 | 10.4 |
| Forest industry | 409.6 | 233.6 | 135.1 | 0.0 | 40.9 |
| Nonindustrial private | 945.3 | 719.6 | 141.3 | 50.3 | 34.0 |
| All owners | 1,538.5 | 1,092.4 | 310.5 | 50.3 | 85.3 |
| Loblolly-shortleaf pine | | | | | |
| Public | 370.4 | 239.1 | 106.8 | 15.9 | 8.5 |
| Forest industry | 1,461.5 | 795.6 | 384.7 | 99.2 | 182.1 |
| Nonindustrial private | 2,106.0 | 1,085.8 | 711.4 | 167.0 | 141.8 |
| All owners | 3,937.9 | 2,120.4 | 1,202.9 | 282.2 | 332.3 |
| Oak-pine | | | | | |
| Public | 139.4 | 82.7 | 49.2 | 3.7 | 3.7 |
| Forest industry | 674.5 | 292.6 | 225.9 | 73.1 | 82.9 |
| Nonindustrial private | 1,026.1 | 611.3 | 242.5 | 92.6 | 79.9 |
| All owners | 1,840.0 | 986.6 | 517.6 | 169.4 | 166.5 |
| Oak-hickory | | | | | |
| Public | 105.9 | 83.8 | 11.4 | 4.7 | 6.1 |
| Forest industry | 657.1 | 455.7 | 74.9 | 63.7 | 62.9 |
| Nonindustrial private | 1,308.1 | 889.6 | 287.6 | 104.5 | 26.4 |
| All owners | 2,071.2 | 1,429.1 | 373.9 | 172.9 | 95.4 |
| Bottomland hardwoods [§] | | | | | |
| Public | 506.9 | 466.8 | 35.7 | 4.5 | 0.0 |
| Forest industry | 695.6 | 505.9 | 140.8 | 27.9 | 21.0 |
| Nonindustrial private | 3,192.9 | 2,808.4 | 263.4 | 82.1 | 39.0 |
| All owners | 4,395.4 | 3,781.0 | 439.9 | 114.5 | 60.0 |
| All forest types | | | | | |
| Public | 1,306.3 | 1,011.6 | 237.2 | 28.8 | 28.7 |
| Forest industry | 3,898.3 | 2,283.3 | 961.3 | 264.0 | 389.8 |
| Nonindustrial private | 8,578.4 | 6,114.7 | 1,646.2 | 496.5 | 321.0 |
| All owners | 13,783.0 | 9,409.5 | 2,844.7 | 789.3 | 739.5 |

*Numbers in rows and columns may not sum to totals due to rounding.

[†]Includes 50.9 thousand acres of salvage cuts.

[‡]Includes 88.0 thousand acres of seed tree and shelterwood cuts.

[§]Includes oak-gum-cypress and elm-ash-cottonwood forest type groups.

Hardwood log production also peaked in 1990 at 71.1 million ft³. The total volume reported for severance taxes from 1985 through 1991 was 426.6 million ft³. Production dropped to 47.7 million ft³ in 1991, but it is expected to increase along with the overall demand for hardwoods throughout the 1990's.

The pine severance tax data tracks fairly closely with the SO-FIA pine removal estimate. However, there is a fairly wide margin between the severance tax data and forest survey estimates for hardwood removals. On average, the hardwood severance tax estimate is 34 percent less than the survey estimate. Three factors may be affecting this difference: (1) the board-foot to cubic-foot ratio for the Doyle scale is not reflective of average log size, (2) the time periods for the two sets of data are not exactly the same, and (3) mill utilization of hardwoods may be somewhat less than the forest survey measurements define as merchantable material.

CONCLUSION AND OUTLOOK

The most notable trend since the 1984 survey is the increase in the softwood harvest. Whether or not this level of harvesting will continue is uncertain. There is certainly the potential for many varied interests to be competing for Louisiana's forest resources. With this in mind, it is important to emphasize the impact that continued high levels of harvest will have on Louisiana's forests for the long term.

Of all the Midsouth States, Louisiana has the highest ratio of softwood removals-to-growth, 1.27 to 1. The Midsouth average is 1.09 to 1 (as of 1991). High levels of removals make it imperative that Louisiana's harvested timberland is regenerated in a timely manner and at adequate stocking levels.

Table XXX.*—Area of timberland commercially harvested by year of harvest and ownership, Louisiana, 1984 to 1991[†]

| Year of harvest | All classes | Ownership | | |
|--------------------|----------------|--------------------------|--------------------|--------------------------|
| | | Public | Forest industry | Nonindustrial private |
| | | -----Thousand acres----- | | |
| 1985 | 145.6 | 10.1 | 76.7 | 58.8 |
| 1986 | 329.8 | 17.7 | 159.3 | 152.7 |
| 1987 | 755.0 | 84.2 | 253.9 | 417.0 |
| 1988 | 950.3 | 64.8 | 350.0 | 535.5 |
| 1989 | 1,068.8 | 49.9 | 351.4 | 667.5 |
| 1990 | 737.8 | 51.5 | 271.1 | 415.1 |
| 1991 | 299.1 | 10.9 | 136.5 | 151.8 |
| All years | 4,286.4 | 289.1 | 1,598.8 | 2,398.4 |

* Modified from Rosson (1994a). Timberland totaling 87,100 acres was not included in this table because of ground use changes between the 1984 and 1991 surveys.

[†] Numbers in rows and columns may not sum to totals due to rounding.

Two recent papers (Rosson 1994a, 1994b) have addressed these concerns by examining harvesting trends and the status of precommercial-sized softwoods. Highlights of these studies reveal several important areas in need of attention. There are 952,500 acres and 765,800 acres in seedling-sized and sapling-sized stands, respectively, less than 60 percent stocked with softwoods (equivalent to fewer than 360 trees per acre). Most of this timberland is on NIPF lands and is naturally regenerating. There were 1,996,400 acres of pine forest types clearcut between 1975 and 1991. Of these, 513,300 acres have converted to the oak-hickory forest type, indicating lack of softwood regeneration or stands being left in a cutover condition. Additionally, the lag time between harvest and regeneration further delays the onset of the next stand rotation. It is taking approximately 6 to 7 years after harvest for substantial amounts of softwoods to reach the 4-inch diameter class. Even then, many stands are below the survey stocking standard and below

Table XXXI*—Area of clearcut upland timberland by year of harvest and forest type group, Louisiana, 1984 to 1991[†]

| Year of harvest | All types | Forest type group [†] | | | |
|-----------------------------------|-----------|--------------------------------|-------------------------|----------|-------------|
| | | Longleaf-slash pine | Loblolly-shortleaf pine | Oak-pine | Oak-hickory |
| ----- <i>Thousand acres</i> ----- | | | | | |
| 1985 | 91.6 | 5.5 | 25.2 | 15.6 | 45.3 |
| 1986 | 147.2 | 6.2 | 83.4 | 39.6 | 17.9 |
| 1987 | 213.5 | 17.4 | 99.2 | 46.4 | 50.7 |
| 1988 | 247.6 | 32.6 | 119.7 | 51.0 | 44.4 |
| 1989 | 234.4 | 45.0 | 89.7 | 71.7 | 28.0 |
| 1990 | 295.8 | 22.6 | 148.2 | 72.7 | 52.2 |
| 1991 | 112.5 | 0.0 | 49.2 | 33.6 | 29.7 |
| All years | 1,342.5 | 129.3 | 614.5 | 330.4 | 268.2 |

* Modified from Rosson (1994a). Timberland totaling 11,800 acres was not included in this table because of ground use changes between the 1984 and 1991 surveys.

[†] Numbers in rows and columns may not sum to totals due to rounding.

[‡] Forest type group prior to harvest.

Table XXXII.—Area of timberland by forest type group prior to activity, ownership, and management activity, Louisiana, 1991*

Louisiana, 1991

| Forest type group and ownership | All classes | Management activity | | | |
|------------------------------------|-------------|---------------------|-----------------------|----------------------|---------------------|
| | | None | Thinning operation | Stand improvement | Site preparation |
| -----Thousand acres----- | | | | | |
| Longleaf-slash pine | | | | | |
| Public | 183.6 | 51.0 | 13.1 | 109.1 | 10.4 |
| Forest industry | 409.6 | 158.2 | 125.2 | 102.6 | 23.6 |
| Nonindustrial private | 945.3 | 613.7 | 77.3 | 208.1 | 46.2 |
| All owners | 1,538.5 | 823.0 | 215.6 | 419.8 | 80.2 |
| Loblolly-shortleaf pine | | | | | |
| Public | 370.4 | 208.4 | 23.8 | 117.4 | 20.8 |
| Forest industry | 1,461.5 | 720.9 | 174.5 | 391.1 | 175.0 |
| Nonindustrial private | 2,106.0 | 1,580.2 | 118.5 | 299.0 | 108.2 |
| All owners | 3,937.9 | 2,509.6 | 316.9 | 807.6 | 303.9 |
| Oak-pine | | | | | |
| Public | 139.4 | 73.1 | 10.6 | 44.5 | 11.2 |
| Forest industry | 674.5 | 433.6 | 21.9 | 134.6 | 84.3 |
| Nonindustrial private | 1,026.1 | 841.1 | 34.1 | 115.5 | 35.4 |
| All owners | 1,840.0 | 1,347.9 | 66.6 | 294.6 | 131.0 |
| Oak-hickory | | | | | |
| Public | 105.9 | 65.6 | 3.8 | 25.7 | 10.7 |
| Forest industry | 657.1 | 461.0 | 23.5 | 82.0 | 90.6 |
| Nonindustrial private | 1,308.1 | 1,179.4 | 25.8 | 69.4 | 33.6 |
| All owners | 2,071.2 | 1,706.0 | 53.1 | 177.1 | 135.0 |
| Bottomland hardwoods† | | | | | |
| Public | 506.9 | 502.0 | 0.0 | 4.9 | 0.0 |
| Forest industry | 695.6 | 649.7 | 5.4 | 29.5 | 11.0 |
| Nonindustrial private | 3,192.9 | 3,152.2 | 5.6 | 6.1 | 29.1 |
| All owners | 4,395.4 | 4,303.9 | 11.0 | 40.4 | 40.0 |
| All forest types | | | | | |
| Public | 1,306.3 | 900.1 | 51.4 | 301.6 | 53.1 |
| Forest industry | 3,898.3 | 2,423.5 | 350.5 | 739.8 | 384.5 |
| Nonindustrial private | 8,578.4 | 7,366.7 | 261.2 | 698.1 | 252.5 |
| All owners | 13,783.0 | 10,690.3 | 663.1 | 1,739.4 | 690.2 |

*Numbers in rows and columns may not sum to totals due to rounding.

[†]Includes oak-gum-cypress and elm-ash-cottonwood forest type groups.

normal yields. Softwood volumes are averaging approximately 1,000 ft³/acre 13 to 17 years after harvest, whereas stands on average sites should have yields averaging 2,000 ft³/acre at 20 years of age (Rosson 1994a).

In spite of the heavy drain on softwoods in this survey period, Louisiana still ranks first in softwood sawtimber volume and second in total softwood volume among Midsouth States. It ranks fifth in both hardwood sawtimber volume and total hardwood volume.

Ranking so high in softwood volume after this heavy cut since 1984 is particularly impressive, given that Louisiana ranks fourth in total timberland area.

The long-term supply of forest resources can be enhanced by timely stand establishment after harvest and by maintaining adequate stocking levels through all stages of stand development. Although there are shortcomings in all ownership classes, NIPF needs are particularly acute. Prompt regeneration after harvest to adequate stocking levels is a most pressing need.

Table XXXIII.—Area of timberland by forest type group, ownership, and treatment opportunity, Louisiana, 1991*

| Forest type group and ownership | All classes | No treatment | Type of treatment | | | | | | Salvage cut |
|------------------------------------|----------------|-----------------|---------------------|---------------------|-------------------------------|--------------------|---------------------------|---------------------|----------------|
| | | | Stand establishment | | Intermediate treatment | | | Final harvest | |
| | | | Regenerate | Stand conversion | Thin seedling and saplings | Thin poletimber | Other stocking control | Regeneration cut | |
| -----Thousand acres----- | | | | | | | | | |
| Longleaf-slash pine | | | | | | | | | |
| Public | 127.1 | 96.3 | 20.2 | 0.0 | 0.0 | 0.0 | 0.0 | 10.7 | 0.0 |
| Forest industry | 338.8 | 264.6 | 34.0 | 0.0 | 0.0 | 12.4 | 0.0 | 27.8 | 0.0 |
| Nonindustrial private | 418.6 | 315.9 | 73.7 | 0.0 | 0.0 | 6.2 | 0.0 | 22.7 | 0.0 |
| All owners | 884.5 | 676.8 | 127.9 | 0.0 | 0.0 | 18.6 | 0.0 | 61.2 | 0.0 |
| Loblolly-shortleaf pine | | | | | | | | | |
| Public | 374.5 | 289.2 | 21.9 | 0.0 | 4.7 | 4.7 | 9.4 | 44.7 | 0.0 |
| Forest industry | 1,726.0 | 1,200.2 | 49.2 | 6.1 | 23.4 | 218.4 | 50.7 | 178.0 | 0.0 |
| Nonindustrial private | 2,053.1 | 1,364.4 | 126.9 | 5.4 | 10.8 | 117.3 | 33.7 | 394.6 | 0.0 |
| All owners | 4,153.6 | 2,853.8 | 198.0 | 11.4 | 38.9 | 340.3 | 93.7 | 617.4 | 0.0 |
| Oak-pine | | | | | | | | | |
| Public | 156.4 | 97.4 | 17.0 | 0.0 | 0.0 | 11.8 | 30.2 | 0.0 | |
| Forest industry | 532.0 | 440.8 | 21.9 | 0.0 | 0.0 | 5.7 | 46.4 | 17.3 | 0.0 |
| Nonindustrial private | 1,198.2 | 856.1 | 133.1 | 0.0 | 0.0 | 16.3 | 117.3 | 75.4 | 0.0 |
| All owners | 1,886.6 | 1,394.3 | 172.0 | 0.0 | 0.0 | 21.9 | 175.5 | 122.8 | 0.0 |
| Oak-hickory | | | | | | | | | |
| Public | 136.8 | 102.0 | 12.2 | 0.0 | 0.0 | 0.0 | 18.1 | 4.5 | 0.0 |
| Forest industry | 584.1 | 370.9 | 125.6 | 0.0 | 11.5 | 0.0 | 70.0 | 6.3 | 0.0 |
| Nonindustrial private | 1,386.2 | 743.0 | 439.6 | 0.0 | 0.0 | 5.4 | 150.2 | 25.0 | 22.9 |
| All owners | 2,107.2 | 1,215.9 | 577.4 | 0.0 | 11.5 | 5.4 | 238.2 | 35.8 | 22.9 |
| Bottomland hardwoods† | | | | | | | | | |
| Public | 511.4 | 304.2 | 139.5 | 0.0 | 0.0 | 0.0 | 18.2 | 24.8 | 24.8 |
| Forest industry | 717.3 | 409.4 | 187.0 | 0.0 | 0.0 | 0.0 | 48.4 | 45.1 | 27.4 |
| Nonindustrial private | 3,522.4 | 2,002.3 | 914.8 | 0.0 | 0.0 | 32.4 | 139.0 | 369.0 | 64.9 |
| All owners | 4,751.2 | 2,715.8 | 1,241.3 | 0.0 | 0.0 | 32.4 | 205.5 | 439.0 | 117.1 |
| All forest types | | | | | | | | | |
| Public | 1,306.3 | 889.1 | 210.8 | 0.0 | 4.7 | 4.7 | 57.4 | 114.9 | 24.8 |
| Forest industry | 3,898.3 | 2,685.9 | 417.8 | 6.1 | 34.9 | 236.5 | 215.4 | 274.5 | 27.4 |
| Nonindustrial private | 8,578.4 | 5,281.7 | 1,688.1 | 5.4 | 10.8 | 177.5 | 440.2 | 886.8 | 87.8 |
| All owners | 13,783.0 | 8,856.7 | 2,316.7 | 11.4 | 50.4 | 418.7 | 713.0 | 1,276.1 | 140.0 |

*Numbers in rows and columns may not sum to totals due to rounding.

[†]Includes oak-gum-cypress and elm-ash-cottonwood forest type groups.

Table XXXIV.—Output of primary timber products subject to severance tax by year and species group, Louisiana, 1985 through 1991*

| Year | Total | | Pulpwood | | Logs | |
|--------------------------------|---------|----------|-------------------|-----------------------|-------------------|-----------------------|
| | Pine | Hardwood | Pine [†] | Hardwood [‡] | Pine [§] | Hardwood [§] |
| ----- Million cubic feet ----- | | | | | | |
| 1985 | 521.3 | 153.6 | 210.1 | 95.8 | 311.2 | 57.8 |
| 1986 | 634.2 | 157.8 | 254.8 | 102.4 | 379.4 | 55.4 |
| 1987 | 633.1 | 172.5 | 262.6 | 110.7 | 370.5 | 61.8 |
| 1988 | 660.1 | 181.1 | 277.6 | 111.9 | 382.5 | 69.2 |
| 1989 | 622.5 | 203.0 | 270.7 | 139.4 | 351.8 | 63.6 |
| 1990 | 659.6 | 191.6 | 267.9 | 120.5 | 391.7 | 71.1 |
| 1991 | 642.9 | 163.9 | 272.2 | 116.2 | 370.7 | 47.7 |
| All years | 4,373.7 | 1,223.5 | 1,815.9 | 796.9 | 2,557.8 | 426.6 |

*Based on severance tax data released by the Louisiana Department of Agriculture and Forestry, Office of Forestry.

[†]Conversion of standard cords to cubic feet based on 72 cubic feet per cord (Avery and Burkhardt 1983).

[‡]Conversion of standard cords to cubic feet based on 79 cubic feet per cord (Avery and Burkhardt 1983).

[§]Conversion of Doyle scale to cubic feet based on board foot to cubic foot ratio of 3.3 to 1 (the ratio is based on 16-foot logs with a 10-inch diameter inside the bark at small end) (Husch and others 1982).

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Appendix

INVENTORY METHODS

Forest resource statistics are obtained by a two-phase sampling method employing a forest-nonforest classification system using aerial photographs (to determine forest area) and on-the-ground measurements of trees at permanent sample locations (to determine tree and stand parameters). Inventory volume and area statistics are required to give precise estimates at the State level to 1 standard error of the total, equal to 1 percent per million acres of forest land and to 5 percent per billion cubic feet.

The estimate of timberland area is based on interpreting dot grid counts, overlaid on recent aerial photographs, as forest or nonforest. Each dot represents approximately 230 acres. This forest-nonforest estimate is then adjusted by ground truth checks at all permanent sample locations. Permanent sample locations consist of intensification plots (used only as ground truths for forest-nonforest classifications) and 3- by 3-mile plots (plots on a 3- by 3-mile square grid). The proportion of dots classified as forest is applied to U.S. Census land area data to develop an estimate of forest area in individual parishes. Appropriate expansion factors for each forested 3- by 3-mile plot are assigned. The expansion factor is dependent on the number of forested plots in a parish but averages 5,760 acres per plot for the State.

Each forested 3- by 3-mile sample plot consists of 10 satellite points spread over an area of approximately 1 acre (fig. 27). This design improves portrayal of stand conditions by eliminating the effect that vegetation clumping and open gaps would induce if only one point or a fixed plot were used at each location.

At each forested sample plot, trees ≥ 5.0 inches in d.b.h. are selected with a 37.5-factor prism at each of the 10 satellite points; each tree selected with the prism represents $3.75 \text{ ft}^2/\text{acre}$ of basal area. Trees ≤ 5.0 inches in d.b.h. are tallied on a $1/275$ -acre circular plot fixed around the first three satellite points (fig. 28).

Volumes in Louisiana are derived from deterministic measurements of trees on forested sample locations. These deterministic measurements include d.b.h., bark thickness, total height, bole length, log length, and four upper stem diameters. Smalian's formula is used to compute volume. In addition, volume equations are developed to estimate the volume for trees not surviving the measurement period or for past volumes of new sample trees.

Data collection at each forested location also includes estimates of site productivity, stand origin, slope, aspect, disturbance, management, and non-timber resources. Ownership information is obtained for each plot from parish tax assessors' records and contact with owners in the field. Additionally, personnel from public agencies and other contacts are con-

sulted when classifying absentee owners such as farmers, individuals, corporations, or lessors.

Components of inventory volume change (growth, removals, and mortality) are estimated from tally tree data on remeasured sample plots. The remeasurement of sample plots allows the history and volume change of each tally tree to be tracked over time. This information can then be used to assign tally tree volumes and changes in volume to one of nine components of change: survivor growth, nongrowth, ingrowth, on-growth, growth on removals, growth on mortality, mortality, timberland removals, and land clearing removals. These components can then be combined to estimate gross growth, net growth, and net change using a Beers and Miller (1964) approach, as modified by Van Deusen and others (1986) and demonstrated by May (1988).

The estimates of timberland area, volume, growth, removals, and mortality for Louisiana are based on the latest and most up-to-date inventory techniques available. There are important differences between the methods used in the 1984 and 1991 inventories. In many cases, improvements in methodology for deriving current estimates can raise concerns about trends between survey periods. Because these differences might appear to cloud the comparisons between 1984 and 1991 results, the major differences in procedures are documented below.

First, the 1984 inventory used 5 satellite points per plot; the 1991 inventory used 10 points. This change should affect comparisons of Louisiana totals very little, but caution should be used when analyzing smaller aggregations of data.

Second, the 1984 survey used regression equations to estimate volume. The coefficients were based on deterministic tree measurements from a small number of sample plots. Volumes for the 1991 survey were derived from deterministic measurements made on all trees ≥ 5.0 inches in d.b.h. on all plots.

Third, the classification of trees into growing-stock, rough, or rotten classes has been modified in two ways to ensure compatibility among the eastern Forest Inventory and Analysis units. (1) Currently, any tree that contains or is capable of producing one 12-ft or two 8-ft logs anywhere in the sawlog portion of the tree is classified as growing stock. The 1984 survey classified growing-stock trees as those that had or were capable of producing a 12-ft log only in the butt 16-ft section. (2) The 1984 survey required that over one-half of the sawlog volume (or prospective volume) had to be utilizable for the tree to be classified as growing stock. The current standard is that one-third of the sawlog volume in the sawlog portion of the tree has to be utilizable.

Using 5 or 10 satellite points per plot has little effect on volume totals because of the large sample size. Likewise, test runs comparing the results of volume

3-BY 3-MILE SAMPLE PLOT LAYOUT

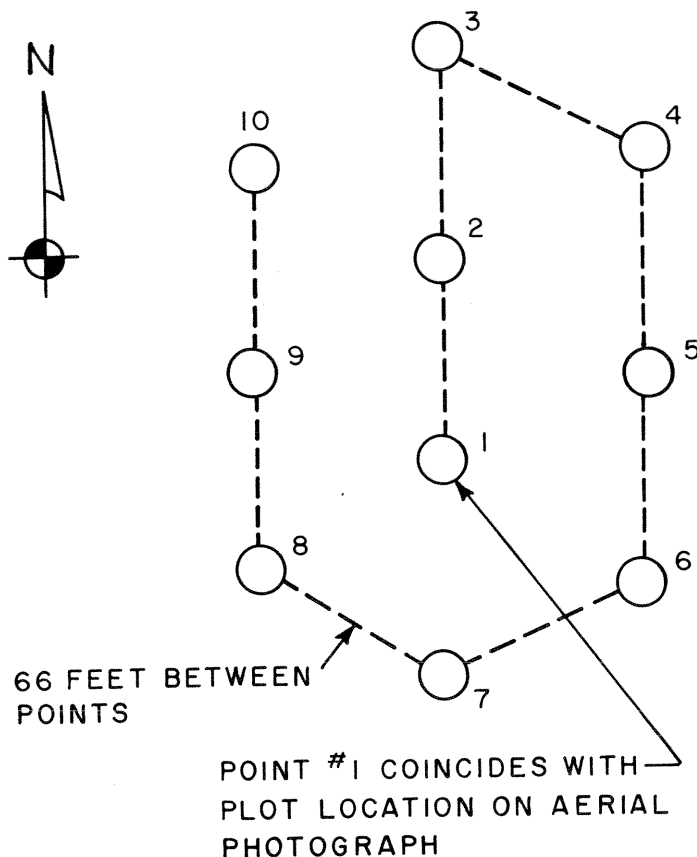


Figure 27. — Configuration of the 10 satellite points at a sample location, Louisiana, 1991.

equations and tree measurements have demonstrated very little difference between methods. Here again, the larger sample size enhances precision.

The first change in the growing-stock definition (that of the log position) did affect direct comparisons between 1984 and 1991 estimates. To compensate for this definition change, the 1984 inventory data were reprocessed to be compatible with the 1991 growing-stock standard. The total number of trees affected by the definition change is small, and most of these trees are hardwoods because of growth habit. It was not possible to consistently reclassify all trees selected in the 1984 survey by the new growing-stock definition. Some trees died or were cut between measurement periods. Since these trees are gone, the survey staff had no way of determining what the classification of these trees would be under the new standard. Therefore, trend information for growing-stock trees in these situations is uncertain.

Expanding the definition of growing stock to include trees with sawlog portions that are one-third sound had virtually no impact. Only a small number of saw-

timber sample trees had between 33 and 50 percent of their sawlog portions sound. Of these, most were reprocessed to resolve log position differences stated earlier. This step left only a very few trees that were affected by this definition change. Thus, the subsequent effect on estimation of growing-stock trends was small.

Users interested in trend analysis of growing-stock volume, growth, removals, and mortality between the 1984 and 1991 surveys should be aware of the impact of the growing-stock definition change. The incompatibility arises from trees that were cut or died, affecting growth, removals, and mortality estimates. The magnitude is, most likely, small but not possible to define with certainty.

Growing-stock comparisons between the 1984 reprocessed data and the 1991 data are valid for most general applications. In a more rigorous analysis, however, it is important to make sure the changes are real and not due to definition changes. In such instances, the comparisons between surveys should be done using all live trees. This procedure eliminates any uncer-

SATELLITE POINT LAYOUT

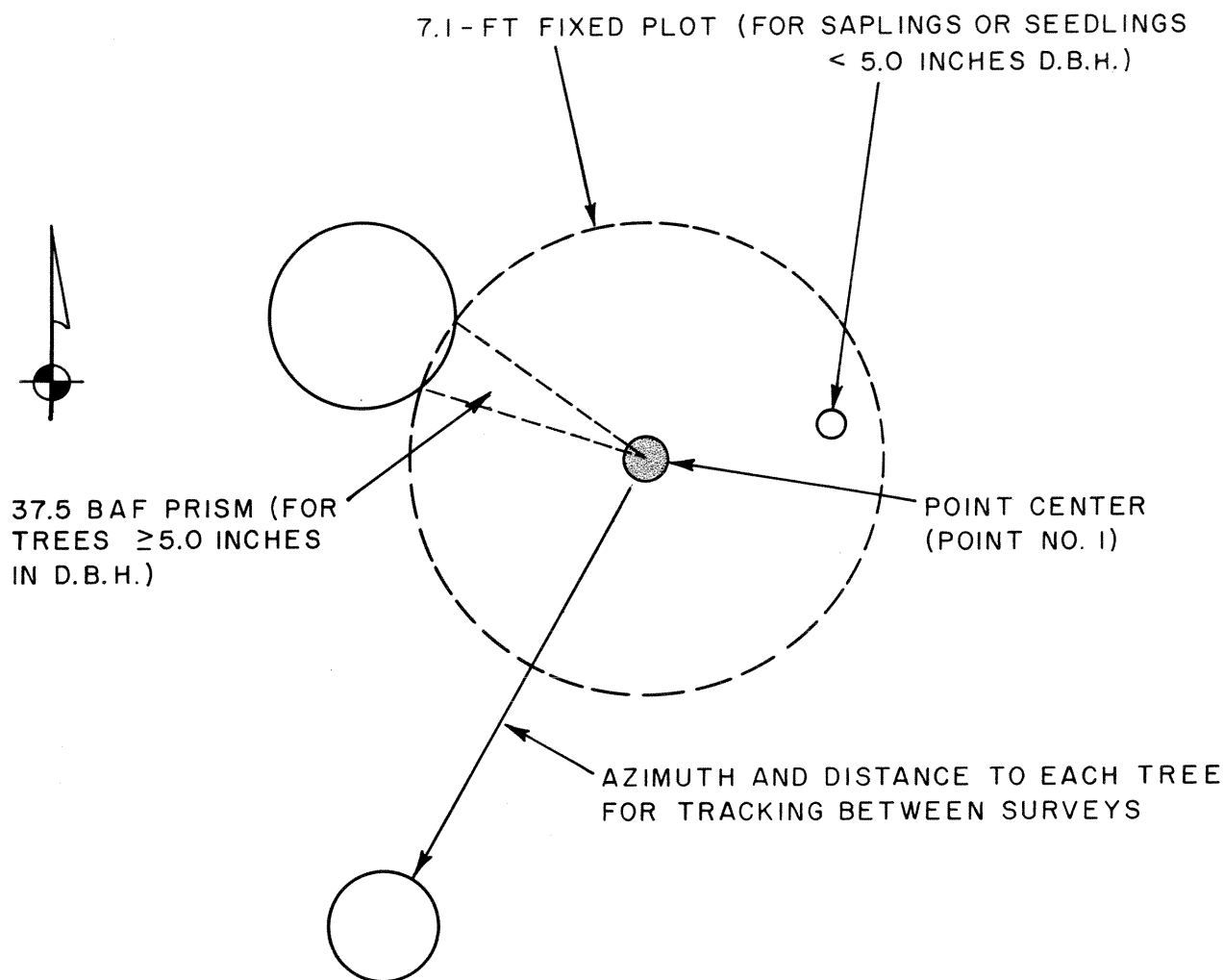


Figure 28. — Configuration of a satellite point, Louisiana, 1991.

tainties caused by the growing-stock definition changes. Finally, to further enhance trend analysis, a slight improvement in precision was made in the 1984 volume estimates by using all the deterministic tree measurements from the 1991 survey to develop new volume coefficients. Because of the change in the growing-stock standard and the improved volume coefficients, estimates for the reprocessed 1984 data may differ slightly from those previously published.

STATISTICAL RELIABILITY

A relative standard of accuracy has been incorporated into the forest survey. This standard satisfies

user demands, minimizes human and instrumental sources of error, and keeps costs within prescribed limits. The two primary types of error are measurement error and sampling error.

There are three elements of measurement error: (1) biased error, caused by instruments not properly calibrated; (2) compensating error, caused by instruments of moderate precision; and (3) accidental error, caused by human error in measuring and compiling. All of these are held to a minimum by a system that incorporates training, check plots, and editing and checking for consistency. Each new field person is trained for 3 to 4 months under the guidance of an experienced field person. Field work is checked by supervisors. Editing checks in the office screen out logical and

key punching errors for all plots. It is not possible to measure measurement error statistically, but SO-FIA holds it to a minimum through training, experienced supervision, and emphasis on careful work.

Sampling error is associated with the natural and expected deviation of the sample from the true population mean. This deviation is susceptible to a mathematical evaluation of the probability of error. Sampling errors for State totals in table XXXV are based on 1 standard error. That is, the chances are two out of three that, if the results of a 100-percent

census were known, the sample results would be within the limits indicated.

Estimates smaller than State totals will have proportionally larger sampling errors. The smaller the area examined, the larger the sampling error. In addition, as area or volume totals are stratified by forest type, species, diameter class, ownership, or other subunits, the sampling error increases and is greatest for the smallest divisions. The magnitude of this increase is depicted in table XXXVI, which shows the sampling error to which the estimates are liable, two chances out of three.

Table XXXV.—Sampling errors for estimates of total timberland area ^{*}(1991), volume [†](1991), average net annual growth [‡](1984 to 1991), and average annual removals [‡](1984 to 1991), Louisiana

| Item | Total | Units | Percent sampling error |
|---------------------------|----------|---------------------------------|------------------------|
| Timberland area | 13,783.0 | Thousand acres | 0.3 |
| Live trees | | | |
| Volume | 20,738.3 | Million cubic feet | 1.6 |
| Average net annual growth | 850.1 | Million cubic feet | 2.3 |
| Average annual removals | 954.7 | Million cubic feet | 3.9 |
| Sawtimber | | | |
| Volume | 75,525.2 | Million board feet [‡] | 2.0 |
| Average net annual growth | 3,731.3 | Million board feet [‡] | 2.5 |
| Average annual removals | 3,792.0 | Million board feet [‡] | 3.9 |

^{*}By binomial formula.

[†]By random sampling formula.

[‡]International 1/4-inch Rule.

Table XXXVI.—Sampling error to which estimates are liable, two chances out of three, Louisiana, 1991^{*}

| Sampling error | Timberland area | Live trees | | | Sawtimber | | |
|----------------|-----------------|--------------------------------|---------------------------|-------------------------|---|---------------------------|-------------------------|
| | | Volume | Average net annual growth | Average annual removals | Volume | Average net annual growth | Average annual removals |
| Percent | Thousand acres | ----- Million cubic feet ----- | | | ----- Million board feet [†] ----- | | |
| 1.0 | 1,240.5 | | | | | | |
| 2.0 | 310.1 | 13,272.5 | | | 75,525.2 | | |
| 3.0 | 137.8 | 5,898.9 | 499.7 | | 33,566.8 | 2,591.2 | |
| 4.0 | 77.5 | 3,318.1 | 281.1 | 907.6 | 18,881.3 | 1,457.5 | 3,604.8 |
| 5.0 | 49.6 | 2,123.6 | 179.9 | 580.8 | 12,084.0 | 932.8 | 2,307.1 |
| 10.0 | 12.4 | 530.9 | 45.0 | 145.2 | 3,021.0 | 233.2 | 576.8 |
| 15.0 | 5.5 | 235.9 | 20.0 | 64.5 | 1,342.7 | 103.7 | 256.3 |
| 20.0 | 3.1 | 132.7 | 11.2 | 36.3 | 755.3 | 58.3 | 144.2 |
| 25.0 | 2.0 | 85.0 | 7.2 | 23.2 | 483.4 | 37.3 | 92.3 |

^{*}By binomial formula for timberland area and by random sampling formula for live-tree and sawtimber parameters.

[†]International 1/4-inch Rule.

Definition of Terms

Classes of Trees Used in Growth Computations

Ingrowth trees—Submerchantable-and-in at time 1 (previous inventory) and merchantable-and-in at time 2 (current inventory).

Mortality trees—Merchantable-and-in at time 1 and dead prior to time 2.

Nongrowth trees—Merchantable-and-out at time 1 and merchantable-and-in at time 2; included with survivor growth for growth computation.

Ongrowth trees—Submerchantable-and-out at time 1 and merchantable-and-in at time 2; included with ingrowth component for growth computation.

Removal trees—Merchantable-and-in at time 1 and removed prior to time 2.

Survivor trees—Merchantable-and-in at time 1 and time 2.

Dimension Classes of Trees

Poletimber trees—Trees 5.0 inches to 8.9 inches in diameter at breast height (d.b.h.) for softwoods and 5.0 to 10.9 inches for hardwoods.

Rough, rotten, and salvable dead trees—See “tree classes.”

Saplings—Trees 1.0 inch to 4.9 inches in d.b.h.

Sawtimber trees—Trees ≥ 9.0 inches in d.b.h. for softwoods and ≥ 11.0 inches for hardwoods.

Seedlings—Trees < 1.0 inch in d.b.h. and > 1 foot tall for hardwoods, > 6 inches tall for softwoods, and > 0.5 inch in diameter at ground level for longleaf pine.

Forest Land Classes

Forest land—Land at least 10 percent stocked by forest trees of any size, or formerly having such tree cover, and not currently developed for nonforest uses. Minimum area considered for classification is 1 acre. Forest land is divided into timberland, reserved timberland, and woodland.

Reserved timberland—Public timberland withdrawn from timber utilization through statutes or administrative regulations.

Timberland—Forest land that is producing, or is capable of producing crops of industrial wood and is not withdrawn from timber utilization. Timberland is synonymous with “commercial forest land” in prior reports.

Woodland—Forest land incapable of yielding crops of industrial wood because of adverse site conditions.

Forest Type Groups

Elm-ash-cottonwood—Forests in which elms, ashes, or cottonwoods, singly or in combination, comprise a plurality of the stocking. Common associates include willow, sycamore, American beech, and maples.

Loblolly-shortleaf pine—Forests in which pines (except longleaf and slash pines) and eastern redcedar, singly or in combination, comprise a plurality of the stocking. Common associates include oaks, hickories, and gums.

Longleaf-slash pine—Forests in which longleaf or slash pines, singly or in combination, comprise a plurality of the stocking. Common associates include other southern pines, oaks, and gums.

Nontyped—Timberland currently unoccupied by any live trees or seedlings; for example, very recent clearcut areas.

Oak-gum-cypress—Bottomland forests in which tupelo, blackgum, sweetgum, oaks, or southern cypress, singly or in combination, comprise a plurality of the stocking, except where pines comprise 25 to 49 percent, in which case the stand would be classified oak-pine. Common associates include cottonwoods, willow, ashes, elms, hackberries, and maples.

Oak-hickory—Forests in which upland oaks or hickories, singly or in combination, comprise a plurality of the stocking, except where pines comprise 25 to 49 percent, in which case the stand would be classified oak-pine. Common associates include yellow-poplar, elms, maples, and black walnut.

Oak-pine—Forests in which hardwoods (usually upland oaks) comprise a plurality of the stocking, but in which softwoods, except southern cypress, comprise 25 to 49 percent of the stocking. Common associates include gums, hickories, and yellow-poplar.

Growth Classes

Gross growth—Total increase in stand volume computed on growing-stock trees or live trees at least 5.0 inches in d.b.h. Gross growth equals survivor growth, plus ingrowth, plus growth on removals, plus growth on mortality, plus cull increment (for growing-stock computations). Gross growth includes mortality.

Net change—Increase or decrease in stand volume computed on growing-stock trees or live trees at least 5.0 inches in d.b.h. Net change is equal to net growth minus removals.

Net growth—Increase in stand volume computed on growing-stock trees or live trees at least 5.0 inches in d.b.h. Net growth is equal to gross growth minus mortality.

Miscellaneous Definitions

Average annual mortality—Average annual sound-wood volume of growing-stock or live trees that died from natural causes for the intersurvey period.

Average annual removals—Average net annual volume of growing-stock or live trees removed from the inventory by harvesting, cultural operations (such as timber stand improvement), land clearing, or changes in land use for the intersurvey period.

Average net annual growth—Average net annual volume increase of growing-stock or live trees for the intersurvey 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 increment—The change in growing-stock volume due to growing-stock, rough, or rotten trees changing tree class between surveys.

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

Diameter classes—The 2-inch diameter classes extend from 1.0 inch below to 0.9 inch above the stated midpoint. Thus, the 12-inch class includes trees 11.0 inches through 12.9 inches in d.b.h.

D.o.b. (diameter outside bark)—Stem diameter including bark.

Log grades—A classification of logs based on external characteristics as indicators of quality or value.

Mortality—Number or sound-wood volume of growing-stock trees or live trees that died from natural causes during a specified period.

Natural stands—Stands with no evidence of artificial regeneration including those stands established by seed-tree regeneration methods.

Plantations—Planted or artificially seeded stands.

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

Sawlog portion—That portion of the bole of a sawtimber tree between a 1-foot stump and the sawlog top.

Sawlog top—The point on the bole of a sawtimber tree above which a sawlog cannot be produced. The minimum sawlog top is 7.0 inches in d.o.b. for softwoods and 9.0 inches in d.o.b. for hardwoods.

Select red oaks—A group of several red oak species composed of cherrybark, Shumard, and northern red oaks. Other red oak species are included in the "other red oaks" group.

Select white oaks—A group of several white oak species composed of white, swamp chestnut, swamp white, chinkapin, Durand, and bur oaks. Other white oak species are included in the "other white oaks" group.

Site class—A classification of forest land in terms of potential capacity to grow crops of industrial wood.

Tree grade—A classification of the sawlog portion of sawtimber trees based on: (1) the grade of the butt log or (2) the ability to produce at least one 12-foot or two 8-foot logs in the upper section of the sawlog portion.

Upper-stem portion—That part of the main stem of a sawtimber tree above the sawlog top to a d.o.b. of 4.0 inches or to the point where the main stem breaks into limbs.

Ownership Classes

Farmer-owned land—Land operated as a unit of 10 acres or more and from which the sale of agricultural products totals \$1,000 or more annually.

Forest industry land—Land owned by companies or individuals operating wood-using plants (either primary or secondary).

National forest land—Federal land that has been legally designated as national forests or purchase units and other land under the administration of the USDA Forest Service, including experimental areas.

Nonindustrial private forest land (corporate)—Land privately owned by corporations other than forest industries and incorporated farms.

Nonindustrial private forest land (individual)—Land privately owned by individuals other than forest industries or farmers.

Other Federal land—Federal land other than national forests.

State, parish, and municipal land—Land owned by States, parishes, and local public agencies or municipalities, or land leased to these governmental units for 50 years or more.

Stand-Size Classes

Nonstocked stands—Stands less than 10 percent stocked with live trees.

Poletimber stands—Stands at least 10 percent stocked with live trees, with half or more of this stocking in sawtimber or poletimber trees, and with poletimber stocking exceeding that of sawtimber stocking.

Sapling-seedling stands—Stands at least 10 percent stocked with live trees, with more than half of this stocking in saplings or seedlings.

Sawtimber stands—Stands at least 10 percent stocked with live trees, with half or more of this stocking in sawtimber or poletimber trees, and with sawtimber stocking at least equal to poletimber stocking.

Stocking

Stocking is a measurement of the extent to which the growth potential of the site is utilized by trees or

preempted by vegetative cover. Stocking is determined by comparing the stand density in terms of number of trees or basal area with a specified standard. Therefore, full stocking is 100 percent of the stocking standard.

The tabulation below shows the density standard in terms of trees per acre by size class required for full stocking.

| D.b.h. | Trees per acre | D.b.h. | Trees per acre |
|---------------|-------------------|---------------|-------------------|
| <i>Inches</i> | | <i>Inches</i> | |
| Seedlings | 600 | 16 | 72 |
| 2 | 560 | 18 | 60 |
| 4 | 460 | 20 | 51 |
| 6 | 340 | 22 | 42 |
| 8 | 240 | 24 | 36 |
| 10 | 155 | 26 | 31 |
| 12 | 115 | 28 | 27 |
| 14 | 90 | 30 | 24 |

Stocking categories are arbitrarily defined as follows:

Optimally stocked—Stands 61 to 100 percent stocked with growing-stock trees. These stands are growing toward a fully stocked condition (ideal space required for each tree increases with age). Optimum growth and bole form occur in this range.

Overstocked—Stands greater than 100 percent stocked with growing-stock trees. These stands will become stagnant with mortality of individuals increasing as stocking increases over 100 percent.

Understocked—Stands 0 to 60 percent stocked with growing-stock trees. These stands will take a very long time to reach full stocking. Meanwhile, poor bole form will result, and much of the productivity will be placed on heavy limbs instead of on the bole.

Tree Classes

Commercial species—Tree species currently or potentially suitable for industrial wood products.

Cull trees—Rough or rotten trees.

Growing-stock trees—Living trees of commercial species classified as sawtimber, poletimber, saplings, and seedlings. Trees must contain at least one 12-foot or two 8-foot logs in the sawlog portion, currently or potentially (if too small to qualify), to be classed as growing stock. The log(s) must meet dimension and merchantability standards to qualify. Trees must also have, currently or potentially, one-third of the gross board-foot volume in sound wood.

Hardwoods—Dicotyledonous trees, usually broad leaved and deciduous.

Live trees—All living trees. Included are all size classes, all tree classes, and both commercial and non-commercial species.

Noncommercial species—Tree species of typically small size, poor form, or inferior quality that normally do not develop into trees suitable for industrial wood products.

Rotten trees—Live trees of commercial species that are unmerchantable for sawlogs, currently or potentially, because of rot deduction in the sawlog section. See growing-stock trees.

Rough trees—Live trees of commercial species that are unmerchantable for sawlogs, currently or potentially, because of roughness or poor form in the sawlog section. Also included are all live trees of noncommercial species. See growing-stock trees.

Salvable dead trees—Standing or downed dead trees that were formerly growing stock and are considered merchantable. Trees must be at least 5.0 inches in d.b.h. to qualify.

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

Volume

Volume of cull—The cubic-foot volume of sound wood in rough and rotten trees at least 5.0 inches in d.b.h. from a 1-foot stump to a minimum 4.0-inch top d.o.b. of the central stem or to the point where the central stem breaks into limbs.

Volume of growing stock—The cubic-foot volume of sound wood in growing-stock trees at least 5.0 inches in d.b.h. from a 1-foot stump to a minimum 4.0-inch top d.o.b. of the central stem or to the point where the central stem breaks into limbs.

Volume of live trees—The cubic-foot volume of sound wood in growing-stock, rough, and rotten trees at least 5.0 inches in d.b.h. from a 1-foot stump to a minimum 4.0-inch top d.o.b. of the central stem or to the point where the central stem breaks into limbs.

Volume of sawlog portion of sawtimber trees—The cubic-foot volume of sound wood in the sawlog portion of sawtimber trees. Volume is the net result after deductions for rot, sweep, and other defects that affect use for lumber.

Volume of sawtimber—The board-foot volume (International 1/4-inch Rule) of sound wood in the sawlog portion of sawtimber trees. Volume is the net result after deductions for rot, sweep, and other defects that affect use for lumber.

Volume of timber—The cubic-foot volume of sound wood in growing-stock, rough, rotten, and salvable dead trees at least 5.0 inches in d.b.h. from a 1-foot stump to a minimum 4.0-inch top d.o.b. of the central stem or to the point where the central stem breaks into limbs.

Species List

Scientific* and common names of tree species ≥ 1.0 inch in d.b.h. occurring in the SO-FIA sample, Louisiana, 1991:

Commercial Species

Scientific Name

Common Name

Softwoods

| | |
|-----------------------------|--|
| <i>Juniperus silicicola</i> | Southern redcedar |
| <i>J. virginiana</i> | Eastern redcedar |
| <i>Pinus echinata</i> | Shortleaf pine |
| <i>P. elliotii</i> | Slash pine |
| <i>P. glabra</i> | Spruce pine |
| <i>P. palustris</i> | Longleaf pine |
| <i>P. taeda</i> | Loblolly pine |
| <i>Taxodium distichum</i> | Baldcypress (may include some pondcypress) |

Hardwoods

| | |
|--------------------------------|-------------------|
| <i>Acer barbatum</i> | Florida maple |
| <i>A. negundo</i> | Boxelder |
| <i>A. rubrum</i> | Red maple |
| <i>A. saccharum</i> | Sugar maple |
| <i>Betula nigra</i> | River birch |
| <i>Carya</i> spp. | Hickories |
| <i>C. aquatica</i> | Water hickory |
| <i>C. illinoensis</i> | Pecan |
| <i>Catalpa</i> spp. | Catalpas |
| <i>Celtis laevigata</i> | Sugarberry |
| <i>C. occidentalis</i> | Hackberry |
| <i>Cornus florida</i> | Flowering dogwood |
| <i>Diospyros virginiana</i> | Common persimmon |
| <i>Fagus grandifolia</i> | American beech |
| <i>Fraxinus americana</i> | White ash |
| <i>F. pennsylvanica</i> | Green ash |
| <i>Gleditsia aquatica</i> | Waterlocust |
| <i>G. triacanthos</i> | Honeylocust |
| <i>Ilex opaca</i> | American holly |
| <i>Juglans cinerea</i> | Butternut |
| <i>J. nigra</i> | Black walnut |
| <i>Liquidambar styraciflua</i> | Sweetgum |
| <i>Liriodendron tulipifera</i> | Yellow-poplar |
| <i>Maclura pomifera</i> | Osage-orange |
| <i>Magnolia acuminata</i> | Cucumbertree |
| <i>M. grandiflora</i> | Southern magnolia |
| <i>M. virginiana</i> | Sweetbay |
| <i>Morus rubra</i> | Red mulberry |
| <i>Nyssa aquatica</i> | Water tupelo |

| | |
|---|--------------------|
| <i>N. sylvatica</i> | Blackgum |
| <i>N. sylvatica</i> var. <i>biflora</i> | Swamp tupelo |
| <i>Persea borbonia</i> | Redbay |
| <i>Platanus occidentalis</i> | American sycamore |
| <i>Populus deltoides</i> | Eastern cottonwood |
| <i>Prunus serotina</i> | Black cherry |
| <i>Quercus alba</i> | White oak |
| <i>Q. bicolor</i> | Swamp white oak |
| <i>Q. coccinea</i> | Scarlet oak |
| <i>Q. durandii</i> | Durand oak |
| <i>Q. falcata</i> | Southern red oak |
| <i>Q. falcata</i> var. <i>pagodifolia</i> | Cherrybark oak |
| <i>Q. laurifolia</i> | Laurel oak |
| <i>Q. lyrata</i> | Overcup oak |
| <i>Q. michauxii</i> | Swamp chestnut oak |
| <i>Q. muehlenbergii</i> | Chinkapin oak |
| <i>Q. nigra</i> | Water oak |
| <i>Q. nuttallii</i> | Nuttall oak |
| <i>Q. palustris</i> | Pin oak |
| <i>Q. phellos</i> | Willow oak |
| <i>Q. prinus</i> | Chestnut oak |
| <i>Q. rubra</i> | Northern red oak |
| <i>Q. shumardii</i> | Shumard oak |
| <i>Q. stellata</i> | Post oak |
| <i>Q. stellata</i> var. <i>paludosa</i> | Delta post oak |
| <i>Q. velutina</i> | Black oak |
| <i>Robinia pseudoacacia</i> | Black locust |
| <i>Salix nigra</i> | Black willow |
| <i>Sassafras albidum</i> | Sassafras |
| <i>Tilia americana</i> | American basswood |
| <i>T. heterophylla</i> | White basswood |
| <i>Ulmus alata</i> | Winged elm |
| <i>U. americana</i> | American elm |
| <i>U. crassifolia</i> | Cedar elm |
| <i>U. rubra</i> | Slippery elm |
| <i>U. serotina</i> | September elm |

Noncommercial Species

| | |
|-------------------------|---------------|
| <i>Aleurites fordii</i> | Tung-oil-tree |
| <i>Amelanchier</i> spp. | Serviceberry |

Bumelia spp.
Carpinus caroliniana
Castanea spp.
Cercis canadensis
Crataegus spp.
Magnolia macrophylla
Malus spp.
Melia azedarach
Morus alba
Ostrya virginiana

Oxydendrum arboreum
Paulownia tomentosa
Planera aquatica

Bumelias
 American hornbeam
 Chinkapins
 Eastern redbud
 Hawthorns
 Bigleaf magnolia
 Apples
 Chinaberry
 White mulberry
 Eastern
 hophornbeam
 Sourwood
 Royal paulownia
 Water-elm

Prunus spp.

Quercus incana
Q. laevis
Q. marilandica
Q. virginiana
Sapium sebiferum
Vaccinium arboreum

Plums, cherries
 (other than black
 cherry)
 Bluejack oak
 Turkey oak
 Blackjack oak
 Live oak
 Chinese tallowtree
 Sparkleberry

*Nomenclature after: Little, Elbert L., Jr. 1979.
 Checklist of United States trees (native and natural-
 ized). Agric. Handb. 541. Washington, DC: U.S. De-
 partment of Agriculture. 375 p.

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Table 1. — *Area by land class, Louisiana, 1991*

| Land class | Area |
|---------------------|-----------------------|
| | <i>Thousand acres</i> |
| Forest | |
| Commercial | |
| Timberland | 13,783.0 |
| Deferred timberland | 0.0 |
| Noncommercial | |
| Productive-reserved | 8.7 |
| Unproductive | 0.00 |
| Total forest | 13,791.7 |
| Nonforest | |
| Cropland* | 5,488.7 |
| Other | 6,985.0 |
| Total nonforest | 12,473.7 |
| All land† | 26,265.4 |

*U.S. Department of Commerce, Bureau of the Census, 1987 Census of agriculture: State and county data, issued 1989. Vol. 1.

†United States Department of Commerce, Bureau of the Census, 1980 (issued October 1981). The following parishes, totaling 3,047.1 thousand acres of total land, were not included in the sixth Louisiana forest survey because of the infrequent occurrence of timberland: Cameron, Jefferson, Orleans, Plaquemines, and St. Bernard. Forest and nonforest estimates do not include these parishes.

Table 2. — *Area of timberland by ownership class, Louisiana, 1991**

| Ownership class | Area |
|-----------------------|-----------------------|
| | <i>Thousand acres</i> |
| Public | |
| National forest | 568.5 |
| Other Federal | 230.2 |
| State | 300.2 |
| Parish | 207.4 |
| Total public | 1,306.3 |
| Private | |
| Forest industry | 3,898.3 |
| Farmer | 739.6 |
| Miscellaneous private | |
| Individual | 5,789.2 |
| Corporate | 2,049.7 |
| Total private | 12,476.7 |
| All ownership | 13,783.0 |

*Numbers in column may not sum to totals due to rounding.

Table 3.—*Area of timberland by stand size and ownership class, Louisiana, 1991**

| Stand size class | All ownerships | National forest | Other public | Forest industry | Farmer | Miscellaneous private |
|----------------------|-----------------------|-----------------|--------------|-----------------|--------|-----------------------|
| | <i>Thousand acres</i> | | | | | |
| Sawtimber | 8,148.1 | 400.1 | 597.9 | 1,799.8 | 449.2 | 4,901.2 |
| Poletimber stands | 2,161.5 | 36.7 | 58.3 | 845.8 | 154.2 | 1,066.5 |
| Sapling and seedling | 3,403.4 | 131.7 | 81.6 | 1,242.5 | 136.2 | 1,811.4 |
| Nonstocked areas | 70.0 | 0.0 | 0.0 | 10.2 | 0.0 | 59.8 |
| All classes | 13,783.0 | 568.5 | 737.8 | 3,898.3 | 739.6 | 7,838.9 |

*Numbers in rows and columns may not sum to totals due to rounding.

Table 4.—Area of timberland by stand volume and ownership class, Louisiana, 1991*

| Stand volume per acre | All ownerships | National forest | Other public | Forest industry | Farmer | Miscellaneous private |
|-------------------------------|-----------------------|--------------------|-----------------|--------------------|--------|--------------------------|
| <i>Board feet[†]</i> | <i>Thousand acres</i> | | | | | |
| Less than 1,500 | 4,116.3 | 111.2 | 128.1 | 1,532.9 | 201.0 | 2,143.1 |
| 1,500 to 5,000 | 3,623.8 | 90.1 | 219.1 | 986.7 | 257.8 | 2,070.0 |
| More than 5,000 | 6,043.0 | 367.2 | 390.7 | 1,378.7 | 280.7 | 3,625.8 |
| All classes | 13,783.0 | 568.5 | 737.8 | 3,898.3 | 739.6 | 7,838.9 |

*Numbers in rows and columns may not sum to totals due to rounding.

[†]International 1/4-inch Rule.

Table 5. — Area of timberland by percent growing-stock trees and cull trees, Louisiana, 1991*

| Growing stock trees | Cull trees (Percent stocking) | | | | | | | |
|-------------------------|----------------------------------|---------|---------|---------|---------|-------|-------|-------|
| | Total | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60+ |
| <i>Percent stocking</i> | <i>Thousand acres</i> | | | | | | | |
| 0-10 | 156.9 | 58.8 | 28.8 | 6.7 | 16.5 | 5.4 | 6.9 | 33.8 |
| 10-20 | 152.1 | 33.0 | 32.6 | 17.2 | 23.2 | 24.0 | 0.0 | 22.0 |
| 20-30 | 220.4 | 46.0 | 46.1 | 17.3 | 34.6 | 27.4 | 22.3 | 26.8 |
| 30-40 | 373.5 | 40.9 | 62.0 | 72.5 | 52.4 | 53.7 | 32.9 | 59.0 |
| 40-50 | 741.7 | 132.4 | 110.8 | 129.5 | 88.1 | 154.5 | 73.5 | 52.8 |
| 50-60 | 1,033.2 | 142.1 | 112.5 | 158.3 | 313.2 | 212.5 | 54.2 | 40.4 |
| 60-70 | 1,212.6 | 232.7 | 252.6 | 233.7 | 218.4 | 137.9 | 116.4 | 20.9 |
| 70-80 | 1,714.4 | 347.1 | 453.9 | 450.0 | 331.1 | 114.8 | 12.1 | 5.2 |
| 80-90 | 1,869.4 | 444.9 | 546.1 | 433.8 | 284.0 | 120.7 | 39.8 | 0.0 |
| 90-100 | 1,995.0 | 656.1 | 650.7 | 469.3 | 176.4 | 36.9 | 5.5 | 0.0 |
| 100-110 | 1,562.2 | 642.5 | 523.1 | 252.8 | 108.7 | 23.6 | 11.6 | 0.0 |
| 110-120 | 1,192.3 | 726.1 | 302.6 | 129.3 | 15.7 | 18.7 | 0.0 | 0.0 |
| 120-130 | 816.3 | 623.0 | 145.5 | 47.7 | 0.0 | 0.0 | 0.0 | 0.0 |
| 130-140 | 501.4 | 376.2 | 90.5 | 34.7 | 0.0 | 0.0 | 0.0 | 0.0 |
| 140-150 | 165.8 | 142.4 | 23.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 150-160 | 45.9 | 45.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 160+ | 29.8 | 29.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total | 13,783.0 | 4,719.9 | 3,381.4 | 2,452.8 | 1,662.5 | 930.2 | 375.2 | 261.1 |

*Numbers in rows and columns may not sum to totals due to rounding.

Table 6. — Average basal area of live trees on timberland by ownership, tree class, species, and tree size class, Louisiana, 1991*

| Ownership and tree class | All species | Softwood | | | Hardwood | | |
|----------------------------------|-------------|----------------------|------------|-----------|----------------------|------------|-----------|
| | | Sapling and seedling | Poletimber | Sawtimber | Sapling and seedling | Poletimber | Sawtimber |
| ----- Square feet per acre ----- | | | | | | | |
| National Forest | | | | | | | |
| Growing stock | 75.0 | 6.5 | 6.1 | 36.4 | 3.6 | 7.6 | 15.0 |
| Rough and rotten | 12.0 | 0.6 | 0.2 | 0.3 | 4.3 | 3.3 | 3.4 |
| Total | 87.1 | 7.0 | 6.3 | 36.6 | 7.8 | 10.9 | 18.4 |
| Other public | | | | | | | |
| Growing stock | 66.6 | 1.8 | 3.7 | 14.6 | 2.8 | 11.0 | 32.8 |
| Rough and rotten | 21.2 | 0.4 | 0.2 | 0.9 | 5.3 | 5.3 | 9.0 |
| Total | 87.7 | 2.2 | 3.9 | 15.4 | 8.1 | 16.3 | 41.8 |
| Forest industry | | | | | | | |
| Growing stock | 64.4 | 7.2 | 12.5 | 19.9 | 3.9 | 8.0 | 13.1 |
| Rough and rotten | 13.2 | 0.9 | 0.4 | 0.4 | 5.1 | 2.8 | 3.6 |
| Total | 77.6 | 8.1 | 12.9 | 20.2 | 8.9 | 10.8 | 16.7 |
| Farmer | | | | | | | |
| Growing stock | 62.6 | 1.0 | 3.8 | 14.2 | 3.1 | 15.2 | 25.4 |
| Rough and rotten | 20.0 | 0.5 | 0.3 | 1.2 | 5.7 | 4.7 | 7.6 |
| Total | 82.6 | 1.5 | 4.0 | 15.3 | 8.7 | 19.9 | 33.0 |
| Miscellaneous private | | | | | | | |
| Growing stock | 70.0 | 2.7 | 6.1 | 22.3 | 4.8 | 12.6 | 21.5 |
| Rough and rotten | 19.2 | 0.5 | 0.4 | 0.8 | 6.0 | 4.3 | 7.2 |
| Total | 89.1 | 3.2 | 6.4 | 23.1 | 10.8 | 16.9 | 28.7 |
| All owners | | | | | | | |
| Growing stock | 68.0 | 4.0 | 7.6 | 21.4 | 4.3 | 11.1 | 19.7 |
| Rough and rotten | 17.3 | 0.6 | 0.4 | 0.7 | 5.6 | 3.9 | 6.1 |
| Total | 85.4 | 4.6 | 8.0 | 22.0 | 9.9 | 15.1 | 25.8 |

*Numbers in rows and columns may not sum to totals due to rounding.

Table 7.—Area of timberland by site and ownership class, Louisiana, 1991*

| Site class | All ownerships | National forest | Other public | Forest industry | Farmer | Miscellaneous private |
|----------------------------|----------------|-----------------|--------------|-----------------|--------|-----------------------|
| ----- Thousand acres ----- | | | | | | |
| ≥165 ft ³ | 2,073.0 | 101.0 | 109.1 | 559.6 | 126.4 | 1,176.9 |
| 120 to 165 ft ³ | 4,328.6 | 186.6 | 138.2 | 1,319.7 | 254.7 | 2,429.3 |
| 85 to 120 ft ³ | 4,522.8 | 203.0 | 265.7 | 1,427.8 | 224.8 | 2,401.4 |
| 50 to 85 ft ³ | 2,559.3 | 73.9 | 199.4 | 543.1 | 122.3 | 1,620.6 |
| <50 ft ³ | 299.4 | 3.9 | 25.3 | 48.1 | 11.3 | 210.7 |
| All classes | 13,783.0 | 568.5 | 737.8 | 3,898.3 | 739.6 | 7,838.9 |

*Numbers in rows and columns may not sum to totals due to rounding.

Table 8.—Area of timberland by forest type group and ownership class, Louisiana, 1991*

| Forest type group | All ownerships | National forest | Other public | Forest industry | Farmer | Miscellaneous private |
|----------------------------|-------------------|--------------------|-----------------|--------------------|--------|--------------------------|
| ----- Thousand acres ----- | | | | | | |
| Longleaf-slash pine | 869.7 | 108.7 | 18.4 | 338.8 | 11.1 | 392.6 |
| Loblolly-shortleaf pine | 4,153.6 | 219.2 | 155.4 | 1,726.0 | 127.1 | 1,925.9 |
| Oak-pine | 1,886.6 | 115.6 | 40.8 | 532.0 | 83.3 | 1,114.9 |
| Oak-hickory | 2,107.2 | 78.5 | 58.3 | 584.1 | 147.6 | 1,238.7 |
| Oak-gum-cypress | 4,349.9 | 46.5 | 411.4 | 671.1 | 345.5 | 2,875.4 |
| Elm-ash-cottonwood | 401.3 | 0.0 | 53.6 | 46.2 | 25.0 | 276.5 |
| Nontyped | 14.9 | 0.0 | 0.0 | 0.0 | 0.0 | 14.9 |
| All types | 13,783.0 | 568.5 | 737.8 | 3,898.3 | 739.6 | 7,838.9 |

*Numbers in rows and columns may not sum to totals due to rounding.

Table 9. — Area of noncommercial forest land by forest type group, Louisiana, 1991

| Forest type group | All areas | Productive reserved areas | Unproductive areas |
|----------------------------|--------------|---------------------------------|-----------------------|
| ----- Thousand acres ----- | | | |
| Longleaf-slash pine | 0.0 | 0.0 | 0.0 |
| Loblolly-shortleaf pine | 8.7 | 8.7 | 0.0 |
| Softwood total | 8.7 | 8.7 | 0.0 |
| Oak-pine | 0.0 | 0.0 | 0.0 |
| Oak-hickory | 0.0 | 0.0 | 0.0 |
| Oak-gum-cypress | 0.0 | 0.0 | 0.0 |
| Elm-ash-cottonwood | 0.0 | 0.0 | 0.0 |
| Hardwood total | 0.0 | 0.0 | 0.0 |
| All types | 8.7 | 8.7 | 0.0 |

Table 10. — Number of growing-stock trees on timberland by species and diameter class, Louisiana, 1991*

| Species | Diameter class (Inches at breast height) | | | | | | | | | | |
|--------------------------------|--|-------------|-------------|--------------|---------------|---------------|---------------|---------------|---------------|---------------|-------|
| | All classes | 5.0– 6.9 | 7.0– 8.9 | 9.0– 10.9 | 11.0– 12.9 | 13.0– 14.9 | 15.0– 16.9 | 17.0– 18.9 | 19.0– 20.9 | 21.0– 28.9 | ≥29.0 |
| <i>Thousand trees</i> | | | | | | | | | | | |
| Longleaf pine | 25,111 | 4,311 | 5,196 | 5,609 | 4,262 | 2,406 | 1,821 | 818 | 460 | 228 | 0 |
| Slash pine | 68,115 | 21,233 | 16,724 | 14,410 | 9,707 | 3,895 | 1,479 | 529 | 104 | 35 | 0 |
| Shortleaf pine | 51,160 | 12,257 | 12,157 | 10,009 | 8,188 | 4,615 | 2,353 | 1,030 | 308 | 242 | 0 |
| Loblolly pine | 492,280 | 193,813 | 119,405 | 63,445 | 43,141 | 29,539 | 19,128 | 11,513 | 6,061 | 5,907 | 327 |
| Spruce pine | 2,898 | 429 | 377 | 576 | 383 | 328 | 282 | 207 | 141 | 166 | 9 |
| Redcedar | 946 | 590 | 89 | 165 | 66 | 25 | 0 | 11 | 0 | 0 | 0 |
| Cypress | 73,453 | 14,730 | 15,276 | 8,796 | 9,161 | 8,043 | 6,837 | 4,812 | 2,494 | 3,000 | 305 |
| Total softwoods | 713,963 | 247,363 | 169,225 | 103,010 | 74,908 | 48,850 | 31,900 | 18,920 | 9,567 | 9,578 | 642 |
| Select white oaks [†] | 28,398 | 9,772 | 5,291 | 4,576 | 2,957 | 1,850 | 1,391 | 1,029 | 540 | 882 | 110 |
| Select red oaks [‡] | 16,314 | 3,552 | 3,187 | 2,788 | 1,618 | 1,174 | 1,252 | 786 | 733 | 1,036 | 190 |
| Other white oaks | 33,932 | 10,305 | 7,565 | 5,204 | 3,248 | 2,470 | 1,608 | 1,246 | 768 | 1,311 | 205 |
| Other red oaks | 111,633 | 28,775 | 23,389 | 17,368 | 11,592 | 9,755 | 6,486 | 4,817 | 3,163 | 5,270 | 1,018 |
| Sweet pecan | 3,599 | 643 | 922 | 552 | 337 | 260 | 273 | 193 | 145 | 204 | 70 |
| Water hickory | 17,048 | 4,640 | 3,204 | 3,152 | 1,723 | 1,319 | 1,190 | 701 | 472 | 555 | 92 |
| Other hickories | 15,749 | 4,621 | 3,556 | 3,076 | 1,176 | 1,408 | 776 | 513 | 294 | 315 | 15 |
| Persimmon | 3,085 | 1,806 | 785 | 419 | 54 | 21 | 0 | 0 | 0 | 0 | 0 |
| Hard maples | 957 | 526 | 304 | 0 | 61 | 19 | 34 | 0 | 0 | 14 | 0 |
| Soft maples | 37,262 | 19,710 | 9,461 | 4,119 | 1,639 | 1,043 | 614 | 240 | 237 | 187 | 12 |
| Boxelder | 7,458 | 2,597 | 2,406 | 1,285 | 674 | 202 | 196 | 88 | 10 | 0 | 0 |
| Beech | 5,084 | 744 | 258 | 913 | 494 | 487 | 634 | 468 | 277 | 735 | 73 |
| Sweetgum | 148,070 | 61,811 | 32,032 | 22,449 | 11,347 | 8,473 | 5,001 | 3,126 | 1,780 | 1,914 | 137 |
| Blackgum | 36,898 | 15,880 | 9,950 | 4,675 | 2,315 | 1,928 | 1,135 | 602 | 226 | 182 | 5 |
| Other gums/tupelos | 64,308 | 13,987 | 14,444 | 15,128 | 6,990 | 6,365 | 3,821 | 1,939 | 720 | 843 | 71 |
| White ash | 2,366 | 839 | 732 | 115 | 236 | 154 | 138 | 82 | 30 | 31 | 9 |
| Other ashes | 32,597 | 11,026 | 7,754 | 4,796 | 2,451 | 1,924 | 1,619 | 1,111 | 816 | 1,005 | 93 |
| Sycamore | 6,337 | 2,132 | 1,385 | 824 | 758 | 618 | 174 | 154 | 135 | 155 | 2 |
| Cottonwood | 5,014 | 1,121 | 627 | 672 | 690 | 508 | 338 | 396 | 263 | 326 | 73 |
| Basswood | 559 | 265 | 110 | 0 | 121 | 32 | 0 | 13 | 10 | 0 | 8 |
| Yellow-poplar | 2,785 | 618 | 444 | 434 | 261 | 275 | 316 | 117 | 131 | 166 | 22 |
| Magnolia | 1,355 | 262 | 193 | 90 | 167 | 259 | 174 | 58 | 39 | 102 | 12 |
| Sweetbay | 6,873 | 2,971 | 1,364 | 1,178 | 481 | 485 | 200 | 82 | 40 | 72 | 0 |
| Willow | 18,940 | 4,600 | 3,594 | 2,339 | 2,585 | 1,486 | 1,593 | 803 | 679 | 1,139 | 120 |
| Black walnut | 227 | 114 | 72 | 0 | 0 | 23 | 18 | 0 | 0 | 0 | 0 |
| Black cherry | 2,409 | 1,051 | 694 | 289 | 145 | 80 | 108 | 41 | 0 | 0 | 0 |
| American elm | 13,967 | 4,977 | 3,499 | 1,530 | 1,474 | 809 | 616 | 442 | 278 | 306 | 37 |
| Other elms | 17,052 | 7,369 | 4,005 | 2,875 | 1,227 | 667 | 333 | 281 | 101 | 189 | 4 |
| River birch | 988 | 427 | 281 | 87 | 120 | 38 | 18 | 0 | 0 | 17 | 0 |
| Hackberry | 25,709 | 6,502 | 7,075 | 4,204 | 2,509 | 1,806 | 1,325 | 1,091 | 595 | 551 | 51 |
| Black locust | 271 | 178 | 83 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 |
| Other locusts | 4,337 | 1,397 | 872 | 837 | 429 | 339 | 278 | 55 | 66 | 55 | 10 |
| Sassafras | 1,194 | 643 | 339 | 85 | 84 | 0 | 67 | 11 | 9 | 7 | 0 |
| Dogwood | 2,247 | 2,093 | 122 | 32 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Holly | 3,705 | 2,671 | 698 | 255 | 28 | 21 | 19 | 15 | 0 | 0 | 0 |
| Other commercial | 1,718 | 1,160 | 289 | 128 | 84 | 48 | 0 | 0 | 9 | 0 | 0 |
| Total hardwoods | 680,445 | 231,784 | 150,984 | 106,475 | 60,076 | 46,346 | 31,698 | 20,502 | 12,568 | 17,577 | 2,436 |
| All species | 1,394,408 | 479,147 | 320,209 | 209,485 | 134,984 | 95,195 | 63,598 | 39,442 | 22,136 | 27,155 | 3,078 |

*Numbers in rows and columns may not sum to totals due to rounding.

[†]Includes white, swamp chestnut, swamp white, chinkapin, and bur oaks.[‡]Includes cherrybark, northern red, and Shumard oaks.

Table 11. — *Volume of timber on timberland by class of timber and by softwoods and hardwoods, Louisiana, 1991**

| Class of timber | All species | Softwood | Hardwood |
|--------------------------------|-------------|----------|----------|
| ----- Million cubic feet ----- | | | |
| Sawtimber trees: | | | |
| Sawlog portion | 12,622.2 | 7,393.2 | 5,229.0 |
| Upper-stem portion | 2,036.8 | 916.7 | 1,120.1 |
| Total | 14,659.0 | 8,309.9 | 6,349.1 |
| Poletimber trees | 4,185.5 | 1,618.2 | 2,567.3 |
| All growing stock | 18,844.4 | 9,928.1 | 8,916.3 |
| Rough trees | 1,600.5 | 159.2 | 1,441.4 |
| Rotten trees | 293.5 | 35.1 | 258.4 |
| Salvable dead trees | 33.2 | 14.8 | 18.4 |
| All timber | 20,771.7 | 10,137.1 | 10,634.6 |

*Numbers in rows and columns may not sum to totals due to rounding.

Table 12. — *Volume of growing stock and sawtimber on timberland by ownership class and by softwoods and hardwoods, Louisiana, 1991**

| Ownership class | Growing stock | | | Sawtimber | | |
|-----------------------|--------------------------------|----------|----------|---|----------|----------|
| | All species | Softwood | Hardwood | All species | Softwood | Hardwood |
| | ----- Million cubic feet ----- | | | ----- Million board feet [†] ----- | | |
| National forest | 1,024.2 | 731.6 | 292.6 | 5,191.0 | 4,030.6 | 1,160.4 |
| Other public | 1,025.8 | 351.4 | 674.4 | 4,408.3 | 1,732.3 | 2,676.0 |
| Forest industry | 4,633.1 | 2,855.1 | 1,778.0 | 17,561.5 | 11,423.8 | 6,137.8 |
| Farmer | 976.1 | 344.6 | 631.4 | 3,725.2 | 1,638.2 | 2,086.9 |
| Miscellaneous private | 11,185.2 | 5,645.3 | 5,539.9 | 44,639.7 | 26,119.3 | 18,520.4 |
| All ownerships | 18,844.4 | 9,928.1 | 8,916.3 | 75,525.6 | 44,944.2 | 30,581.4 |

*Numbers in rows and columns may not sum to totals due to rounding.

[†]International 1/4-inch Rule.

Table 13. — Volume of growing stock on timberland by species and diameter class, Louisiana, 1991*

| Species | Diameter class (Inches at breast height) | | | | | | | | | | |
|--------------------------------|--|---------|---------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-------|
| | All classes | 5.0–6.9 | 7.0–8.9 | 9.0–10.9 | 11.0–12.9 | 13.0–14.9 | 15.0–16.9 | 17.0–18.9 | 19.0–20.9 | 21.0–28.9 | ≥29.0 |
| <i>Million cubic feet</i> | | | | | | | | | | | |
| Longleaf pine | 436.8 | 11.6 | 35.8 | 74.7 | 86.6 | 68.3 | 71.6 | 39.6 | 31.2 | 17.5 | 0.0 |
| Slash pine | 790.3 | 48.6 | 111.3 | 191.5 | 206.3 | 124.7 | 66.0 | 30.2 | 7.9 | 3.8 | 0.0 |
| Shortleaf pine | 838.3 | 37.7 | 89.4 | 148.0 | 191.3 | 155.9 | 107.4 | 62.6 | 21.7 | 24.5 | 0.0 |
| Loblolly pine | 6,268.7 | 459.2 | 700.0 | 784.9 | 886.3 | 903.4 | 801.2 | 639.5 | 427.8 | 607.1 | 59.3 |
| Spruce pine | 92.0 | 1.0 | 2.6 | 8.1 | 9.2 | 11.6 | 13.7 | 13.6 | 12.0 | 18.4 | 1.8 |
| Redcedar | 4.5 | 1.3 | 0.3 | 1.3 | 0.9 | 0.4 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 |
| Cypress | 1,497.5 | 33.4 | 86.0 | 103.2 | 162.3 | 213.5 | 251.6 | 227.8 | 142.4 | 235.6 | 41.7 |
| Total softwoods | 9,928.1 | 592.7 | 1,025.5 | 1,311.9 | 1,542.9 | 1,477.8 | 1,311.2 | 1,013.6 | 642.8 | 906.8 | 102.8 |
| Select white oaks [†] | 411.5 | 25.0 | 32.5 | 49.5 | 54.8 | 48.6 | 47.0 | 46.2 | 30.0 | 63.0 | 14.9 |
| Select red oaks [‡] | 364.6 | 8.6 | 20.1 | 32.0 | 30.3 | 33.2 | 46.5 | 37.9 | 41.5 | 86.7 | 27.8 |
| Other white oaks | 449.7 | 24.7 | 40.0 | 49.3 | 48.7 | 52.7 | 44.7 | 43.8 | 36.7 | 84.3 | 24.9 |
| Other red oaks | 1,989.7 | 78.4 | 141.5 | 192.5 | 204.0 | 248.5 | 213.5 | 207.7 | 169.2 | 396.5 | 137.9 |
| Sweet pecan | 83.2 | 1.3 | 5.5 | 6.5 | 5.8 | 6.4 | 9.6 | 8.9 | 8.6 | 18.4 | 12.1 |
| Water hickory | 266.4 | 12.3 | 17.1 | 32.0 | 27.7 | 30.8 | 36.8 | 29.1 | 25.2 | 39.4 | 16.1 |
| Other hickories | 213.1 | 9.7 | 19.9 | 31.9 | 22.3 | 35.7 | 25.8 | 23.1 | 16.6 | 25.3 | 2.9 |
| Persimmon | 13.2 | 4.2 | 4.1 | 3.6 | 0.9 | 0.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Hard maples | 6.9 | 2.0 | 1.4 | 0.0 | 1.0 | 0.4 | 1.2 | 0.0 | 0.0 | 0.8 | 0.0 |
| Soft maples | 243.6 | 52.1 | 55.0 | 40.2 | 25.7 | 22.1 | 16.7 | 8.3 | 11.4 | 10.9 | 1.3 |
| Boxelder | 59.9 | 7.4 | 14.0 | 13.9 | 11.4 | 4.3 | 5.4 | 3.0 | 0.4 | 0.0 | 0.0 |
| Beech | 148.8 | 1.9 | 1.5 | 9.2 | 8.1 | 10.9 | 20.5 | 19.2 | 15.4 | 53.4 | 8.7 |
| Sweetgum | 1,664.2 | 141.0 | 188.0 | 252.4 | 220.1 | 237.3 | 191.3 | 151.9 | 105.6 | 160.4 | 16.3 |
| Blackgum | 304.7 | 35.9 | 51.5 | 46.7 | 40.2 | 45.5 | 36.5 | 25.9 | 11.1 | 11.1 | 0.4 |
| Other gums/tupelos | 785.0 | 33.0 | 78.1 | 153.2 | 112.1 | 142.3 | 108.3 | 73.7 | 31.2 | 46.1 | 7.0 |
| White ash | 29.2 | 2.6 | 5.2 | 1.3 | 4.2 | 3.4 | 4.8 | 3.8 | 1.7 | 1.8 | 0.6 |
| Other ashes | 396.7 | 28.2 | 46.8 | 49.7 | 39.3 | 43.7 | 47.7 | 39.7 | 36.6 | 57.5 | 7.4 |
| Sycamore | 99.1 | 6.4 | 10.7 | 11.5 | 16.0 | 18.0 | 7.1 | 7.8 | 8.6 | 12.2 | 0.8 |
| Cottonwood | 131.6 | 2.5 | 2.5 | 7.8 | 13.7 | 14.3 | 12.6 | 19.5 | 16.7 | 30.4 | 11.5 |
| Basswood | 5.9 | 0.8 | 0.6 | 0.0 | 2.0 | 0.9 | 0.0 | 0.6 | 0.3 | 0.0 | 0.7 |
| Yellow-poplar | 61.9 | 1.7 | 2.3 | 5.1 | 5.0 | 6.5 | 10.2 | 5.9 | 8.1 | 13.9 | 3.3 |
| Magnolia | 28.6 | 0.5 | 1.2 | 0.9 | 2.9 | 5.4 | 5.6 | 2.2 | 2.3 | 6.6 | 1.1 |
| Sweetbay | 63.4 | 8.7 | 7.8 | 13.0 | 8.5 | 11.0 | 5.8 | 3.0 | 1.6 | 4.0 | 0.0 |
| Willow | 347.5 | 12.5 | 19.6 | 22.9 | 42.6 | 36.2 | 50.4 | 32.7 | 32.8 | 84.7 | 13.1 |
| Black walnut | 1.9 | 0.3 | 0.3 | 0.0 | 0.0 | 0.6 | 0.6 | 0.0 | 0.0 | 0.0 | 0.0 |
| Black cherry | 19.5 | 2.7 | 3.8 | 3.1 | 2.6 | 2.0 | 4.1 | 1.4 | 0.0 | 0.0 | 0.0 |
| American elm | 157.2 | 11.8 | 19.0 | 14.4 | 24.1 | 17.1 | 17.3 | 17.5 | 13.2 | 18.9 | 3.9 |
| Other elms | 152.2 | 17.0 | 24.0 | 29.7 | 20.8 | 16.2 | 11.3 | 12.3 | 5.0 | 15.0 | 0.9 |
| River birch | 7.5 | 1.2 | 1.5 | 0.8 | 1.6 | 0.9 | 0.7 | 0.0 | 0.0 | 0.9 | 0.0 |
| Hackberry | 326.4 | 17.1 | 40.0 | 44.1 | 40.1 | 41.0 | 37.7 | 41.0 | 26.6 | 34.1 | 4.6 |
| Black locust | 1.7 | 0.9 | 0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.3 | 0.0 |
| Other locusts | 48.8 | 3.8 | 5.0 | 7.4 | 7.0 | 6.4 | 8.7 | 1.6 | 3.7 | 4.4 | 0.8 |
| Sassafras | 6.8 | 1.2 | 2.3 | 0.5 | 1.0 | 0.0 | 0.6 | 0.5 | 0.4 | 0.4 | 0.0 |
| Dogwood | 4.9 | 4.1 | 0.6 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Holly | 12.9 | 6.4 | 3.2 | 1.8 | 0.4 | 0.4 | 0.6 | 0.2 | 0.0 | 0.0 | 0.0 |
| Other commercial | 8.1 | 3.0 | 1.3 | 1.0 | 1.6 | 1.0 | 0.0 | 0.0 | 0.3 | 0.0 | 0.0 |
| Total hardwoods | 8,916.3 | 570.8 | 868.3 | 1,128.2 | 1,046.3 | 1,143.7 | 1,029.6 | 868.6 | 660.8 | 1,281.4 | 318.6 |
| All species | 18,844.4 | 1,163.5 | 1,893.7 | 2,440.1 | 2,589.2 | 2,621.6 | 2,340.8 | 1,882.2 | 1,303.7 | 2,188.2 | 421.4 |

*Numbers in rows and columns may not sum to totals due to rounding.

†Includes white, swamp chestnut, swamp white, chinkapin, and bur oaks.

‡Includes cherrybark, northern red, and Shumard oaks.

Table 14. — Volume of sawtimber on timberland by species and diameter class, Louisiana, 1991*

| Species | Diameter class (Inches at breast height) | | | | | | | | |
|--------------------------------|---|----------|-----------|-----------|-----------|-----------|-----------|-----------|---------|
| | All classes | 9.0–10.9 | 11.0–12.9 | 13.0–14.9 | 15.0–16.9 | 17.0–18.9 | 19.0–20.9 | 21.0–28.9 | ≥29.0 |
| | ----- Million board feet [†] ----- | | | | | | | | |
| Longleaf pine | 2,071.8 | 338.1 | 446.7 | 373.8 | 401.0 | 221.0 | 187.1 | 104.1 | 0.0 |
| Slash pine | 3,365.3 | 850.9 | 1,107.4 | 730.4 | 411.7 | 189.4 | 51.0 | 24.6 | 0.0 |
| Shortleaf pine | 4,060.8 | 715.1 | 1,082.4 | 935.7 | 656.2 | 385.2 | 136.6 | 149.6 | 0.0 |
| Loblolly pine | 28,292.3 | 3,355.4 | 4,637.3 | 5,110.3 | 4,672.7 | 3,804.1 | 2,592.1 | 3,751.9 | 368.4 |
| Spruce pine | 522.1 | 34.5 | 52.0 | 69.3 | 81.7 | 87.3 | 74.3 | 110.9 | 12.2 |
| Redcedar | 12.2 | 4.6 | 4.0 | 2.0 | 0.0 | 1.6 | 0.0 | 0.0 | 0.0 |
| Cypress | 6,619.7 | 330.0 | 675.2 | 1,006.9 | 1,270.3 | 1,171.1 | 733.3 | 1,223.9 | 209.1 |
| Total softwoods | 44,944.2 | 5,628.6 | 8,005.0 | 8,228.4 | 7,493.6 | 5,859.6 | 3,774.3 | 5,365.0 | 589.8 |
| Select white oaks [‡] | 1,517.7 | 0.0 | 233.6 | 244.9 | 233.6 | 242.6 | 159.3 | 338.5 | 85.3 |
| Select red oaks [§] | 1,568.4 | 0.0 | 118.6 | 159.8 | 228.6 | 201.7 | 220.4 | 485.7 | 153.5 |
| Other white oaks | 1,666.9 | 0.0 | 203.4 | 244.6 | 216.2 | 221.9 | 193.1 | 446.1 | 141.6 |
| Other red oaks | 7,893.5 | 0.0 | 818.6 | 1,185.9 | 1,067.3 | 1,071.3 | 891.4 | 2,127.7 | 731.3 |
| Sweet pecan | 355.4 | 0.0 | 25.5 | 30.2 | 45.5 | 44.5 | 42.9 | 99.3 | 67.5 |
| Water hickory | 1,001.5 | 0.0 | 112.7 | 138.1 | 183.2 | 142.6 | 131.3 | 205.4 | 88.2 |
| Other hickories | 764.4 | 0.0 | 96.7 | 171.1 | 127.9 | 122.6 | 89.5 | 138.5 | 18.1 |
| Persimmon | 5.3 | 0.0 | 3.8 | 1.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Hard maples | 18.9 | 0.0 | 4.9 | 1.4 | 7.7 | 0.0 | 0.0 | 4.9 | 0.0 |
| Soft maples | 414.2 | 0.0 | 97.6 | 94.3 | 69.0 | 42.0 | 54.2 | 51.0 | 6.1 |
| Boxelder | 100.6 | 0.0 | 43.9 | 16.6 | 25.5 | 13.3 | 1.5 | 0.0 | 0.0 |
| Beech | 723.6 | 0.0 | 35.2 | 54.0 | 106.8 | 104.9 | 83.6 | 289.7 | 49.6 |
| Sweetgum | 5,300.7 | 0.0 | 863.7 | 1,137.6 | 955.7 | 813.6 | 567.0 | 881.2 | 81.9 |
| Blackgum | 775.6 | 0.0 | 150.6 | 200.9 | 178.0 | 129.9 | 57.7 | 57.5 | 0.9 |
| Other gums/tupelos | 2,116.6 | 0.0 | 357.8 | 551.5 | 465.0 | 353.4 | 146.8 | 210.6 | 31.3 |
| White ash | 99.3 | 0.0 | 16.5 | 15.2 | 26.1 | 21.2 | 8.2 | 10.0 | 2.1 |
| Other ashes | 1,196.2 | 0.0 | 141.9 | 181.9 | 212.0 | 188.1 | 172.8 | 267.3 | 32.2 |
| Sycamore | 335.8 | 0.0 | 66.4 | 83.2 | 38.5 | 38.9 | 43.7 | 60.9 | 4.3 |
| Cottonwood | 601.9 | 0.0 | 53.6 | 66.6 | 63.0 | 97.4 | 91.9 | 168.5 | 61.0 |
| Basswood | 18.4 | 0.0 | 6.9 | 3.5 | 0.0 | 3.2 | 0.9 | 0.0 | 3.8 |
| Yellow-poplar | 263.5 | 0.0 | 20.4 | 27.0 | 48.8 | 32.5 | 43.4 | 74.7 | 16.7 |
| Magnolia | 125.9 | 0.0 | 11.8 | 22.9 | 29.3 | 11.7 | 12.5 | 35.0 | 2.8 |
| Sweetbay | 151.2 | 0.0 | 36.5 | 46.2 | 27.9 | 15.2 | 6.6 | 18.7 | 0.0 |
| Willow | 1,370.4 | 0.0 | 152.8 | 161.0 | 237.6 | 161.0 | 161.5 | 437.1 | 59.4 |
| Black walnut | 6.6 | 0.0 | 0.0 | 2.7 | 4.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Black cherry | 47.7 | 0.0 | 10.9 | 8.2 | 22.3 | 6.4 | 0.0 | 0.0 | 0.0 |
| American elm | 519.7 | 0.0 | 97.6 | 77.9 | 79.5 | 85.2 | 64.5 | 95.5 | 19.4 |
| Other elms | 397.3 | 0.0 | 90.1 | 79.5 | 57.6 | 62.8 | 24.8 | 77.9 | 4.6 |
| River birch | 20.6 | 0.0 | 7.3 | 4.6 | 4.2 | 0.0 | 0.0 | 4.5 | 0.0 |
| Hackberry | 1,016.4 | 0.0 | 153.7 | 176.7 | 171.5 | 196.4 | 126.4 | 172.1 | 19.5 |
| Black locust | 2.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.9 | 0.0 |
| Other locusts | 152.2 | 0.0 | 28.7 | 28.2 | 41.9 | 8.5 | 20.2 | 22.3 | 2.5 |
| Sassafras | 13.9 | 0.0 | 4.0 | 0.0 | 3.0 | 2.6 | 2.3 | 2.0 | 0.0 |
| Holly | 7.1 | 0.0 | 1.6 | 1.9 | 3.0 | 0.7 | 0.0 | 0.0 | 0.0 |
| Other commercial | 11.0 | 0.0 | 6.0 | 3.3 | 0.0 | 0.0 | 1.7 | 0.0 | 0.0 |
| Total hardwoods | 30,581.4 | 0.0 | 4,073.1 | 5,202.9 | 4,980.1 | 4,436.1 | 3,420.1 | 6,785.6 | 1,683.5 |
| All species | 75,525.6 | 5,628.6 | 12,078.1 | 13,431.3 | 12,473.7 | 10,295.6 | 7,194.4 | 12,150.6 | 2,273.3 |

*Numbers in rows and columns may not sum to totals due to rounding.

[†]International 1/4-inch Rule.[‡]Includes white, swamp chestnut, swamp white, chinkapin, and bur oaks.[§]Includes cherrybark, northern red, and Shumard oaks.

Table 15. — *Volume of sawtimber on timberland by species and tree grade, Louisiana, 1991**

| Species | All grades | Grade 1 | Grade 2 | Grade 3 | Grade 4 | Grade 5 |
|--|---------------------------------------|----------|----------|----------|---------|---------|
| | <i>Million board feet[†]</i> | | | | | |
| Yellow pines | 38,312.3 | 6,893.0 | 6,789.9 | 24,001.1 | 0.0 | 628.3 |
| Cypress | 6,619.7 | 1,892.3 | 1,793.0 | 2,646.7 | 0.0 | 287.7 |
| Redcedar | 12.2 | 6.6 | 0.0 | 2.0 | 0.0 | 3.6 |
| Total softwoods | 44,944.2 | 8,791.9 | 8,582.9 | 26,649.8 | 0.0 | 919.6 |
| Select white and red oaks [‡] | 3,086.1 | 583.8 | 734.3 | 1,189.6 | 392.4 | 186.0 |
| Other white and red oaks | 9,560.4 | 1,125.8 | 1,668.0 | 4,021.7 | 2,071.9 | 673.0 |
| Hickories | 2,121.3 | 273.3 | 428.6 | 914.9 | 358.0 | 146.5 |
| Hard maples | 18.9 | 0.0 | 7.7 | 4.4 | 5.7 | 1.1 |
| Sweetgum | 5,300.7 | 731.8 | 1,314.5 | 2,324.9 | 514.0 | 415.5 |
| Tupelo and blackgum | 2,892.2 | 305.3 | 708.3 | 1,426.2 | 206.3 | 246.0 |
| Ash, walnut, and black cherry | 1,349.9 | 272.1 | 343.9 | 560.6 | 47.0 | 126.4 |
| Yellow-poplar | 263.5 | 45.8 | 43.9 | 129.6 | 29.2 | 15.1 |
| Other hardwoods | 5,988.6 | 612.9 | 792.4 | 2,861.4 | 981.6 | 740.4 |
| Total hardwoods | 30,581.4 | 3,950.8 | 6,041.5 | 13,433.2 | 4,605.9 | 2,549.9 |
| All species | 75,525.6 | 12,742.7 | 14,624.4 | 40,083.0 | 4,605.9 | 3,469.5 |

*Numbers in rows and columns may not sum to totals due to rounding.

[†]International 1/4-inch Rule.[‡]Includes white, swamp chestnut, swamp white, chinkapin, bur, cherrybark, northern red, and Shumard oaks.Table 16. — *Average net annual growth and average annual removals of growing stock on timberland, by species, Louisiana, 1984 to 1991**

| Species | Average net annual growth | Average annual removals |
|--|---------------------------|-------------------------|
| | <i>Million cubic feet</i> | |
| Yellow pines | 502.7 | 655.3 |
| Other softwoods | 23.8 | 6.7 |
| Total softwoods | 526.6 | 662.0 |
| Select white and red oaks [‡] | 35.2 | 25.2 |
| Other white and red oaks | 98.9 | 87.2 |
| Hickories | 13.6 | 14.8 |
| Hard maples | 0.4 | 0.1 |
| Sweetgum | 59.0 | 64.1 |
| Tupelo and blackgum | 14.4 | 13.4 |
| Ash, walnut and black cherry | 14.3 | 9.4 |
| Yellow-poplar | 3.7 | 1.6 |
| Other hardwoods | 68.5 | 47.4 |
| Total hardwoods | 308.1 | 263.7 |
| All species | 834.7 | 925.8 |

*Numbers in columns may not sum to totals due to rounding.

[‡]Includes white, swamp chestnut, swamp white, chinkapin, bur, cherrybark, northern red, and Shumard oaks.

Table 17. — *Average net annual growth and average annual removals of growing stock on timberland by ownership class and by softwoods and hardwoods, Louisiana, 1984 to 1991**

| Ownership class | Average net annual growth | | | Average annual removals | | |
|--------------------------------|---------------------------|----------|----------|-------------------------|----------|----------|
| | All species | Softwood | Hardwood | All species | Softwood | Hardwood |
| ----- Million cubic feet ----- | | | | | | |
| National forest | 27.3 | 21.0 | 6.3 | 28.6 | 25.1 | 3.4 |
| Other public | 32.4 | 11.8 | 20.6 | 14.5 | 9.1 | 5.7 |
| Forest industry | 280.0 | 210.2 | 69.7 | 347.6 | 263.6 | 83.8 |
| Farmer | 42.4 | 12.6 | 29.8 | 44.7 | 24.3 | 20.6 |
| Miscellaneous private | 452.6 | 270.9 | 181.7 | 490.3 | 339.8 | 150.3 |
| All ownerships | 834.7 | 526.6 | 308.1 | 925.8 | 662.0 | 263.7 |

*Numbers in rows and columns may not sum to totals due to rounding.

Table 18. — *Average net annual growth and average annual removals of sawtimber on timberland by species, Louisiana, 1984 to 1991**

| Species | Average net annual growth | Average annual removals |
|---|---------------------------|-------------------------|
| ----- Million board feet [†] ----- | | |
| Yellow pines | 2,437.2 | 2,899.6 |
| Cypress | 126.4 | 29.9 |
| Redcedar | 0.9 | 0.0 |
| Total softwoods | 2,564.4 | 2,929.5 |
| Select white and red oaks [‡] | 151.5 | 89.2 |
| Other white and red oaks | 408.0 | 304.7 |
| Hickories | 46.5 | 47.7 |
| Hard maples | -0.2 | 0.5 |
| Sweetgum | 203.1 | 160.5 |
| Tupelo and blackgum | 58.0 | 47.9 |
| Ash, walnut, and black cherry | 49.7 | 32.6 |
| Yellow-poplar | 18.1 | 6.7 |
| Other hardwoods | 231.8 | 172.6 |
| Total hardwoods | 1,166.5 | 862.4 |
| All species | 3,731.0 | 3,792.0 |

*Numbers in columns may not sum to totals due to rounding.

[†]International 1/4-inch Rule.

[‡]Includes white, swamp chestnut, swamp white, chinkapin, bur, cherrybark, northern red, and Shumard oaks.

Table 19. — *Average net annual growth and average annual removals of sawtimber on timberland by ownership class and by softwoods and hardwoods, Louisiana, 1984 to 1991**

| Ownership class | Average net annual growth | | | Average annual removals | | |
|---|---------------------------|----------|----------|-------------------------|----------|----------|
| | All species | Softwood | Hardwood | All species | Softwood | Hardwood |
| <i>----- Million board feet[†] -----</i> | | | | | | |
| National forest | 153.9 | 121.0 | 32.9 | 137.7 | 130.0 | 7.7 |
| Other public | 145.5 | 62.8 | 82.7 | 65.2 | 41.8 | 23.4 |
| Forest industry | 1,060.8 | 816.5 | 244.4 | 1,348.2 | 1,078.0 | 270.3 |
| Farmer | 197.1 | 80.0 | 117.1 | 201.5 | 119.2 | 82.3 |
| Miscellaneous private | 2,173.7 | 1,484.1 | 689.5 | 2,039.4 | 1,560.6 | 478.8 |
| All ownerships | 3,731.0 | 2,564.4 | 1,166.5 | 3,792.0 | 2,929.5 | 862.5 |

*Numbers in rows and columns may not sum to totals due to rounding.

[†]International 1/4-inch Rule.

Table 20. — *Average annual mortality of growing stock and sawtimber on timberland by species, Louisiana, 1984 to 1991**

| Species | Growing stock | Sawtimber |
|--|---------------------------|---------------------------------------|
| | <i>Million cubic feet</i> | <i>Million board feet[†]</i> |
| Yellow pines | 74.9 | 285.9 |
| Cypress | 2.7 | 11.7 |
| Redcedar | 0.1 | 0.0 |
| Total softwoods | 77.7 | 297.7 |
| Select white and red oaks [‡] | 2.4 | 8.9 |
| Other white and red oaks | 19.4 | 70.0 |
| Hickories | 5.4 | 15.6 |
| Sweetgum | 12.3 | 26.8 |
| Tupelo and blackgum | 9.9 | 28.5 |
| Ash, walnut, and black cherry | 5.0 | 5.7 |
| Yellow-poplar | 0.4 | 0.7 |
| Other hardwoods | 25.2 | 63.4 |
| Total hardwoods | 80.0 | 219.5 |
| All species | 157.6 | 517.2 |

*Numbers in columns may not sum to totals due to rounding.

[†]International 1/4-inch Rule.

[‡]Includes white, swamp chestnut, swamp white, chinkapin, bur, cherrybark, northern red, and Shumard oaks.

Table 21. — *Average annual mortality of growing stock and sawtimber on timberland by ownership class and by softwoods and hardwoods, Louisiana, 1984 to 1991**

| Ownership class | Growing stock | | | Sawtimber | | |
|-----------------------|--------------------------------|----------|----------|---|----------|----------|
| | All species | Softwood | Hardwood | All species | Softwood | Hardwood |
| | ----- Million cubic feet ----- | | | ----- Million board feet [†] ----- | | |
| National forest | 5.8 | 4.2 | 1.6 | 19.8 | 17.3 | 2.5 |
| Other public | 10.2 | 2.2 | 8.1 | 32.6 | 9.5 | 23.1 |
| Forest industry | 38.6 | 23.5 | 15.1 | 141.8 | 95.1 | 46.7 |
| Farmer | 13.9 | 6.5 | 7.4 | 49.2 | 26.7 | 22.6 |
| Miscellaneous private | 89.2 | 41.3 | 47.9 | 273.6 | 149.1 | 124.5 |
| All ownerships | 157.6 | 77.7 | 80.0 | 517.2 | 297.7 | 219.5 |

*Numbers in rows and columns may not sum to totals due to rounding.

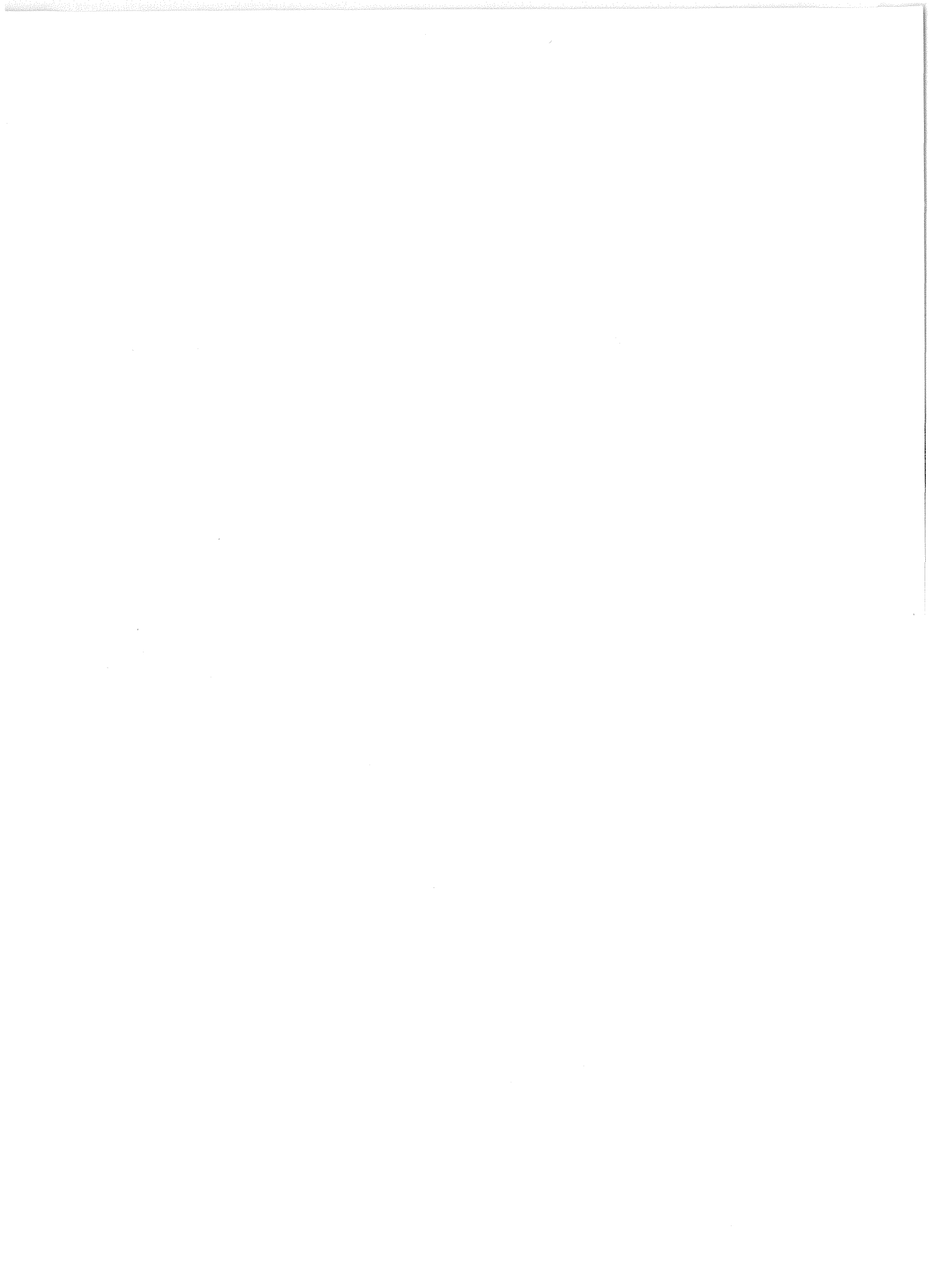
[†]International 1/4-inch Rule.

Table 22. — *Average annual mortality of growing stock and sawtimber on timberland by cause of death and by softwoods and hardwoods, Louisiana, 1984 to 1991**

| Cause of death | Growing stock | | | Sawtimber | | |
|----------------|--------------------------------|----------|----------|---|----------|----------|
| | All species | Softwood | Hardwood | All species | Softwood | Hardwood |
| | ----- Million cubic feet ----- | | | ----- Million board feet [†] ----- | | |
| Bark beetles | 17.4 | 17.4 | 0.0 | 79.2 | 79.2 | 0.0 |
| Other insects | 0.9 | 0.9 | 0.0 | 2.5 | 2.5 | 0.0 |
| Disease | 117.7 | 52.7 | 65.1 | 369.0 | 195.7 | 173.3 |
| Fire | 0.4 | 0.2 | 0.2 | 0.0 | 0.0 | 0.0 |
| Beaver | 1.6 | 0.0 | 1.6 | 3.4 | 0.0 | 3.4 |
| Weather | 14.6 | 4.5 | 10.1 | 49.9 | 17.3 | 32.6 |
| Suppression | 2.0 | 1.1 | 0.9 | 0.7 | 0.0 | 0.7 |
| Other | 3.0 | 0.9 | 2.2 | 12.5 | 3.0 | 9.5 |
| All causes | 157.6 | 77.7 | 80.0 | 517.2 | 297.7 | 219.5 |

*Numbers in rows and columns may not sum to totals due to rounding.

[†]International 1/4-inch Rule.



Rosson, James F., Jr. 1995 Forest resources of Louisiana, 1991. Resour. Bull. SO-192. New Orleans, LA: U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station. 71 p.

The principal findings of the sixth forest survey of Louisiana (1991) and changes that have occurred since the previous survey are presented. Topics examined include forest area, ownership, forest type group, stand structure, basal area, timber volume, growth, removals, mortality, harvesting, management activity, and timber products output.

Keywords: Forest inventory, forest productivity, forest survey, large-scale sample, plantation, species distribution.

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