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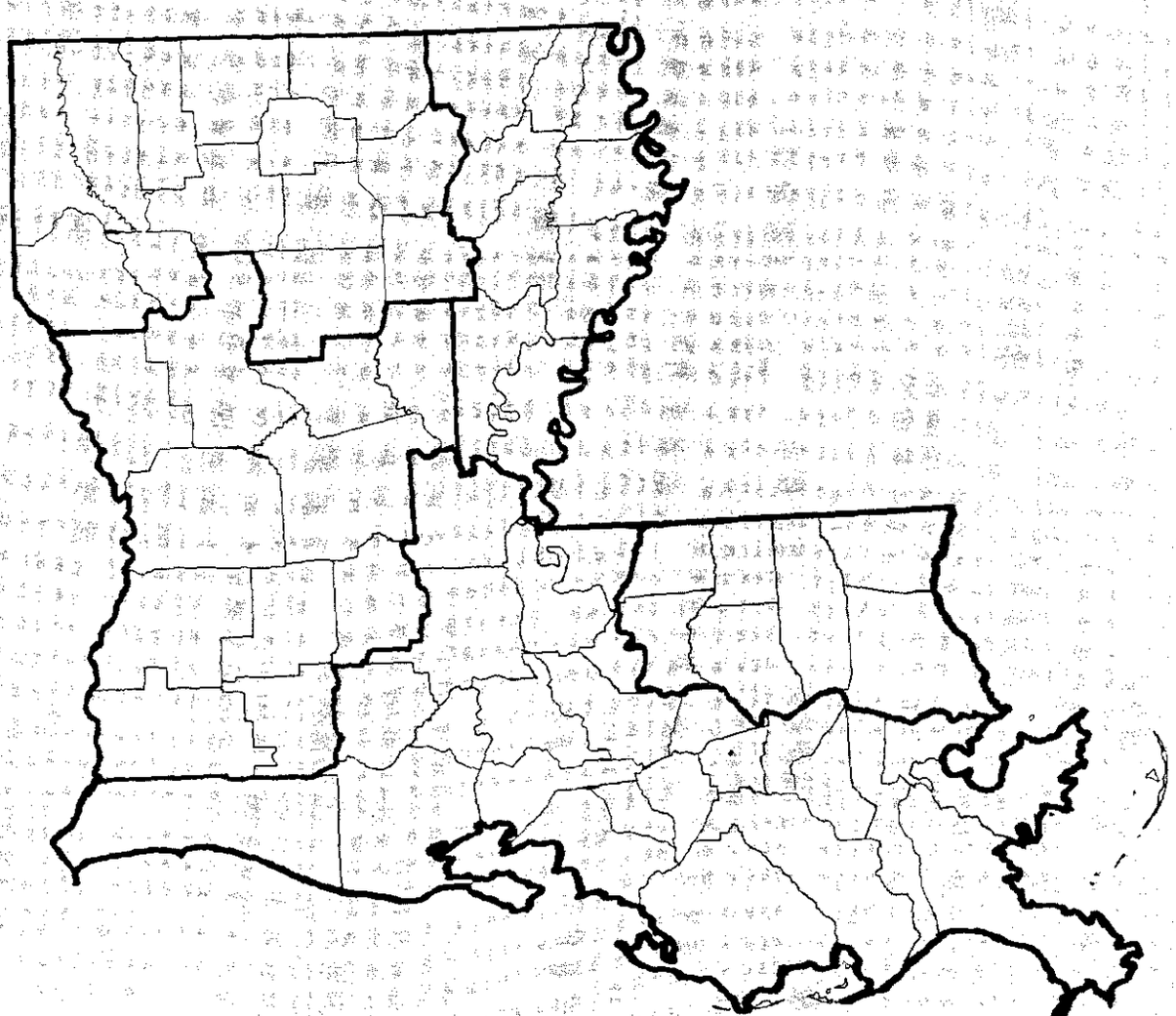
Forest Resources of Louisiana

James F. Rosson, Jr., William H. McWilliams, Paul D. Frey



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HIGHLIGHTS

This report documents the findings of the fifth forest survey of Louisiana. Trend data on the forest resource are presented along with appropriate tables and figures. The Appendix contains definitions of terms, a discussion of data reliability, a tree species list, and 22 standard statistical tables. Data are reported for January 1, 1984. Major highlights are listed below. Comparisons, unless otherwise noted are made between surveys conducted and dated January 1, 1974, and January 1, 1984.

- Total timberland has declined by 654,000 acres since 1974. Most of this acreage loss was in the North Delta and South Delta survey units. Louisiana currently has 13,872,600 acres of timberland.
- Most of the acreage declines are nonindustrial private timberland (804,400 acres). Forest industry timberland also declined, but only slightly. Public timberland increased, principally through State acquisition of bottomland areas. Currently in Louisiana, 64 percent of timberland is owned by nonindustrial private landowners, 26 percent by forest industry, and 10 percent by public agencies.
- The predominant forest type is oak-gum-cypress (4,377,600 acres) followed closely by loblolly-shortleaf (4,033,200 acres). The oak-gum-cypress forest type experienced a 579,000 acre decline. No significant change occurred in the loblolly-shortleaf forest type. The longleaf-slash forest type acreage declined 9 percent.
- Most of Louisiana's timberland is occupied by sawtimber stands (8,178,900 acres). Acreage of poletimber and, sapling and seeding stands declined significantly (a 1,076,200-acre drop). More than 449,000 acres are in a nonstocked condition.
- Total growing-stock volume is 18,992 million cubic feet, a 14 percent increase. Fifty-six percent of the volume is in softwoods. Total sawtimber volume is 70,735 million board feet, a 16 percent increase. Sixty-four percent of the volume is in softwoods.
- Softwood growing-stock volume is 10,552 million cubic feet, a 17 percent increase. Sawtimber volume is 45,445 million board feet, a 23 percent increase.
- Hardwood growing-stock volume is 8,440 million cubic feet, a 10 percent increase. Sawtimber volume is 25,290 million board feet, a 6 percent increase.
- Cull volume has increased by 23 percent and currently stands at 3,031 million cubic feet. Of cull volume 87 percent is in hardwood trees.
- Loblolly pine is the most dominant tree in the State, comprising 62 percent of the softwood growing-stock volume and 35 percent of total growing-stock volume. Baldcypress, shortleaf pine, slash pine, and longleaf pine follow, making up 14, 11, 7, and 4 percent, respectively, of softwood growing-stock volume.
- Oaks are dominant among hardwood species, comprising 36 percent of hardwood growing-stock volume. Other major constituents are sweetgum, tupelos, hickories, ashes, and willows at 19, 14, 6, 5, and 4 percent, respectively, of hardwood growing-stock volume.
- More trees are in larger sizes. The number of trees and growing-stock volumes have increased in every diameter class above 8 inches.
- Optimally stocked timberland is currently 5,850,000 acres, a 1,422,500 acre decline. Overstocked and understocked acreage is currently 3,964,100 and 4,058,500 acres, respectively. Understocked acreage has increased by 777,200 acres.
- Gross growth for softwood growing stock is 43.2 cubic feet per acre per year, down slightly. Hardwood growing-stock gross growth is 26.5 cubic feet per acre per year, also down slightly.

James F. Rosson, Jr. and William H. McWilliams are research foresters, USDA Forest Service, Southern Forest Experiment Station, Starksville, MS; Paul D. Frey is Chief of Forest Management, Louisiana Department of Agriculture and Forestry, Baton Rouge, LA.

- Net growth of softwood growing-stock is 39.3 cubic feet per acre per year, down 6 percent. Hardwood growing-stock net growth is 21.2 cubic feet per acre per year, down 5 percent.
- Net change of softwood growing stock is +8.2 cubic feet per acre per year, down 27 percent from the 1974 rate. Hardwood growing-stock net change is +8.3 cubic feet per year, also down 27 percent.
- Gross growth of softwood sawtimber is 205.4 board feet per acre per year, a 7 percent increase. Hardwood sawtimber gross growth is 93.6 board feet per acre per year, down slightly.
- Net growth of softwood sawtimber is 193.0 board feet per acre per year, a 6 percent increase. Hardwood sawtimber net growth is 78.6 board feet per acre per year, down slightly.
- Net change of softwood sawtimber is +55.8 board feet per acre, up 56 percent from the 1974 rate. Hardwood sawtimber net change is +38.9 board feet per acre, a 37 percent increase.
- Removals of softwood growing stock total 432 million cubic feet per year. Hardwood growing-stock removals are 178 million cubic feet per year.
- Removals of softwood sawtimber total 1,904 million board feet per year. Hardwood sawtimber removals are 550 million board feet per year.
- Mortality of softwood growing stock is 55 million cubic feet per year, a 38 percent increase. Mortality of hardwood growing stock is 74 million cubic feet per year, a 7 percent increase.

INTRODUCTION

This report summarizes the findings of the fifth Louisiana forest survey by the Forest Inventory and Analysis Work Unit (FIA) of the Southern Forest Experiment Station. Previous surveys were conducted in 1936 (Winters et al. 1943), 1954 (U.S. Department of Agriculture 1955), 1964 (Sternitzke 1965), and 1974 (Murphy 1975).

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 data compilation and field work because unit boundaries are correlated fairly closely with physiographic and vegetative regions of the State.

Field work began on February 28, 1983, and ended on February 4, 1985. In all, 4,471 sample plots, systematically distributed throughout the State on a three-mile square grid, were visited by field crews. A total of 2,365 of these plots were forested and had tree measurements taken. Another 2,200 plots interspersed in the three-mile grid were ground-checked as to forest or nonforest condition. These ground checks enhanced the statistical reliability of the timberland area estimate.

Field personnel measured 50,917 trees, which included 75 commercial tree species, 17 noncommercial tree species, and several miscellaneous noncommercial tree species. The miscellaneous species occur infrequently and were lumped into one category. There were 25 plot description variables, 31 tree measurement variables, and 21 nontimber variables assessed on the sample plots by field crews.

Individual unit reports were published prior to this report and may be consulted for more detailed regional statistics (Rosson and Bertelson 1985, Rosson and Bertelson 1986a, Rosson and Bertelson 1986b, Rosson and Bertelson 1986c, Rosson and Bertelson 1986d). In addition, parish statistics for the entire State have also been published (May and Bertelson 1986). A forthcoming publication will address the other forest resources of Louisiana.

The Forest Service was mandated by law (McSweeney-McNary Act of 1928) to conduct periodic assessments of the Nation's forest resources. Recently, the assessment emphasis was expanded and broadened by the Renewable Resources Planning Act of 1974, the National Forest Management Act of 1976, and the Forest and Rangeland Renewable Resources Research Act of 1978 (this last act effectively cancels the 1928 McSweeney-McNary Act). These acts ensure the availability of adequate data to determine ways of balancing the demand and supply factor for forestland resources, benefits, and uses that the American people need.

HISTORY

The area of what is now the State of Louisiana came into possession of the United States in 1803 as a part of the Louisiana Purchase. In 1810 the federal government opened the southern states' lands, including Louisiana, to public sales. Because of the remoteness of Louisiana and vastness of the timber resource, only local residents acquired sizeable amounts of land. These people remained on or acquired only cleared land because it was extremely difficult both physically and financially to bring forested land under cultivation. In the early part of the 19th century small mills only nibbled at the edge of Louisiana's timber resource—mostly for local use.

The 1850's brought a substantial increase in southern lumbering operations, and with it came more and more outside buyers of timberland. In 1866, the Southern Homestead Law was passed, its purpose being to restrict entry of outsiders and to favor local set-

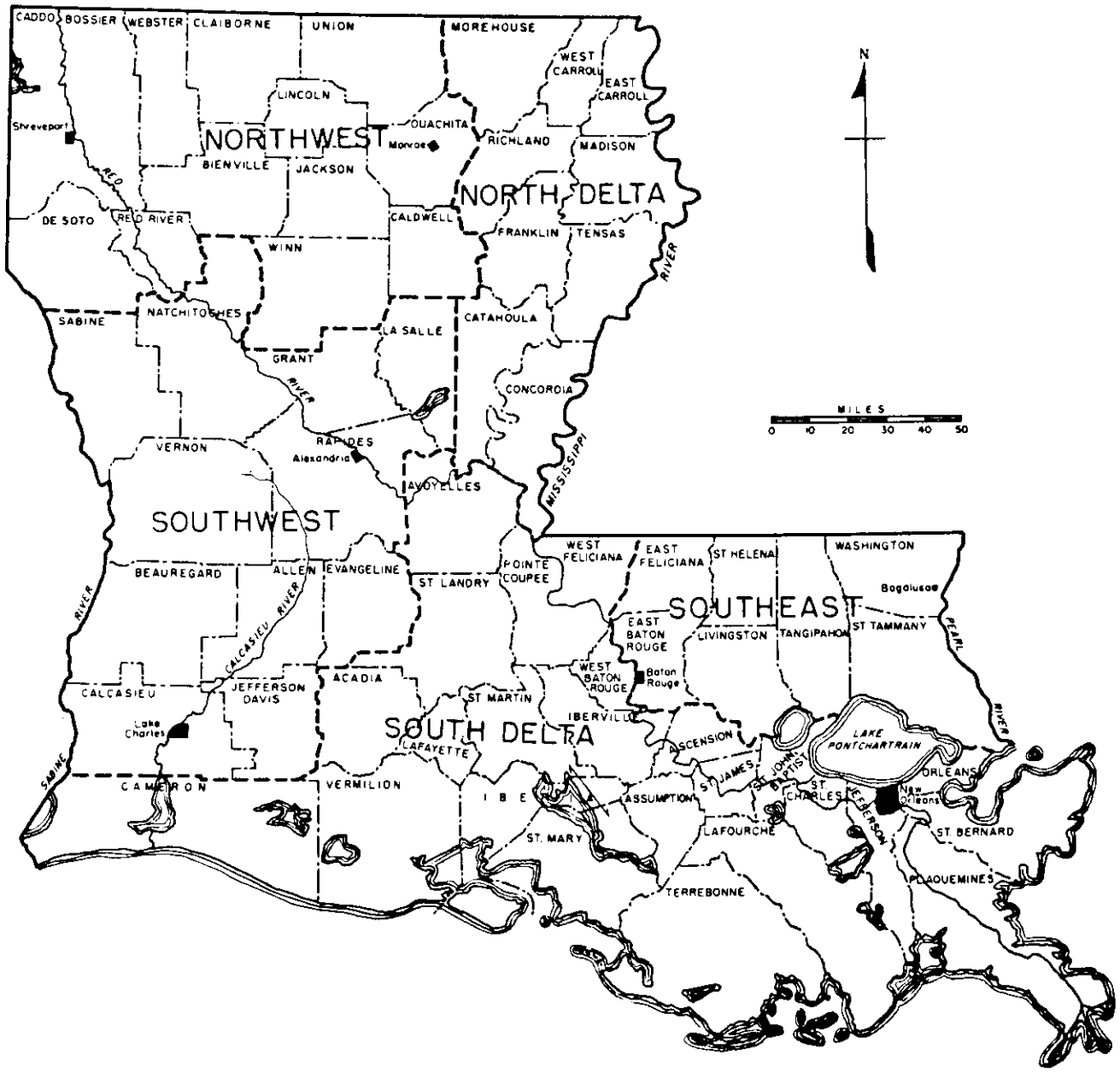

Figure 1.—*The forest survey units in Louisiana.*

tlers. Lumber demand continued to increase and timber speculators were beginning to turn more and more of their attention to the forest resource in the South. After bitter congressional fighting, the Homestead Law was revised in 1876 and this, in effect, opened the door to the southern timberlands to many timber buyers. Millions of acres of virgin timberland were bought for $1.25 an acre. In Louisiana, northern purchasers bought well over 1 million acres between 1800 and 1888. With fears raised that timber monopolies would own the South, Congress passed another law in 1889 which again restricted homesteading to local people. Meanwhile, a substantial title to the major resource of Louisiana had transferred to absentee mill owners (Clark 1984, Cowdrey 1983).

As the Nation's northeastern and northcentral forests were being rapidly depleted, the center of the lumbering industry shifted to the South. In Louisiana, the era of heaviest cutting occurred between 1880 and 1937. During that 57-year period, more than 120 billion board feet of lumber was produced. In 1880, Louisiana ranked 13th in lumber production but by 1914 led the nation with an annual cut of 4 billion board feet.

The pace of cutting in Louisiana at the turn of the century was frantic. The focus was to haul logs from the forest and deliver lumber to purchasers anywhere they could be found. No thought was given to future forest resources. The removal of vast virgin stands of timber could have led to the total collapse of the resource had it not been for the inspiration and ingenuity of Henry Hardtner of Urania, Louisiana (Clark 1984). Hardtner was a timberman and mill operator who knew that the disastrous rate of depletion would close the lumbering industry permanently in just a few years. He pioneered efforts in establishing a saw dimensional scale to guide his loggers; he ordered 3 or 4 seed trees left on each acre logged; he demanded more careful logging procedures; and he protected stands from wild hogs and fire.

Historically, Hardtner's greatest accomplishment occurred when he was a Senator in the Louisiana General Assembly where, along with many other legislative initiatives, he promoted the 1912 tax-deferral law. That action provided that forestland devoted to reforestation would be assessed at a fixed annual rate for 20 years. As the timber was cut, the owner was assessed at an established severance tax rate.

By 1924, Hardtner's mill at Urania was sawing second-growth fixed-assessment timber. But more important, many other landowners were beginning to consider such management practices. Still, despite Hardtner's efforts, many large lumber companies still vacated vast expanses of forestland after cutting. By 1936, Louisiana's inventory had been reduced to 41 billion board feet.

In the mid-1920's, the forest industry in Louisiana was experiencing a serious downturn. Saw logs were being quickly depleted and there was no certainty of a profitable second forest ever being grown for sawtimber products. It had been predicted that the virgin forests would be cut and gone by 1940, but by 1930 the onset of the Great Depression substantially reduced the demand for timber. The wooden ship building era had passed; automobile manufacturers no longer used wood for wheels, bodies, and trim; the wagon and carriage industries were closed; the huge initial demand for railroad ties, telegraph, and light poles had been met.

By 1930, despite the downturn in demand, the South and Louisiana were left with a cut-over forest of varying dimension but dominated by smaller sized trees. For the forest industry to survive, it had to utilize this smaller sized resource. The kraft and sulphite paper processes had been developed and were in use but many thought that shopping and grocery bags, cardboard boxes, etc. would not support a full-fledged industry alone. The first kraft plant in Louisiana, at Bogalusa, began operation in 1918 but used only a small portion of the resource. Research, meanwhile, had developed a process to neutralize and bleach the resin in southern pines and in 1940 the first plant to run newsprint in commercial quantity was started in Lufkin, Texas (Clark 1984). Other mills came on line across the South and by 1953 pulpwood production accounted for 50 percent of total softwood output in Louisiana. The 1950's also brought the beginning of the clearing of bottomland hardwoods in the Mississippi River Delta, but despite this, Louisiana still had more hardwood volume than any other State.

During the 1960's Louisiana continued to increase its pulp and paper capacity but lost its position as the no. 1 hardwood State. Meanwhile, seven plywood plants had been planned or were under construction in 1964.

In the 1970's, Louisiana was the leading softwood plywood producer in the Midsouth. Increasing inventories of second and third growth pine had attracted 13 veneer mills to the State.

Today in Louisiana, forest industry is second behind the petrochemical industry in employment. Despite a continued shrinking of the resource land base, inventory volumes are increasing and it appears that the balance between growth and drain is still on the positive side.

FOREST AREA

The total land base for Louisiana is 28,493,700 acres. Of this, 14,611,000 acres are classified as agriculture, urban, residential, highways and other rights-of-way, and small wooded lots of strips too small

or narrow to meet forest survey definitions. The remaining 13,882,700 acres are forested, with 10,100 of these acres classed in productive-reserved status. Productive-reserved forestlands occur in Claiborne, Natchitoches, Rapides, Webster, and Winn parishes. This leaves 13,872,600 acres of Louisiana land classed as timberland (see definitions in Appendix).

The current timberland estimate is 654,000 acres less than that reported in 1974. Since the first survey in 1936, Louisiana has lost 2,283,300 acres of timberland. All but one of the forest survey units show a loss of timberland since the first survey. The exception is the Northwest unit (table I). That unit's acreage has increased every survey period except the 1984 and 1974 surveys in which 50,500 and 233,700 timberland acres, respectively, were diverted.

Of the 2,283,300 acres of timberland lost since 1936, 2,136,700 acres were in the North Delta and South Delta units alone. This is 94 percent of all timberland acreage losses in the State since the first survey. The Northwest unit helped offset total lost acreage by gaining 1,027,800 acres between 1936 and 1964, primarily by reversion of agricultural land to timberland.

Since the 1974 survey, every unit has lost timberland. The losses range from a high of 264,900 acres in the North Delta to 35,100 acres in the Southeast unit. Although timberland acreage losses are reported in every unit, land use does shift both ways. While some nonforest land is reverting back to timberland, some timberland is diverting to nonforest use. During the survey period between 1974 and 1984, Louisiana lost more timberland than it gained (table II). A total of 1,219,200 acres were diverted, 660,900 to agricultural use. The other 558,300 acres were diverted to more permanent nonforest uses such as urban and municipal areas, rights-of-way, etc., areas not easily or likely to be reclaimed as timberland any time in the foreseeable future. Of the 565,300 reverting acres, 431,500 were from abandoned agriculture land and most of the remaining 133,800 acres were from abandoned rural home-places.

At the parish level, three parishes each gained more than 20,000 acres of timberland (fig. 2). Conversely, 13 parishes each lost more than 20,000 acres of timberland. As noted previously, the majority of gains were in the Northwest unit and the losses in the Delta units.

Table I.—*Timberland area, Louisiana, 1937-1984*[1]

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

[1] Rows and columns may not sum due to rounding.

Table II.—*Changes in timberland by forest survey units, Louisiana, 1974-1984*[1]

Forest survey units	Total land[2]	Timberland	Change	Additions from:			Diversions to:		
				Total	Agriculture	Other[3]	Total	Agriculture	Other[3]
	Thousand acres								
North Delta	3,515.5	913.5	−264.5	52.7	42.2	10.5	317.6	284.8	32.9
South Delta	9,629.4	2,391.3	−181.8	166.3	83.2	83.2	348.1	152.8	195.3
Southwest	6,665.4	4,416.8	−121.6	72.2	72.2	0.0	193.8	96.5	97.3
Southeast	2,762.7	1,751.2	−35.1	100.3	73.5	26.7	135.4	43.3	92.1
Northwest	5,920.7	4,399.9	−50.5	173.8	160.4	13.4	224.3	83.4	140.8
All units	28,493.7	13,872.7	−653.9	565.3	431.5	133.8	1,219.2	660.9	558.3

[1] Rows and columns may not sum due to rounding.
[2] United States Department of Commerce, Bureau of the Census, 1980.
[3] Includes urban, industrial, highway, noncommercial forest, water, rights of way, and other land uses.

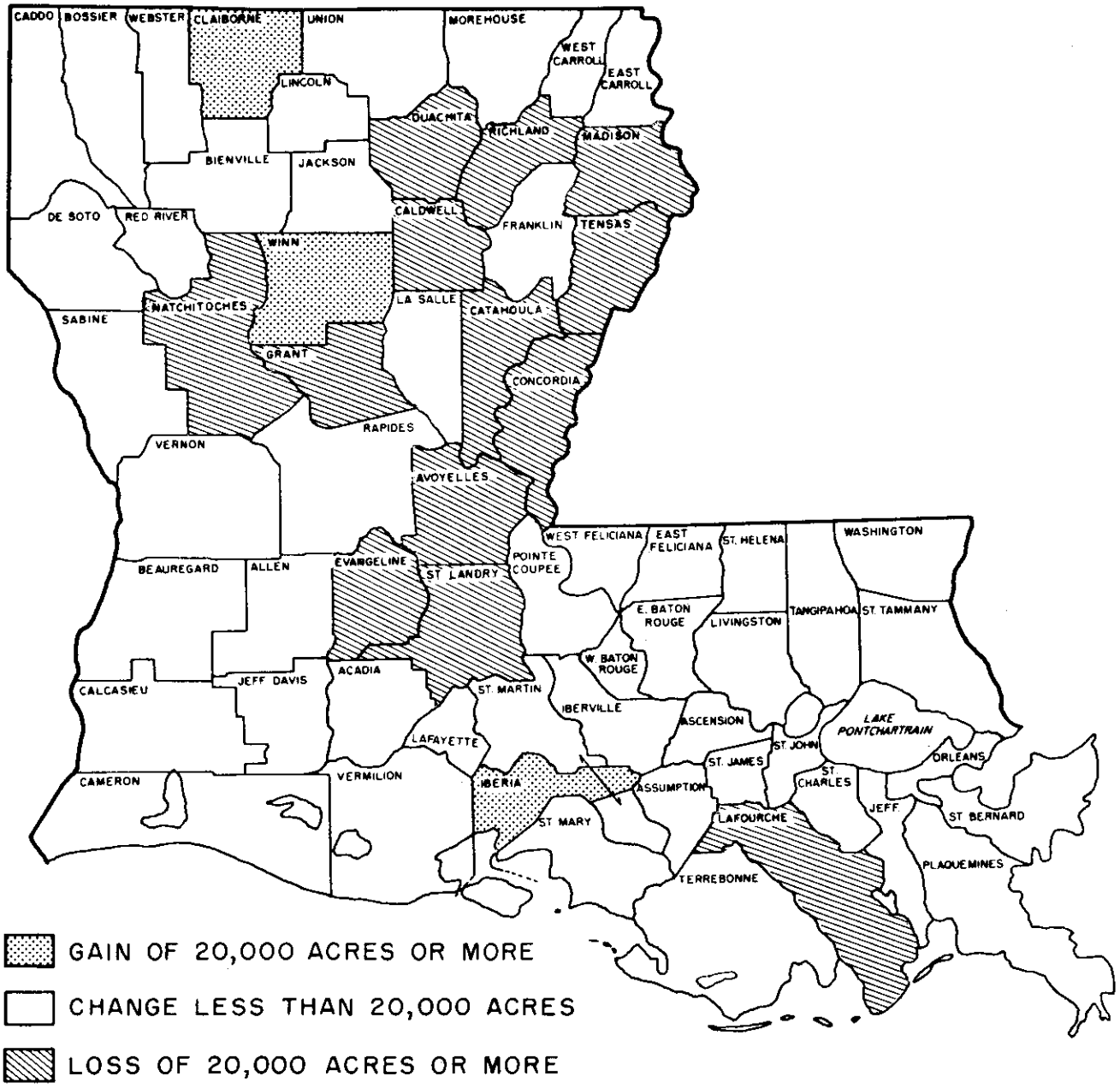

Figure 2.—*Louisiana parishes with gains and losses in timberland from 1974 to 1984.*

The survey period between 1964 and 1974 was the era when land clearing of bottomland hardwoods in the Mississippi Delta was peaking. During that period, 716,400 acres of timberland were cleared in the North Delta unit and 177,800 acres were cleared in the South Delta unit. Although the 1984 survey shows another 264,900 acres cleared in the North Delta and 181,800 acres in the South Delta, most of this acreage was cleared between 1975 and 1977 and does not reflect a current ongoing phenomenon. Much of the timberland remaining in the Mississippi Delta today is either batture land or is land that does not drain well or would be of short-term significance edaphically for agriculture productivity.

Hopefully, bottomland clearing has ebbed and Louisiana's Delta units have stabilized in timberland area. Perhaps marginal agriculture land will revert back to forest in the future. Regardless, Louisiana will still lose small amounts of timberland to urban expansion, rights-of-way, and agriculture.

Louisiana parishes vary considerably in extent of forest coverage. A total of 14 parishes have less than 20 percent of their land area in timberland (fig. 3). Three of these are in the North Delta unit, the remainder along the width of the southern coastline. Conversely, 8 parishes are more than 80 percent forested. The most concentrated regions of timberland are in the western and northcentral portions of the State.

OWNERSHIP

Forest Survey reports ownership information in five major categories: National Forests, public (including timberland under public stewardship other than National Forests), forest industry, farmer, and nonindustrial private. See the Appendix for definitions of these categories. For discussion purposes and except where noted, farm owners will be grouped with the nonindustrial private owners; National Forests and other public timberland will be classed together; and forest industry timberland will stand alone.

Currently in Louisiana, 8,938,700 acres of timberland are in nonindustrial private ownership (this includes 666,800 acres that are leased to forest industry). Nonindustrial private timberland is 64 percent of all timberland in the State (fig. 4). Forest industry follows with 3,603,100 acres, 26 percent of the State's timberland. Public ownership of timberland is only 10 percent of State acreage — 1,330,700 acres. National Forest lands are almost one-half of all public lands, 620,900 acres. Note that forest survey reports National Forest acreage as a statistical estimate and not as enumeration data that is published by the USDA Forest Service. Using the statistical estimate ensures consistency and compatability of all Forest Inventory and Analysis data.

Deviation from average Statewide numbers, for the various ownerships, can be seen when looking at individual survey units. For instance, in the South Delta, 88 percent of timberland is nonindustrial private and 6 percent is forest industry. In contrast, 54 percent is private and 31 percent is forest industry in the Southwest unit (fig. 4).

Several parishes stand out in ownership patterns. Currently three parishes in Louisiana have more than 60 percent of their timberland in forest industry ownership—St. Helena in the Southeast unit, LaSalle in the Southwest unit, and East Carroll in the North Delta unit (fig. 5). Many parishes have more than 81 percent of their timberland in nonindustrial private ownership. The majority of these are in the South Delta unit and the Northwest unit (fig. 6).

Since the 1974 survey there have been some moderate changes in ownership acreage. Public ownership has increased by 308,700 acres, a 30 percent increase (table III). Most of this increase occurred in the North Delta and Northwest units (101,400 acres and 105,600 acres, respectively), but the South Delta also had an increase of 61,000 acres. Acquisition of bottomland acreage by the State is the reason for most of this increase in public ownership.

Forest industry holdings decreased 4 percent since the 1974 survey, a 158,300-acre decline. Only the Southeast and Northwest units had increases in timberland; all other units showed a decline. Forest industry holdings dropped 170,800 acres in the North and South Delta units alone. Most of this acreage went into public ownership or was diverted to agriculture or other land uses.

Statewide, nonindustrial private timberland ownership declined 8 percent, 804,400 acres. The North Delta and South Delta units accounted for 438,300 acres of this decline. The Southwest and Northwest units also had significant declines in nonindustrial private timberland holdings, 142,700 and 170,500 acres, respectively. Much of this private timberland was sold to public agencies and forest industy or was diverted to agriculture or other land uses.

FOREST TYPE

FIA assigns forest type based on dominant and codominant trees. These are also the trees most likely to be disturbed or removed from a stand either naturally or through cutting. Therefore, forest type classification is sensitive to disturbances of dominant and codominat trees on sample plots.

There are four primary reasons for shifts in forest type acreage. First, selective cutting of pine, without ensuring adequate pine regeneration, will result in a shift of pine forest types toward the hardwood types. Second, diversion of timberland acreage in a single type

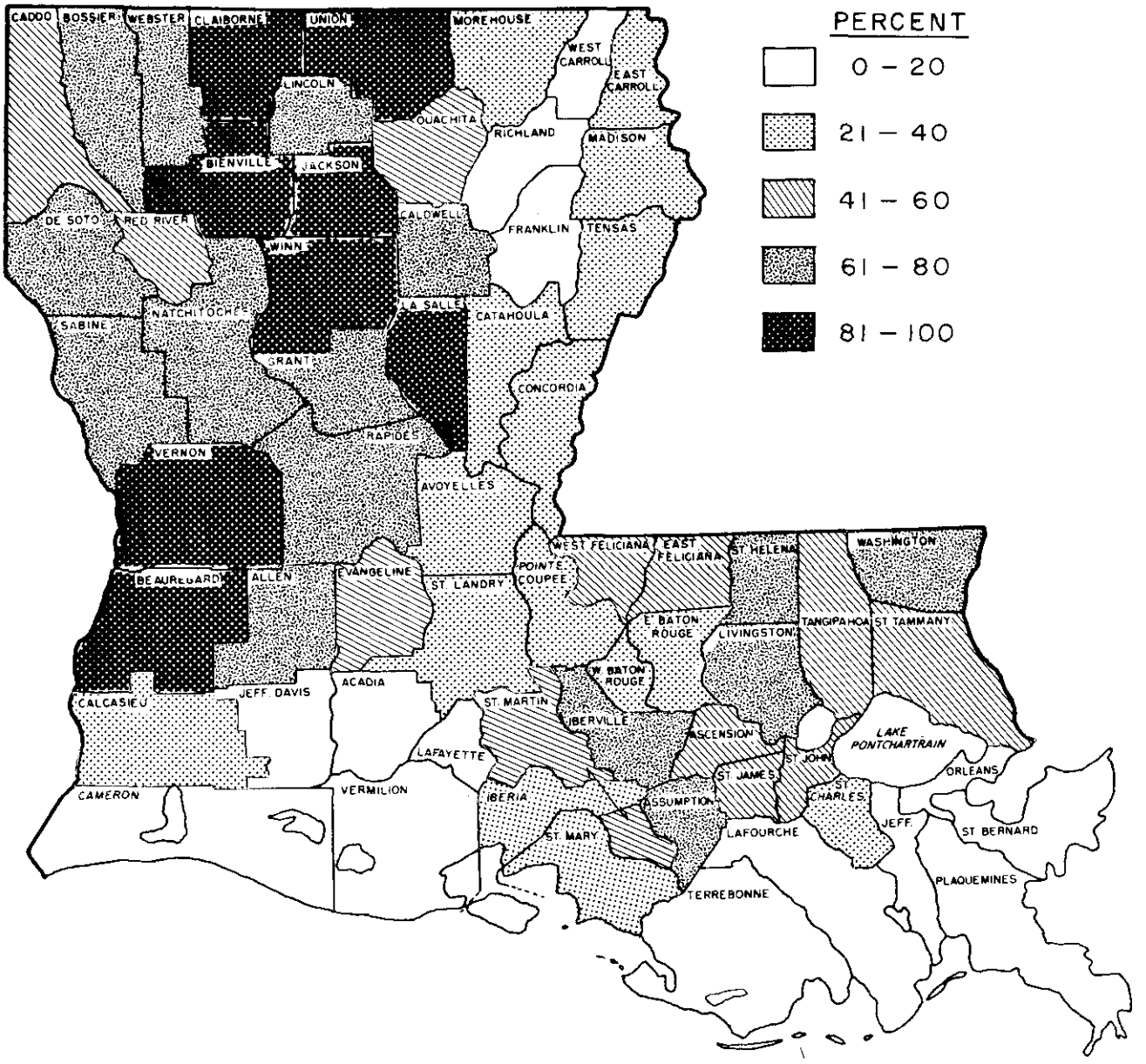

Figure 3.—*Percent timberland area in Louisiana parishes, 1984.*

will undoubtedly show a decline; so, loss of timberland area must be considered when portraying forest type shifts. Third, fire can shift types toward pine while fire suppression can shift types toward hardwood, especially in younger stands. Fourth, since forest typing is an artificial classification system, forest types are not totally separate and discrete entities. Rather, they merge and flow into each other, sometimes with considerable overlap, forming, in essence, a continuum. Since type categories are defined by discrete boundaries, a slight shift of species dominance across these arbitrary thresholds may give a false impression of dramatic changes in forest type acreage.

The most frequently occurring forest type in Louisiana is still oak-gum-cypress, even though the type has declined by 579,000 acres, 12 percent, since the 1974 survey (table IV). Thirty-two percent of the State's timberland acreage (4,377,600 acres) is in this type, it being most prevalent in the North Delta, South Delta, and Southeast units (fig. 7). Most of the oak-gum-cypress type decline occurred in the North Delta unit. There, 307,200 acres were lost primarily due to conversion to agricultural use. This conversion trend has slowed in the lower Mississippi River Valley (Rudis and Birdsey 1986).

The loblolly-shortleaf forest type occurs on 29 percent of Louisiana's timberland and is most common in the Northwest and Southwest units where 1,789,900 and 1,530,900 acres are occupied, respectively (table IV). Eighty-two percent of the State's loblolly-shortleaf

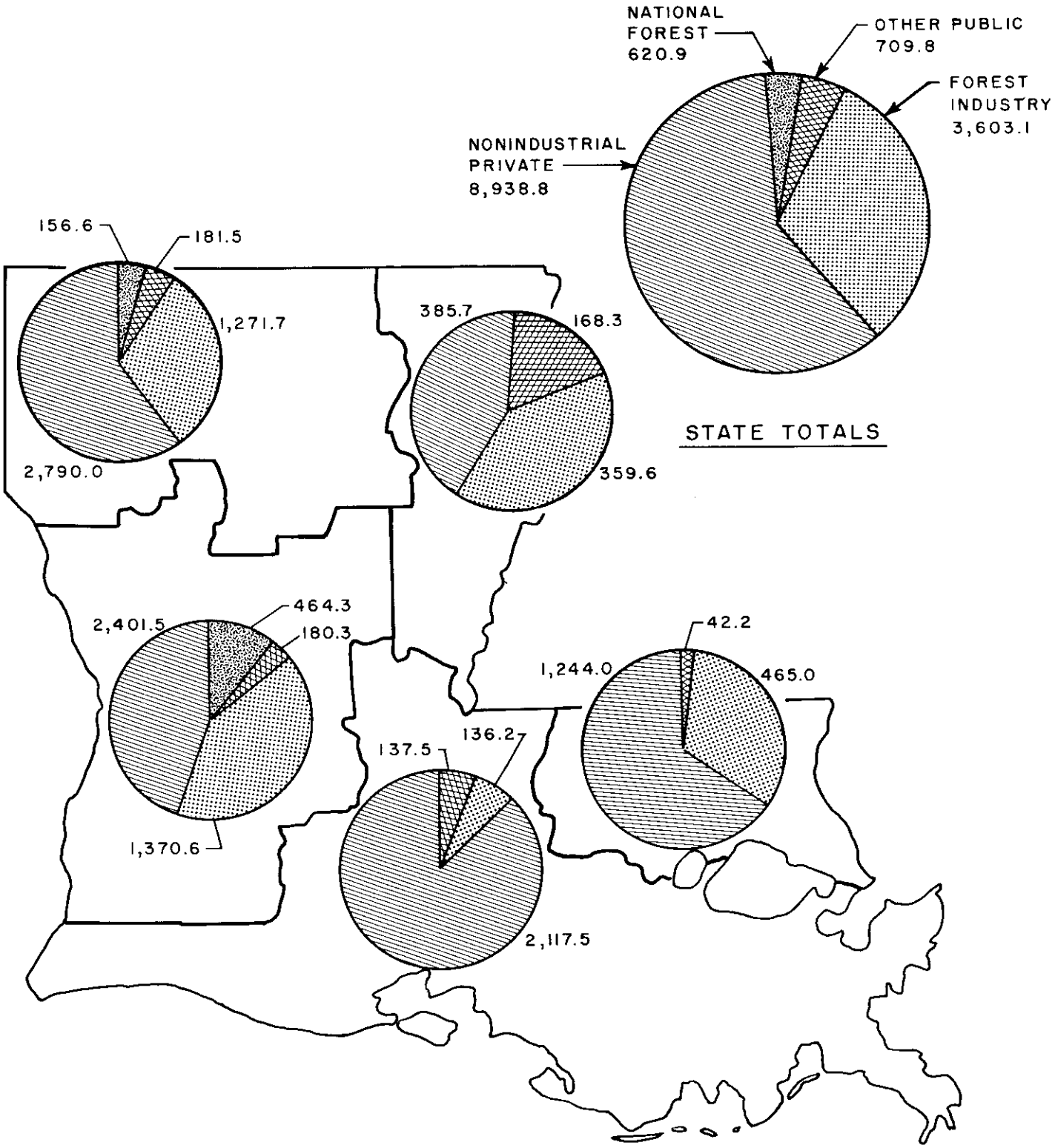

Figure 4.—*Proportion of timberland in thousand acres by ownership, Louisiana, 1984.*

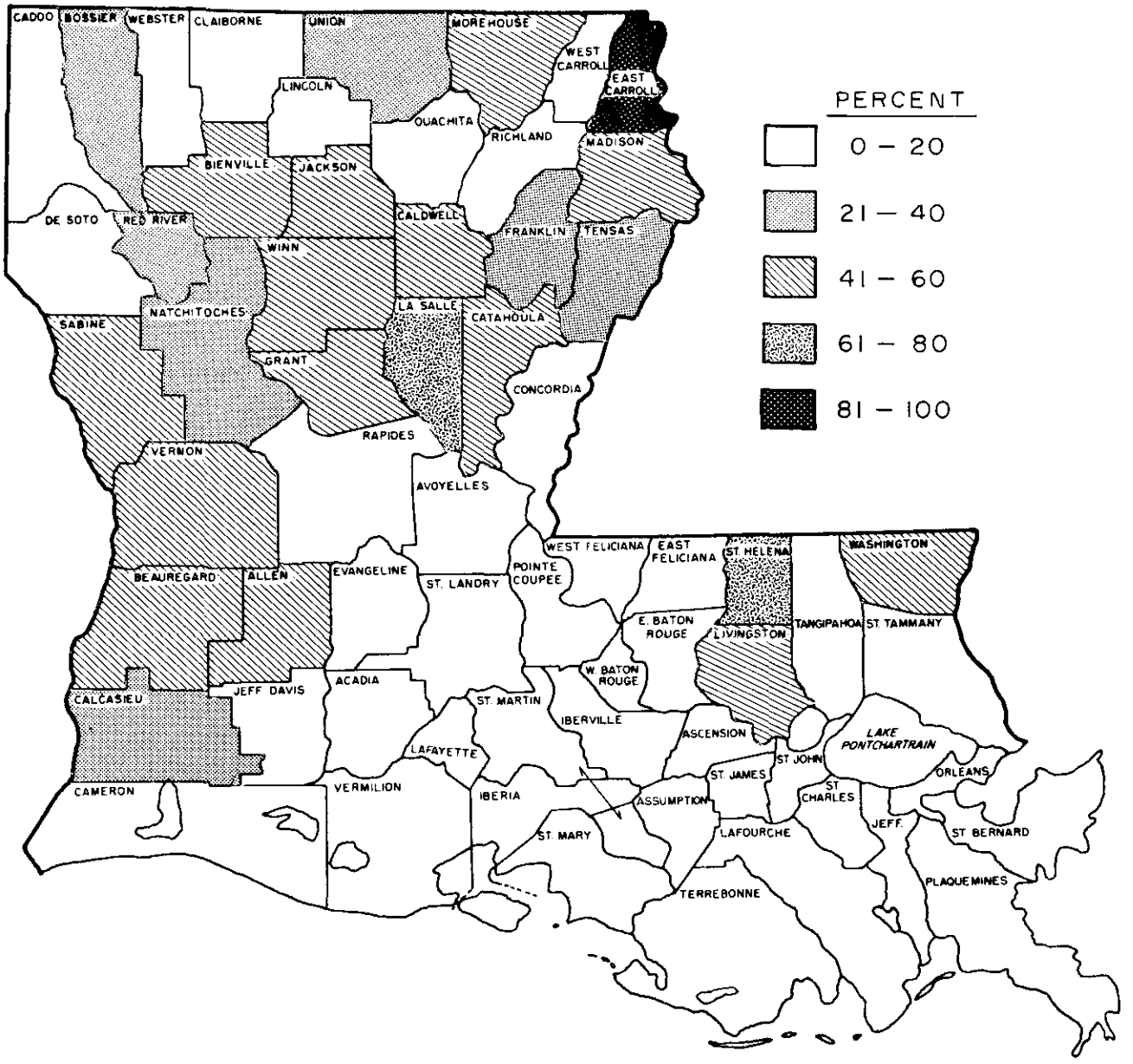

Figure 5.—*Percent timberland held by forest industries, Louisiana, 1984.*

type is in these two units. Currently, 4,033,200 acres of this type exist in the State and since the 1974 survey only a 1 percent decline in acreage has occurred.

Currently, there are 933,200 acres of the longleaf-slash forest type, an 89,400-acre drop since 1974. The Southwest unit has 84 percent of the State's longleaf-slash type followed by the Southeast unit with 14 percent. As older longleaf stands are cut, many are being replaced with loblolly stands, especially on sites which are marginal (heavier soils) for longleaf pine and slash pine. Between 1974 and 1984, approximately 150,000 acres of the longleaf-slash forest type were clearcut; approximately 30,000 of these acres were converted to loblolly pine.

A decline of the oak-pine forest type is linked to an increase in the oak-hickory forest type mostly because of selective cutting of pine on private land without subsequent regeneration practices to replace pine. This results in a shift to the oak-hickory type acreage. Statewide, the oak-pine type decreased 294,300 acres and the oak-hickory type increased 445,200 acres. The oak-pine decrease occurred in the Southwest and Northwest units. Here, 319,400 acres dropped out of the type while the North Delta, South Delta, and Southeast units increased in oak-pine acreage slightly—37,200 acres.

Across Louisiana, each unit except the South Delta increased its oak-hickory forest type acreage. The

Table III.—*Area of timberland by ownership, forest survey units, and percent change, Louisiana, 1974-1984*[1]

Forest survey units	All owners	Public	Change	Forest industry[2]	Change	Nonindustrial private	Change
			Thousand acres				
North Delta	913.5	168.3	+152	359.6	−20	385.7	−42
South Delta	2,391.3	137.5	+80	136.2	−38	2,117.5	−7
Southwest	4,416.8	644.6	+7	1,370.6	−1	2,401.6	−6
Southeast	1,751.2	42.2	+1	465.0	+4	1,244.0	−4
Northwest	4,399.9	338.1	+45	1,271.7	+1	2,790.0	−6
All units	13,872.6	1,330.7	+30	3,603.1	−4	8,938.8	−8

[1] Rows and columns may not sum due to rounding.

[2] Not including 666,800 acres of private lands leased to forest industry.

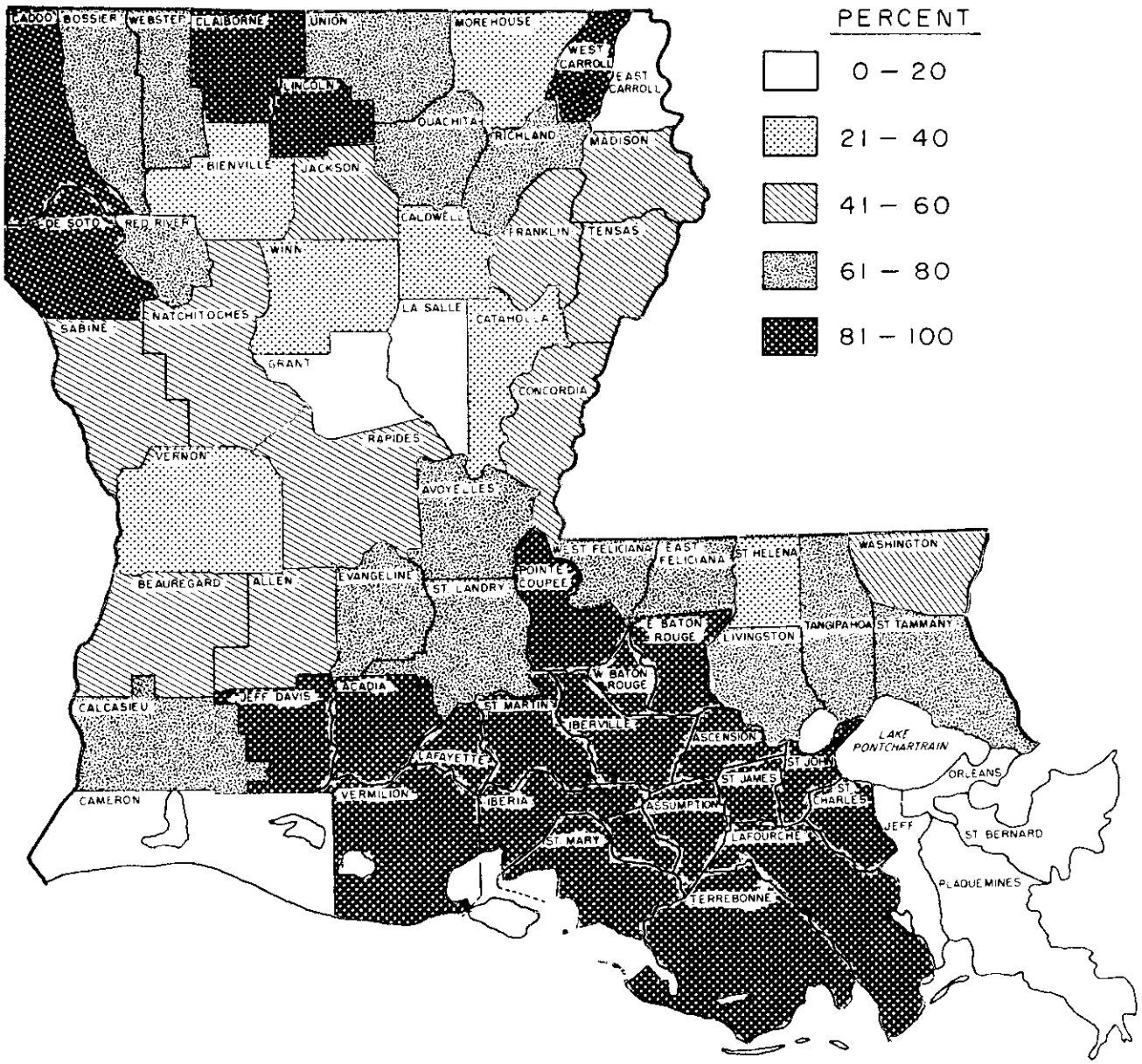

Figure 6.—*Percent timberland held by nonindustrial private landowners, Louisiana, 1984.*

Table IV.—*Area of timberland by forest types, percent change, and forest survey units, Louisiana, 1974-1984*[1]

Forest survey units	All types	Longleaf-slash	Change	Loblolly-shortleaf	Change	Oak-pine	Change	Oak-hickory	Change	Oak-gum-cypress	Change	Elm-ash-cottonwood	Change	Nontyped[2]
	Thousand acres	*Thousand acres*	*Percent*	*Thousand acres*	*Percent*	*Thousand acres*	*Percent*	*Thousand acres*	*Percent*	*Thousand acres*	*Percent*	*Thousand acres*	*Percent*	*Thousand acres*
North Delta	913.5	6.1	+3	98.1	+34	81.1	+13	55.5	+39	561.0	−35	103.6	−13	8.1
South Delta	2,391.3	0.0	(3)	55.9	+28	11.5	+83	82.7	(3)	1,989.8	−5	243.4	−30	8.0
Southwest	4,416.8	779.3	+2	1,530.9	−4	677.6	−18	678.6	+26	716.9	−10	33.5	+20	0.0
Southeast	1,751.2	131.4	−41	558.4	+2	259.3	+4	357.6	+21	438.9	−3	0.0	−100	5.5
Northwest	4,399.9	16.3	−39	1,789.9	−8	883.9	−17	996.3	+30	670.9	−10	31.9	+14	10.8
All units	13,872.6	933.2	−9	4,033.2	−1	1,913.3	−13	2,170.7	+26	4,377.6	−12	412.4	−24	32.2

[1] Rows and columns may not sum due to rounding.
[2] No live trees, saplings, or seedlings.
[3] Less than 1 percent change.

South Delta unit showed less than a 1 percent change since 1974. Most of the 445,200-acre oak-hickory increase was in the Northwest and Southwest units, 228,500 and 140,500 acres, respectively. These two units account for 83 percent of the oak-hickory type increase in the State.

Species dominance in particular forest types is illustrated by forest survey units in figures 8a-8e. In the longleaf-slash forest type, slash pine clearly dominates the type in the Southwest, Southeast, and Northwest units with more than double the growing-stock volume of longleaf pine. Longleaf pine ranks second and, together, these two species account for 91, 92, and 96 percent of longleaf-slash forest type growing-stock volume, respectively, in these three units.

In the loblolly-shortleaf forest type, loblolly pine accounts for 70 percent or more of the volume in every unit. Shortleaf is a distant second followed closely by sweetgum. Less than 10 percent of the volume in the loblolly-shortleaf type is made up of species other than loblolly, shortleaf, and sweetgum.

Loblolly pine still accounts for a major portion of the volume in the oak-pine forest type but is not nearly as dominant as in the loblolly-shortleaf type. For the oak-pine forest type in the Southwest, Southeast, and Northwest units, loblolly accounts for 53, 37, and 42 percent of the growing-stock volume, respectively. Second ranking dominants are composed of several species including sweetgum, shortleaf pine, slash pine, southern red oak, and numerous others.

The oak-hickory forest type is not dominated strongly by a particular species. In the Southwest, Southeast, and Northwest units loblolly pine and sweetgum together account for 36, 33, and 32 percent, respectively, of the growing-stock volume. The North Delta and South Delta units are dominated by white oak, American beech, sweetgum, and water oak. However, in these units the dominance is not as striking and other species rank close behind in importance.

The bottomland types are dominated by sweetgum except in the South Delta and Southeast units. Here, baldcypress and water tupelo predominate, accounting for 52 and 30 percent of the growing-stock volume, respectively. The other three units are dominated by sweetgum, followed by willow, water oak, loblolly pine, and blackgum. The diversity of the bottomland forest type becomes evident as it takes eight species or more to account for at least 70 percent of the growing-stock volume.

TIMBER VOLUME

Presently in Louisiana 22,023 million cubic feet of timber exists on timberland (in trees $\geq$5.0 inches diameter at breast height [d.b.h.]). Of this, 18,992 million cubic feet are in growing-stock trees. This

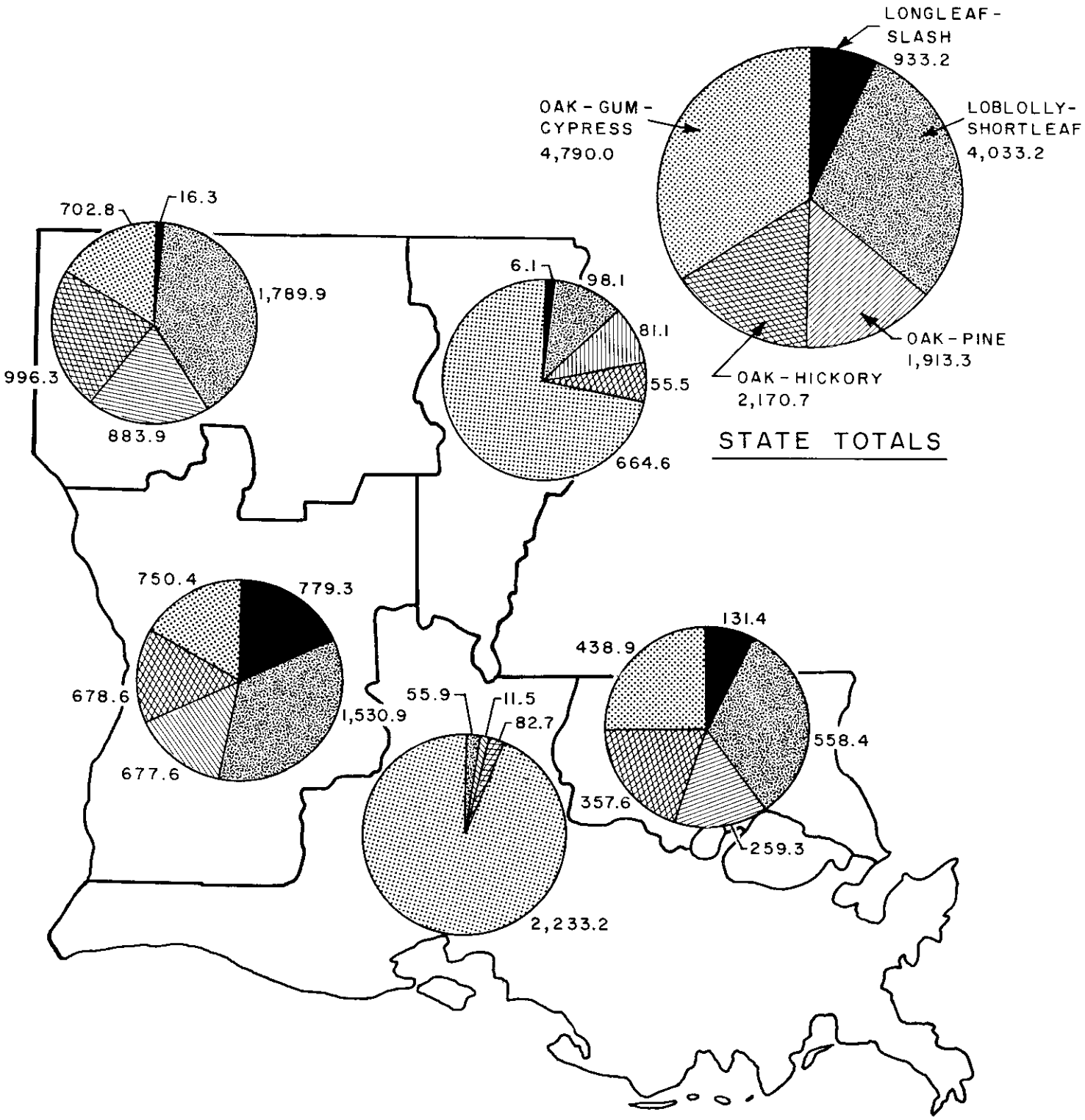

Figure 7.—*Proportion of timberland in thousand acres by forest type, Louisiana, 1984. Elm-ash-cottonwood forest type is included in the oak-gum-cypress forest type.*

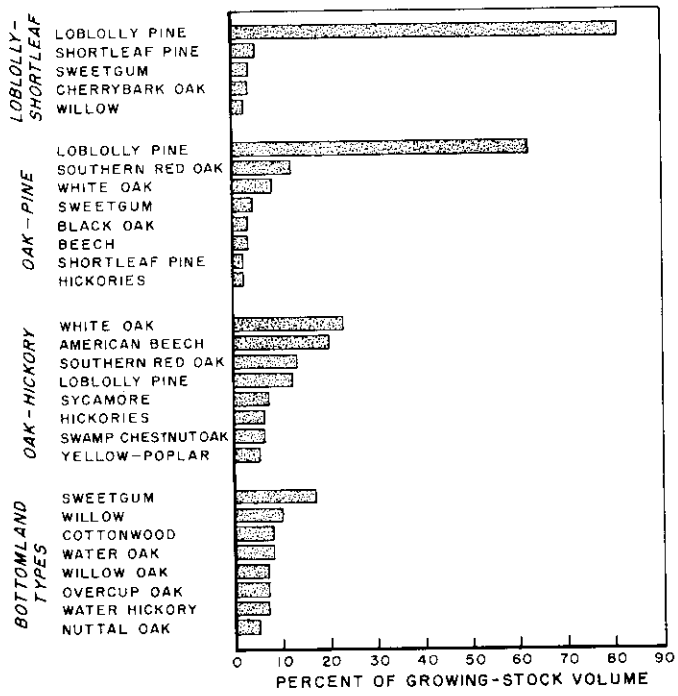

Figure 8a.—*Relative species importance by forest type, North Delta unit, Louisiana, 1984. The importance value is volume.*

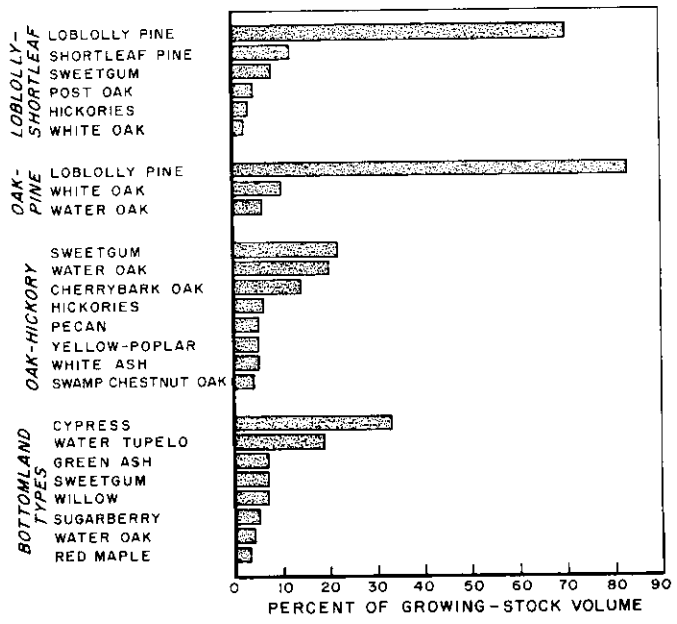

Figure 8b.—*Relative species importance by forest type, South Delta unit, Louisiana 1984. The importance value is volume.*

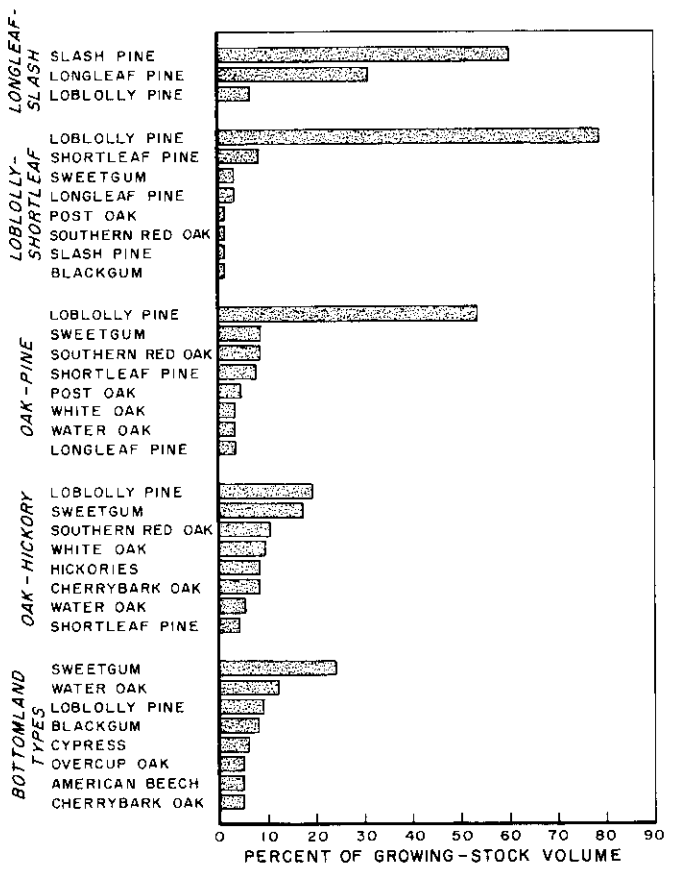

Figure 8c.—*Relative species importance by forest type, Southwest unit, Louisiana, 1984. The importance value is volume.*

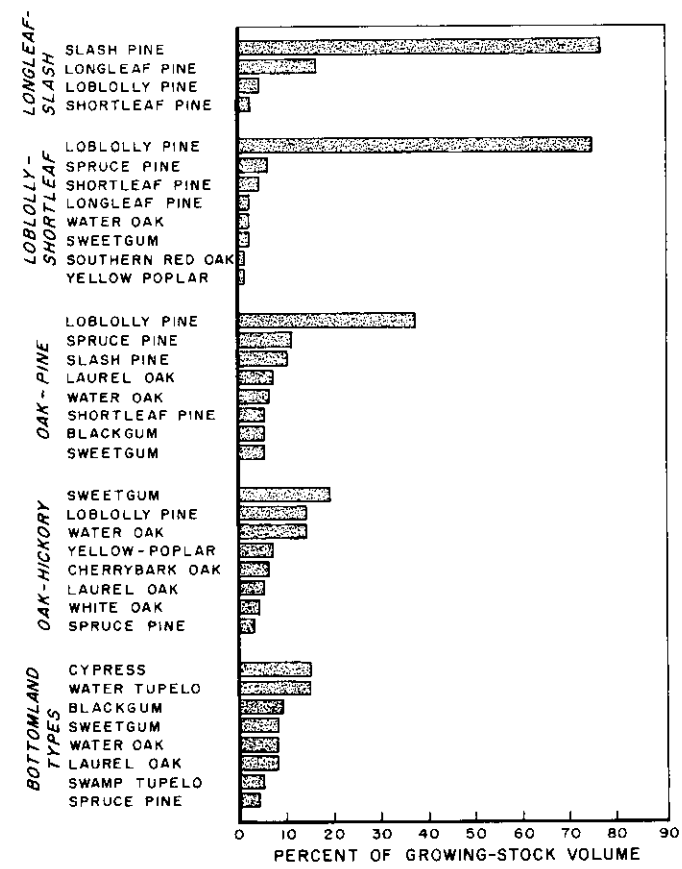

Figure 8d.—*Relative species importance by forest type, Southeast unit, Louisiana, 1984. The importance value is volume.*

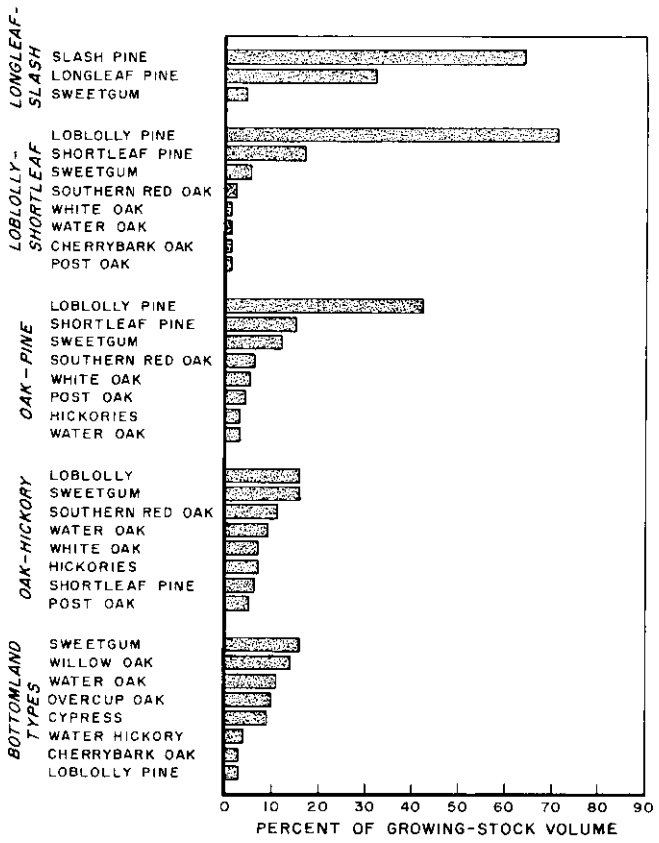

Figure 8e.—*Relative species importance by forest type, Northwest unit, Louisiana, 1984. The importance value is volume.*

represents a 15 percent increase in gross volume and a 14 percent increase in growing-stock volume since the 1974 survey. In total growing-stock volume there are 4,145 million cubic feet in poletimber trees and 14,847 million cubic feet in sawtimber timber trees, a 10 percent decrease and 23 percent increase, respectively (fig. 9).

Most of the increase in growing-stock volume occurred on nonindustrial private timberland—1,743 million cubic feet (76 percent of the increase). Volume on public timberland accounted for the remaining 24 percent of the increase while forest industry growing-stock volume did not change. Currently, 10 percent of growing-stock volume is on public timberland, 23 percent is on forest industry timberland, and 66 percent is on nonindustrial private timberland. These are only slight shifts in distribution of growing-stock volume since 1974, when, 8, 27, and 65 percent, of growing-stock volume was on public, forest industry, and nonindustrial private timberland, respectively.

Total sawtimber volume increased by 9,920 million board feet since 1974. Most of this increase, 7,900 million board feet, was on nonindustrial private timberland, but public timberland also had a substantial increase—2,218 million board feet. Sawtimber volume on forest industry timberland decreased very slightly. Currently, 12 percent of sawtimber volume is on public timberland, 24 percent is on forest industry timberland, and 64 percent is on nonindustrial private timberland. This distribution of sawtimber volume is a shift from the respective volume distributions of 10, 28, and 62 percent reported in 1974.

Sound wood in cull trees totals 3,031 million cubic feet. This is a 23 percent increase since the 1974 survey. Most of the cull increase (74 percent) occurred in hardwood volume. Softwood cull has increased by 26 percent since the 1974 survey. The probable causes for these increases are trees reaching older ages along with increases in stand density.

Softwood Growing-Stock Volume

Current softwood growing-stock inventory in Louisiana is 10,552 million cubic feet. This is 17 percent over the 1974 volume with every survey unit increasing its softwood inventory (table V). The largest increase was in the Northwest unit—503 million cubic feet, followed by the Southwest unit with 475 million cubic feet. These two units alone account for 65 percent of the increase in softwood growing-stock volume for the State.

Louisiana is a softwood State with 56 percent of its growing-stock volume in softwoods (fig. 10). The proportion of softwood volume is 48 percent (baldcypress excluded). Softwood growing stock is predominant in the Southwest, Southeast, and Northwest survey units with 69, 57, and 60 percent, respectively, of those units being in southern pine growing stock. Baldcypress is significant primarily in the South Delta unit where it accounts for 31 percent of the total growing-stock volume (fig. 10).

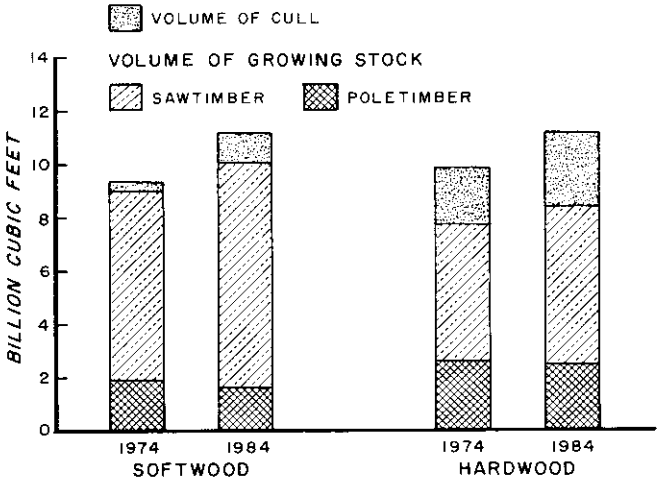

Figure 9.—*Volume of timber by species group and class of timber, Louisiana, 1984.*

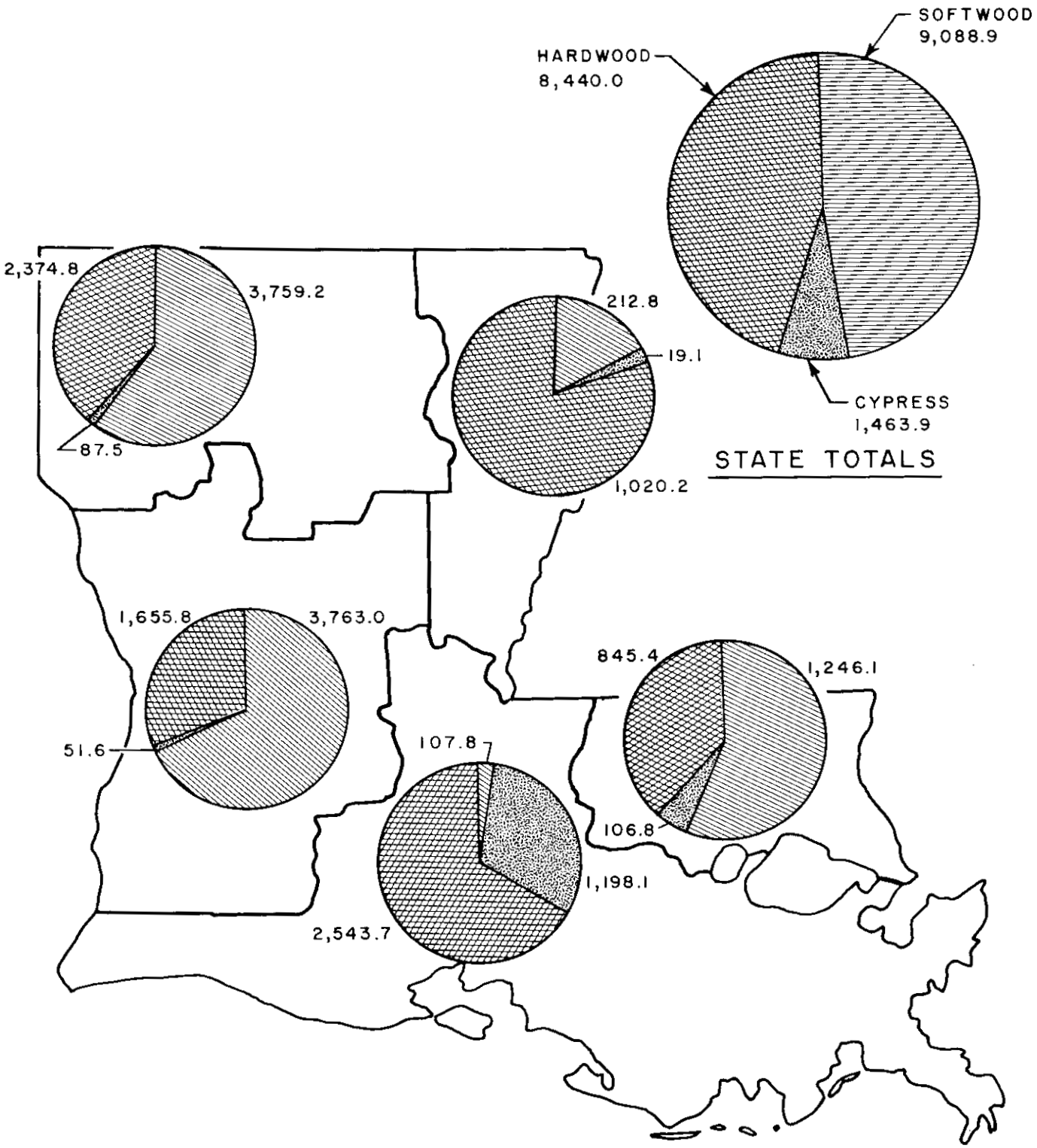

Figure 10.—*Proportion of growing-stock volume in million cubic feet by species group (and cypress), Louisiana, 1984.*

Table V.—*Percent change in growing-stock volume by forest survey units, Louisiana, 1974-1984*[1]

Forest survey units	Softwood		Hardwood	
	Volume	Change	Volume	Change
	Million cubic feet	*Percent*	*Million cubic feet*	*Percent*
North Delta	231.9	+34	1,020.2	−9
South Delta	1,305.9	+31	2,543.7	+11
Southwest	3,814.6	+14	1,655.8	−1
Southeast	1,352.9	+14	845.4	+15
Northwest	3,846.7	+15	2,374.8	+27
All units	10,552.0	+17	8,440.0	+10

[1] Rows and columns may not sum due to rounding.

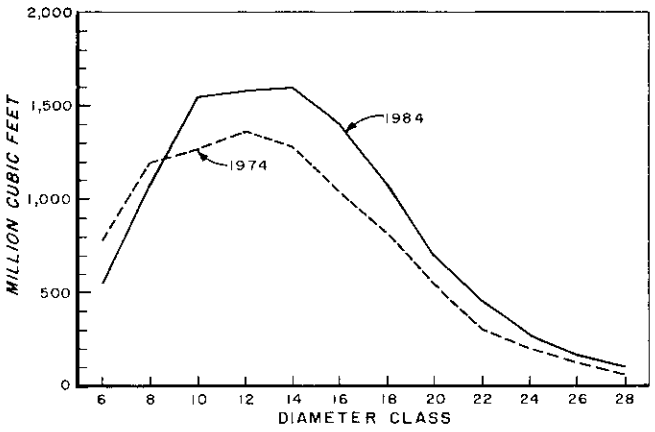

Figure 11.—*Softwood growing-stock volume by diameter class, Louisiana, 1974 and 1984.*

Except for the 6-inch and 8-inch diameter classes, softwood growing-stock volume has increased across the range of diameter classes since the 1974 survey (fig.11). The largest increases in volume occurred in the 10-inch through 16-inch classes. Of concern are the reduced increases in volume in the 6- and 8-inch classes, where present growing stock is below 1974 inventory levels.

Table VI gives an indication of overall tree sizes by species and species groups. The board-foot to cubic-foot ratio gives a general index for tree sizes, the lower ratio indicating the prevalence of more small-sized trees (poletimber-size trees versus sawtimber-size trees).

All the softwood species except longleaf pine and baldcypress have increased in average size since the 1974 survey; that is, more trees are moving into saw-log sizes and trees already saw-log size are slightly larger. It appears that baldcypress, although increasing in growing-stock volume, is losing many larger trees to cutting.

In Louisiana, 6,600 million cubic feet (63 percent) of softwood volume is in loblolly pine (fig.12). It is, by far, the dominant southern pine in the State. Loblolly is also the only southern pine to have a noteworthy increase in inventory volume since the 1974 survey, 1,080 million cubic feet (a 20 percent increase). The slash pine inventory rose 200 million cubic feet since the 1974 survey. Shortleaf pine and longleaf pine showed slight decreases in their inventories.

Currently in Louisiana, 10 percent of softwood growing-stock volume is on public timberland, 26 percent is on forest industry timberland, and 64 percent is on nonindustrial private timberland. Most of the increase in softwood volume (80 percent) was on nonindustrial private timberland.

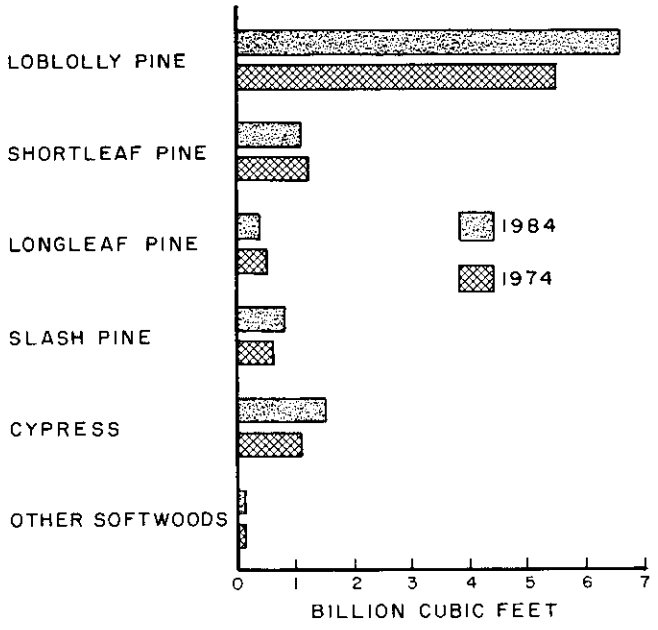

Figure 12.—*Softwood growing-stock volume by species, Louisiana, 1974 and 1984.*

Table VI.—*Distribution of net volume among commercial species and board foot to cubic foot ratios, Louisiana 1974 and 1984*[1]

Species	Volume				Board foot to cubic foot ratio	
	Million cubic feet		Million board feet[4]			
	1974	1984	1974	1984	1974	1984
Softwood:						
Longleaf pine	484.7	438.2	2,138.8	1,666.8	4.41	3.80
Slash pine	589.8	790.5	1,395.3	2,114.1	2.36	2.67
Shortleaf pine	1,217.4	1,141.3	4,872.1	4,701.1	4.00	4.12
Loblolly pine	5,507.5	6,587.4	23,429.0	31,113.0	4.25	4.72
Spruce pine	92.1	126.8	413.9	631.0	4.49	4.98
Cypress	1,147.5	1,463.0	4,741.3	5,201.8	4.13	3.56
Red cedar	1.0	4.7	2.3	17.7	2.30	3.77
Total	9,040.0	10,551.9	36,992.7	45,445.5	4.09	4.31
Hardwood:						
Select white oaks[2]	329.4	367.5	1,147.2	1,090.2	3.48	2.97
Select red oaks[3]	189.6	297.7	681.3	1,039.1	3.59	3.49
Other white oaks	510.7	476.2	1,707.3	1,621.4	3.34	3.40
Other red oaks	1,536.8	1,869.2	5,018.0	6,254.1	3.27	3.34
Sweet pecan	344.1	77.2	1,268.1	275.6	3.69	3.57
Hickories	225.3	485.4	755.1	1,566.2	3.35	3.23
Hard maple	3.4	3.2	6.9	13.9	2.03	4.34
Soft maple	153.8	182.4	234.3	280.9	1.52	1.54
Beech	143.3	127.2	652.7	542.6	4.55	4.27
Sweetgum	1,398.7	1,578.1	4,025.3	4,226.3	2.88	2.68
Tupelo and blackgum	1,176.7	1,146.6	3,123.2	2,999.2	2.65	2.62
Ash	405.5	432.7	1,096.4	1,208.1	2.70	2.79
Sycamore	51.4	92.8	152.1	279.2	2.96	3.01
Cottonwood	106.3	170.1	454.7	610.4	4.28	3.59
Basswood	6.6	5.1	11.4	13.0	1.73	2.55
Yellow-poplar	27.9	52.6	99.2	202.0	3.56	3.84
Magnolia	72.6	21.9	185.7	68.9	2.56	3.15
Willow	329.6	361.9	1,357.2	1,290.9	4.12	3.57
Black cherry	11.2	20.3	24.8	43.3	2.21	2.13
American elm	129.6	130.8	406.3	377.3	3.14	2.88
Other elms	144.4	127.6	415.1	292.9	2.87	2.30
Hackberry	229.1	236.2	693.8	649.3	3.03	2.75
Other commercial hardwoods	131.5	177.3	306.6	345.1	2.33	1.95
Total	7,657.5	8,440.0	23,822.7	25,289.9	3.11	3.00
All species	16,697.4	18,991.9	60,815.3	70,735.4	3.64	3.72

[1] Rows and columns may not sum due to rounding.

[2] Includes white, swamp chestnut, swamp white, and chinkapin oak (Durand and bur oak are select white oaks but did not occur in the Louisiana sample).

[3] Includes cherrybark and Shumard oak (northern red oak is a select red oak but did not occur in the Louisiana sample).

[4] International ¼-inch rule.

Softwood Sawtimber Volume

Softwood sawtimber volume is 45,445 million board feet, a 23 percent increase over the 1974 survey (table VII). Together, the Southwest and Northwest units have 75 percent of the State's softwood sawtimber volume.

The largest reported increases in sawtimber inventory were in the Northwest and Southwest units, 3,685 and 3,105 million board feet, respectively. The South Delta unit had a 693 million board feet increase in softwood sawtimber volume, most of which was in baldcypress.

Fifty-seven percent of the State's sawtimber volume is in southern pines, 7 percent in baldcypress (fig. 13). Only the South Delta unit is noteworthy in baldcypress sawtimber volume. Southern pines comprise two-thirds or more of the State's sawtimber volume in the Southwest, Southeast, and Northwest units. Even in the North Delta unit, southern pines make up 20 percent of that unit's sawtimber volume,

Table VII.—*Percent change in sawtimber volume by forest survey units, Louisiana, 1974-1984*[1]

Forest survey units	Softwood		Hardwood	
	Volume	Change	Volume	Change
	Million board feet[2]	*Percent*	*Million board feet*[2]	*Percent*
North Delta	1,067.9	+40	3,819.2	−5
South Delta	4,808.9	+17	7,827.5	+11
Southwest	16,482.6	+23	4,743.3	−7
Southeast	5,645.6	+13	2,381.9	+13
Northwest	17,440.4	+27	6,517.9	+18
All Units	45,445.4	+23	25,289.8	+6

[1] Rows and columns may not sum due to rounding.
[2] International ¼-inch rule.

primarily on the Macon Ridge, an elevated geologic region in the western parishes.

Figures 14a through 14e illustrate the relative distribution of softwood sawtimber volume, in areal extent, by varying scales of volume per acre. Timberland area is not broken down by forest type, physiographic class, etc., in these figures but is the total area versus the total volume for the respective unit. Two things stand out when studying these figures; (1) there is much timberland with very little softwood sawtimber volume and; (2) there is little timberland with adequate amount of softwood sawtimber volume per acre.

In every unit, except the South Delta, 50 percent or more of softwood sawtimber is on timberland that has 9,000 or more board feet per acre. In the South Delta unit, 41 percent of the softwood sawtimber (mostly baldcypress) is on timberland with 9,000 or more board feet per acre. However, the acreage in all survey units of timberland with 9,000 or more board feet per acre is minimal. The Southwest and Northwest units have the most timberland acreage in this category, 13 and 16 percent respectively.

Countering this are large amounts of acreage with less than 1,000 board feet per acre. The North Delta unit has a large amount of such acreage because of the small amount of softwood sawtimber in the unit. All of the other units have at least 40 percent of their timberland with only 1,000 or less board feet per acre. The South Delta unit has the highest amount (63 percent) of timberland in the category of 1,000 or less board feet per acre. Softwoods in this unit are primarily baldcypress, and the restrictive conditions necessary for baldcypress reproduction may contribute to this large amount of low sawtimber volume per acre. In units where southern pines predominate in sawtimber volume, (the Southwest, Southeast, and Northwest), 43 percent of the timberland contains only 2 percent of the State's softwood volume.

Hardwood Growing-Stock Volume

Hardwood growing-stock volume has increased from 7,657 million cubic feet to 8,440 million cubic feet since the 1974 survey, a 10 percent rise (table V). However, not every survey unit had an increase. Most notably, the North Delta unit fell 100 million cubic feet to the current 1,020 million cubic feet, a 9 percent change. The most significant change in volume occurred in the Northwest unit. There, hardwood growing-stock volume increased by 502 million cubic feet, a 27 percent rise.

Even with the substantial volume increase in the Northwest unit, the South Delta unit still has most of the State's hardwood growing-stock volume. Together, the South Delta and Northwest units hold 58 percent of the State's hardwood growing-stock volume.

Most of the hardwood volume is in other red oaks, sweetgum, and blackgum-tupelo species. These groups account for 54 percent (4,594 million cubic feet) of Louisiana's hardwood volume (fig. 15). White oak volumes have fallen slightly since the 1974 survey. Although select red oak volumes increased slightly, the select red oak and select white oak classes account for only 8 percent of the hardwood volume.

Since the 1974 survey, hardwood growing-stock volumes increased in every diameter class except the 6-, 8-, and 10-inch classes (fig.16). The largest increase was in the 12-inch diameter class. The significant volume decrease in the 6-inch class suggests that future hardwood inventories will stabilize or decline slightly.

Currently in the State, 10 percent of hardwood growing-stock volume is on public timberland, 20 percent on forest industry, and 70 percent on nonindustrial private timberland. Volume increases were on nonindustrial private and public timberland with forest industry showing a decrease.

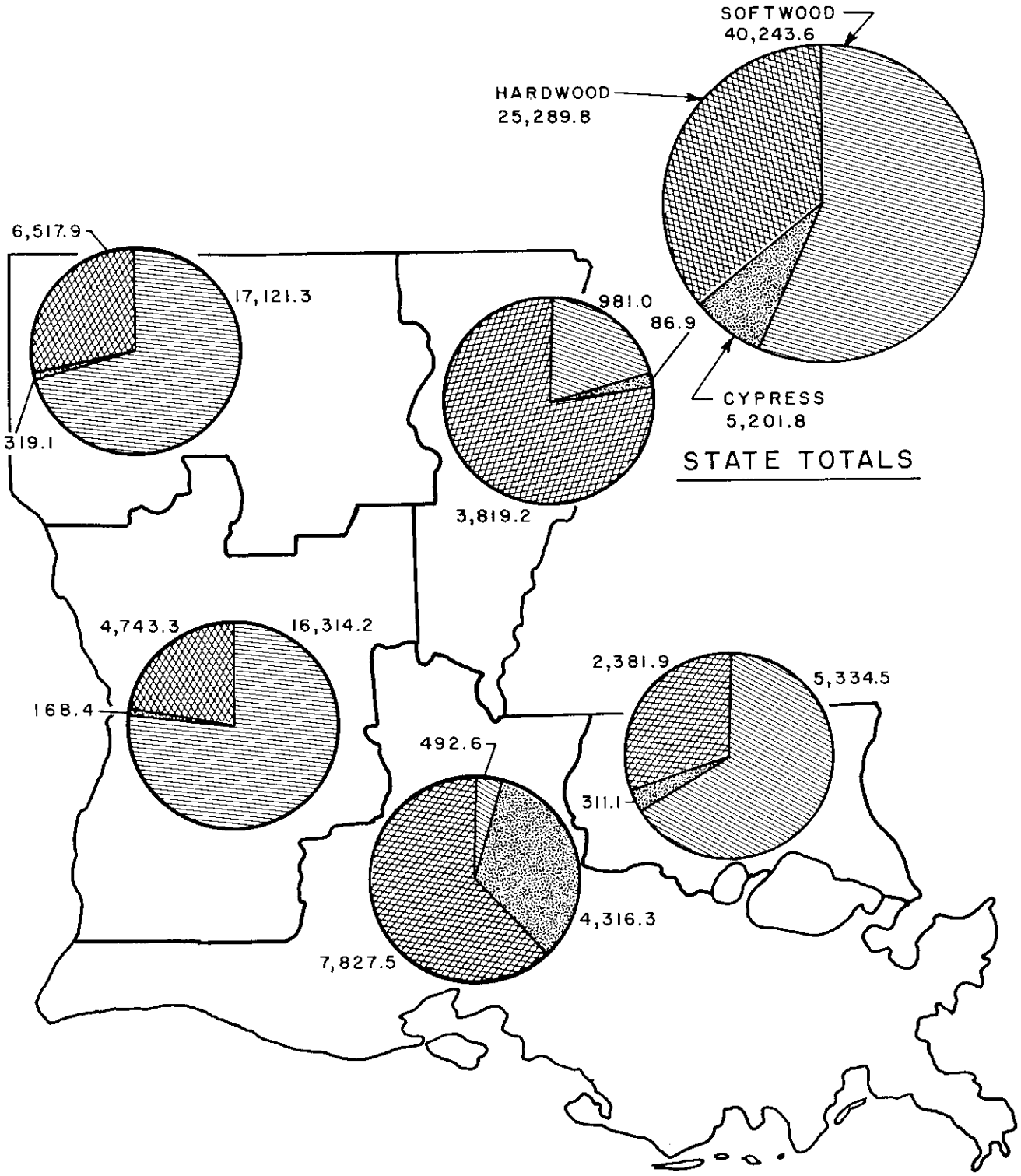

Figure 13.—*Proportion of sawtimber volume in million board feet by species group (and cypress), Louisiana, 1984.*

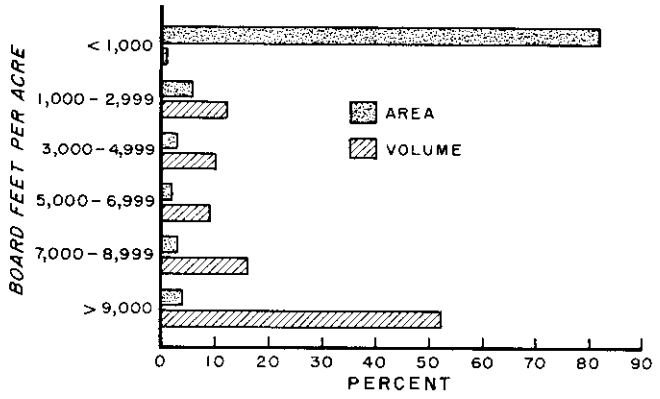

Figure 14a.—*Area and softwood sawtimber volume comparison by volume classes, North Delta unit, Louisiana, 1984.*

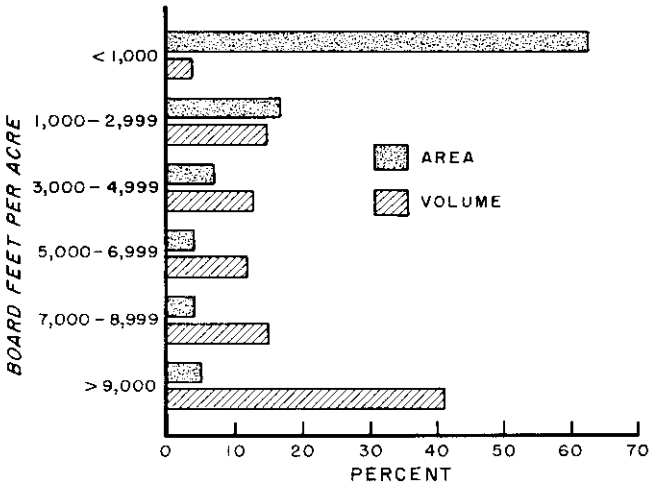

Figure 14b.—*Area and softwood sawtimber volume comparison by volume classes, South Delta unit, Louisiana, 1984.*

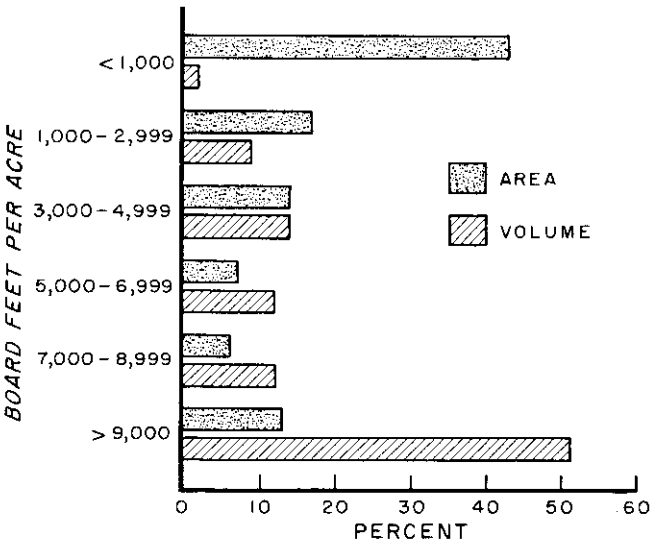

Figure 14c.—*Area and softwood sawtimber volume comparison by volume classes, Southwest unit, Louisiana, 1984.*

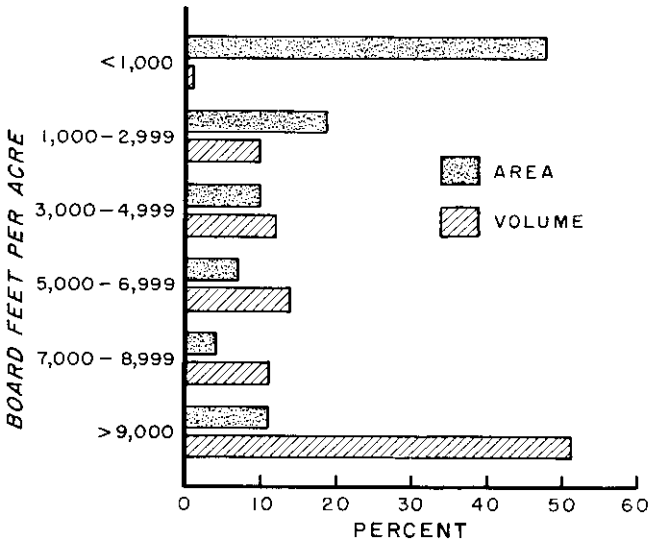

Figure 14d.—*Area and softwood sawtimber volume comparison by volume classes, Southeast unit, Louisiana, 1984.*

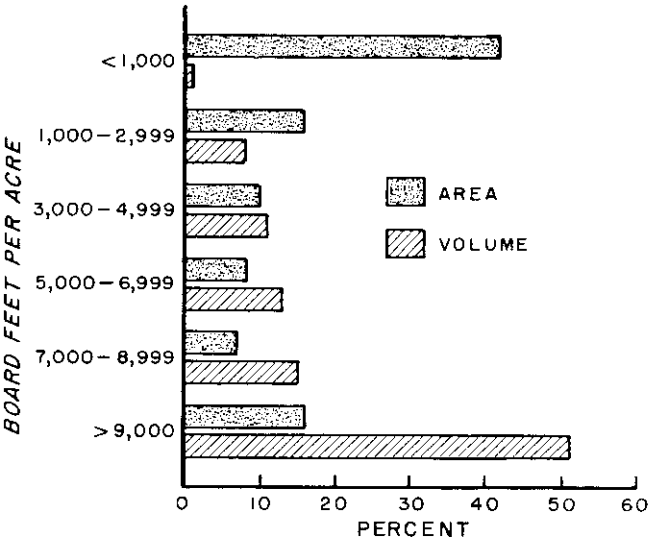

Figure 14e.—*Area and softwood sawtimber volume comparison by volume classes, Northwest unit, Louisiana, 1984.*

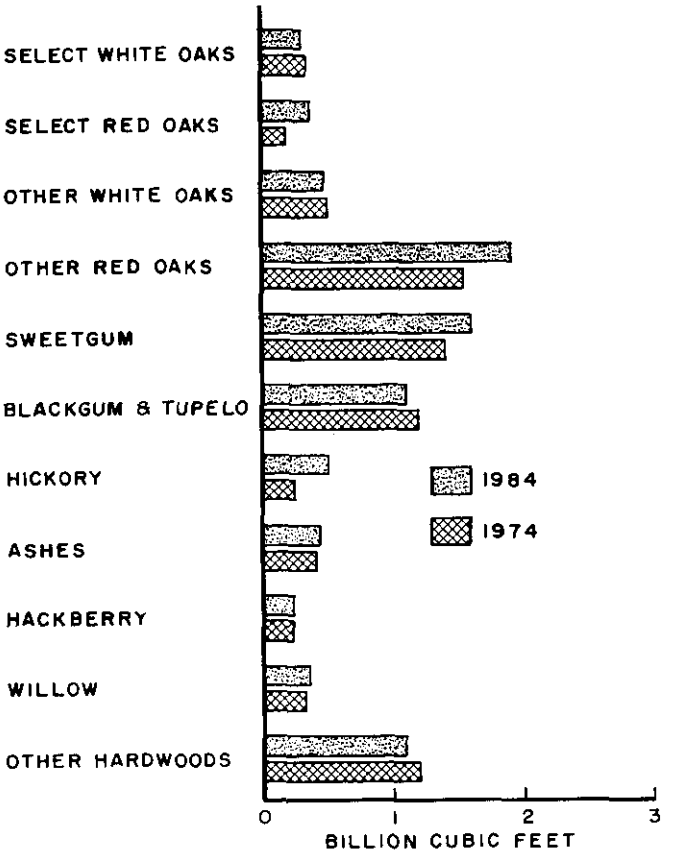

Figure 15.—*Hardwood growing-stock volume by species, Louisiana, 1974 and 1984.*

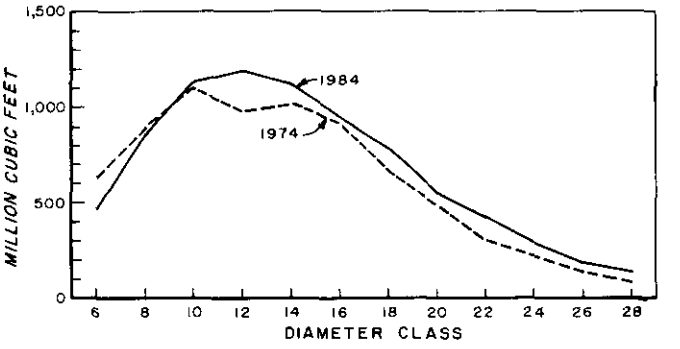

Figure 16.—*Hardwood growing-stock volume by diameter class, Louisiana, 1974 and 1984.*

Hardwood Sawtimber Volume

Louisiana's hardwood sawtimber volume is up 6 percent since the 1974 survey, increasing from 23,823 million board feet to 25,290 million board feet. Most of the sawtimber volume is in the South Delta, Southwest, and Northwest units (table VII). Approximately 75 percent of the State's hardwood sawtimber volume is in these three units.

The largest increase in volume, amounting to 18 percent, occurred in the Northwest unit. There were inventory decreases in the North Delta and Southwest units. Losses can be attributed mostly to the timberland-base decline in the North Delta and to selective exclusion of hardwood management in the Southwest unit. Figures 17a-17e illustrate the relative distribution of hardwood sawtimber volume by volume-per-acre classes. The units with large areas of upland hardwoods—Southwest, Southeast, and Northwest—have high amounts of acreage with very low sawtimber volumes. In contrast to the softwood sawtimber volume these units have little acreage with 9,000 or more board feet per acre.

Adequate amounts of hardwood sawtimber volume are rare in the Southwest unit. Here, 88 percent of timberland has only 34 percent of the hardwood sawtimber volume. And, only 6 percent of timberland has 5,000 or more board feet per acre. Forty-four percent of the unit's sawtimber volume is on these lands.

Similarly, in the Southeast unit, 83 percent of the timberland has 35 percent of the hardwood sawtimber volume where concentrations are less than 3,000 board feet per acre. On timberland with higher concentrations of sawtimber (5,000 board feet or more per acre), 10 percent of the unit's timberland holds 41 percent of the volume. The Southeast unit has relatively few stands of hardwood sawtimber with 9,000 or more board feet per acre.

The Northwest unit also has large amounts of timberland with less than 3,000 board feet per acre. Here, 83 percent of timberland holds 32 percent of hardwood sawtimber. Also, 23 percent of the unit's hardwood sawtimber grows on only three percent of its timberland that contains 9,000 or more board feet per acre.

The North Delta unit, primarily bottomland hardwoods, has almost 50 percent of its volume on timberland with 9,000 or more board feet per acre. Only 14 percent of the unit's timberland is in this category. Conversely, 56 percent of the unit's timberland has 13 percent of the sawtimber volume.

In the Southeast unit, 83 percent of the timberland has 35 percent of the hardwood sawtimber volume where concentrations are less than 3,000 board feet per acre. On timberland with higher concentrations of sawtimber (5,000 board feet or more), 10 percent of the unit's timberland holds 41 percent of the volume. The Southeast unit has relatively few stands with 9,000 or more board feet per acre, and those stands cover less than 3 percent of timberland area.

The hardwood inventory, overall, appears to be comprised of slightly smaller-sized trees. Since the 1974 survey the select white oak and red oak group board-foot to cubic-foot ratios declined as did the hickories (table VI). However, other white and red oaks, and the ashes showed a slight increase in their ratios. Overall, the State's board-foot to cubic-foot ratios indicate that increased hardwood volume is on an increased number of smaller sized trees.

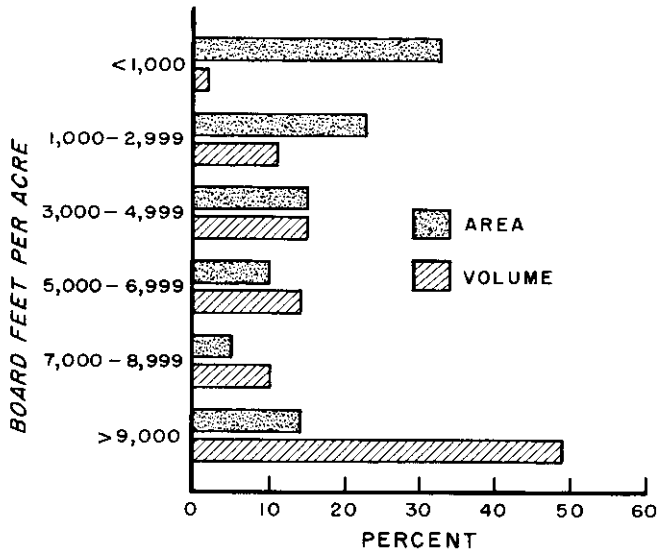

Figure 17a.—*Area and hardwood sawtimber volume comparison by volume classes, North Delta unit, Louisiana, 1984.*

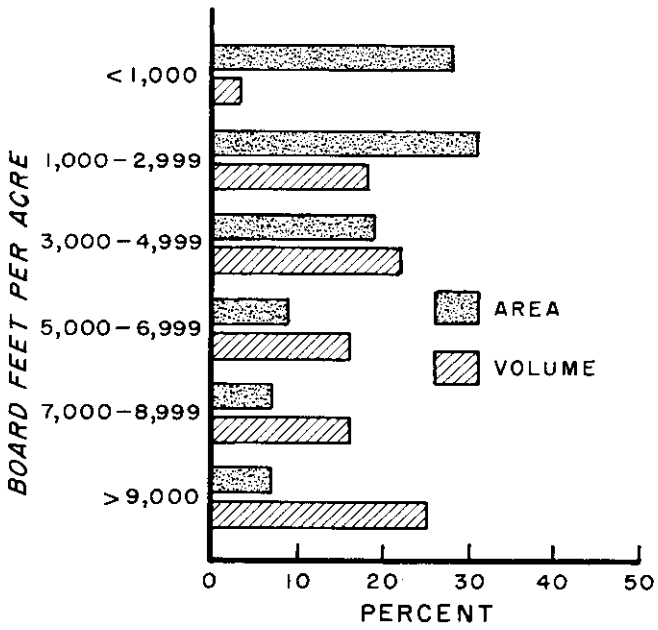

Figure 17b.—*Area and hardwood sawtimber volume comparison by volume classes, South Delta unit, Louisiana, 1984.*

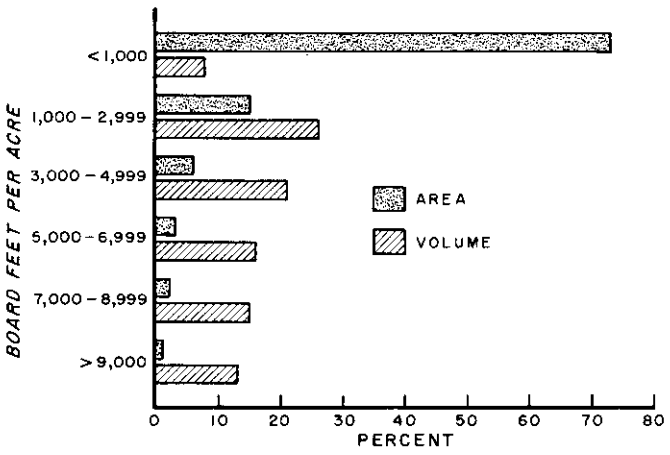

Figure 17c.—*Area and hardwood sawtimber volume comparison by volume classes, Southwest unit, Louisiana, 1984.*

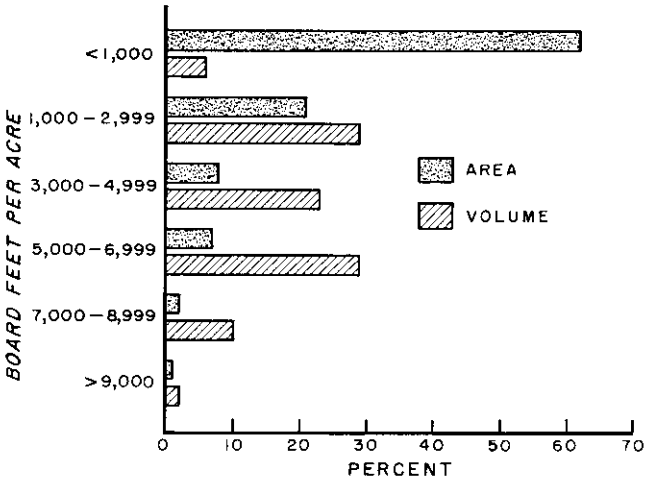

Figure 17d.—*Area and hardwood sawtimber volume comparison by volume classes, Southeast unit, Louisiana, 1984.*

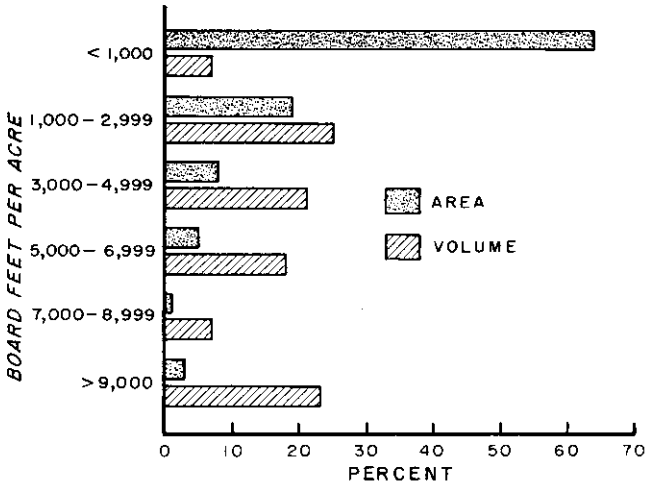

Figure 17e.—*Area and hardwood sawtimber volume comparison by volume classes, Northeast unit, Louisiana, 1984.*

STAND STRUCTURE

Stand Size

Currently in Louisiana, 59 percent of timberland, 8,178,900 acres, is occupied by sawtimber stands (fig. 18). Twenty percent of the State's timberland is poletimber, 18 percent is sapling and seedling, and 3 percent is nonstocked.

The stand-size proportions are fairly uniform for every unit in the State with 50 to 60 percent timberland in sawtimber, 15 to 25 percent in poletimber, and 15 to 25 percent in sapling and seedling stands. An exception, the South Delta unit, has 76 percent of its timberland in sawtimber stands. Baldcypress is naturally even aged with very few understory trees. Because of the special regeneration requirements of baldcypress, few of these stands are in the sapling and seedling or poletimber size unless there are large amounts of cutting activity. This would most likely increase nonstocked acreage until optimum regeneration conditions occur.

The Northwest and Southwest units have the most timberland in sawtimber stands, 2,444,000 and 2,390,800 acres, respectively. Since the 1974 survey, the South Delta, Southwest, and Northwest units had increased in sawtimber acreage, while the North Delta and Southeast units decreased slightly (table VIII).

Sapling and seedling stands declined, especially in the North Delta, South Delta, and Southwest units. A combination of cutting and acreage decline in these stands with subsequent increases in nonstocked acreage would indicate lack of regeneration after cutting.

Stocking

Since the 1974 survey, there have been some distinct shifts in stocking, Statewide. First, in overstocked stands (100.1 to 160 percent stocked; see Appendix for stocking definitions), the stocking level for the range as a whole remained relatively stable but significant changes occurred in detailed classes. Timberland increased by 424,000 acres in the 120.1 to 160 percent stocking class but decreased 423,700 acres in the 100.1 to 120 percent stocking class (table IX). Second, acreage has increased in understocked stands (0 to 60 percent) by 777,200 acres. Last, acreage has declined by 1,422,500 acres in the optimally stocked class (60.1 to 100 percent stocked). Louisiana has an increase in acreage of the higher ranges of overstocked and all ranges of understocked stands and a decrease in acreage of optimally stocked stands.

Increases of timberland acreage in the 120.1 to 160 percent stocking range occurred in every unit. The Southwest and Northwest units alone had an increase of 261,300 acres, 62 percent of the total increase in that stocking range.

In understocked stands, every unit had an increase of timberland acreage except the North Delta and South Delta units and there the decrease was only in the 40.1 to 60 percent stocking class. The largest increases in understocked acreage occurred in the Northwest and Southwest units. These two units accounted for 676,800 acres of the 777,200 acre timberland increase in the 0 to 60 percent stocking classes.

Most of the decrease of optimally stocked stands occurred in the 80.1 to 100 percent stocking class (table IX). Although decreases occurred in all the units, the Southwest and Northwest units accounted for 671,200 acres in this class alone. Other substantial decreases totaling 645,700 acres occurred in both Delta units in the optimally stocked class.

On nonindustrial private timberland optimally stocked stands decreased by 1,100,200 acres (table X). Overstocked stands increased 88,900 acres. However, substantial increases in the 120.1 to 160 percent range were offset by a 132,800-acre decline in the 100.1 to 120 percent stocking range. Understocked stand acreage increased by 397,600 acres. Currently, 2,772,500 acres (31 percent) of private timberland are classed in the understocked category, 2,503,700 acres

Table VIII.—*Percent change in timberland by stand size and forest survey units, Louisiana, 1974-1984*[1]

Forest survey units	Sawtimber		Poletimber		Sapling and seedling		Nonstocked	
	Area	Change	Area	Change	Area	Change	Area	Change
	Thousand acres	*Percent*	*Thousand acres*	*Percent*	*Thousand acres*	*Percent*	*Thousand acres*	*Percent*
North Delta	566.0	−12	183.0	−40	115.1	−46	49.4	+179
South Delta	1,806.7	+7	356.5	−36	101.4	−56	126.8	+26
Southwest	2,390.8	+6	937.1	−14	974.0	−10	114.9	+12
Southeast	971.4	−4	304.0	+11	427.2	−4	48.5	−9
Northwest	2,444.0	+7	938.4	−21	908.2	−3	109.4	+115
All units	8,178.9	+4	2,718.9	−20	2,525.8	−13	449.0	+38

[1] Rows and columns may not sum due to rounding.

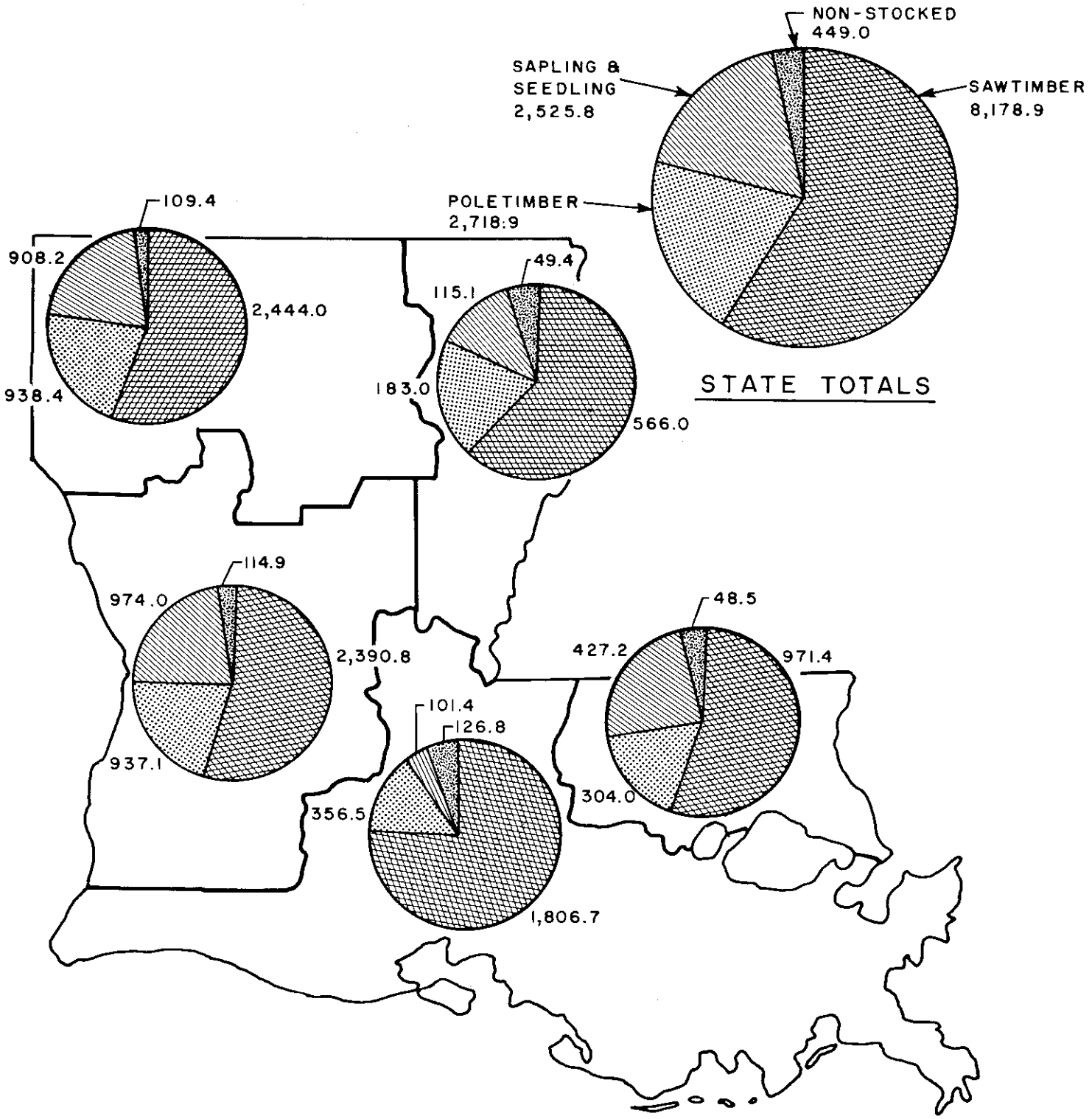

Figure 18.—*Proportion of timberland in thousand acres by stand-size classes, Louisiana, 1984.*

Table IX.—*Area of timberland by forest survey units and detailed stocking class of growing-stock trees, Louisiana, 1974[1] and 1984[2]*

Forest survey units	Stocking class (percent)															
	>140		121-140		101-120		81-100		61-80		41-60		21-40		0-20	
	1974	1984	1974	1984	1974	1984	1974	1984	1974	1984	1974	1984	1974	1984	1974	1984
	Thousand acres															
North Delta	5.9	15.4	23.9	77.6	103.8	116.2	247.6	182.8	448.3	181.5	226.3	170.5	97.2	107.7	24.7	61.6
South Delta	46.9	57.2	103.0	129.1	342.9	378.3	541.4	420.6	680.6	487.3	502.1	482.5	245.0	273.6	111.5	162.7
Southwest	29.1	131.3	360.7	393.5	1,060.1	670.3	1,228.1	1,022.1	916.3	992.5	557.6	650.9	267.1	406.8	113.9	149.5
Southeast	17.3	37.4	100.9	143.6	310.4	281.9	463.1	369.5	392.3	369.7	285.8	298.8	143.1	163.2	71.9	87.1
Northwest	62.7	138.6	420.6	471.0	975.6	922.4	1,373.1	907.9	981.7	916.1	468.2	631.0	104.4	292.6	62.8	120.0
All units	161.9	380.1	1,009.1	1,214.9	2,792.8	2,369.1	3,853.3	2,902.9	3,419.2	2,947.1	2,039.9	2,233.7	856.7	1,243.9	384.7	580.9

[1] Area totals of 1974 estimates do not equal 1974 published data because of different rounding procedures.
[2] Rows and columns may not sum due to rounding.

Table X.—*Area of timberland by ownership and detailed stocking class of growing-stock trees, Louisiana, 1974[1] and 1984[2]*

Ownership Class	Stocking class (percent)															
	>140		121-140		101-120		81-100		61-80		41-60		21-40		0-20	
	1974	1984	1974	1984	1974	1984	1974	1984	1974	1984	1974	1984	1974	1984	1974	1984
	Thousand acres															
Public	0.0	12.0	76.0	113.7	262.4	173.5	343.9	290.5	260.1	304.2	162.0	267.4	80.6	121.1	15.6	48.4
Forest industry	39.6	140.4	324.4	376.3	846.4	644.6	1,148.6	811.2	757.3	781.5	485.0	517.9	115.2	229.4	47.9	101.8
Nonindustrial private	122.2	227.7	608.7	724.9	1,683.9	1,551.1	2,360.8	1,801.2	2,402.0	1,861.4	1,392.9	1,448.4	660.9	893.4	321.1	430.7
All ownerships	161.8	380.1	1,009.1	1,214.9	2,792.7	2,369.1	3,853.3	2,902.9	3,419.4	2,947.1	2,039.9	2,233.6	856.7	1,243.9	384.6	580.9

[1] Area totals of 1974 estimates do not equal 1974 published data because of different rounding procedures.
[2] Rows and columns may not sum due to rounding.

(28 percent) are overstocked, and 3,662,600 acres (41 percent) are optimally stocked.

Similar trends were evident on forest industry lands except in the optimum stocking range. There, the acreage decreases occurred in the 80.1 to 100 percent range, 337,400 acres. Overstocked stands decreased by 49,100 acres, with a 152,700-acre increase in the upper part of the stocking range (120.1 to 160 percent) being offset by a 201,800-acre decrease in the 100.1 to 120 percent stocking class. Understocked timberland on forest industry land increased by 201,000 acres since 1974. Most of this increase was in the 20.1 to 40 percent stocking range. An increasing time lapse between cutting and stand regeneration could contribute significantly to the increase in understocked stands. A total of 849,100 acres (24 percent) of forest industry land is in the understocked condition, 1,161,300 acres (32 percent) are overstocked, and 1,592,700 acres (44 percent) are optimally stocked.

On public lands, there was no change in the acreage of optimally stocked stands, however, a decrease in the upper part of that range did offset an increase in the lower part of the range. Overstocked timberland decreased by 39,200 acres but there was a 49,700-acre increase in the upper portion of the stocking range. Understocked stands increased by 178,700 acres, mainly because stand regeneration has fallen behind cutting. Currently, 436,900 acres (33 percent) of public timberland are in an understocked condition, 299,200 acres (22 percent) are overstocked, and 594,700 acres (45 percent) are optimally stocked.

Since the 1974 survey there has been a 532,700-acre increase in understocked sawtimber stands (table XI). Louisiana currently has 2,066,100 acres of sawtimber stands in the understocked class. Optimally stocked sawtimber stand acreage has remained relatively stable with the exception of the 80.1 to 100 percent class. This class declined by 483,200 acres.

Poletimber stands have decreased in the optimum stocking range by 412,100 acres and decreased in the overstocked class by 509,800 acres. In the understocked class, these stands increased slightly by 233,500 acres.

Sapling and seedling stands decreased by 112,600 acres in the understocked class, by 407,800 acres in the optimally stocked class, and increased by 136,800 acres in the overstocked class (table XI). The decline of acreage in the optimally stocked sapling and seedling stands is cause for concern because of the impact on Louisiana's future growing stock inventory.

The longleaf-slash pine forest type stocking situation has been relatively stable since 1974. This is expected since most of these stands are in plantation management in Louisiana. Approximately 22 percent of the stands in this type are understocked (table XII).

The stocking of the loblolly-shortleaf forest type can vary more widely than the longleaf-slash type, because of the combination of natural stands with lack of management coming into play. This creates instability in stand stocking, but such was not true in Louisiana. Optimally stocked stand acreage has remained unchanged since 1974. There was, however, a decrease in the 80.1 to 100 percent stocking range offsetting an increase in the 60.1 to 80 percent range. Overstocked acreage has decreased by 160,100 acres. Currently, 360,400 acres of the loblolly-shortleaf type are understocked, 9 percent of the type. Plantation management and prolific seeding habits of shortleaf and loblolly keep understocked acreage low.

The oak-pine forest type lost 316,200 acres of optimally stocked stands since 1974. Acreage decreased in the 100.1 to 120 percent stocking range, but that was offset by higher acreage in the upper ranges of the overstocked category. Still, overstocked oak-pine stands declined by 65,700 acres. Understocked stands increased by 90,400 acres; currently, 19 percent of the oak-pine forest type is in understocked stands.

In the oak-hickory forest type, understocked acreage increased substantially, 512,100 acres since 1974. Optimally stocked acreage declined by 200,400 acres, while overstocked stands increased by 134,300 acres.It appears that as stands are cut over, pine removal is sufficient to shift the forest type. This is the primary reason 49 percent of Louisiana's oak-hickory type is in an understocked condition.

A similar situation has arisen in Louisiana's bottomland forest types. Forty-two percent of the acreage of these types is in an understocked condition. Optimally stocked stands have declined by 860,700 acres, caused mostly by heavy cutting and land clearing. Overstocked stands have increased slightly by 126,000 acres. Nearly 18 percent of the State's bottomland types are overstocked. Nevertheless, past heavy cutting and landclearing has seriously depleted these stands overall.

Table XIII depicts growing-stock volume by detailed stocking levels. Volume has decreased in optimally stocked stands in all units except the Southwest. There, volume increased by 217 million cubic feet. Currently, the State has 7,958 million cubic feet of growing stock in optimally stocked stands. There are 8,628 million cubic feet in overstocked stands and 2,406 million cubic feet in understocked stands. These are increases of 29 and 46 percent, respectively, over those reported in 1974. All of the survey units had increases in volume in their respective stocking classes of understocked and overstocked stands.

Sawtimber volume changed little in the optimally stocked class and is currently 30,000 million board feet (table XIV). Significant volume declines were registered since 1974 in all the survey units except the Southwest. The Southwest unit offset other unit declines with a 895-million board feet increase.

Table XI.—*Area of timberland by size class and detailed stocking class of growing-stock trees, Louisiana, 1974[1] and 1984[2]*

Size Class	Stocking class (percent)															
	>140		121-140		101-120		81-100		61-80		41-60		21-40		0-20	
	1974	1984	1974	1984	1974	1984	1974	1984	1974	1984	1974	1984	1974	1984	1974	1984
	Thousand acres															
Sapling and seedling	39.4	128.8	206.9	264.1	459.9	450.1	738.1	524.0	656.0	462.3	500.1	362.8	278.4	262.2	30.7	71.6
Poletimber	58.8	71.4	331.9	224.6	819.8	404.7	790.1	537.0	793.3	634.3	369.9	517.0	226.5	298.9	17.0	31.0
Sawtimber	63.6	179.9	470.4	726.2	1,513.0	1,514.4	2,325.1	1,841.9	1,970.0	1,850.5	1,170.0	1,354.0	351.8	682.8	11.6	29.3
Nonstocked	...	...	...	...	...	...	...	...	...	...	...	...	...	...	325.3	449.0
All classes	161.8	380.1	1,009.1	1,214.9	2,792.8	2,369.2	3,853.3	2,902.9	3,419.2	2,947.1	2,039.9	2,223.7	856.7	1,243.9	384.7	580.9

[1] Area totals of 1974 estimates do not equal 1974 published data because of different rounding procedures.
[2] Rows and columns may not sum due to rounding.

Table XII.—*Area of timberland by detailed stocking class and forest type, Louisiana, 1971[1] and 1984[2]*

Forest type	Stocking class (percent)															
	>140		121-140		101-120		81-100		61-80		41-60		21-40		0-20	
	1974	1984	1974	1984	1974	1984	1974	1984	1974	1984	1974	1984	1974	1984	1974	1984
	Thousand acres															
Longleaf-slash	28.8	42.1	75.2	94.3	252.3	185.9	226.1	217.3	197.8	191.9	129.6	130.6	72.8	53.6	40.9	17.6
Loblolly-shortleaf	57.4	224.0	638.9	627.2	1,408.2	1,093.2	1,289.7	971.1	469.3	757.4	142.5	255.1	28.3	86.8	34.4	18.5
Oak-pine	11.5	22.3	113.9	151.8	434.3	319.9	811.5	543.9	553.7	505.1	233.7	266.3	34.9	92.9	11.2	11.0
Oak-hickory	16.5	22.9	28.9	101.6	155.7	210.9	425.1	284.1	541.5	482.1	332.2	543.8	155.5	376.8	69.2	148.5
Oak-gum-cypress[3]	47.6	68.7	152.2	240.0	542.2	559.3	1,100.8	886.5	1,657.0	1,010.6	1,201.9	1,038.0	565.2	633.8	229.0	353.0
All types[4]	161.8	380.1	1,009.1	1,214.9	2,792.8	2,369.2	3,853.3	2,902.9	3,419.2	2,947.1	2,039.9	2,233.7	856.7	1,243.9	384.7	580.9

[1] Area totals of 1974 estimates do not equal 1974 published data because of different rounding procedures.
[2] Rows and columns may not sum due to rounding.
[3] Includes 412,400 acres of elm-ash-cottonwood type.
[4] The 1984 figures do not include 32,400 acres of nontyped timberland.

Table XIII.—*Volume of growing stock by forest survey units and detailed stocking class, Louisiana, 1974[1] and 1984[2]*

Forest survey units	Stocking class (percent)															
	>140		121-140		101-120		81-100		61-80		41-60		21-40		0-20	
	1974	1984	1974	1984	1974	1984	1974	1984	1974	1984	1974	1984	1974	1984	1974	1984
	Million cubic feet															
North Delta	10.4	13.6	32.0	162.0	216.1	303.3	363.2	312.6	462.2	240.5	171.9	162.4	33.4	52.6	1.6	5.4
South Delta	196.0	296.6	356.6	435.3	748.8	1,072.4	841.8	791.8	713.7	675.0	333.1	399.3	91.7	145.6	10.8	33.6
Southwest	73.8	244.2	608.1	860.5	1,560.8	1,212.6	1,520.7	1,481.6	801.7	1,057.9	329.9	456.5	80.9	142.3	3.5	14.9
Southeast	40.3	75.2	135.7	332.8	506.4	521.1	638.4	539.0	369.9	430.9	176.8	218.2	42.7	74.4	4.4	6.6
Northwest	70.6	300.1	675.9	985.4	1,440.8	1,813.1	1,636.3	1,330.3	1,012.2	1,098.2	327.5	534.4	33.9	145.1	10.0	14.8
All units	391.1	929.7	1,808.3	2,776.1	4,472.9	4,922.5	5,000.5	4,455.5	3,359.7	3,502.2	1,339.1	1,770.8	282.6	559.9	30.3	75.3

[1] Volume totals of 1974 estimates do not equal 1974 published data because of different rounding procedures.
[2] Rows and columns may not sum due to rounding.

Table XIV.—*Volume of sawtimber by forest survey units and detailed stocking class, Louisiana, 1974[1] and 1984[2]*

Forest survey units	Stocking class (percent)															
	>140		121-140		101-120		81-100		61-80		41-60		21-40		0-20	
	1974	1984	1974	1984	1974	1984	1974	1984	1974	1984	1974	1984	1974	1984	1974	1984
	Million board feet[3]															
North Delta	4.8	28.2	19.4	560.0	843.6	1,188.0	1,461.4	1,249.2	1,696.4	1,000.2	656.3	622.6	86.1	220.6	4.5	18.3
South Delta	735.1	1,031.0	1,169.4	1,353.5	2,436.5	3,596.0	2,949.0	2,650.1	2,442.5	2,130.7	1,143.3	1,277.2	290.9	497.2	23.7	100.7
Southwest	222.7	1,006.0	1,948.6	3,263.5	5,688.1	5,810.0	5,955.4	5,810.0	3,063.2	4,104.1	1,255.9	1,721.7	320.4	495.4	10.9	49.7
Southeast	188.2	216.3	443.2	1,117.9	1,798.2	1,915.2	2,447.0	2,095.0	1,423.4	1,541.9	641.7	855.6	148.1	271.5	11.0	14.1
Northwest	103.9	971.7	2,351.3	3,710.4	5,193.2	7,212.5	6,259.3	5,202.4	3,994.4	4,216.5	1,239.5	2,064.0	139.7	525.3	41.8	55.6
All units	1,254.7	3,253.3	5,931.9	10,005.2	15,959.6	18,687.3	19,072.1	17,006.5	12,619.9	12,993.4	4,936.7	6,541.1	985.2	2,010.0	91.9	238.3

[1] Sawtimber totals of 1974 estimates do not equal 1974 published data because of different rounding procedures.
[2] Rows and columns may not sum due to rounding.
[3] International ¼-inch rule.

Sawtimber volume also increased substantially in the overstocked and understocked classes. Forty-five percent of Louisiana's sawtimber is in overstocked stands and 12 percent is in understocked stands. All of the survey units showed increases of sawtimber in overstocked and understocked stands. The Northwest unit had an exceptional increase in overstocked stands, from 7,648 million board feet in 1974 to 11,895 million board feet, currently.

Species Distribution

The distribution of tree species across the Louisiana landscape is by no means homogeneous. Instead, particular species have more importance (using volume as the importance value) in different areas of the State. Figures 19 through 31 portray the relative distribution of the more important softwoods and hardwoods. These particular maps illustrate species distribution by volume of growing-stock trees only; relative locations are based upon county volume rather than plot volume.

Loblolly is the most important and extensively distributed softwood in Louisiana (fig. 19). Its range covers the western, northern, and southeast areas of the State. Shortleaf, once dominant in the Northwest, is becoming sporadic in distribution with no heavy concentration approaching that of loblolly pine (fig. 20). This is because harvested (cut) shortleaf pine is being replaced by loblolly pine, both naturally and artificially. Longleaf pine and slash pine are concentrated in the west central and southeast portions of Louisiana (fig. 21 and 22). These areas of Louisiana were once covered predominantly with longleaf pine, but longleaf regeneration problems have created preference for slash pine. Between 1974 and 1984, approximately 95,000 acres of harvested longleaf were converted to slash pine. Currently, despite improved techniques and knowledge about longleaf establishment, longleaf pine is still declining in Louisiana while slash pine is increasing.

The largest concentration of baldcypress is found in the Atchafalaya Basin but there is also significant concentration in the north central area on lowlands bordering the Ouachita River and its tributaries (fig. 23). Baldcypress is limited in the North Mississippi Delta and is sporadic in the Red River Basin.

Water tupelo is also heavily concentrated in the Atchafalaya Basin (fig. 24). It is virtually nonexistent in

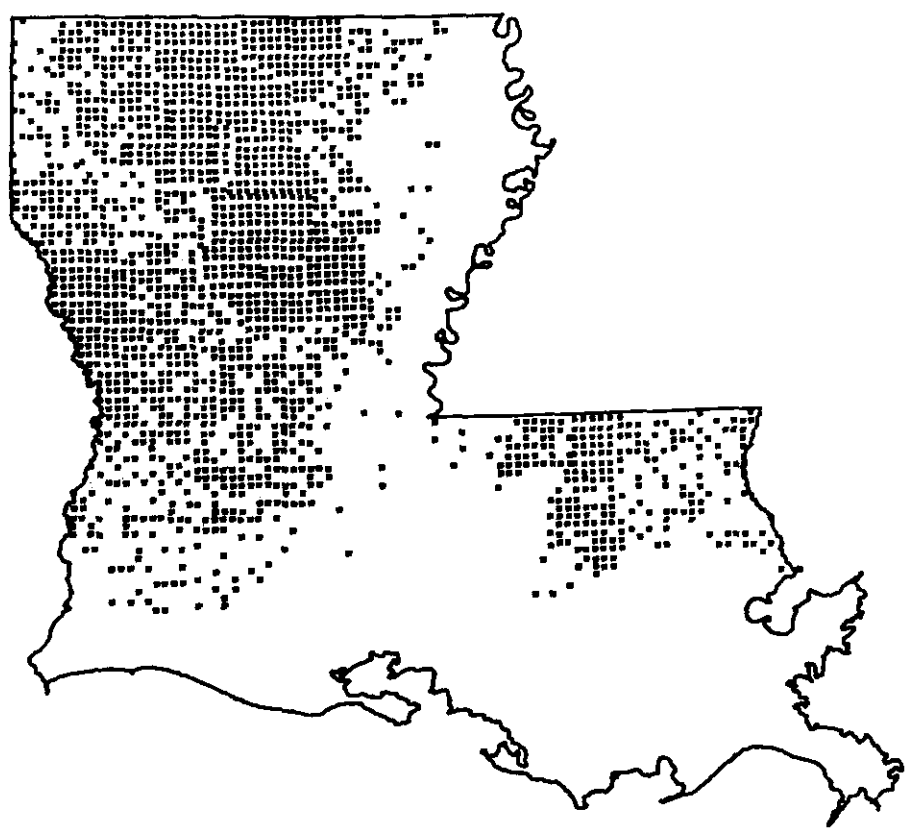

Figure 19.—*Distribution of loblolly pine, Louisiana, 1984. Each dot represents 5,000,000 cubic feet.*

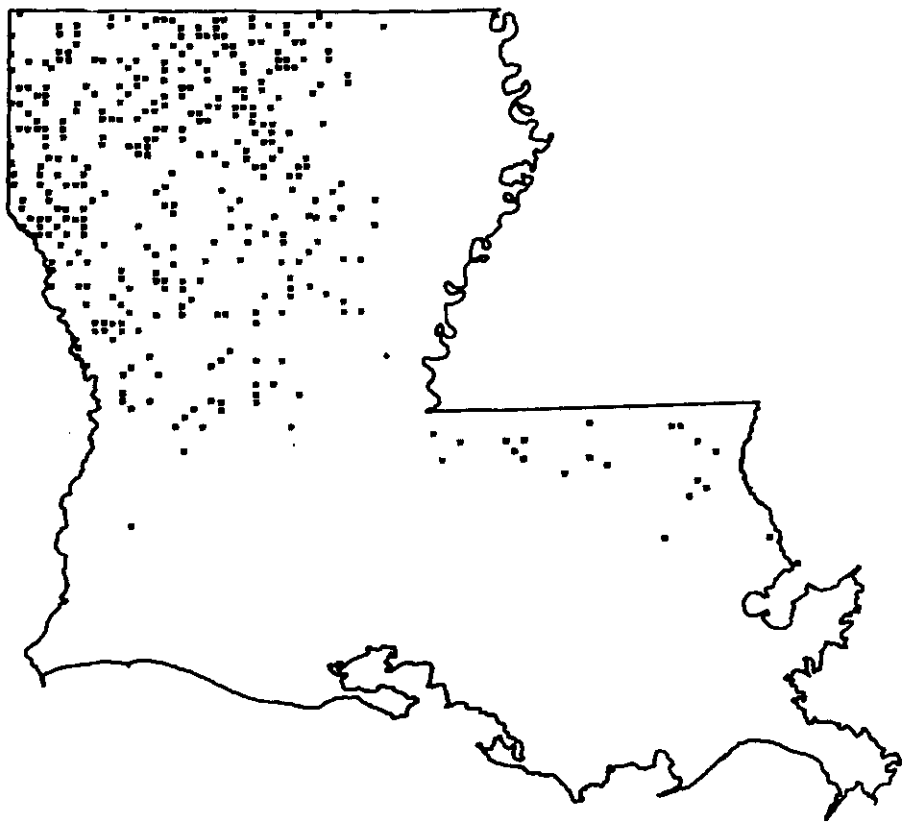

Figure 20.—*Distribution of shortleaf pine, Louisiana, 1984. Each dot represents 5,000,000 cubic feet.*

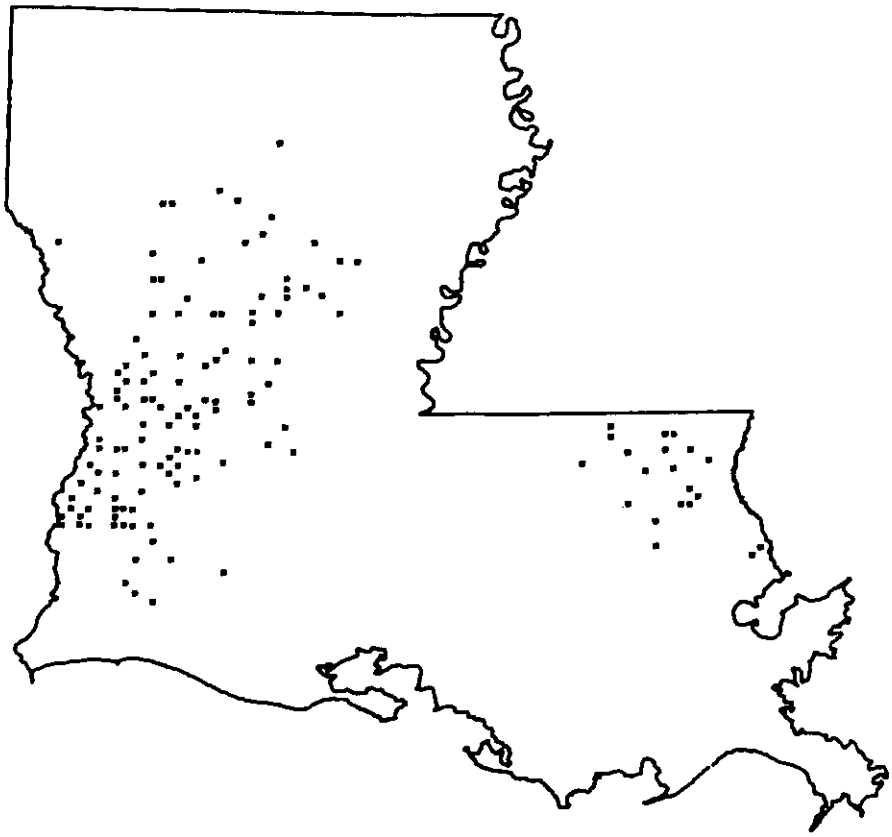

Figure 21.—*Distribution of longleaf pine, Louisiana, 1984. Each dot represents 5,000,000 cubic feet.*

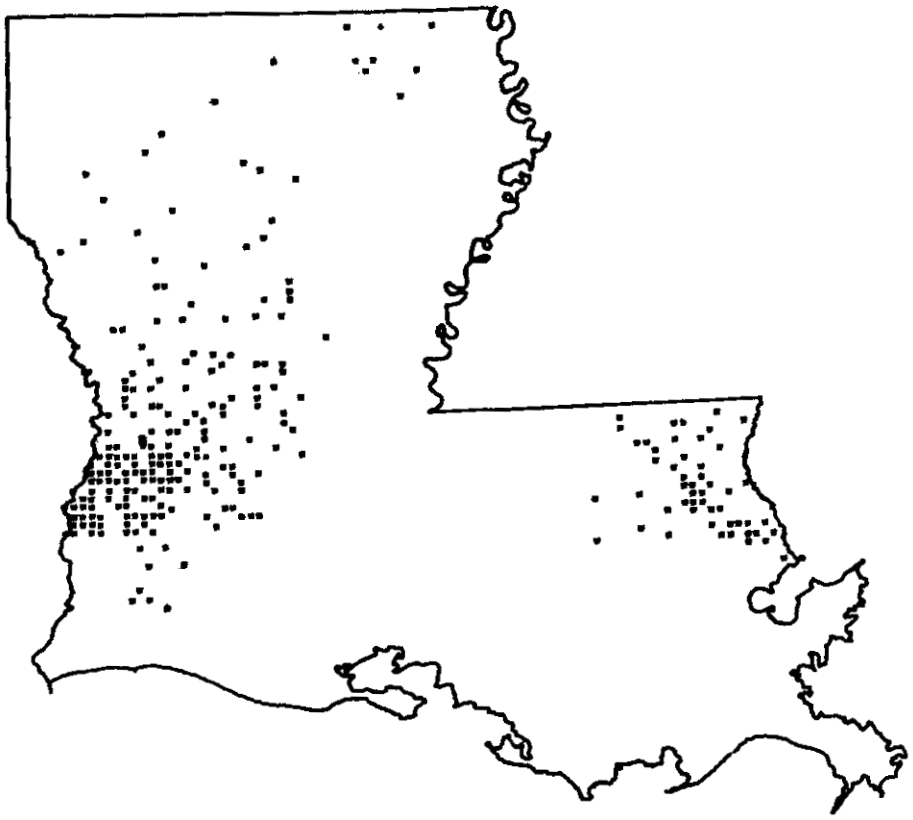

Figure 22.—*Distribution of slash pine, Louisiana, 1984. Each dot represents 5,000,000 cubic feet.*

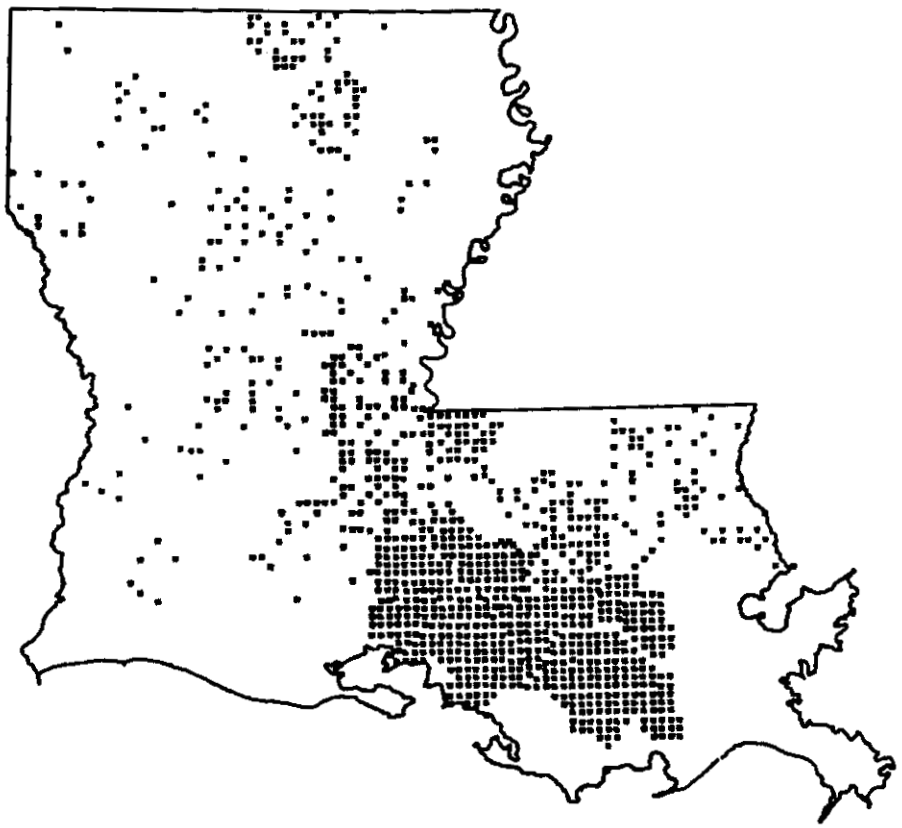

Figure 23.—*Distribution of baldcypress, Louisiana, 1984. Each dot represents 1,000,000 cubic feet.*

the northern portion of the Mississippi Delta and in the Red River Basin. A notable concentration exists in the northern portion of the State along the Ouachita River.

Five of the principal oaks in Louisiana were mapped, 2 upland (white oak and southern red oak) and 3 lowland oaks (cherrybark oak, willow oak, and water oak). White oak and southern red oak have similar ranges, but the concentration of southern red oak is higher, especially in the north and northwest areas of the State (fig. 25 and 26).

Cherrybark oak is fairly evenly distributed across the State, except in the north Mississippi Delta. There is a fairly high concentration east of the Mississippi River in the southeastern part of the State (fig. 27).

Since willow oak is confined mainly to lowland soils, its distribution is somewhat limited (fig. 28). Willow oak, however, is abundant in the north Mississippi Delta and also in the Ouachita and Red River Basins. Water oak has a wider distribution because of its occurrence on both lowland and upland sites (fig. 29). It, too, is one of the few significant hardwoods in the northern Mississippi Delta.

Sweetgum is the most widely dispersed species in Lousiana (fig. 30). It occurs on all sites but develops best on well-drained lowland areas. It is abundant in the north Mississippi Delta but heaviest concentrations are in the northcentral portion of the State.

Blackgum is most prevalent in the flatwoods areas of the southeast and western areas of the State (fig. 31). However, it is also abundant in the northcentral portion of Louisiana.

Table XV ranks by unit all live trees using stem volume as the importance value. Importance here refers to a measurement by which the species in a community can be compared and ranked (Whittaker 1975). Readily apparent is the dominance of loblolly pine in all the survey units except the South Delta. Loblolly pine is co-dominant with sweetgum in the North Delta unit because of its extensive occurrence on the Macon Ridge.

The degree of species diversity varies among the different forest survey units. The lowland units have more even distribution of importance among species where no single species clearly outranks all others. In the North Delta unit 12 species account for three-fourths of the total importance value: loblolly pine, sweetgum, willow, water oak, overcup oak, willow oak, cottonwood, water hickory, sugarberry, green ash, Nuttal oak, and cedar elm. Seven species make up three-fourths of the total species importance in the South Delta unit: baldcypress, water tupelo, green ash,

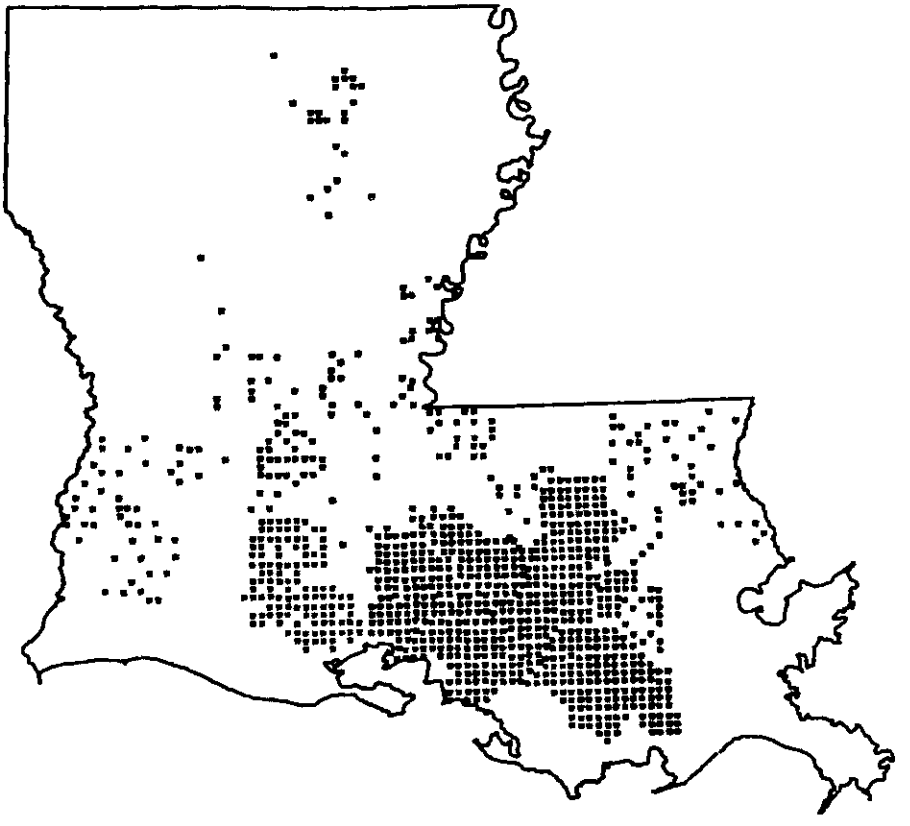

Figure 24.—*Distribution of water tupelo, Louisiana, 1984. Each dot represents 500,000 cubic feet.*

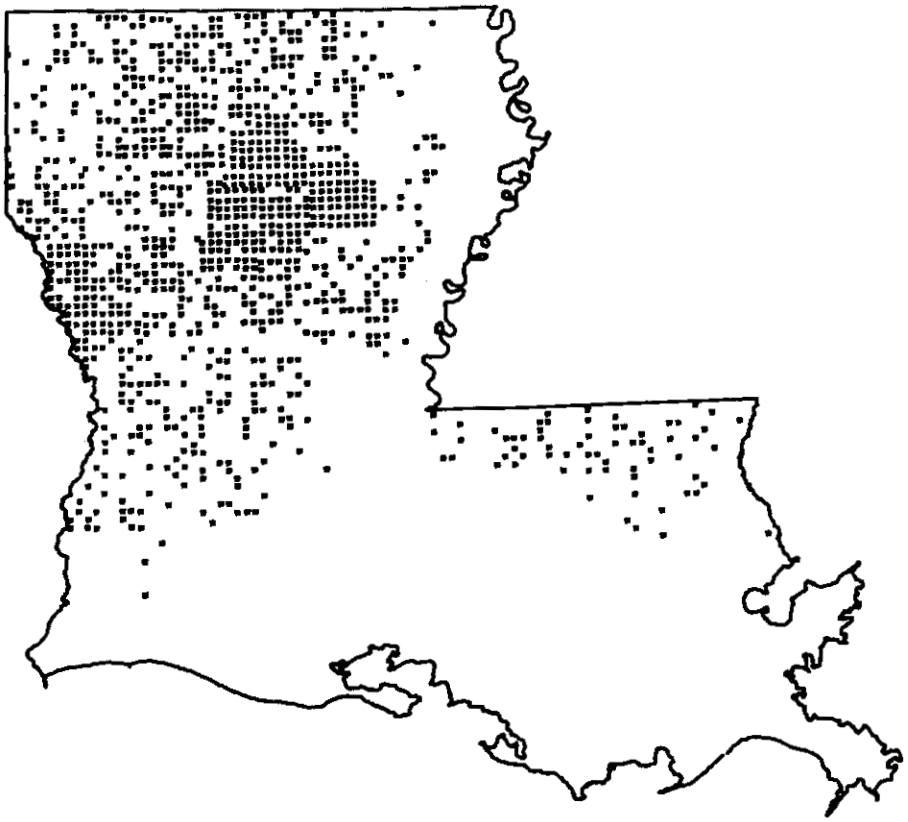

Figure 25.—*Distribution of white oak, Louisiana, 1984. Each dot represents 500,000 cubic feet.*

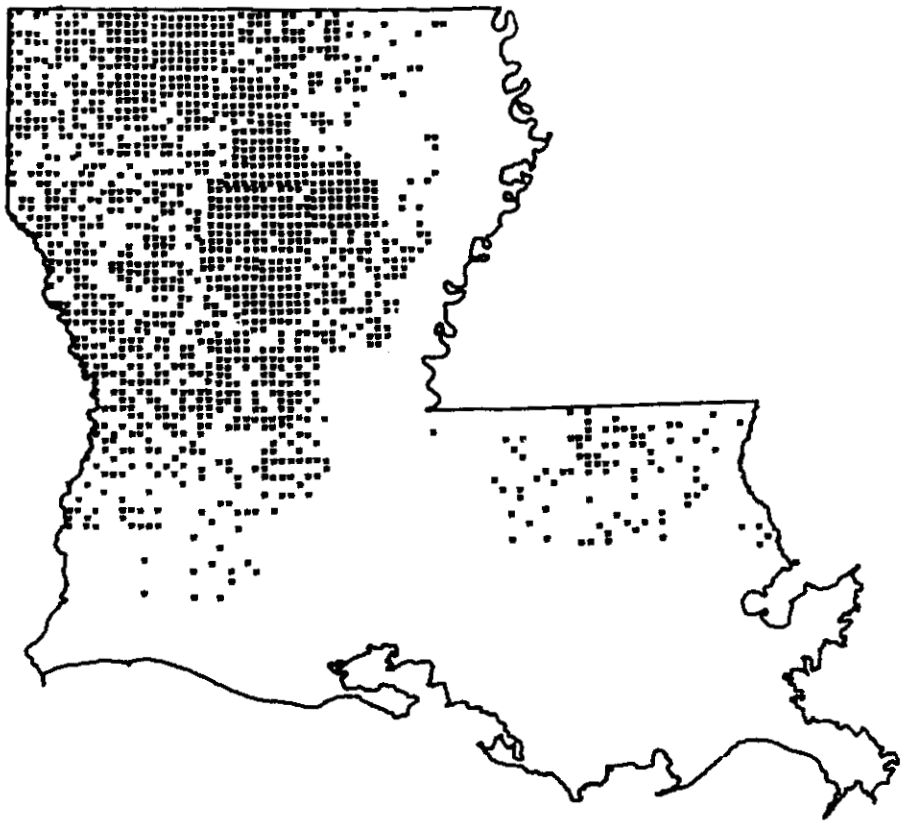

Figure 26.—*Distribution of southern red oak, Louisiana, 1984. Each dot represents 500,000 cubic feet.*

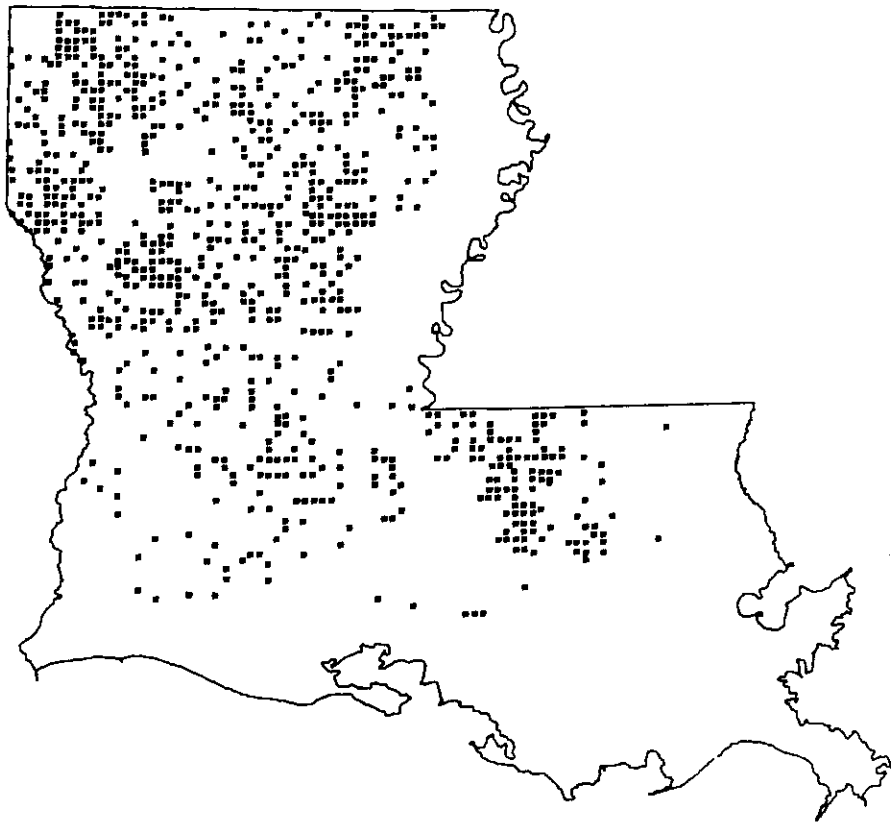

Figure 27.—*Distribution of cherrybark oak, Louisiana, 1984. Each dot represents 500,000 cubic feet.*

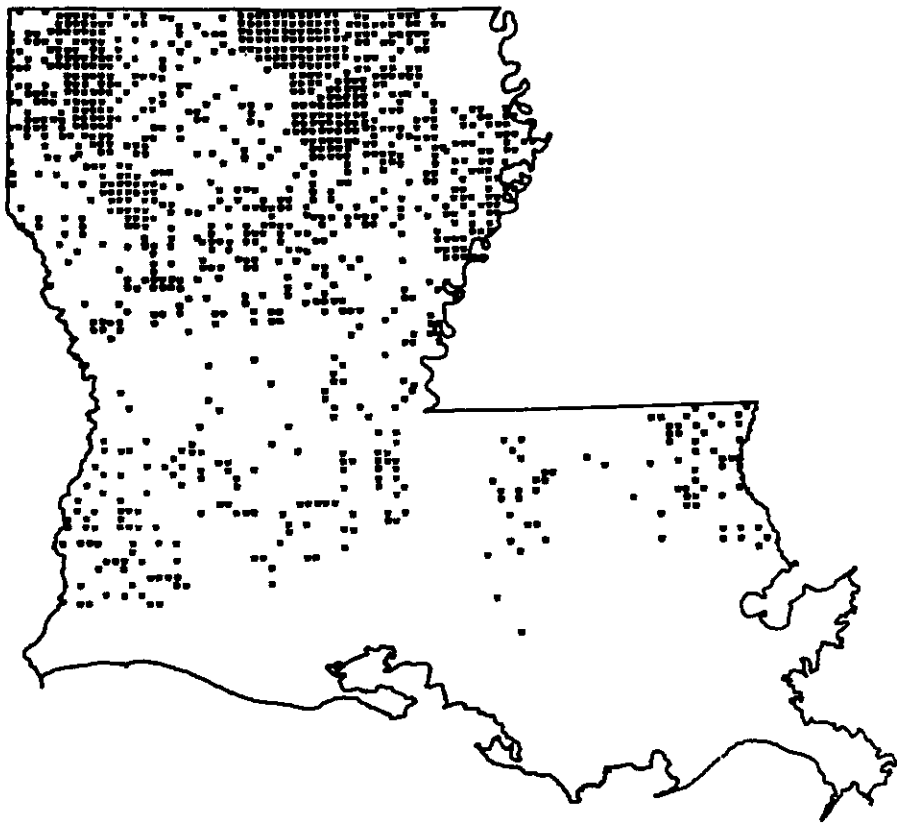

Figure 28.—*Distribution of willow oak, Louisiana, 1984. Each dot represents 500,000 cubic feet.*

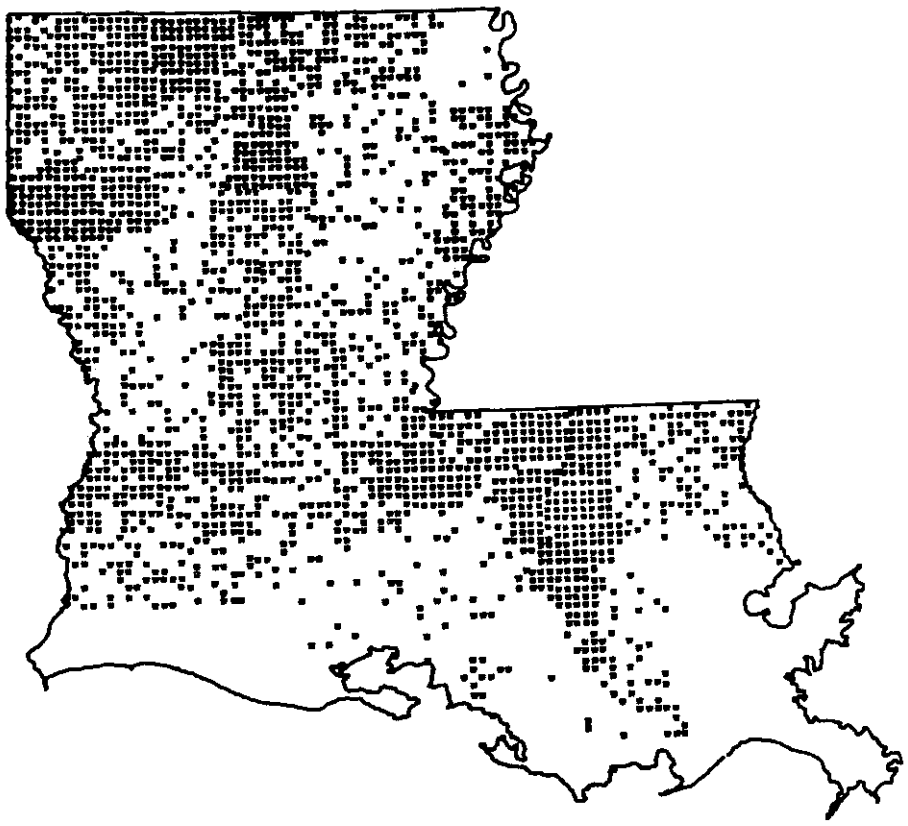

Figure 29.—*Distribution of water oak, Louisiana, 1984. Each dot represents 500,000 cubic feet.*

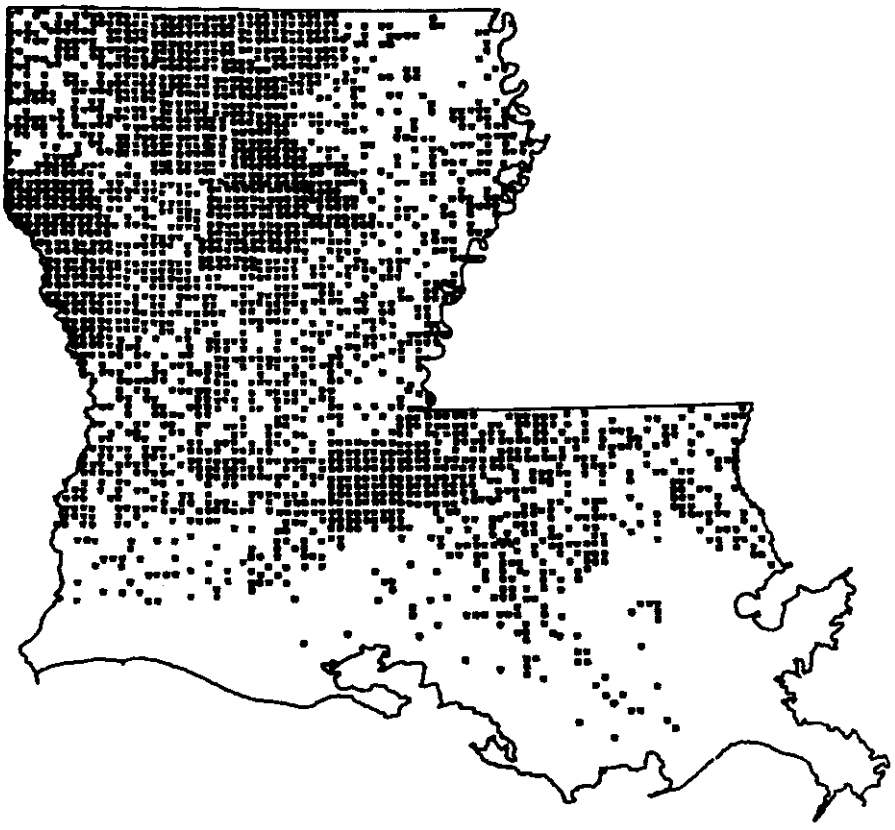

Figure 30.—*Distribution of sweetgum, Louisiana, 1984. Each dot represents 1,000,000 cubic feet.*

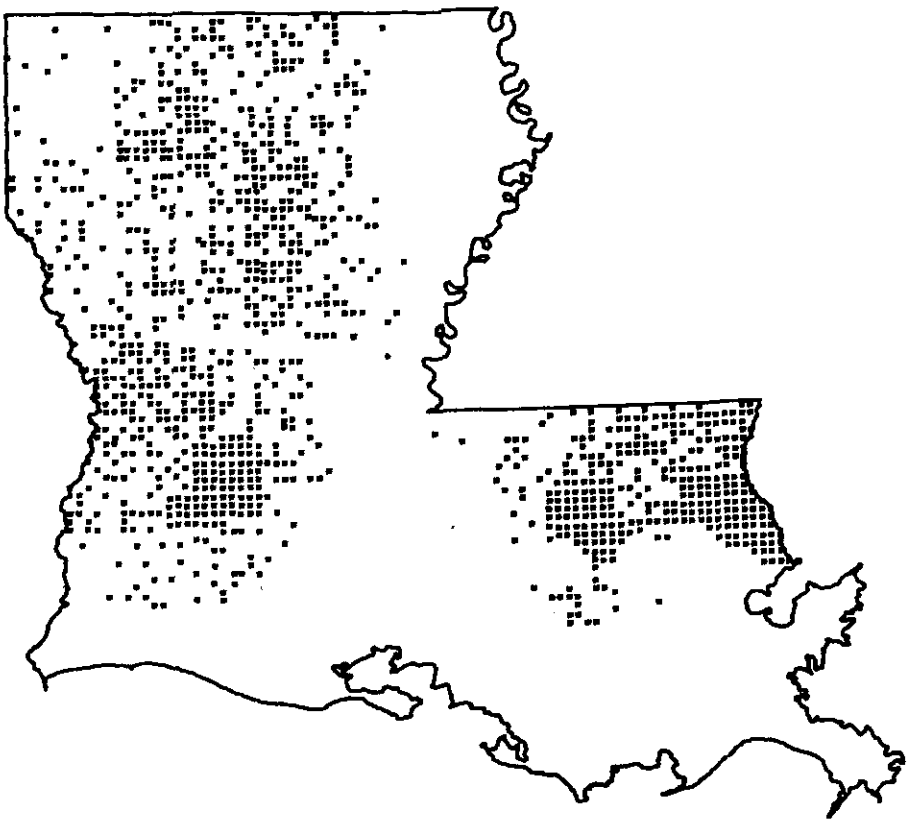

Figure 31.—*Distribution of blackgum, Louisiana, 1984. Each dot represents 500,000 cubic feet.*

willow, sweetgum, red maple, and sugarberry.

The upland units (Southwest, Southeast, and Northwest), are clearly dominated by loblolly pine. This species accounts for 41, 32, and 40 percent of the importance value, respectively, in each unit. Although the dominance of loblolly pine is substantial in these units, the remainder of importance is equally shared by the other species. Exception might be taken in the Northwest unit where sweetgum and shortleaf pine occupy important codominant positions below loblolly pine but clearly outrank the remaining species.

Change in Number of Trees

Since the 1974 inventory, there have been significant changes in the number of live trees by diameter class. The number of 2-, 4-, 6-, and 8-inch softwood trees has declined sharply (fig. 32) and the increase of trees 10 inches and larger is substantial. Increases were largest in the 16-, 18-, 22-, 24-, 28-, 30-inch, and greater-than-30-inch classes.

When changes between surveys are compared on a per-acre basis, the trend differences remain but they shift somewhat (fig. 33). Comparing the number of trees between surveys on a per acre basis takes into account the loss of timberland acreage that Louisiana experienced during the current survey period. The number of 2-, 4-, 6-, and 8-inch softwoods is still down from that reported in 1974 but not as much as total number of trees. It appears that approximately 4 percent of the declines in these diameter classes can be attributed to acreage declines. This carries over into the larger diameter classes where the increases in number of softwoods per acre are higher than the change in total number of trees.

The number of hardwoods changed since the 1974 survey but not as dramatically as softwoods. Most significant was the decline of trees in the 4-inch diameter class. Notable increases in the number of hardwoods were most evident in the 22-inch diameter class and larger.

On a per-acre basis, small hardwoods declined 11 percent while larger hardwood diameter classes rose 7 percent. In all likelihood, the increase in the number of stems in the larger size-classes accounts for most of the decrease in the number of smaller stems. Because of increased overstory competition, there is simply less space for saplings and smaller trees. Consequently, a decrease in the number of larger trees should be correlated with a corresponding increase in the number of saplings. This type of density-dependent relationship (Harper 1977) does not account for all the decrease in small-sized trees. When dealing with the forest at a

Table XV.—*Ranking of species[1] importance by volume, forest survey units, and State, Louisiana, 1984*

North Delta		South Delta		Southwest	
Species	Volume[2]	Species	Volume[2]	Species	Volume[2]
loblolly pine	221.342	baldcypress	1,336.033	loblolly pine	2,808.775
sweetgum	219.156	water tupelo	902.196	slash pine	628.453
willow sp.	130.199	green ash	415.715	sweetgum	585.124
water oak	95.391	willow sp.	400.670	*longleaf pine*	393.019
overcup oak	93.980	sweetgum	378.787	shortleaf pine	303.859
willow oak	91.916	red maple	374.464	water oak	211.525
cottonwood	83.550	sugarberry	290.846	southern red oak	201.831
water hickory	79.129	water oak	193.663	black tupelo	177.010
sugarberry	73.549	American elm	117.028	post oak	131.138
green ash	61.340	water hickory	110.923	white oak	130.649
Nuttall oak	57.666	loblolly pine	110.674	cherrybark oak	109.717
cedar elm	48.286	Nuttall oak	106.424	American beech	105.810
American sycamore	40.893	cottonwood	85.977	hickory sp.	98.309
American elm	29.981	overcup oak	62.884	red maple	86.309
cherrybark oak	27.806	boxelder	60.961	laurel oak	72.776
honey locust	24.587	American sycamore	45.514	baldcypress	66.167
baldcypress	23.715	pecan	40.451	bluebeech	64.617
southern red oak	23.602	cherrybark oak	32.953	green ash	62.311
pecan	21.539	hickory sp.	23.976	willow oak	60.336
white oak	20.307	willow oak	22.549	sweetbay	50.209
boxelder	19.883	*other noncommercial species*	19.643	water tupelo	46.014
American beech	14.445	slippery elm	15.139	water hickory	45.126
winged elm	11.949	live oak	14.847	overcup oak	44.785
white ash	10.579	*shortleaf pine*	14.763	swamp chestnut oak	38.870
slash pine	10.369	swamp chestnut oak	13.159	flowering dogwood	38.199
persimmon	9.810	water-elm	12.868	blackjack oak	32.269
shortleaf pine	9.745	bluebeech	12.333	pecan	29.957
hickory sp.	9.397	pondcypress	11.759	winged elm	29.178
water tupelo	7.761	laurel oak	11.287	ironwood	23.724
post oak	7.280	water locust	10.696	*southern magnolia*	20.322
slippery elm	6.235	black tupelo	9.989	Nuttall oak	20.060
laurel oak	6.162	honey locust	9.850	hawthorn	19.852
swamp chestnut oak	6.006	winged elm	8.905	American *holly*	19.149
ironwood	5.148	post oak	8.238	sugarberry	16.120
hawthorn	4.747	persimmon	7.622	white ash	15.449

red maple	4.676
black tupelo	4.603
water locust	4.198
bluebeech	4.160
flowering dogwood	4.153
black oak	4.070
Delta post oak	4.025
water-elm	3.059
pondcypress	2.953
yellow-poplar	1.502
black cherry	1.086
southern magnolia	0.727
sourwood	0.716
blackjack oak	0.673
plums, cherries (except black cherry)	0.325
gum bumelia	0.296
sassafras	0.279
red mulberry	0.213
Florida maple	0.204
eastern redcedar	0.183
Shumard oak	0.090

white ash	6.867
hawthorn	5.198
American beech	4.889
flowering dogwood	4.863
yellow-poplar	4.801
swamp tupelo	4.092
Shumard oak	3.772
white oak	3.759
cedar elm	2.725
ironwood	2.716
redbay	2.627
red mulberry	2.358
Florida maple	1.970
sassafras	1.791
black cherry	1.433
spruce pine	1.141
Delta post oak	1.041
pin oak	0.928
southern red oak	0.913
river birch	0.876
sourwood	0.600
southern magnolia	0.449
American holly	0.432
white basswood	0.396
plums, cherries (except black cherry)	0.235
chinaberry	0.201
blackjack oak	0.077

slippery elm	11.627
black cherry	11.606
swamp tupelo	11.134
American elm	11.018
sassafras	6.726
sourwood	6.426
water-elm	5.885
other noncommercial species	5.078
American sycamore	4.932
willow sp.	4.918
honey locust	4.706
sparkleberry	4.459
persimmon	3.821
black oak	3.749
plums, cherries (except black cherry)	3.455
redbay	3.268
bluejack oak	3.132
Florida maple	2.793
yellow-poplar	2.623
American basswood	2.297
Shumard oak	2.092
water locust	1.859
swamp white oak	1.520
red mulberry	1.513
boxelder	1.400
pond pine	1.357
river birch	1.334
live oak	1.228
pin oak	1.098
eastern redcedar	0.986
chinkapin	0.754
Osage orange	0.716
black locust	0.604
sugar maple	0.444
chinaberry	0.346
bigleaf magnolia	0.314
eastern redbud	0.123
southern redcedar	0.036

Table XV.—*Ranking of species[1] importance by volume, forest survey units, and State, Louisiana, 1984—(Continued)*

Southeast		Northwest	
Species	Volume[2]	Species	Volume[2]
loblolly pine	967.508	loblolly pine	3,198.898
slash pine	194.868	sweetgum	860.172
sweetgum	194.090	shortleaf pine	830.306
water oak	172.635	water oak	353.473
black tupelo	144.746	southern red oak	283.120
spruce pine	129.934	willow oak	252.774
baldcypress	118.823	white oak	206.022
laurel oak	113.972	hickory sp.	188.189
water tupelo	111.732	post oak	161.289
shortleaf pine	62.689	cherrybark oak	143.861
swamp tupelo	61.712	black tupelo	127.489
red maple	58.229	overcup oak	117.896
longleaf pine	51.433	baldcypress	109.346
yellow-poplar	50.888	red maple	107.627
bluebeech	47.537	American beech	82.360
cherrybark oak	40.916	winged elm	76.789
green ash	34.167	water hickory	66.232
sweetbay	31.679	green ash	65.081
willow oak	31.461	bluebeech	59.657
swamp chestnut oak	27.864	laurel oak	38.226
American beech	27.595	American elm	37.160
white oak	27.176	slash pine	35.921
southern red oak	25.798	flowering dogwood	35.406
hickory sp.	25.283	ironwood	35.388
post oak	22.941	sugarberry	30.687
water hickory	22.478	sweetbay	27.774
southern magnolia	21.690	Nuttall oak	25.097
flowering dogwood	18.442	white ash	24.786
pondcypress	17.231	swamp chestnut oak	24.405
American elm	12.226	longleaf pine	21.624
black cherry	10.796	black cherry	20.027
American sycamore	10.013	hawthorn	18.647
other noncommercial species	9.053	American holly	16.430
winged elm	8.194	cottonwood	15.507
American holly	7.609	willow sp.	14.876
ironwood	6.965	cedar elm	14.650
overcup oak	6.069	black oak	13.725
sourwood	6.033	water tupelo	13.688
persimmon	5.249	persimmon	12.728
live oak	5.192	sassafras	10.990
willow sp.	5.184	swamp tupelo	9.711
river birch	5.111	Shumard oak	9.162
water-elm	3.988	honey locust	8.355
blackjack oak	3.493	red mulberry	7.766
sassafras	3.024	pecan	7.517
redbay	2.656	white basswood	7.493
sugarberry	2.553	American sycamore	6.704
honey locust	2.406	water-elm	6.023
chinkapin oak	2.364	plums, cherries (except black cherry)	5.660
cottonwood	2.318	Florida maple	5.521
hawthorn	2.252	eastern redcedar	4.349
black oak	1.329	river birch	3.452
pecan	1.142	black locust	3.335
pin oak	1.052	American basswood	3.088
white ash	1.013	boxelder	2.867
red mulberry	0.871	southern magnolia	2.799
cucumbertree	0.798	red bay	2.724
Nuttall oak	0.624	sourwood	2.658
sparkleberry	0.588	yellow-poplar	2.629
eastern redcedar	0.441	Delta post oak	2.623
plums, cherries (except black cherry)	0.324	slippery elm	2.580
chinaberry	0.292	blackjack oak	2.402
apple sp.	0.291	other noncommercial species	2.197
slippery elm	0.265	water locust	2.031
chinkapin	0.041	sparkleberry	1.998

Table XV.—*Ranking of species[1] importance by volume, forest survey units, and State, Louisiana, 1984—(Continued)*

	Northwest - Continued	
	Species	Volume[2]
	sugar maple	1.987
	chinaberry	1.914
	southern redcedar	1.206
	bluejack oak	1.131
	eastern redbud	1.116
	swamp white oak	0.689
	chinkapin	0.625
	black walnut	0.337
	bigleaf magnolia	0.114
	hackberry	0.067
	chestnut oak	0.038

Table XV.—*Ranking of species[1] importance by volume, forest survey units, and State, Louisiana, 1984—(Continued)*

	State		
Species	Volume[2]	Species	Volume[2]
loblolly pine	7,307.197	black cherry	44.949
sweetgum	2,237.329	American holly	43.620
baldcypress	1,654.084	persimmon	39.230
shortleaf pine	1,221.362	blackjack oak	38.914
water tupelo	1,081.392	other noncommercial species	35.972
water oak	1,026.687	slippery elm	35.846
slash pine	869.610	pondcypress	31.943
green ash	638.613	water-elm	31.823
red maple	631.305	black oak	23.913
willow sp.	555.847	sassafras	22.811
southern red oak	535.265	live oak	21.267
longleaf pine	466.076	water locust	18.784
blackgum	463.835	sourwood	16.434
willow oak	459.037	Shumard oak	15.116
sugarberry	413.755	red mulberry	12.720
white oak	387.913	redbay	11.274
cherrybark oak	355.253	river birch	10.773
hickory sp.	345.154	Florida maple	10.488
post oak	330.885	plums, cherries (except black cherry)	9.998
overcup oak	325.614	white basswood	7.889
water hickory	323.888	sparkleberry	7.046
laurel oak	242.422	Delta post oak	6.648
American beech	235.099	eastern redcedar	5.959
Nuttall oak	209.871	American basswood	5.386
American elm	207.412	bluejack oak	4.263
blue beech	188.303	black locust	3.938
cottonwood	187.352	pin oak	3.078
winged elm	135.014	chinaberry	2.753
spruce pine	131.075	sugar maple	2.431
swamp chestnut oak	110.304	chinkapin oak	2.364
sweetbay	109.661	swamp white oak	2.209
American sycamore	108.057	chinkapin	1.420
flowering dogwood	101.062	pond pine	1.357
pecan	100.605	southern redcedar	1.242
swamp tupelo	86.648	eastern redbud	1.240
boxelder	85.111	cucumbertree	0.798
ironwood	73.940	Osage orange	0.716
cedar elm	65.661	bigleaf magnolia	0.428
yellow-poplar	62.442	black walnut	0.337
white ash	58.693	gum bumelia	0.296
hawthorn	50.696	apple sp.	0.291
honey locust	49.904	hackberry	0.067
southern magnolia	45.988	chestnut oak	0.038

[1] Scientific names can be cross referenced in species list in Appendix.

[2] Values are net cubic foot volume in million cubic feet for all live trees $\geq$ 1.0 inch in diameter at breast height.

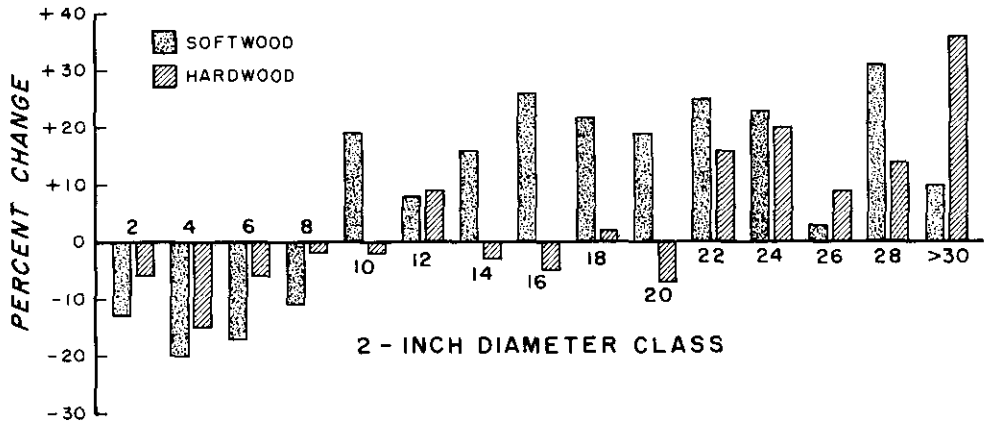

Figure 32.—*Percent change in total number of live trees between 1974 and 1984 Louisiana surveys.*

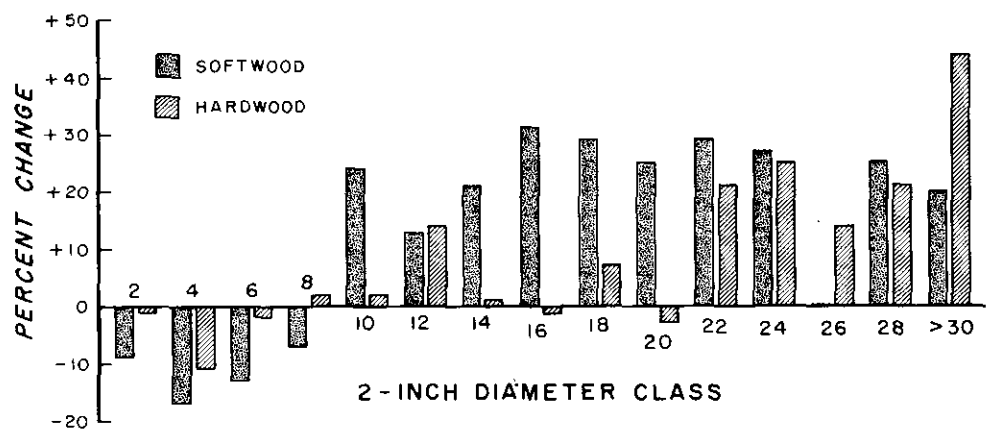

Figure 33.—*Percent change in number of live trees per acre between 1974 and 1984 Louisiana surveys.*

State-wide level, lack of regeneration after cutting can also cause significant decreases in the number of small trees.

Basal Area

Basal area of all live trees by diameter class for the State and individual units is illustrated in figures 34a-34f. The small amount of basal area in the larger stems is obvious. At the State level, only 29 percent of the basal area is in trees in the 16-inch diameter class and larger. Although having recovered substantially from an all-time low inventory in the late 1920's and early 1930's, Louisiana's forest as a whole is still in a cutover condition. Currently, the forests in the State are not properly balanced to provide a sustained yield of larger dimension timber. An intensively managed forest should carry much more basal area in the larger diameter classes to provide a sustained supply of suitable merchantable products. Recommended basal areas are in the range of 4 to 8, 6 to 10, 6 to 11, 7 to 12, and 8 to 12 square feet per acre for the 16-, 18-, 20-, 22-, and 24-inch diameter classes, respectively (Putnam et al. 1960, Meyer 1952, Eyre and Zillgitt 1953, Gilbert and Jenson 1958). Although Louisiana's forest has a fairly adequate stocking level of 90 square feet per acre, 50 percent of this is in the 10-inch diameter class and smaller.

Unit trends are similar to that at the State level. The exception is the South Delta unit (117 square feet of basal area per acre). Here, a large proportion of basal area is in the mid-diameter ranges as these stands continue to recover from the heavy cutting that occurred up through the 1930's. Even today, these stands show signs of disturbance evidenced by a high proportion of basal area in the smaller diameter classes coupled with the relatively low basal area per acre for the entire unit. Other studies suggest that the cypress-tupelo type should be much higher in basal area (Ewel and Odum 1984).

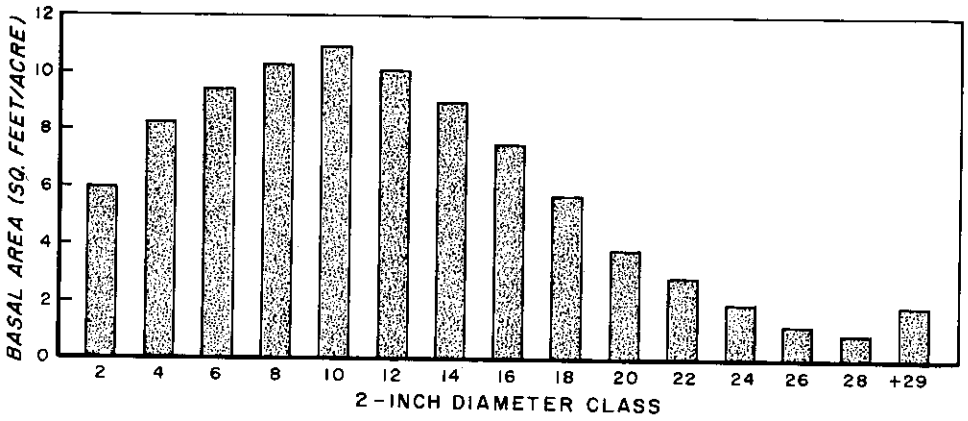

Figure 34a.—*Basal area of all live trees by diameter class, Louisiana, 1984.*

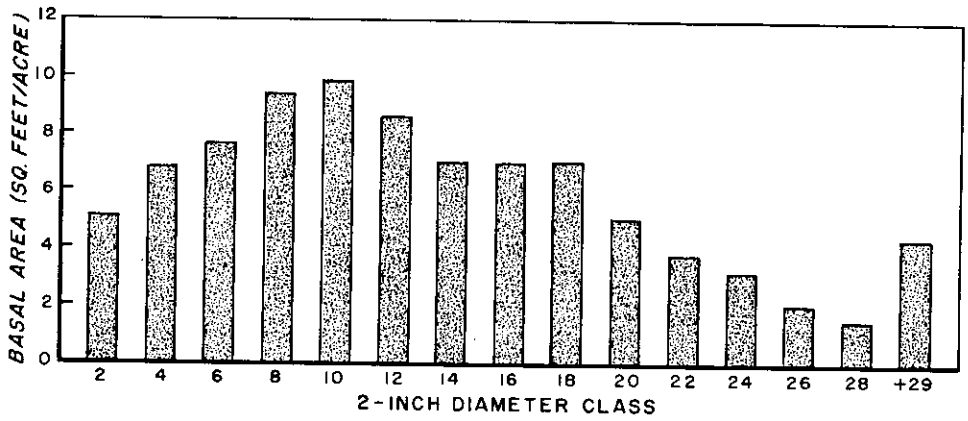

Figure 34b.—*Basal area of all live trees by diameter class, North Delta unit, Louisiana, 1984.*

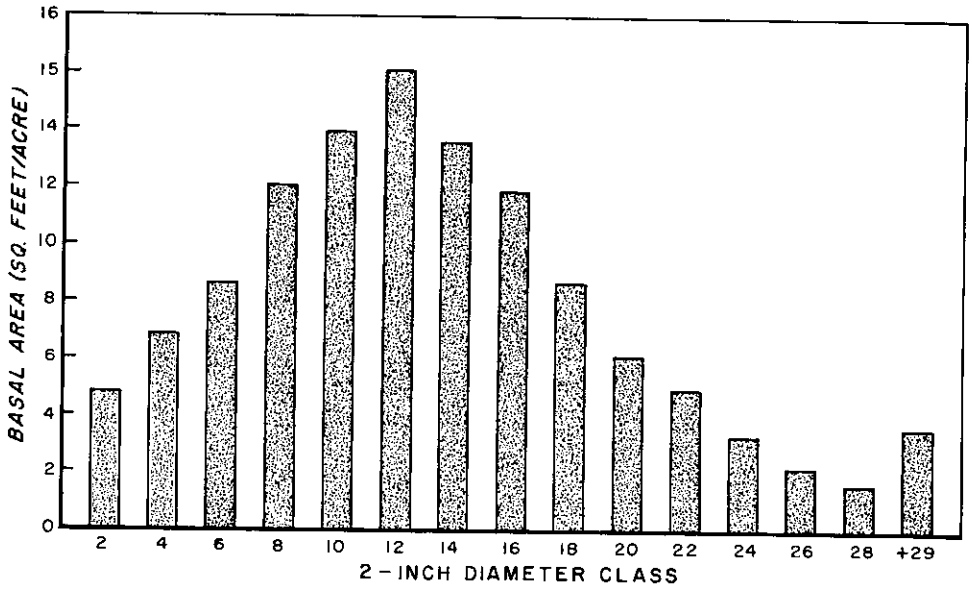

Figure 34c.—*Basal area of all live trees by diameter class, South Delta unit, Louisiana, 1984.*

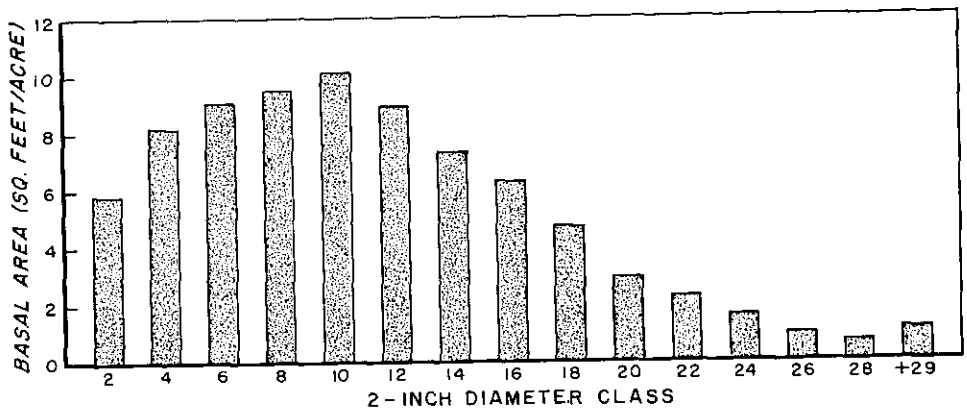

Figure 34d.—*Basal area of all live trees by diameter class, Southwest unit, Louisiana, 1984.*

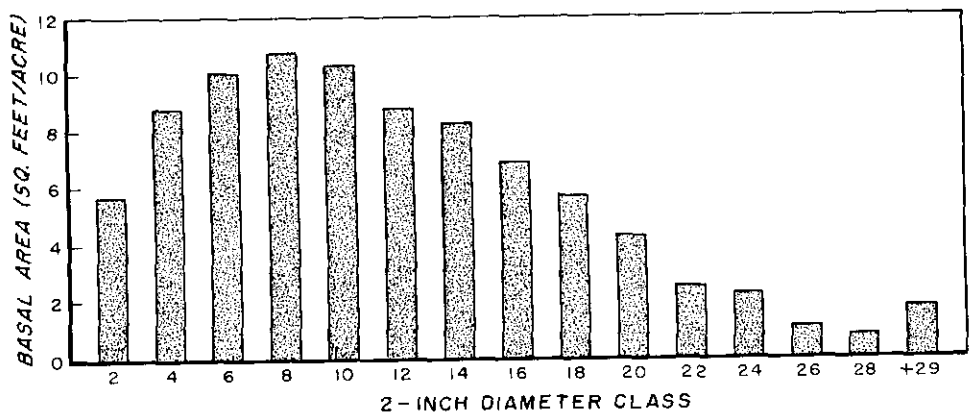

Figure 34e.—*Basal area of all live trees by diameter class, Southeast unit, Louisiana, 1984.*

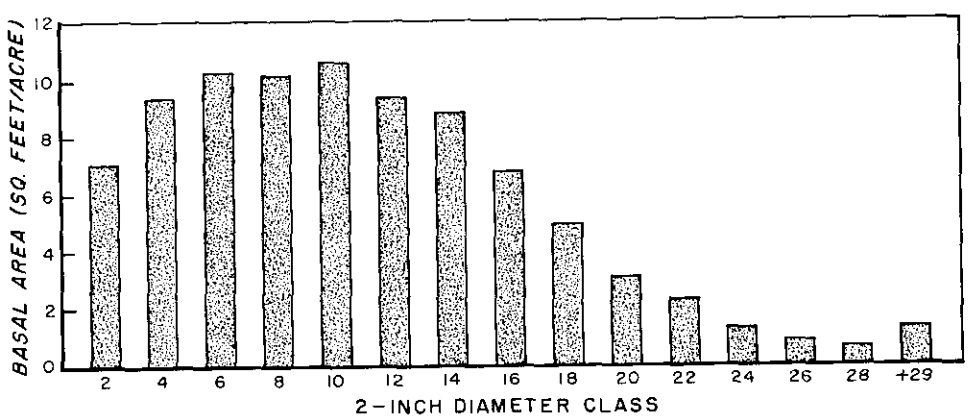

Figure 34f.—*Basal area of all live trees by diameter class, Northwest unit, Louisiana, 1984.*

GROWTH, REMOVALS, AND MORTALITY

Growth can be visualized in two ways: (1) growth of an individual tree or the mean growth of a collection of individual trees, and (2) growth of an entire stand of trees. Growth of an individual tree is fairly straight forward. It is reflected by the increase in bole diameter and increase in bole length, both of which are dependent on the biotic and abiotic environment of the forest. Stand growth is more complex in that it deals not only with increases in bole diameter and bole length but also with changes in tree population structure and timberland acreage fluctuations. That is, stand growth includes the realm of tree population dynamics. Additions to the tree population occur through regeneration and when individual trees reach or surpass an arbitrarily defined minimum dimension threshold. In addition, timberland acreage will increase when nonforest land reverts to forest, thus bringing established trees into the tree population. Likewise, the tree population can be reduced by the mortality of individual trees, either through disease, insect, injury, stress, and age or through the cultural practice of cutting trees. In addition,the tree population is reduced by conversion of timberland to agriculture, urban, or other nonforest uses; this plays a significant role by reducing the amount of acreage on which trees can grow.

Growth reported in FIA publications always implies stand growth, using volume (cubic feet or board feet) as the unit of measure. Stand growth is the periodic annual increment rather than current, average, or mean annual increment. Periodic annual increment is the measure of increase in merchantable volume of growing-stock trees divided by the number of years in the survey period. Trees are susceptible to mortality because of suppression (competition) in the earlier stages of stand development and because of natural or cultural causes (cutting) as stands approach maturity. Thus, growth of a timber stand cannot be found by assuming all trees alive now will survive. Rather, it is the net increase in stand volume after natural losses are deducted. Gross growth may be useful as a measure of site potential and for use as a guide in minimizing losses due to insect and disease.

An improvement in the procedure for computing growth and removals has been implemented for the current Louisiana survey. In effect, this eliminates the "imbalance" problem at the State level ("imbalance" refers to the volume of the initial inventory plus computed net growth for the period, not equaling the volume of the second inventory). However, as the data are broken into smaller and smaller subsets, the increase in sampling error will mask the balance. The change in method of computing growth and removals is significant and may affect the validity of comparing these estimates with those of previous survey periods.

Some confusion surrounds the question of "imbalance" when computing growth estimates from horizontal point sampling data. In previous surveys, net growth was always calculated on trees from the past inventory and, when added to the past inventory volume, the sum did not always equal the new inventory volume. There were several reasons for this. First, growth was computed on survivor trees (see Appendix for definitions of growth component trees) of the first inventory. Second, ingrowth was then added to computed growth to give gross growth. Third, volume for the second inventory was based upon trees tallied at the second inventory which included new, nongrowth trees not included in the growth computations of the first survey. In essence, this was an entirely new sample and was not comparable with the first survey. Just as one would not expect two sets of fixed plots to be equal in volume, a prism point sampled at two different times will not be equal. With prism sampling, even though the sample point is the same, time changes the plot "size" because of the addition of nongrowth trees. In fixed plot sampling, time brings change only through ingrowth (regeneration) and growth on survivors because the plot boundary does not change (Husch et al. 1982). Therefore, because nongrowth trees were not used in computing growth, one would not expect the computation of growth plus the volume of the first survey to equal the volume of a new sample.

To solve this problem for the current Louisiana survey, ongrowth and nongrowth trees were included in the growth calculations. In the past, the survivor and ingrowth component of growth came from the time 1 portion of the sample. Currently, ongrowth and nongrowth trees, from time 2, are also included in the growth component. Ongrowth trees, trees that were submerchantable and out (on the 37.5 basal area factor prism) at time 1 but merchantable and in (on the 37.5 basal area factor prism) at time 2, are part of the ingrowth component. Nongrowth trees, trees that are merchantable and out at time 1 but merchantable and in at time 2, are included in the survivor growth component (Van Deusen et al 1986).

Six components are used to compute growth: (1) growth on survivors—the growth on growing-stock trees present in the initial inventory that survive to the end of the inventory period, plus nongrowth trees; (2) ingrowth — the volume of trees that attain growing-stock size (5.0 inches in diameter) during the inventory period, plus ongrowth trees; (3) growth on cut—the growth on growing-stock trees that were cut (harvested) before the end of the inventory period; (4) growth on mortality—the growth on growing-stock trees that died before the end of the inventory period, from the first inventory up to the time of death; (5) mortality—the net volume of trees that have died before the end of the inventory period; (6) cull increment—a measure of trees going from an acceptable class at time 1 to a

rough or rotten class at time 2 (table XVI and table XVII). Trees may also pass from the rough or rotten class to the acceptable class, though rarely. In that instance cull increment would be an addition to growth for the inventory period. This condition usually results from a smaller tree being classed rough or rotten during the initial inventory due to the relative percentage of cull defect. Then, through growth and containment of the defect, the percentage of cull is reduced to an acceptable level in relation to the total tree.

To obtain removal estimates, prior Louisiana surveys used information from an industry canvass of timber received or produced, and from records of severance taxes paid on timber products removed. This information came solely from the calendar year prior to the field work of the survey. Currently, the removals estimates are derived entirely from field survey data, the same as growth and mortality information. Growth, removal, and mortality estimates are now all periodic averages and statistically compatible.

There are three growth classes commonly reported by FIA: (1) gross growth—the total growth in volume for the survey period. This includes growth on mortality trees up until their time of death; (2) net growth—gross growth minus mortality; and (3) net change—net growth minus removals. Net change is real change in stand conditions and may be positive when net growth exceeds removals, or negative when removals exceeds net growth.

Softwood Growth

Gross growth of softwood growing stock in the 10 years since the 1974 survey has been 600 million cubic feet annually, 43.2 cubic feet per acre (table XVIII). This is a statistically significant decline from the 644 million cubic feet or 44.3 cubic feet per acre reported for the survey period between 1964 and 1974. Growth comparisons between surveys in this and subsequent sections are judged statistically significant or insignificant on the basis of the periodic annual estimate, not the per-acre estimate. On an annual basis, gross growth of softwood sawtimber for the current survey period is 2,850 million board feet, or 205.4 board feet per acre (table XIX). This is a nonsignificant change from the 2,787 million board feet (191.9 board feet per acre) reported in the preceding survey.

Softwood growing-stock net growth since the 1974 survey has been 545 million cubic feet annually, or 39.3 cubic feet per acre. This compares to 604 million cubic

Table XVI.—*Components of annual change in the volume of growing stock by species group and forest survey units, Louisiana, 1974-1984*[1]

Forest survey units	Species group	Growth component								
		Survivor growth[2]	Ingrowth[3]	Growth on removals	Growth on mortality	Cull increment	Mortality	Timberland removals	Land-clearing removals	Net change
		Million cubic feet								
North Delta	Softwood	9.7	1.4	2.9	0.2	0.5	−0.9	−11.0	−0.1	2.6
	Hardwood	40.0	2.6	2.6	1.0	−0.4	−8.3	−13.1	−22.9	1.5
	Total	49.7	4.0	5.5	1.2	0.1	−9.2	−24.2	−23.0	4.1
South Delta	Softwood	24.6	1.1	0.4	0.1	−1.4	−1.5	−3.3	−1.7	18.4
	Hardwood	85.9	6.3	1.9	3.9	−8.6	−27.9	−12.6	−10.8	38.0
	Total	110.5	7.4	2.3	4.1	−10.0	−29.4	−15.9	−12.5	56.4
Southwest	Softwood	172.5	21.2	41.9	4.3	−0.8	−20.4	−169.9	−6.2	42.6
	Hardwood	55.0	6.0	7.5	1.8	0.6	−10.8	−42.5	−6.8	10.8
	Total	227.5	27.2	49.4	6.1	−0.2	−31.2	−212.4	−12.9	53.4
Southeast	Softwood	61.4	7.2	8.7	1.2	−2.9	−6.8	−47.6	−6.1	15.1
	Hardwood	30.0	3.9	0.8	1.6	−3.3	−9.5	−6.8	−4.2	12.4
	Total	91.4	11.1	9.5	2.8	−6.3	−16.3	−54.4	−10.3	27.5
Northwest	Softwood	180.5	19.0	39.6	7.7	−0.7	−25.2	−172.8	−13.1	35.0
	Hardwood	103.2	9.5	9.4	2.6	4.5	−17.6	−51.2	−7.5	52.9
	Total	283.7	28.5	49.0	10.3	3.8	−42.8	−224.0	−20.6	87.9
All units	Softwood	448.6	49.8	93.4	13.5	−5.4	−54.6	−404.5	−27.1	113.7
	Hardwood	314.1	28.3	22.1	10.8	−7.1	−74.1	−126.1	−52.2	115.8
	Total	762.7	78.1	115.5	24.3	−12.5	−128.7	−530.6	−79.3	229.5

[1] Rows and columns may not sum due to rounding.
[2] Includes nongrowth trees.
[3] Includes ongrowth trees.

Table XVII.—*Components of annual change in the volume of sawtimber by species group and forest survey units, Louisiana, 1974-1984*[1]

Forest survey units	Species group	Growth component								
		Survivor growth[3]	Ingrowth[4]	Growth on removals	Growth on mortality	Cull increment	Mortality	Timberland removals	Land-clearing removals	Net change
		Million board feet[2]								
North Delta	Softwood	40.8	13.3	10.0	0.0	2.9	0.0	−43.2	−0.3	23.6
	Hardwood	138.6	44.9	9.1	3.7	0.6	−30.5	−52.2	−73.1	41.2
	Total	179.4	58.3	19.1	3.7	3.5	−30.5	−95.4	−73.4	64.8
South Delta	Softwood	120.0	17.0	2.2	0.4	−4.5	−3.1	−15.7	−6.7	109.7
	Hardwood	244.0	116.8	6.8	11.0	−25.7	−73.3	−41.9	−30.9	206.8
	Total	364.0	133.8	9.1	11.4	−30.2	−76.4	−57.5	−37.6	316.5
Southwest	Softwood	615.1	290.1	161.1	14.7	−1.5	−66.3	−717.8	−23.8	271.6
	Hardwood	131.0	68.0	21.8	3.7	7.9	−27.5	−123.2	−17.8	64.0
	Total	746.1	358.1	182.9	18.4	6.4	−93.8	−841.0	−41.6	335.6
Southeast	Softwood	229.6	86.5	40.4	5.5	−11.2	−22.4	−214.7	−21.6	92.2
	Hardwood	72.7	40.1	2.9	2.7	−7.4	−23.2	−20.3	−13.7	53.7
	Total	302.3	126.6	43.2	8.2	−18.6	−45.6	−235.0	−35.3	145.9
Northwest	Softwood	727.1	274.2	192.7	21.8	1.5	−80.2	−803.8	−56.7	276.6
	Hardwood	241.6	106.5	33.3	7.8	16.0	−53.8	−160.7	−16.3	174.4
	Total	968.7	380.7	226.0	29.6	17.5	−134.0	−964.5	−73.0	451.0
All units	Softwood	1,732.6	681.1	406.4	42.4	−12.9	−171.9	−1,795.1	−109.1	773.5
	Hardwood	827.8	376.3	73.9	28.8	−8.5	−208.3	−398.2	−151.7	540.1
	Total	2,560.4	1,057.4	480.3	71.2	−21.4	−380.2	−2,193.3	−260.8	1,313.6

[1] Rows and columns may not sum due to rounding.
[2] International ¼-inch rule.
[3] Includes nongrowth trees.
[4] Includes ongrowth trees.

Table XVIII.—*Growing-stock growth in cubic feet per acre per year by growth classes and by softwood and hardwood, Louisiana, 1964-1974 and 1974-1984*

Growth class	Softwood		Hardwood	
	1964-1974	1974-1984	1964-1974	1974-1984
	Cubic feet			
Gross growth	44.3	43.2	27.1	26.5
Net growth	41.6	39.3	22.4	21.2
Net change	11.2	8.2	11.3	8.3

Table XIX.—*Sawtimber growth in board feet per acre per year by growth classes and by softwood and hardwood, Louisiana, 1964-1974 and 1974-1984*

Growth class	Softwood		Hardwood	
	1964-1974	1974-1984	1964-1974	1974-1984
	Board feet[1]			
Gross growth	191.9	205.4	95.1	93.6
Net growth	182.7	193.0	79.2	78.6
Net change	35.7	55.8	28.4	38.9

[1] International ¼-inch rule.

feet (a significant decline) or 41.6 cubic feet per acre, annually, for the 1964 to 1974 survey period. The net growth change for sawtimber volume was nonsignificant between the past and present survey periods, 2,654 million board feet versus 2,678 million board feet, 182.7 and 193.0 board feet per acre, respectively.

The comparison of net change between the past and present survey periods should especially be used with caution because of the different methods used to derive removal estimates. However, generalized trends should be valid. Currently, the periodic annual net change of softwood growing-stock volume is +114 million cubic feet per year, +8.2 cubic feet per acre. This is a 30-percent decline compared to data for net change from the survey period of 1964 to 1974. Net change, then, was a volume increase at a rate of 163 million cubic feet, 11.2 cubic feet per acre per year. Softwood sawtimber volume net change for the current survey period is increasing at a rate of 774 million board feet, 55.8 board feet per acre compared to 518 million board feet, 35.7 board feet per acre in the preceding survey period. The net change of sawtimber volume in softwoods has increased 49 percent over that of the previous survey period.

Highest gross growth rates for softwood growing stock are in the Northwest and Southwest units at 55.9 and 54.1 cubic feet per acre, respectively (table XX). These two units also have the highest net growth in the State. However, highest increases of net change are in the Southwest and Southeast units with 9.6 and 8.6 cubic feet per acre, respectively. The high rate of removals has dropped the Northwest unit to third in the State ranking in net change.

Hardwood Growth

Gross growth for hardwood growing stock is currently 368 million cubic feet per year, 26.5 cubic feet per acre per year, for the State (table XVIII). This is a significant decline from the 394 million cubic feet per year, 27.1 cubic feet per acre, reported in 1974. Sawtimber gross growth also declined significantly from 1,382 million board feet in 1974 to 1,298 million board feet, currently. On a per-acre basis, that represents a drop from 95.1 board feet per acre per year to 93.6 board feet per acre per year between 1974 and 1984 (table XIX).

Hardwood growing-stock net growth has also declined slightly from 22.4 cubic feet per acre per year in 1974 to 21.2 cubic feet per acre per year currently (table XVIII). This is a significant decline from 325 million cubic feet per year in 1974 to 294 million cubic feet per year in 1984. Sawtimber net growth also declined slightly from 79.2 board feet per acre per year to 78.6 board feet per acre per year (table XIX). Total board foot net growth fell from 1,150 million board feet in 1974 to 1,090 million board feet in 1984, a significant change.

Hardwood growing-stock net change also decreased, from 11.3 cubic feet per acre in 1974 to 8.3 cubic feet per acre in 1984 (table XVIII). This is a total volume drop from 164 million cubic feet per year to 116 million cubic feet per year at the present time. However, sawtimber net change increased between survey periods from 28.4 board feet per acre per year to 38.9 board feet per acre per year (table XIX). This is a total volume change from 412 million board feet per year in 1974 to 540 million board feet in 1984, a 31 percent increase.

Highest gross growth in the State is in the North Delta unit at 50.1 cubic feet per acre per year (table XXI). Next are the South Delta and Northwest units at 37.4 and 29.4 cubic feet per acre per year. The North Delta unit is also highest in net growth, followed by the South Delta and Northwest units, all at 41.1, 25.7, and 25.4 cubic feet per acre, respectively. However, because of high rates of land clearings and removals, the North Delta unit drops to last in the State in the volume net change category. The net change is an addition in volume of only 1.6 cubic feet per acre per year. The South Delta and Northwest units are greatest with net changes of 15.9 and 12.0 cubic feet per acre per year, respectively.

Table XX.—*Softwood growing-stock growth in cubic feet per acre per year ranked in descending order by forest survey units for gross growth, net growth, and net change, Louisiana, 1974-1984*

Gross growth		Net growth		Net change	
Unit	Cubic feet per acre	Unit	Cubic feet per acre	Unit	Cubic feet per acre
Northwest	55.9	Northwest	50.2	Southwest	9.6
Southwest	54.1	Southwest	49.5	Southeast	8.6
Southeast	43.2	Southeast	39.3	Northwest	7.9
North Delta	16.1	North Delta	15.1	South Delta	7.7
South Delta	10.4	South Delta	9.7	North Delta	3.0

Table XXI.— *Hardwood growing-stock growth in cubic feet per acre per year ranked in descending order by forest survey units for gross growth, net growth, and net change, Louisiana, 1974-1984*

Gross growth		Net growth		Net change	
Unit	Cubic feet per acre	Unit	Cubic feet per acre	Unit	Cubic feet per acre
North Delta	50.1	North Delta	41.1	South Delta	15.9
South Delta	37.4	South Delta	25.7	Northwest	12.0
Northwest	29.4	Northwest	25.4	Southeast	7.1
Southeast	18.8	Southwest	13.6	Southwest	2.5
Southwest	16.1	Southeast	13.4	North Delta	1.6

Growing-Stock Removals

Between 1974 and 1984, 610 million cubic feet of softwood and hardwood growing-stock volume were removed per year in Louisiana. Of this, 531 million cubic feet were removed by harvesting and 79 million cubic feet were removed by land-clearings. The Northwest and Southwest units, by far, had the highest amounts of harvesting removals at 224 and 212 million cubic feet per year, respectively. Eighty-two percent of the State's growing-stock harvesting was within these two units. The highest amounts of land-clearing removals were in the North Delta unit, 23 million cubic feet per year, followed by the Northwest unit at 21 million cubic feet per year.

Most of the harvesting in the State was softwoods, 76 percent. In land-clearing removals, 66 percent were hardwoods.

Fifty-two percent of softwood growing-stock removals were from nonindustrial private lands while 40 percent came from forest industry lands. Only 8 percent came from public lands. Hardwood removals were even higher on nonindustrial private lands, 63 percent, with 31 percent coming from forest industry lands. Six percent of hardwood removals were from public lands.

Of the 432 million cubic feet of annual softwood removals in the State, only 1 percent was baldcypress, the remainder was in the southern yellow pines. Currently, only one mill is handling cypress timber in the State. Forty-seven percent of the annual 178 million cubic feet of hardwood removals were in the oak genus and 20 percent were in sweetgum.

Sawtimber Removals

More than 2,454 million board feet of softwood and hardwood sawtimber were removed per year from Louisiana timberlands between 1974 and 1984. Of this, 2,193 million board feet were removed by harvesting and 261 million board feet by land-clearing. Again, the Northwest and Southwest units had the highest amounts of removals in the State, 964 and 841 million board feet per year, respectively. The highest amounts of sawtimber removed by land-clearing were in the North Delta and Northwest units, each at 73 million board feet per year. Over one-half of the State's land-clearing sawtimber removals were in these two units.

Eighty-two percent of the sawtimber harvesting removals were softwoods, while 58 percent of the sawtimber land-clearing removals were hardwoods.

Forty-nine percent of softwood sawtimber removals were from nonindustrial private lands, 42 percent from forest industry lands, and 9 percent from public lands. In hardwood sawtimber removals, nonindustrial private lands had an even larger contribution with 61 percent of the State's saw-log volume coming from such lands. Only 33 percent of sawtimber volume came from forest industry lands and 6 percent from public lands.

All of the softwood sawtimber removals were from the southern yellow pines except for 1 percent from baldcypress. The oak genus comprised 47 percent of hardwood sawtimber removals and sweetgum 20 percent. The remaining sawtimber removals were dispersed among several species of which only the hickories comprised a substantial amount, 9 percent, of the State's hardwood removals.

Growth-to-Removal Ratio

The growth-to-removal ratio is an indicator of the balance between growth and removals. Theoretically, as the ratio approaches 1.00 the probability of local shortages of specific forest resources becomes higher, because it is highly unlikely that the remaining depleted forest resource is evenly distributed throughout the given area in question at any specific time.

Growing stock growth-to-removal ratios for the State during the 1974 to 1984 survey period have been greatest on other public land (1.96), followed by nonin-

dustrial private land (1.58), and National forest land (1.35); the lowest ratio was on forest industry land (1.04). for sawtimber, respective ratios are 2.23, 1.87. 1.61, and 1.05.

Regionally, growing stock growth-to-removal rations were highest in the South Delta unit (2.99). The lowest ratio was in the North Delta unit where a shrinking timberland base caused by land-clearings, along with substantial harvest removal, has lowered the ratio to 1.09. The Southeast, Northwest, and Southwest units were fairly similar in their growth-to-removal ratios of 1.43, 1.36, and 1.25, respectively.

Sawtimber ratios were also highest in the South Delta unit (4.33). The North Delta and Southwest units had the lowest ratios, both 1.38. The Southeast and Northwest units had growth-to-removal ratios of 1.54 and 1.43, respectively.

Mortality

Between 1974 and 1984, Louisiana lost 129 million cubic feet per year of growing stock to mortality, an increase of 18 percent over the previous survey period. Fifty-eight percent of this volume is in hardwood trees. However, most of the increase in mortality over the previous survey can be attributed to softwoods. Softwood mortality increased from 40 million to 55 million cubic feet per year, a 38 percent increase whereas hardwood mortality only increased 7 percent, from 69 million cubic feet per year to 74 million cubic feet per year.

The greatest incidence of mortality is in the South Delta unit at 12.3 cubic feet per acre per year. The North Delta unit is next highest at 10.1 cubic feet per acre per year followed by the Northwest, Southeast, and Southwest units at 9.7, 9.3, and 7.1 cubic feet per acre per year, respectively.

The annual mortality of sawtimber trees has been 380 million board feet, only a 4 percent increase. All of this increase over the last survey period can be attributed to softwood sawtimber mortality which rose 29 percent. Hardwood sawtimber mortality decreased to 10 percent.

While many agents cause mortality, the major categories are insects, disease, fire, and weather. These are especially significant on older trees, mostly larger pole-size and saw-log size trees. On younger trees, suppression is the major causal agent of mortality, especially when initial densities of newly established stands are high.

When the field work for the Louisiana survey was initiated the Southern Pine Beetle infestations were not significant in the State. Therefore, no special assessment was made of the impact of this agent on the resource by survey field crews. Statewide, the losses would be a small portion of the total volume. However, the impact locally could be significant due to the clumping nature of Southern Pine Beetle outbreaks.

TIMBER MANAGEMENT OPPORTUNITIES

Forest Productivity

The average acre of timberland in Louisiana has the potential for growing 114 cubic feet of growing-stock volume per acre per year (table XXII). This estimate is based on site class, which represents potential growth for fully-stocked natural stands at the culmination of mean annual increment of species appropriate to the site. The current estimate of potential productivity represents an apparent 23 percent increase over potential productivity in 1974. Potential productivity may appear to fluctuate between surveys

Table XXII.—*Periodic annual gross growth and potential productivity[1] of timberland by forest survey units, Louisiana, 1974-1984*

Forest survey units	Gross growth	Potential productivity	Gross growth as proportion of potential
	Cubic feet/acre/year		*Percent*
North Delta	66	141	47
South Delta	48	94	51
Southwest	70	114	61
Southeast	62	114	54
Northwest	85	120	71
All units	70	114	61

[1] Based on site class.

as new site trees are bored at each remeasurement. Depending on the situation, trees that are superior or inferior to trees of the previous survey may cause change in the potential productivity of the site. Gross growth of growing stock averaged 70 cubic feet per acre per year or 61 percent of potential growth. Growth as a percent of potential was highest in the Northwest unit (71 percent) and lowest in the North Delta unit (51 percent).

Current Forest Conditions

Stocking characteristics of Louisiana's timberland have changed somewhat since the previous inventory. Increases took place in both the area of severely-overstocked (greater than 130 percent) and understocked (less than 60 percent) stands. Decreases occurred in the moderately-overstocked (100 to 130 percent) and optimally stocked (60 to 100 percent) categories (fig. 35). Statewide, the area of severely-overstocked timberland nearly doubled. Two-thirds of the increase in these stands occurred in pine types. Understocked stands increased by 24 percent and now occupy 4,047,500 acres. Most of the increase in understocked stands occurred in the oak-hickory type. Such stands commonly result when oak-pine stands undergo pine-selection cuts and subsequently are converted to the oak-hickory type. Over one-half of the understocked acreage is classified as bottomland hardwoods.

Another change related to stocking occurred in cull stands (60 percent or more stocked with rough and rotten trees). The area of cull stands nearly tripled, increasing from 518,100 to 1,415,100 acres between 1974 and 1984.

Site occupancy, expressed as basal area per acre of all live trees, increased at the state level since 1974 (table XXIII). However, examination of changes in basal area by tree class shows that an increase has occurred in the occupancy of rough and rotten trees at the expense of growing-stock trees. This trend is most apparent for hardwoods in the bottomland hardwood and loblolly-shortleaf forest types. At the survey unit level, the occupancy of growing-stock trees has increased in the North Delta, South Delta, and Southeast units. The occupancy of rough and rotten trees increased in all survey units but is most pronounced in the South Delta and Southeast units.

Pine Stands

Currently, 8,680,100 acres are classified as capable of supporting pine timber. The area of pine sites declined only slightly since 1974 (by 1 percent). The area of pine site timberland supporting oak-pine and oak-hickory stands shows no significant change since 1974 and is presently 43 percent of the total. The opportunity still exists for conversion of such stands to pure pine.

There has been a trend toward more intensive pine management, particulary pine plantations establishment, over the past decade. Planting records document a steady increase in plantations, especially on forest industry land (fig. 36). Pine plantations total 1,470,800 acres, an increase of 5 percent. Most of the increase resulted from planting of loblolly pine. The area of plantations in the longleaf-slash forest type decreased since the previous survey.

An additional 494,100 acres of plantations are classified as oak-pine, oak-hickory, and bottomland-

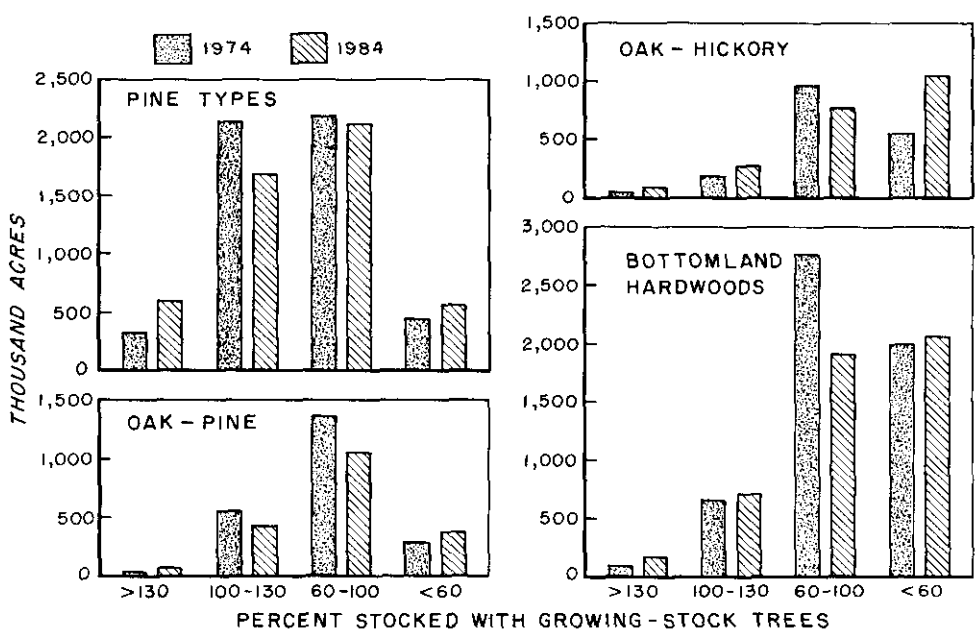

Figure 35.—*Area of timberland by forest type and stocking class, Louisiana, 1974 and 1984.*

Table XXIII.—*Average basal area per acre of live trees by forest type and survey units, Louisiana, 1974 and 1984*

Species group and forest type	Tree class 1984			Tree class 1974			Tree class 1984			Tree class 1974		
	All trees	Growing stock	Rough & rotten	All trees	Growing stock	Rough & rotten	All trees	Growing stock	Rough & rotten	All trees	Growing stock	Rough & rotten
	Square feet per acre											
	State of Louisiana						Southwest					
Softwoods:												
Longleaf-slash	61.9	58.8	3.1	58.8	57.7	1.1	59.8	57.0	2.9	58.4	57.4	1.1
Loblolly-shortleaf	73.5	68.7	4.8	70.0	67.8	2.2	71.5	66.4	5.1	67.8	66.2	1.6
Oak-pine	33.8	31.7	2.1	32.6	31.6	1.0	34.8	32.9	1.9	32.8	32.1	0.7
Oak-hickory	7.8	7.2	0.6	9.6	9.2	0.4	7.6	7.0	0.6	9.6	9.4	0.2
Bottomland hardwoods[1]	16.3	13.9	2.4	13.0	11.2	1.8	7.3	6.6	0.7	8.7	7.3	1.3
All softwoods	37.0	34.2	2.8	34.7	33.2	1.6	43.1	40.3	2.8	42.2	41.1	1.1
Hardwoods:												
Longleaf-slash	4.5	2.0	2.4	5.2	2.8	2.4	4.0	1.7	2.2	4.6	2.5	2.2
Loblolly-shortleaf	23.0	13.1	10.0	23.7	16.0	7.7	20.0	10.9	9.1	23.7	15.2	8.5
Oak-pine	46.3	29.0	17.3	50.5	34.3	16.2	48.1	29.0	19.0	49.8	34.4	15.5
Oak-hickory	56.8	34.1	22.7	59.2	37.4	21.7	50.9	30.0	20.8	59.0	38.7	20.2
Bottomland hardwoods[1]	89.2	55.4	33.8	84.8	56.4	28.4	79.4	48.0	31.4	83.8	51.6	32.2
All hardwoods	53.1	32.4	20.6	53.8	35.7	18.1	36.3	21.3	15.0	40.3	25.9	14.4
All types	90.1	66.6	23.4	88.5	68.9	19.7	79.4	61.6	17.8	82.5	67.0	15.5
	North Delta						Southeast					
Softwoods:												
Longleaf-slash	75.0	75.0	...	151.6	151.6	...	73.6	68.8	4.8	54.1	53.6	1.0
Loblolly-shortleaf	78.4	74.8	3.6	69.7	68.2	1.4	67.7	62.8	4.9	61.3	59.5	1.8
Oak-pine	34.6	32.0	2.5	31.9	31.9	...	33.9	30.2	3.7	29.0	28.1	0.9
Oak-hickory	8.7	8.5	0.2	9.2	8.5	0.7	5.9	5.2	0.7	6.7	6.2	0.4
Bottomland hardwoods[1]	2.1	1.5	0.6	1.4	0.8	0.6	18.3	15.3	2.9	12.0	11.1	0.9
All softwoods	14.1	13.0	1.1	8.5	7.9	0.6	37.9	34.6	3.4	34.0	32.9	1.1
Hardwoods:												
Longleaf-slash	19.4	17.6	1.8	12.6	12.6	...	5.2	2.2	2.9	6.3	3.2	3.1
Loblolly-shortleaf	24.0	16.6	7.4	20.0	10.5	9.5	21.3	10.7	10.6	18.0	11.6	6.4
Oak-pine	43.6	29.7	13.9	56.0	42.2	13.8	42.2	23.7	18.4	46.5	26.8	19.7
Oak-hickory	48.3	28.5	19.9	54.2	32.4	21.9	55.3	27.6	27.7	45.2	25.6	19.6
Bottomland hardwoods[1]	89.7	62.4	27.3	83.5	59.9	23.6	100.8	61.4	39.4	94.8	62.4	32.4
All hardwoods	74.8	51.6	23.1	76.5	54.6	22.0	50.0	28.1	21.8	45.1	28.3	16.8
All types	88.9	64.6	24.2	85.0	62.5	22.6	87.9	62.7	25.2	79.1	61.2	17.9

	South Delta						Northwest					
Softwoods:												
Longleaf-slash	...	...	...	...	...	...	59.9	59.9	...	85.4	83.1	2.3
Loblolly-shortleaf	80.7	67.0	13.7	65.7	65.7	...	76.4	72.2	4.2	74.5	71.6	2.9
Oak-pine	36.6	36.6	...	56.3	56.3	...	32.9	31.1	1.8	33.2	31.9	1.3
Oak-hickory	1.7	1.7	...	3.7	3.7	...	9.2	8.5	0.7	11.3	10.8	0.5
Bottomland hardwoods[1]	25.9	22.3	3.6	20.7	18.0	2.6	7.4	5.9	1.5	8.6	7.2	1.4
All softwoods	26.3	22.6	3.1	21.0	18.5	2.5	41.2	38.7	2.5	42.4	40.5	1.9
Hardwoods:												
Longleaf-slash	...	...	...	...	...	...	17.5	10.2	7.3	9.3	6.1	3.2
Loblolly-shortleaf	43.0	29.5	13.6	19.1	14.1	4.9	25.4	15.0	10.5	25.7	18.3	7.4
Oak-pine	42.7	9.9	32.8	97.1	87.8	9.3	46.4	30.7	15.8	51.4	35.2	16.1
Oak-hickory	82.5	49.4	33.0	72.5	40.6	32.0	59.7	38.2	21.5	63.5	41.0	22.5
Bottomland hardwoods[1]	93.2	56.3	37.0	85.9	57.5	28.4	78.8	50.2	28.6	77.8	50.0	27.8
All hardwoods	91.1	55.0	36.2	84.4	56.3	28.1	45.8	28.9	16.9	47.3	31.7	15.6
All types	117.4	77.6	39.3	105.4	74.8	30.6	87.0	67.6	19.4	89.7	72.2	17.5

[1] Includes oak-gum-cypress and elm-ash-cottonwood forest types.

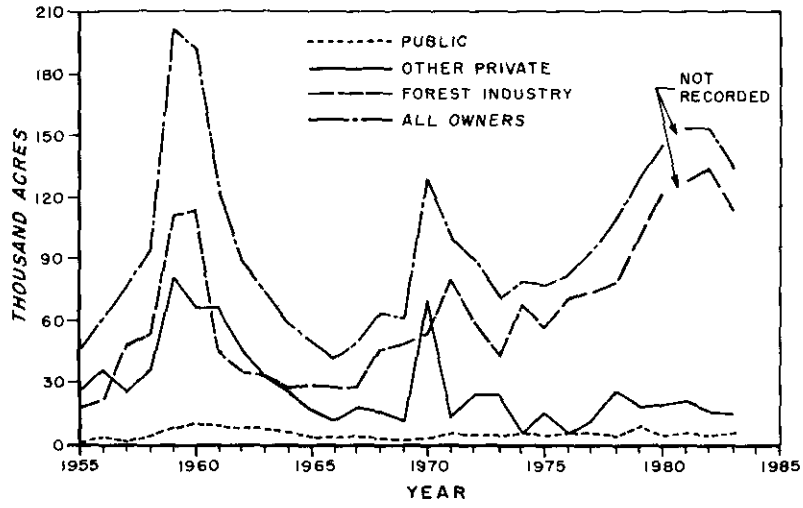

Figure 36.—*Acres of forest planting in Louisiana, 1955-1983.*

Table XXIV.—*Area of timberland classified as plantations by ownership class and forest type, Louisiana, 1984*[1]

Ownership class	All types	Longleaf-slash	Loblolly-shortleaf	Oak-pine	Oak-hickory	Bottomland hardwoods[2]
			Thousand acres			
Public	97.4	33.8	45.3	12.1	6.2	...
Forest industry	1,008.8	198.9	505.9	141.7	135.1	27.2
Nonindustrial private	858.6	311.2	375.6	67.3	75.4	29.1
All ownerships	1,964.9	544.0	926.8	221.1	216.7	56.3

[1] Rows and columns may not sum due to rounding.
[2] Includes oak-gum-cypress and elm-ash-cottonwood forest types.

hardwood forest types. This is because the pine component contributes less than 25 percent of total stocking (table XXIV). Hardwood control in the upland stands represents an opportunity for increasing future softwood production.

Most of the acreage in pine forest types (58 percent) is in good condition and requires no treatment (table XXV). An opportunity for commercial harvest exists on 900,600 acres of the pine stands. This recommendation is made for sawtimber stands containing in excess of 5,000 board feet (International 1/4-inch rule) of merchantable volume per acre. The bulk of the acreage is in natural stands on nonindustrial private land. Another 415,100 acres are inadequately stocked with growing-stock trees and need regeneration. Growth on this acreage will be considerably below potential if the area is left unmanaged. Thinning of poletimber stands is an opportunity on 312,200 acres of pine type timberland.

Fifty-six percent of Louisiana's oak-pine forest could be left to grow without additional treatment. Opportunities in the remaining stands lie mostly in improving stand quality in terms of the level of stocking and corresponding competition from undesirable trees. Regeneration activity is suggested for 330,900 acres to boost stocking and improve subsequent growth. Stocking control other than thinning is recommended for 274,200 acres of oak-pine stands. Such stands are adequately stocked with growing-stock trees but require removal of vegetation inhibiting the growth of crop trees.

Hardwood Stands

Bottomland hardwoods are Louisiana's most prevalent hardwood forest type. Substantial opportunity exists for improvement of these forests as two-thirds of the bottomland hardwood area (3,189,100 acres)

Table XXV.—*Area of timberland by forest class, ownership class, and treatment opportunity, Louisiana, 1984*[1]

Forest class and ownership classes	Total	No treatment	Stand Establishment		Intermediate treatments			Final harvest	
			Regenerate	Stand conversion[2]	Thin seedlings and saplings	Thin poletimber	Other stocking control	Regeneration cut	Salvage cut
	Thousand acres								
Pine plantation:									
Public	79.2	45.0	11.4	...	...	...	11.7	11.1	...
Forest industry	704.8	407.1	63.2	5.8	17.3	91.3	68.9	45.4	5.8
Nonindustrial private	686.9	396.8	50.9	5.5	17.4	52.4	28.3	118.2	17.4
Total	1,470.8	849.0	125.5	11.3	34.7	143.6	108.9	174.7	23.2
Natural pine:									
Public	395.0	277.4	35.4	...	...	...	11.2	71.0	...
Forest industry	986.8	548.4	57.9	...	11.4	88.9	79.3	177.0	23.9
Nonindustrial private	2,113.6	1,223.2	196.2	5.5	6.3	79.7	81.7	478.0	43.0
Total	3,495.7	2,049.1	289.6	5.5	17.8	168.6	172.2	726.0	66.9
Oak-pine:									
Public	160.3	107.0	11.2	...	...	...	12.0	24.6	5.5
Forest industry	635.5	377.4	88.1	...	5.6	17.6	106.5	15.3	25.0
Nonindustrial private	1,117.5	589.8	231.7	...	11.4	17.6	155.7	72.8	38.5
Total	1,913.4	1,074.2	330.9	...	17.0	35.3	274.2	112.7	69.1
Oak-hickory:									
Public	121.6	51.4	35.7	...	...	...	34.5	...	...
Forest industry	661.5	183.4	295.1	11.2	5.5	11.6	117.2	16.7	20.8
Nonindustrial private	1,387.5	447.2	587.0	30.1	...	48.0	158.1	17.3	99.8
Total	2,170.7	682.0	917.8	41.2	5.5	59.6	309.9	34.1	120.6
Bottomland hardwood:									
Public	574.5	167.0	242.2	...	...	5.5	22.2	22.6	115.0
Forest industry	614.3	231.0	185.3	16.9	...	14.2	10.9	34.0	122.0
Nonindustrial private	3,633.3	1,235.1	1,255.0	20.0	...	63.7	230.0	347.8	481.7
Total	4,822.3	1,633.2	1,682.6	36.9	...	83.4	263.1	404.4	718.7
All classes:									
Public	1,330.8	647.8	335.9	...	...	5.5	91.7	129.4	120.5
Forest industry	3,603.0	1,747.5	689.7	33.9	39.7	223.6	382.8	288.3	197.5
Nonindustrial private	8,938.7	3,892.1	2,320.8	61.1	35.1	261.4	653.8	1,034.0	680.4
Total	13,872.5	6,287.4	3,346.3	94.9	74.9	490.5	1,128.3	1,451.8	998.4

[1] Rows and columns may not sum due to rounding.

[2] Stands containing considerable stocking of damaged or diseased trees but with insufficient merchantable volume to warrant a salvage cut.

needs some form of treatment. Over one-half of the area recommended for treatment (1,682,600 acres) needs regeneration work due to inadequate stocking of growing-stock trees. An additional 718,700 acres are characterized by excessive damage to the merchantable stand. Salvable dead volume should be removed in these stands and regeneration should be undertaken to restore the stand's future merchantability. The decision to invest in bottomland hardwood stands should be tempered by consideration of treatment costs. Roughly one-fourth of the bottomland hardwood stands recommended for treatment are more than a mile from an all-weather road. Additional constraints exist that are related to operability in poorly-drained stands.

Louisiana's oak-hickory forest is often neglected due to higher priorities set for pine management. Much of the existing oak-hickory stands originated as oak-pine stands that were selectively logged for pine. In addition, pure pine stands that were not regenerated after harvesting became oak-hickory stands. More than two-thirds of Louisiana's oak-hickory stands would require some form of treatment to attain full vigor. Sixty-two percent of the area needing treatment requires regeneration (917,800 acres). Twenty-one percent is in need of stocking control to concentrate production on crop trees.

Management Activity

Since 1974, 2,853,800 acres of Louisiana timberland have shown evidence of some form of forest management. Three major areas were assessed by forest survey field crews: thinning, stand improvement, and site preparation. Most of the activity, 48 percent, involved some aspect of stand improvement. Only 903,900 acres showed signs of site preparation (table XXVI). This is a conservative estimate because field crews may have been sampling a clearcut area before site preparation activity commenced. However, there will, in all likelihood, be a slight shift from intensive site preparation techniques to natural stand regeneration in the future because of the increasing costs of the former. It appears that many companies are also finding it difficult to keep artificial stand establishment in pace with cutting.

The survey shows that 11,018,900 acres of timberland had no signs of management activity since 1974. As one would expect, nonindustrial private landowners showed least activity, 85 percent of their timberland was not involved in management activity. Public timberland was next with 79 percent showing no activity. Forest industry had 65 percent of its timberland showing no form of activity. Thirty-five percent of foresty industry timberland did have signs of management activity; site preparation and stand improvement accounted for 81 percent.

Clearly an opportunity exists for forest management on nonindustrial private timberlands in Louisiana. Most of this activity should be in the form of site preparation and regeneration on cutover timberland, in stand improvement on established stands with growing-stock trees, and finally in thinning operations on timberland that has been cut and replanted. All too often on private lands, once stand establishment has taken place, forest stands are left to stagnate and go through natural suppression cycles until harvest. Thinning speeds the succession process and is an important follow-up in a sound management plan. According to the stocking levels reported by the survey, 1,606,000 acres of overstocked poletimber stands need thinning.

Tract Size

Size of timberland may be important to management in terms of economic feasibility. The size of equipment, distance this equipment has to be moved, cost of labor, etc. all impact on management from regeneration to harvest. Small tracts require too much down time in relocating equipment between areas of operation.

Louisiana has 898,200 acres of timberland that could be considered nonoperable because of small tract size (100 acres or less) (table XXVII). Most of this acreage is in the bottomland hardwood forest types (386,500 acres), but a sizeable amount is also in the loblolly-shortleaf forest type (227,500 acres). Much of

Table XXVI.—*Area of timberland by management activity and ownership class, Louisiana, 1984*[1]

Ownership class	Management activity				
	All classes	None	Thinning operation	Stand improvement	Site preparation
	Thousand acres				
Public	1,330.8	1,054.0	48.0	188.1	40.7
Forest industry	3,603.1	2,335.4	240.8	497.4	529.5
Nonindustrial private	8,938.8	7,629.5	304.3	671.3	333.7
All ownerships	13,872.7	11,018.9	593.1	1,356.8	903.9

[1] Rows and columns may not sum due to rounding.

Table XXVII.—*Area of timberland by forest type and size of forest tract, Louisiana, 1984*[1]

Forest type	Size of forest tract (acres)							
	All classes	1-10	11-50	51-100	101-500	501-2,500	2,501-5,000	More than 5,000
	Thousand acres							
Longleaf-slash	933.2	...	12.1	12.4	71.2	376.4	195.7	265.4
Loblolly-shortleaf	4,033.2	34.3	109.4	83.8	661.3	1,642.9	887.8	613.8
Oak-pine	1,913.3	...	40.8	52.3	259.4	877.9	382.2	300.6
Oak-hickory	2,170.7	18.3	57.7	90.6	359.1	930.1	508.0	206.9
Oak-gum-cypress	4,377.6	58.7	125.8	146.9	542.4	1,141.0	925.0	1,437.7
Elm-ash-cottonwood	412.4	13.8	30.2	11.1	71.0	58.4	58.2	169.6
All types[2]	13,840.2	125.1	376.0	397.1	1,964.4	5,026.7	2,956.9	2,994.0

[1] Rows and columns may not sum due to rounding.
[2] Does not include 32,400 acres of nontyped timberland.

this small-tract timberland might be harvested with systems that utilize smaller equipment or it could be taken out of timber management altogether and utilized as a wildlife and aesthetic resource.

Most of Louisiana's timberland, however, is in tracts of 500 acres or larger. A total of 10,977,600 acres of timberland consists of such tracts and 5,950,900 acres of this is in tracts 2,500 acres and larger. The majority of this acreage is of the oak-gum-cypress (2,362,700 acres) and loblolly-shortleaf forest types (1,501,600 acres). There is ample opportunity for varying degrees of management in these stands. Unfortunately, the data do not adequately explain ownership tract sizes. For example, 2,500 acres, even though contiguous, might be divided among 10 different owners. More attention needs to be given to this important area in future surveys in order to give a more complete meaning to the term tract size.

TIMBER PRODUCTS OUTPUT

Louisiana's forest industries generated 583 million cubic feet of roundwood for use in the manufacture of timber products in 1983 (table XXVIII). Softwood output gained in all of the major product classes, including pulpwood, saw logs, and veneer logs. Hardwood pulpwood output increased but saw and veneer log output declined substantially.

Pulpwood

Pulpwood continues to dominate Louisiana's timber products output, accounting for 48 percent of total production. Pulpwood output was 3,459 thousand cords in 1983, an increase of 7 percent since 1973. Louisiana ranked fourth (behind Georgia, Alabama, and Mississippi) in total pulpwood production in the South in 1983 (Hutchins 1983). Softwoods represented 75 percent of the pulpwood harvest. Hardwood pulpwood output rose by 15 percent, reflecting increased demand for this product.

Pulpwood roundwood output is supplemented by residues generated by sawmills and other sources. Residues comprised 29 percent of the total pulpwood production from 1974 to 1983. Softwood roundwood output declined during the period, reaching a low of 2,027 thousand cords in 1977 and then increased to a high of 2,586 thousand cords in 1980 (fig. 37). Hardwood roundwood output remained relatively stable, averaging about 770 thousand cords per year.

Output of residues was erratic. Softwood increases occurred in the early part of the period, then declined. In 1983 a sharp increase took place. Hardwood residues remained somewhat stable until the period between 1979 and 1981 when they more than doubled. Subsequently, hardwood residues decreased to a level more consistent with the early part of the period.

Sawtimber

The last 10 years were an unstable period for the saw and veneer log industry in Louisiana (Louisiana Department of Natural Resources 1986). Fluctuations in sawtimber output were most severe for pine (fig. 38). Production climbed from 1,310 million board feet in 1975 to a high of 1,814 million board feet in 1977. Output of pine sawtimber plunged to a low of 1,239 million board feet in 1982, and then recovered in 1983 by increasing to roughly the average output level for the 10-year period.

Forest industries received 1,101 million board feet of saw logs from Louisiana's timberland in 1983. This amounted to a decrease of 6 percent compared to 1973.

Table XXVIII.—*Total output of timber products by product and species, Louisiana, 1983*

Product	Standard units	Volume in standard units			Volume in cubic feet		
		All species	Softwood[4]	Hardwood	All species	Softwood[4]	Hardwood
					Million cubic feet		
Saw logs[1]	Million board feet[2]	1,100.5	828.4	272.1	186.7	140.2	46.5
Veneer logs[1] and bolts	Million board feet[2]	692.5	685.3	7.2	108.4	107.2	1.2
Pulpwood[3]	Thousand cords	3,459.3	2,579.8	879.5	279.4	209.0	70.4
Posts, poles[1], and piling	Million board feet[2]	50.3	50.3	...	8.1	8.1	...
All products					582.6	464.5	118.1

[1] Based on severance tax estimates.
[2] International ¼-inch rule.
[3] From Hutchins, 1985.
[4] Includes cypress.

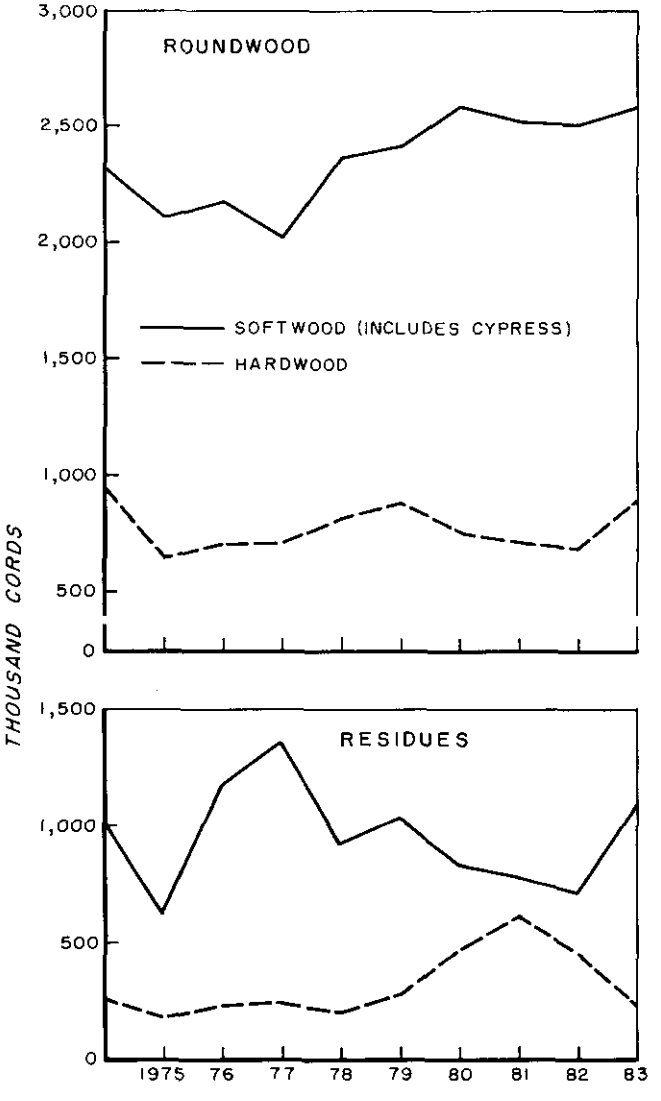

Figure 37.—*Pulpwood production by roundwood and residues, softwood and hardwood, Louisiana, 1975-1983.*

The softwood component of 828 million board feet represented three-fourths of the total and increased by 1 percent over 1973. The 1983 hardwood saw-log production of 272 million board feet, conversely, declined by 22 percent from 1973 levels.

Louisiana has 20 fewer sawmills than a decade ago (fig. 39). The decline in the number of sawmills is due primarily to two recessions in the wood products industry over the past decade. Additionally, buy-outs and company mergers caused consolidation of some facilities. The average annual production per mill is approaching 8 million board feet. Fifty-four of the 118 mills are classified as large sawmills producing over 3 million board feet annually. Twenty of these mills exceed 10 million board feet per year and account for approximately 50 percent of the total saw-log production.

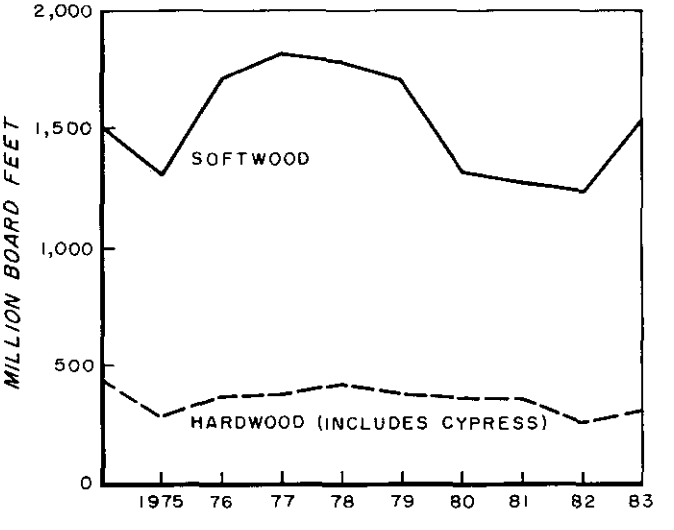

Figure 38.—*Output of sawtimber products in Louisiana, 1974-1983.*

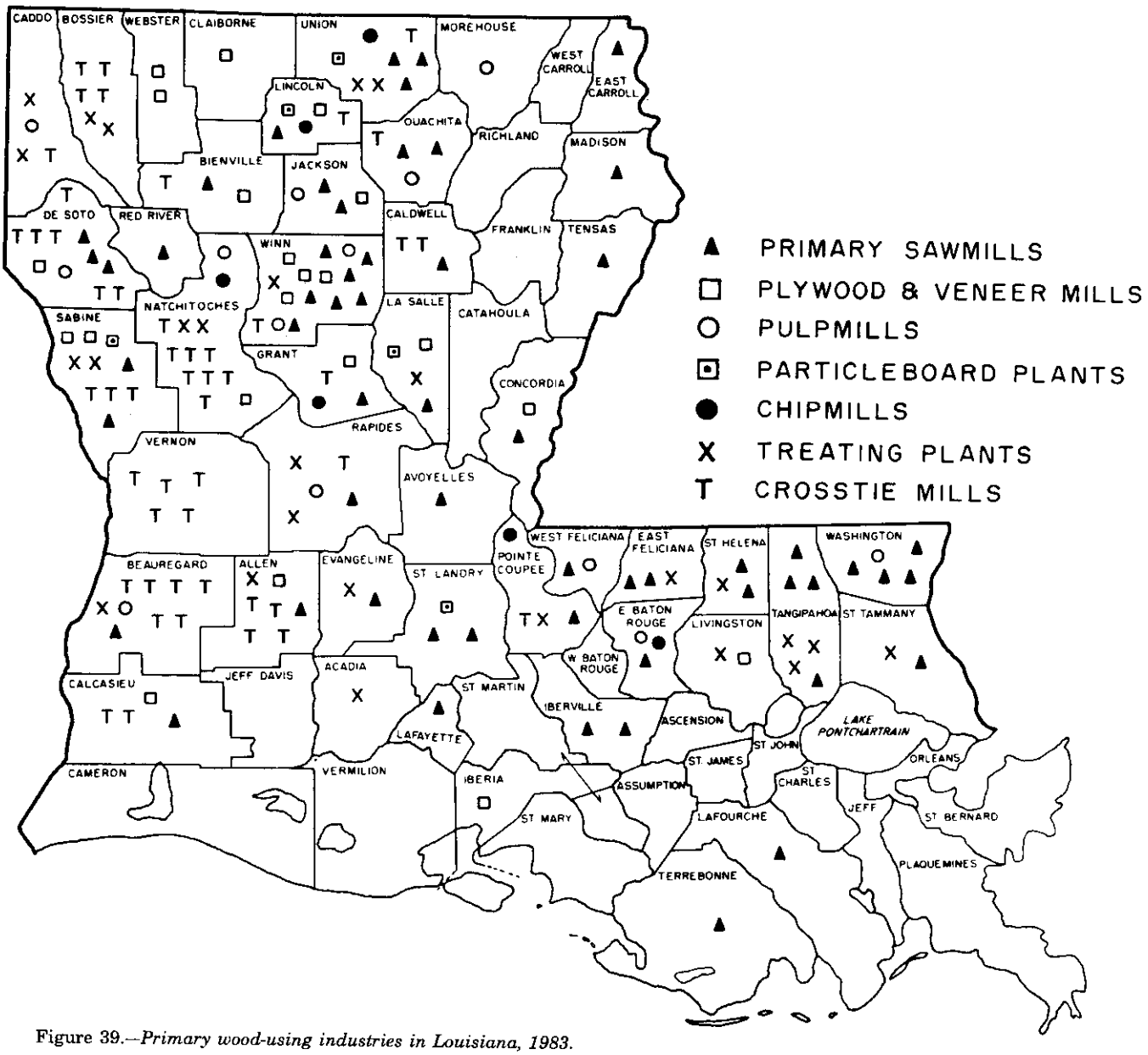

Figure 39.—*Primary wood-using industries in Louisiana, 1983.*

A total of 692 million board feet of veneer logs was received by Louisiana's 14 plywood and veneer mills in 1983, an increase of 8 percent. The preponderance of veneer production, 99 percent, was softwood. With the introduction of oriented-strand board, softwood veneer production may decline over the next 10 years. Since 1981, seven plywood and veneer mills have closed down. Hardwood veneer production has dropped by 52 percent since 1973. The 7 million board foot total represented an all time low for this product.

Output of posts, poles, and piling collectively totaled 50 million board feet, or 1 percent of the total product mix in 1983. All three products experienced declines over 1973 levels.

Fuelwood

The U.S. Department of Energy estimated that fuelwood consumption in Louisiana amounted to 2,258 thousand cords in 1981, with industrial consumption at 1,930 thousand cords and residential consumption at 328 thousand cords (U.S. Department of Energy 1982). A decade earlier, industrial consumption was 1,868 thousand cords, with residential consumption at 216 thousand cords. About two-thirds of the increase between 1971 and 1981 was due to an increase in consumption by residential users.

Recent industrial fuelwood production data are not available. Domestic fuelwood output was derived from a telephone survey of Louisiana households and com

mercial vendors for the 1983 to 84 heating season (Rudis 1986). Domestic fuelwood output amounted to 467 thousand cords. Of this amount, 45 percent came from live trees on timberland, with the remainder from logging residues, dead trees, and nontimberland areas. Most of the wood was oak, and was cut from nonindustrial private timberland. Production was greatest in the northern parishes near major cities. An estimated 140 thousand cords of fuelwood (10 million cubic feet) came from growing-stock trees.

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APPENDIX

Survey Methods

Forest resource statistics were obtained by a sampling method employing a forest-nonforest classification on aerial photography and on-the-ground measurements of trees at sample locations. Inventory volume and area statistics are required to give precise answers at the State level to 1 standard deviation 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 acreage is based on the photointerpretation of recent aerial photography using dot counts on specific plot locations as to a forest or nonforest classification. These dot counts yield the proportion of forest to nonforest areas in each parish. Forest area changes are then determined from field observation of permanent 3- by 3-mile grid (measurement plots) locations. Additional plots (intensification plots), for classifying points as to forest or nonforest condition only, are used to further reduce the sampling error for forest area. The field classifications of these two types of plots (3 by 3 and intensification) are used to correct photointerpretation errors and adjust the parish timberland acreage estimate that comes from the dot counts associated with each plot location in the parish. The intensity level of the 3- by 3-mile grid layout of permanent measurement plots gives each sample plot an expansion factor representing, on average, 5,760 acres per plot.

Volume estimates come entirely from the 3- by 3-mile grid permanent sample plots and measurements of individual trees on these plots. The plots established by the prior survey were remeasured to determine the elements of change. In Louisiana, five horizontal points were measured at each plot location. Trees 5.0 inches in diameter and larger were selected with a 37.5 factor prism, thus each tree selected with the prism represented 7.5 square feet of basal area. Trees smaller than 5.0 inches in diameter were tallied on a 1/275-acre circular plot fixed around the first 3 points of the 5-point cluster.

Forest survey uses a satellite point system with a large factor prism to get a representative sample of stand conditions at each plot location. This eliminates the effect that vegetation clumping and open gaps would induce if only one point or one fixed plot were used at each plot location.

Volumes in Louisiana were derived from fixed form diameter-squared times bole length regression equations. These equations were developed from deterministic measurements of trees on 8 percent of the field locations. The deterministic measurements include diameter at breast height, total height, bole length, log length, and four upper stem diameters. Volumes for these trees were computed using Smalian's formula. Equations were developed for seven species groups in Louisiana and these equations were used to estimate volumes on the remaining trees that did not have deterministic measurements made.

Reliability of the Data

A relative standard of accuracy has been incorporated into the forest survey. This satisfies user demands, eliminates as much as possible any elements of error—either human or from instrumentation—and permits the control of costs within prescribed economic limits.

The first type of error, estimating error, involves three basic areas: (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 an edit (consistency) check. Field personnel undergo training for 3 to 4 months under the guidance of field-experienced personnel. Field work is checked by supervisors. In Louisiana 4 percent of the plots were field checked for errors. Editing checks in the office screen out logical and key punching errors on all plots. It is not possible to measure estimating error statistically

Table XXIX.—*Sampling errors for estimates of total timberland area, volume, periodic net annual growth (1974-1984), and periodic annual removals (1974-1984), Louisiana, 1984*

Item	Total	Unit	Percent sampling error
Timberland area	13,872.6	Thousand acres	0.3
Growing stock			
Volume	18,992.0	Million cubic feet	1.9
Periodic net annual growth	839.4	Million cubic feet	2.0
Periodic annual removals	610.0	Million cubic feet	2.6
Sawtimber			
Volume	70,735.2	Million board feet[1]	2.4
Periodic net annual growth	3,767.7	Million board feet[1]	2.1
Periodic annual removals	2,454.1	Million board feet[1]	3.1

[1] International ¼-inch rule.

Table XXX.—*Sampling error to which estimates are liable, 2 chances out of 3, Louisiana, 1984*

Sampling error[1]	Timberland area	Growing stock			Sawtimber		
		Volume	Periodic net annual growth	Periodic annual removals	Volume	Periodic net annual growth	Periodic annual removals
Percent	*Thousands acres*	*Million cubic feet*			*Million board feet*[2]		
1.0	1,248.5	...	...	...	...	...	...
2.0	312.1	17,140.3	839.4	...	...	...	...
3.0	138.7	7,617.9	373.1	458.2	45,270.5	1,846.2	...
4.0	78.0	4,285.1	209.9	257.7	25,464.7	1,038.5	1,474.0
5.0	49.9	2,742.4	134.3	164.9	16,297.4	664.6	943.4
10.0	12.5	685.6	33.6	41.2	4,074.4	166.2	235.8
15.0	5.6	304.7	14.9	18.3	1,810.8	73.9	104.8
20.0	3.1	171.4	8.4	10.3	1,018.6	41.5	59.0
25.0	2.0	109.7	5.6	6.6	651.9	26.6	37.7

[1] By random sampling formula.

[2] International ¼-inch rule.

but the Forest Inventory and Analysis Unit holds it to a minimum by adequate training, experienced supervision, and emphasis on careful work.

The second type of error, sampling error, is the error associated with natural and expected deviation of the sample from the true population mean. Thus, the deviation is susceptible to a mathematical evaluation of the probability of error. Sampling errors for State totals in table XXIX are based on 1 standard deviation. That is, the chances are 2 out of 3 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 resultant 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 XXX and shows the sampling error to which the estimates are liable, 2 chances out of 3.

Definition of Terms

Forest Land Classes

Forest Land—Land at least 16.7 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 one acre. Forest land is divided into commercial categories: timberland, deferred timberland; and noncommercial categories: productive-reserved forest land, unproductive forest land.

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

Deferred Timberland—National forest land that meets productivity standards for timberland but is under study for possible inclusion in the wilderness system.

Productive-Reserved Forest Land—Productive public forest land withdrawn from timber utilization through statute or administrative regulations.

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

Tree Classes

Commercial Species—Tree species currently or prospectively suitable for industrial wood products. Excluded are noncommercial species. See species list.

Noncommercial Species—Tree species of typical small size, poor form, or inferior quality which normally do not develop into trees suitable for industrial wood products. See species list.

Growing-Stock Trees—Live trees of commercial species classified as sawtimber, poletimber, sapling, and seedlings. Trees must have a 12-foot butt log now or prospectively to be classed as growing stock.

Rough Trees—Live trees of commercial species that are unmerchantable for saw logs currently or potentially because of roughness or poor form in the butt log.

Also included are all live trees of noncommercial species.

Rotten Trees—Live trees of commercial species that are unmerchantable for saw logs currently or potentially because of rot deduction in the butt log.

Cull Trees—Rough or rotten trees.

Hardwoods—Dicotyledonous trees, usually broadleaved and deciduous.

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

Live Trees—All trees alive. Included are all size classes and all tree classes.

Salvable Dead Trees—Standing or down dead trees that were formerly growing stock and are considered merchantable.

Forest Types

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

Loblolly-Shortleaf Pine—Forests in which pine and eastern redcedar (except longleaf or slash pine), singly or in combination, comprise a plurality of the stocking. Common associates include oak, hickory, and gum.

Oak-Pine—Forests in which hardwoods (usually upland oaks) comprise a plurality of the stocking, but in which softwoods, except cypress, comprise 25-49 percent of the stocking. Common asociates include gum, hickory, and yellow-poplar.

Oak-Hickory—Forests in which upland oaks or hickory, singly or in combination, comprise a plurality of the stocking except where pines comprise 25-50 percent, in which case the stand would be classified oak-pine. Common associates include yellow-poplar, elm, maple, and black walnut.

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 25-50 percent, in which case the stand would be classified oak-pine. Common associates include cottonwood, willow, ash, elm, hackberry, and maple.

Elm-Ash-Cottonwood—Forests in which elm, ash, or cottonwood, singly or in combination, comprise a plurality of the stocking. Common associates include willow, sycamore, beech, and maple.

Nontyped—Timberland currently unoccupied with any live trees or seedlings, e.g., very recent clearcut areas.

Dimension Classes of Trees

Sawtimber Trees—Trees 9.0 inches and larger in d.b.h. for softwoods, and 11.0 inches and larger for hardwoods.

Poletimber Trees—5.0 to 8.9 inches in d.b.h. for softwoods and 5.0 to 10.9 inches d.b.h. for hardwoods.

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

Seedlings—Trees which are less than 1.0 inch in d.b.h.

Rough, Rotten, and Salvable Dead Trees—See "tree classes."

Stand-Size Classes

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

Poletimber Stands—Stands at least 16.7 percent stocked with growing-stock trees, 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 16.7 percent stocked with growing-stock trees, more than half of this stocking in saplings or seedlings.

NonStocked Stands—Stands less than 16.7 percent stocked with growing-stock trees.

Stocking

Stocking is a measure 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.

Defined below are arbitrarily defined stocking categories.

Understocked—Stands 0 to 60 percent stocked.

Optimally stocked—Stands 61.0 to 100 percent stocked.

Overstocked—Stands greater than 100 percent stocked.

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

D.b.h. (inches)	Number of trees	D.b.h. (inches)	Number of trees
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

Volume

Volume of Cull—The volume of sound wood in the bole of rough and rotten trees.

Volume of Growing Stock—Volume of sound wood in the bole of sawtimber and poletimber trees from a 1-foot stump to a minimum 4.0-inch top outside bark or to the point where the central stem breaks into limbs. Rough, rotten, and noncommercial trees are excluded.

Volume of Sawtimber—Net volume of the saw-log portion of live sawtimber trees in board feet of the International 1/4-inch rule. Net volume equals gross volume less deductions for rot, sweep, and other defects that affect use for lumber to the point where the central stem breaks into limbs. Rough, rotten, and noncommercial trees are excluded.

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

Growth Classes

Gross Growth—Total increase in stand volume computed on growing-stock trees. Gross growth equals survivor growth plus ingrowth plus growth on removals plus growth on mortality plus cull increment plus mortality.

Net Growth—Increase in stand volume, computed on growing-stock trees. Net growth is equal to gross growth minus mortality.

Net Change—Increase or decrease in stand volume, computed on growing-stock trees. Net change is equal to net growth minus removals.

Classes of Trees Used in Growth Computations

Survivor Trees—Merchantable-and-in at time 1 (previous inventory) and time 2 (current inventory).

Ingrowth Trees—Submerchantable-and-in at time 1 and merchantable-and-in at time 2.

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

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

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

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

Ownership Classes

National Forest Land—Federal lands which have been legally designated as National Forests or purchase units, and other lands under the administration of the Forest Service, including experimental areas.

Other Federal Land—Federal lands other than National Forests; lands administered by the Bureau of Land Management and Indian Lands.

State, County, and Municipal Lands—Lands owned by States, counties, and local public agencies or municipalities, or lands leased to these governmental units for 50 years or more.

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

Farmer Owned Land—Lands operated as a unit of 10 acres or more and from which the sale of agricultural products total $1,000 or more annually.

Nonindustrial Private Land (Individual)—Lands privately owned by individuals other than forest industry, farmer owned, or miscellaneous private corporations.

Nonindustrial Private Land (Corporate)—Lands privately owned by private corporations other than forest industry and incorporated farms.

Miscellaneous Definitions

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 when growing-stock, rough, or rotten trees change tree class between time 1 and time 2 measurement periods. See explanation in Growth, Removals, and Mortality section.

D.b.h. (Diameter at breast height)—Tree diameter in inches, outside bark, measured at 4 1/2 feet above ground.

D.i.b. (Diameter inside bark)—Stem diameter of wood, bark excluded.

Diameter Classes—The 2-inch diameter-classes extend from 1.0 inch below to 0.9 inches above the stated midpoint. Thus, the 12-inch class includes trees 11.0 inches through 12.9 inches 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 live trees dying from natural causes during a specified period.

Plantations—Stands evidenced by regeneration from planting or seeding. Forest Survey categorizes plantations by forest type based upon plot tally.

Saw-Log Portion—That part of the bole of a sawtimber tree between a 1-foot stump and the saw-log top.

Saw-Log Top—The point on the bole of a sawtimber tree above which a saw log cannot be produced. The

minimum saw-log top is 7.0 inches diameter outside bark (d.o.b.) for softwoods and 9.0 inches d.o.b. for hardwoods.

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

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

Tree Grade—The grade assigned to the entire log length of a sawtimber tree, which is based upon the log grade of the butt log portion (the first 16 feet) only. In past surveys, a log grade was assigned to each upper log based upon log grade standards.

Upper-Stem Portion—That part of the main stem or fork of a sawtimber tree above the saw-log top to a diameter outside bark of 4.0 inches or to the point where the main stem or fork breaks into limbs.

Species List

Scientific and common names of tree species sampled in Louisiana[1].

Commercial Species

Genus	Species	Common Name
Softwoods		
Juniperus	*silicicola*	southern redcedar
	virginiana	eastern redcedar
Pinus	*echinata*	shortleaf pine
	elliottii	slash pine
	glabra	spruce pine
	palustris	longleaf pine
	serotina	pondpine
	taeda	loblolly pine
Taxodium	*distichum* var. *distichum*	baldcypress
	distichum var. *nutans*	pondcypress
Hardwoods		
Acer	*barbatum*	Florida maple
	negundo	boxelder
	rubrum var. *rubrum*	red maple
	saccharinum	silver maple
	sacharum	sugar maple
Betula	*nigra*	river birch
Carya	sp.	hickory
	aquatica	water hickory
	illinoensis	pecan
Castanea	*dentata*	American chestnut
Celtis	*laevigata*	sugarberry
	occidentalis	hackberry
Cornus	*florida*	flowering dogwood
Diospyros	*virginiana*	common persimmon
Fagus	*grandifolia*	American beech
Fraxinus	*americana*	white ash
	pennsylvanica	green ash
	profunda	pumpkin ash
Gleditsia	*aquatica*	water locust
	triacanthos	honey locust
Ilex	*opaca*	American holly
Juglans	*nigra*	black walnut
Liquidambar	*styraciflua*	sweetgum
Liriodendron	*tulipifera*	yellow-poplar
Maclura	*pomifera*	Osage-orange
Magnolia	*acuminata*	cucumbertree
	grandiflora	southern magnolia
	virginiana	sweetbay
Morus	*rubra*	red mulberry
Nyssa	*aquatica*	water tupelo
	sylvatica var. *sylvatica*	black tupelo, blackgum
	sylvatica var. *biflora*	swamp tupelo
Persea	*borbonia*	redbay
Platanus	*occidentalis*	American sycamore
Populus	sp.	cottonwood
Prunus	*serotina*	black cherry
Quercus	*alba*	white oak
	bicolor	swamp white oak
	falcata var. *falcata*	southern red oak
	falcata var. *pagodifolia*	cherrybark oak
	laurifolia	laurel oak
	lyrata	overcup oak

[1] Names according to: Little, Elbert L., Jr. Checklist of United States Trees (Native and Naturalized). 1978. U.S. Dept. Agr. Handbook No. 541, 375p.

Genus	Species	Common Name
	michauxii	swamp chestnut oak
	muehlenbergii	chinkapin oak
	nigra	water oak
	nuttallii	Nuttall oak
	palustris	pin oak
	phellos	willow oak
	prinus	chestnut oak
	shumardii	Shumard oak
	stellata var. *stellata*	post oak
	stellata var. *paludosa*	Delta post oak
	velutina	black oak
Robinia	*pseudoacacia*	black locust
Salix	sp.	willow
Sassafras	*albidum*	sassafras
Tilia	*americana*	American basswood
	heterophylla	white basswood
Ulmus	*alata*	winged elm
	americana	American elm
	crassifolia	cedar elm
	rubra	slippery elm

Noncommercial Species

Genus	Species	Common Name
Aesculus	sp.	buckeye
Bumelia	sp.	chittamwood, gum bumelia
Carpinus	*caroliniana*	bluebeech, American hornbeam
Castanea	sp.	chinkapin
Cercis	*canadensis*	eastern redbud
Crataegus	sp.	hawthorn
Magnolia	*macrophylla*	bigleaf magnolia
Malus	sp.	apple
Melia	*azedarach*	chinaberry
Ostrya	*virginiana*	eastern hophornbeam, ironwood
Oxydendrum	*arboreum*	sourwood
Planera	*aquatica*	water-elm
Prunus	sp.	plums, cherries
Quercus	*incana*	bluejack oak
	marilandica	blackjack oak
	virginiana	live oak
Vaccinium	*arboreum*	sparkleberry

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Table 1.—*Area by land classes, Louisiana, 1984*

Land class	Area
	Thousand acres
Forest	
Commercial:	
Timberland	13,872.6
Deferred timberland	...
Non-commercial:	
Productive-reserved	10.1
Unproductive	...
Total forest	13,882.7
Nonforest	
Cropland[1]	6,093.5
Other[2]	8,517.5
Total Nonforest	14,611.0
All land[3]	28,493.7

[1] U.S. Department of Commerce, Bureau of Census, 1982 Census of Agriculture, Volume 1: State and County Data.

[2] Includes pasture range, swampland, industrial, urban, and other nonforest land classed as water by Forest Survey standards, but defined by the Bureau of the Census as land.

[3] Bureau of Census, 1980.

Table 2.—*Area of timberland by ownership classes, Louisiana, 1984*[1]

Ownership class	Area
	Thousand acres
Public	
National Forest	620.9
Other federal	212.4
State	329.8
County	167.6
Total public	1,330.8
Private	
Forest industry[2]	3,603.1
Farmer	928.3
Miscellaneous private:	
Individual	5,813.5
Corporate	2,196.9
Total private	12,541.8
All ownerships	13,872.6

[1] Rows and columns may not sum due to rounding.

[2] Not including 666,800 acres of farmer-owned and miscellaneous private lands leased to forest industry.

Table 3.—*Area of timberland by stand size and ownership classes, Louisiana, 1984*[1]

Stand size class	All ownerships	National Forest	Other public	Forest industry	Farmer	Miscellaneous private
			Thousand acres			
Sawtimber	8,178.9	424.0	492.6	1,728.7	585.4	4,948.1
Poletimber	2,718.9	74.9	96.0	749.8	178.2	1,620.0
Sapling and seedling	2,525.8	122.0	72.8	1,034.6	132.2	1,164.1
Nonstocked areas	449.0	...	48.4	89.9	32.5	278.3
All classes	13,872.6	620.9	709.8	3,603.1	928.3	8,010.5

[1] Rows and columns may not sum due to rounding.

Table 4.—*Area of timberland by stand volume and ownership classes, Louisiana, 1984*[1]

Stand volume per acre	All ownerships	National Forest	Other public	Forest industry	Farmer	Miscellaneous private
Board feet[2]	*Thousand acres*					
Less than 1,500	4,196.3	137.6	172.8	1,345.8	264.6	2,275.6
1,500 to 5,000	4,268.4	150.6	267.4	957.9	306.0	2,586.5
More than 5,000	5,407.8	332.7	269.7	1,299.4	357.7	3,148.3
All classes	13,872.6	620.9	709.8	3,603.1	928.3	8,010.5

[1] Rows and columns may not sum due to rounding.
[2] International ¼-inch rule.

Table 5.—*Area of timberland by percent growing-stock trees and cull trees, Louisiana, 1984*[1].

Growing-stock trees	Cull trees percent stocking							
	Total	0-10	10-20	20-30	30-40	40-50	50-60	60+
Percent stocking	*Thousand acres*							
0-10	245.1	56.4	13.9	6.4	14.9	5.9	22.6	125.0
10-20	300.9	29.1	...	51.3	24.0	59.1	23.5	114.0
20-30	500.4	28.3	34.8	22.1	40.8	67.8	81.8	224.8
30-40	756.2	76.7	66.0	73.2	118.4	65.9	133.2	223.0
40-50	1,143.9	100.1	156.2	120.9	172.8	178.3	193.8	221.9
50-60	1,101.0	125.7	112.3	155.9	152.0	184.2	184.2	186.6
60-70	1,347.4	124.0	206.5	197.1	265.7	219.1	181.4	153.6
70-80	1,574.9	210.0	229.6	349.1	281.6	246.6	158.7	99.3
80-90	1,551.5	321.1	270.1	380.0	320.1	165.5	53.2	41.5
90-100	1,363.5	293.0	362.4	340.6	195.0	80.1	66.7	25.5
100-110	1,321.6	334.3	381.6	259.9	208.2	94.5	43.0	...
110-120	1,060.5	359.4	294.3	233.6	108.1	65.1	...	...
120-130	720.3	259.6	313.5	98.5	48.7	...	...	...
130-140	493.8	289.5	153.4	51.0	...	...	...	...
140-150	241.9	150.0	80.2	11.7	...	...	...	...
150-160	109.2	97.6	11.6	...	...	...	...	...
160+	40.7	40.7	...	...	...	...	...	...
Total	13,872.6	2,895.4	2,686.5	2,351.1	1,950.3	1,432.2	1,142.0	1,415.1

[1] Rows and columns may not sum due to rounding.

Table 6.—*Average basal area of live trees on timberland by ownership and timber classes, Louisiana, 1984*[1]

Owner and tree classes	All species	Softwood			Hardwood		
		Sapling & seedling	Poletimber	Sawtimber	Sapling & seedling	Poletimber	Sawtimber
	Square feet per acre						
National forest:							
Growing stock	68.4	2.5	5.2	37.5	2.8	9.1	11.3
Rough and rotten	17.4	1.1	1.0	0.6	5.8	4.1	4.9
Total	85.8	3.6	6.2	38.1	8.6	13.2	16.1
Other public:							
Growing stock	60.9	1.5	3.1	12.3	2.0	10.8	31.3
Rough and rotten	29.2	0.6	0.2	1.1	5.0	7.8	14.5
Total	90.1	2.0	3.3	13.4	7.0	18.6	45.8
Forest industry:							
Growing stock	62.2	5.9	10.9	21.7	3.1	8.0	12.6
Rough and rotten	17.9	1.5	0.8	0.6	6.1	4.0	5.0
Total	80.1	7.4	11.7	22.3	9.2	12.0	17.6
Farmer:							
Growing stock	64.4	1.5	3.8	18.6	4.1	15.8	20.6
Rough and rotten	28.4	0.5	0.4	0.8	7.0	7.7	12.0
Total	92.8	2.0	4.2	19.4	11.1	23.5	32.6
Miscellaneous private:							
Growing stock	69.3	2.4	7.7	24.2	3.7	12.5	18.9
Rough and rotten	25.3	0.9	0.6	1.5	7.1	6.0	9.2
Total	94.6	3.2	8.3	25.7	10.8	18.5	28.1
All owners:							
Growing stock	66.6	3.2	7.9	23.2	3.4	11.3	17.7
Rough and rotten	23.5	1.0	0.6	1.2	6.7	5.6	8.4
Total	90.1	4.2	8.5	24.3	10.1	16.9	26.1

[1] Rows and columns may not sum due to rounding.

Table 7.—*Area of timberland by site and ownership classes, Louisiana, 1984*[1]

Site class	All ownerships	National forest	Other public	Forest industry	Farmer	Miscellaneous private
	Thousand acres					
165 ft³ *or more*	1,477.1	52.6	92.0	407.4	129.2	795.9
120 to 165 ft³	3,821.0	202.4	71.1	1,178.7	302.7	2,066.1
85 to 120 ft³	5,142.1	262.5	302.1	1,299.5	291.9	2,986.1
50 to 85 ft³	3,049.5	92.4	211.9	682.0	188.6	1,874.6
Less than 50 ft	382.9	11.1	32.8	35.4	15.8	287.9
All classes	13,872.6	620.9	709.8	3,603.1	928.3	8,010.5

[1] Rows and columns may not sum due to rounding.

Table 8.—*Area of timberland by forest types and ownership classes, Louisiana, 1984*[1]

Type	All ownerships	National Forest	Other public	Forest industry	Farmer	Miscellaneous private
			Thousand acres			
Longleaf-slash pine	933.2	108.0	17.9	274.1	11.5	521.6
Loblolly-shortleaf pine	4,033.2	245.0	103.3	1,417.7	211.4	2,055.9
Oak-pine	1,913.3	111.0	49.3	635.5	83.6	1,033.9
Oak-hickory	2,170.7	97.8	23.9	661.5	194.2	1,193.3
Oak-gum-cypress	4,377.6	59.1	428.2	559.4	391.0	2,939.3
Elm-ash-cottonwood	412.4	...	87.2	41.4	36.5	247.3
Nontyped[2]	32.3	...	...	13.6	...	18.7
All types	13,872.6	620.9	709.8	3,603.1	928.3	8,010.5

[1] Rows and columns may not sum due to rounding.
[2] No live trees, saplings, or seedlings.

Table 9.—*Area of noncommercial forest land by forest types, Louisiana, 1984*

Type	All areas	Productive reserved areas	Unproductive areas
		Thousand acres	
Longleaf-slash pine	...	...	...
Loblolly-shortleaf pine	...	10.1	...
Oak-pine	...	...	...
Oak-hickory	...	...	...
Oak-gum-cypress	...	...	...
Elm-ash-cottonwood	...	...	...
All types	...	10.1	...

Table 10.—*Number of growing-stock trees on timberland by species and diameter classes, Louisiana, 1984*[1]

Species	All classes	Diameter class (inches at breast height) 5.0–6.9	7.0–8.9	9.0–10.9	11.0–12.9	13.0–14.9	15.0–16.9	17.0–18.9	19.0–20.9	21.0–28.9	29.0 & larger
	Thousand trees										
Softwood:											
Longleaf pine	32,370	8,072	7,422	6,050	4,136	2,776	2,095	1,089	474	249	8
Slash pine	89,063	30,680	29,849	18,436	5,909	2,915	867	308	57	43	...
Shortleaf pine	87,620	26,286	21,871	17,209	10,606	6,426	2,996	1,528	329	369	...
Loblolly pine	474,280	170,795	99,750	75,359	47,243	33,347	21,953	12,742	6,626	6,132	335
Spruce pine	4,482	704	399	866	674	646	409	390	216	144	35
Other pines	48	...	...	...	48	...	...	...	...	...	...
Redcedar	826	397	260	157	...	...	...	...	...	11	...
Cypress	80,795	18,489	16,265	12,011	11,018	7,959	6,415	3,790	2,364	2,409	74
Total	769,483	255,422	175,815	130,088	79,634	54,068	34,736	19,847	10,067	9,355	451
Hardwood:											
Select white oaks[2]	30,972	11,569	6,226	4,620	3,501	1,714	1,299	791	531	651	68
Select red oaks[3]	17,476	6,363	2,828	2,482	1,604	1,486	804	719	428	681	80
Other white oaks	38,427	11,527	8,739	5,652	4,267	2,958	1,917	1,330	676	1,175	186
Other red oaks	123,105	33,699	28,612	20,570	14,880	8,203	5,946	4,247	2,221	4,126	601
Sweet pecan	4,040	1,734	615	415	283	337	124	218	123	159	32
Water hickory	15,692	4,467	2,119	3,310	1,626	1,850	946	511	249	515	100
Other hickories	19,906	6,606	4,364	3,085	2,764	1,073	937	575	237	250	15
Persimmon	2,437	1,682	433	322	...	...	...	...	...	...	...
Hard maple	150	...	...	...	56	77	...	...	...	17	...
Soft maple	28,591	14,037	8,800	2,807	1,267	757	495	186	123	109	10
Boxelder	4,578	1,751	849	1,152	523	80	144	80	...	...	...
Beech	5,468	1,021	217	922	686	644	705	334	357	561	20
Sweetgum	150,943	62,585	36,641	21,435	12,051	8,382	4,515	2,443	1,730	1,150	10
Blackgum	30,689	11,854	8,098	4,554	1,933	1,753	1,437	634	281	146	...
Other gums/tupelos	73,216	12,932	17,717	16,566	11,922	7,399	3,831	1,416	801	613	18
White ash	3,229	1,222	556	314	432	369	220	23	63	30	...
Other ashes	31,480	9,329	7,631	5,443	3,273	1,900	1,743	930	541	667	23
Sycamore	6,345	2,072	1,588	867	894	225	277	157	163	88	14
Cottonwood	7,304	1,060	2,331	1,322	841	539	458	310	122	265	57
Basswood	556	407	..	78	...	43	28	...	...	...	...
Yellow-poplar	2,212	207	689	169	333	284	137	204	91	76	22
Magnolia	1,214	...	482	261	105	185	...	77	62	43	...
Sweetbay	6,115	1,961	2,298	762	459	416	101	118	...	...	...
Willow	18,820	4,972	3,703	2,607	2,288	1,567	1,171	950	462	1,003	99
Black cherry	2,368	854	540	583	170	79	100	25	18	...	...
American elm	13,168	4,502	3,407	1,471	1,548	864	559	453	198	165	...
Other elms	14,288	4,816	4,698	1,815	1,384	779	318	239	86	143	10
River birch	359	...	...	275	...	...	32	52	...	...	...
Hackberry	22,357	7,111	5,296	3,623	2,187	1,657	1,094	933	198	258	...
Black locust	868	753	115	...	...	...	...	...	...	...	...
Other locusts	3,379	1,070	570	602	381	350	192	45	77	75	18
Sassafras	1,288	1,010	159	72	...	...	31	...	18	...	...
Dogwood	1,997	1,843	149	...	...	...	...	...	...	...	...
Holly	3,797	3,061	429	93	58	120	35	...	...	...	...
Other commerical hardwoods	1,344	895	178	166	72	...	33	...	...	...	...
Total	688,177	228,975	161,077	108,414	71,788	46,091	29,629	17,999	9,856	12,965	1,383
Total all species	1,457,660	484,396	336,892	238,502	151,422	100,159	64,365	37,846	19,923	22,321	1,834

[1] Rows and columns may not sum due to rounding.

[2] Includes white, swamp chestnut, swamp white, and chinkapin oak (Durand and bur oak are select white oaks but did not occur in the Louisiana sample).

[3] Includes cherrybark and Shumard oak (northern red oak is a select red oak but did not occur in the Louisiana sample).

Table 11.—*Volume of timber on timberland by classes of timber and by softwoods and hardwoods, Louisiana, 1984*[1]

Class of timber	All species	Softwood	Hardwood
	Million cubic feet		
Sawtimber trees:			
Saw-log portion	12,959.6	7,922.1	5,037.4
Upper-stem portion	1,887.9	996.0	891.8
Total	14,847.4	8,918.2	5,929.2
Poletimber trees	4,144.6	1,633.8	2,510.8
All growing stock	18,992.0	10,552.0	8,440.0
Rough trees	2,385.4	324.2	2,061.2
Rotten trees	646.0	68.6	577.4
Salvable dead trees	185.5	107.1	78.4
All timber	22,208.9	11,052.0	11,156.9

[1] Rows and columns may not sum due to rounding.

Table 12.—*Volume of growing stock and sawtimber on timberland by ownership classes and by softwoods and hardwoods, Louisiana, 1984*[1]

Ownership class	Growing stock			Sawtimber		
	All species	Softwood	Hardwood	All species	Softwood	Hardwood
	Million cubic feet			*Million board feet*[2]		
National Forest	1,064.3	774.6	289.8	4,793.3	3,985.6	807.8
Other public	894.4	277.2	617.2	3,497.2	1,276.6	2,220.6
Forest industry	4,431.1	2,779.5	1,651.6	17,073.1	11,863.0	5,210.1
Farmer	1,214.6	527.8	686.8	4,190.4	2,278.3	1,912.0
Miscellaneous private	11,387.6	6,193.0	5,194.6	41,181.1	26,041.9	15,139.3
All ownerships	18,992.0	10,552.0	8,440.0	70,735.1	45,445.4	25,289.8

[1] Rows and columns may not sum due to rounding.
[2] International ¼-inch rule.

Table 13.—*Volume of growing-stock on timberland by species and diameter classes, Louisiana, 1984*[1]

Species	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 & larger
	Diameter class (inches at breast height)										
	Million cubic feet										
Softwood:											
Longleaf pine	438.2	16.5	48.2	65.6	73.8	71.6	70.8	49.8	25.1	15.3	1.5
Slash pine	790.5	80.1	199.8	228.1	122.5	99.1	35.8	16.1	4.5	4.5	...
Shortleaf pine	1,141.3	66.1	153.4	220.7	226.9	200.3	130.7	85.5	22.7	35.1	...
Loblolly pine	6,587.4	359.1	588.0	899.0	941.3	996.6	896.8	713.6	487.5	641.8	63.7
Spruce pine	125.4	1.8	3.4	12.1	13.4	19.2	19.0	20.9	14.4	12.9	8.4
Other pines	1.4	...	...	...	1.4	...	...	...	...	...	...
Redcedar	4.7	0.6	0.7	2.0	...	...	...	...	...	1.3	...
Cypress	1,463.0	32.1	84.0	138.6	203.9	218.3	242.3	183.9	143.7	206.5	9.7
Total	10,552.0	556.3	1,077.5	1,566.2	1,583.2	1,605.1	1,395.4	1,069.7	697.9	917.4	83.3
Hardwood:											
Select white oaks[2]	367.5	24.6	35.5	48.7	59.1	44.8	45.3	30.4	26.9	43.4	8.8
Select red oaks[3]	297.7	15.5	17.1	28.7	32.0	41.4	30.8	36.3	28.6	54.1	13.2
Other white oaks	476.2	20.6	45.6	55.2	61.4	60.4	50.7	52.4	30.9	76.8	22.2
Other red oaks	1,869.2	76.6	169.7	222.7	262.0	200.2	197.3	185.7	119.3	341.0	94.7
Sweet pecan	77.2	7.5	3.9	5.1	5.2	11.0	5.1	12.0	6.7	17.2	3.5
Water hickory	223.6	10.4	10.4	29.2	23.5	40.0	24.2	20.5	12.3	35.1	17.9
Other hickories	261.8	14.8	25.4	34.7	53.9	29.2	33.3	28.6	14.5	24.7	2.8
Persimmon	9.5	4.0	1.6	3.9	...	...	...	...	...	...	...
Hard maple	3.2	...	...	...	0.5	1.7	...	...	...	1.0	...
Soft maple	182.4	31.7	50.0	27.6	20.2	18.0	12.9	8.5	5.5	6.8	1.2
Boxelder	31.7	3.6	4.5	8.2	7.3	1.9	4.1	2.1	...	...	...
Beech	127.2	2.4	1.3	7.5	10.0	12.3	24.2	12.6	17.5	36.7	2.8
Sweetgum	1,578.1	123.2	214.4	243.4	226.8	237.2	187.4	125.2	113.9	103.9	2.7
Blackgum	271.9	22.5	39.8	42.2	28.8	40.2	43.1	27.8	15.3	12.2	...
Other gums/tupelos	874.7	23.8	85.3	163.4	189.8	164.1	115.4	54.6	37.8	39.2	1.4
White ash	37.7	2.6	3.5	3.3	6.9	9.0	6.4	1.2	2.5	2.3	...
Other ashes	395.0	23.8	45.0	57.6	51.0	47.6	51.5	39.6	27.2	48.3	3.3
Sycamore	92.8	4.9	8.0	10.4	17.1	7.0	11.6	9.1	13.2	9.1	2.3
Cottonwood	170.1	3.2	14.0	16.5	17.9	19.2	17.7	16.9	9.8	37.0	17.9
Basswood	5.1	1.3	...	0.8	...	1.6	1.5	...	...	...	...
Yellow-poplar	52.6	0.5	4.8	2.1	7.8	8.3	5.2	9.3	5.1	5.7	3.7
Magnolia	21.9	...	2.8	3.3	2.5	4.0	...	2.7	3.9	2.7	...
Sweetbay	58.8	5.4	14.6	9.0	9.4	11.8	3.5	5.2	...	...	...
Willow	361.9	8.6	21.9	26.4	43.5	44.9	42.3	41.5	27.1	91.8	13.8
Black cherry	20.3	1.2	3.3	5.2	2.8	2.4	3.5	1.0	1.0	...	...
American elm	130.8	10.1	16.2	12.5	21.2	17.0	14.6	17.6	8.6	13.0	...
Other elms	127.6	9.8	27.1	17.7	20.5	17.4	9.6	10.0	3.6	9.5	2.2
River birch	5.5	...	...	2.7	...	...	0.7	2.1	...	...	...
Hackberry	236.2	12.9	26.1	33.1	33.5	34.9	33.4	33.2	10.7	18.4	...
Black locust	2.7	2.0	0.7	...	...	...	...	...	...	...	...
Other locusts	41.9	2.7	2.3	5.2	6.5	7.7	4.3	1.3	3.9	5.2	2.7
Sassafras	6.6	1.6	0.8	1.2	...	...	1.1	...	1.8	...	...
Dogwood	3.2	2.8	0.4	...	...	...	...	...	...	...	...
Holly	12.5	6.3	1.9	0.6	0.7	2.4	0.7	...	...	...	...
Other commerical hardwoods	4.9	1.8	0.5	1.4	0.4	...	0.8	...	...	...	...
Total	8,440.0	482.7	898.4	1,129.7	1,222.5	1,137.4	982.0	787.4	547.8	1,035.2	216.9
Total all species	18,992.0	1,039.0	1,976.0	2,695.8	2,805.7	2,742.5	2,377.4	1,857.1	1,245.7	1,952.5	300.2

[1] Rows and columns may not sum due to rounding.

[2] Includes white, swamp chestnut, swamp white, and chinkapin oak (Durand and bur oak are select white oaks but did not occur in the Louisiana sample).

[3] Includes cherrybark and Shumard oak (northern red oak is a select red oak but did not occur in the Louisiana sample).

Table 14.—*Volume of sawtimber on timberland by species and diameter classes, Louisiana, 1984*[1]

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 & larger
	Million board feet[4]								
Softwood:									
Longleaf pine	1,666.8	239.4	301.2	315.9	334.5	251.0	130.6	85.1	9.1
Slash pine	2,114.1	866.4	506.5	440.8	167.6	80.2	25.2	27.4	...
Shortleaf pine	4,701.1	893.6	1,063.2	1,048.1	752.5	533.2	152.7	257.8	...
Loblolly pine	31,113.0	3,652.9	4,390.5	5,197.4	5,119.3	4,395.1	3,197.2	4,663.1	497.4
Spruce pine	624.7	54.1	62.8	95.5	97.5	111.0	78.6	73.5	51.8
Other pines	6.3	...	6.3	...	...	...	...	...	...
Redcedar	17.7	9.5	...	...	...	...	...	8.2	...
Cypress	5,201.8	170.5	634.8	784.3	968.2	801.6	679.9	1,103.3	59.2
Total	45,445.4	5,886.3	6,965.3	7,881.9	7,439.6	6,172.1	4,264.3	6,218.4	617.5
Hardwood:									
Select white oaks[2]	1,090.2	...	202.4	171.9	188.5	133.6	128.9	216.4	48.6
Select red oaks[3]	1,039.1	...	113.0	159.4	127.8	160.0	132.5	273.0	73.4
Other white oaks	1,621.4	...	224.4	237.9	217.7	244.2	151.0	410.8	135.3
Other red oaks	6,254.1	...	930.6	771.9	828.4	846.2	567.0	1,761.2	548.8
Sweet pecan	275.6	...	17.3	40.8	20.8	51.8	31.3	92.3	21.2
Water hickory	758.6	...	76.8	145.8	97.8	89.6	56.7	182.5	109.4
Other hickories	807.6	...	196.2	117.7	145.0	130.1	69.9	132.6	16.1
Hard maple	13.9	...	2.1	6.7	...	...	...	5.2	...
Soft maple	280.9	...	63.0	63.9	50.4	36.4	25.9	34.5	6.9
Boxelder	53.3	...	22.6	6.2	16.1	8.3	...	...	...
Beech	542.6	...	36.2	49.0	102.1	58.4	83.3	195.8	17.9
Sweetgum	4,226.3	...	655.9	866.9	809.8	624.3	625.4	627.0	16.9
Blackgum	703.5	...	79.9	144.2	182.1	137.4	82.7	77.3	...
Other gums/tupelos	2,295.7	...	600.8	595.9	463.4	238.6	179.4	209.0	8.5
White ash	114.9	...	25.0	33.6	24.9	5.6	11.2	14.7	...
Other ashes	1,093.2	...	156.6	171.8	203.4	169.7	123.4	247.2	21.0
Sycamore	279.2	...	52.0	25.8	46.3	36.8	58.7	45.6	14.0
Cottonwood	610.4	...	54.8	68.7	67.0	70.1	45.1	190.8	114.0
Basswood	13.0	...	...	6.2	6.8	...	...	...	...
Yellow-poplar	202.0	...	23.6	31.5	21.0	41.2	25.1	32.2	27.5
Magnolia	68.9	...	8.7	15.4	...	11.9	18.8	14.1	...
Sweetbay	116.7	...	32.2	45.8	14.8	23.9	...	...	...
Willow	1,290.9	...	136.6	154.5	158.2	172.2	122.5	465.0	81.8
Black cherry	43.3	...	10.2	9.5	14.3	4.5	4.7	...	...
American elm	377.3	...	69.5	62.7	57.6	77.8	40.8	68.7	...
Other elms	292.9	...	68.2	66.0	38.7	42.1	14.7	48.2	15.0
River birch	12.5	...	...	...	2.9	9.6	...	...	...
Hackberry	649.3	...	105.6	124.5	132.5	141.7	48.7	96.4	...
Other locusts	130.8	...	22.2	27.5	15.9	5.5	18.5	26.3	14.9
Sassafras	13.4	...	...	...	4.7	...	8.6	...	...
Holly	13.9	...	2.4	8.8	2.6	...	...	...	...
Other commercial hardwoods	4.5	...	1.5	...	3.0	...	...	...	...
Total	25,289.8	...	3,990.2	4,230.5	4,064.7	3,571.5	2,674.7	5,466.7	1,291.5
Total all species	70,735.2	5,886.3	10,955.5	12,112.3	11,504.2	9,743.7	6,939.0	11,685.1	1,909.0

[1] Rows and columns may not sum due to rounding.

[2] Includes white, swamp chestnut, swamp white, and chinkapin oak (Durand and bur oak are select white oaks but did not occur in the Louisiana sample).

[3] Includes cherrybark and Shumard oak (northern red oak is a select red oak but did not occur in the Louisiana sample).

[4] International ¼-inch rule.

Table 15.—*Volume of sawtimber on timberland by species and tree grades, Louisiana, 1984*[1]

Species	All grades	Grade 1	Grade 2	Grade 3	Grade 4
			Million board feet[4]		
Softwood:					
Yellow pines	40,225.9	5,645.3	7,042.3	27,538.3	...
Cypress	5,201.8	1,430.9	1,468.5	2,302.4	...
Redcedar	17.7	17.7	...	...	...
Total	45,445.4	7,093.9	8,510.7	29,840.7	...
Hardwood:					
Select white[2] and red oaks[3]	2,129.3	342.9	516.4	837.5	432.6
Other white and red oaks	7,875.5	618.7	1,508.7	3,119.6	2,628.5
Hickory	1,841.8	230.6	485.8	806.7	318.7
Hard maple	13.9	...	4.1	7.8	2.1
Sweetgum	4,226.3	769.6	1,147.2	1,753.6	555.9
Tupelo and blackgum	2,999.2	506.3	915.8	1,489.0	88.1
Ash, walnut, and black cherry	1,251.4	198.9	431.2	587.1	34.1
Yellow-poplar	202.0	50.4	22.4	46.6	82.5
Other commerical hardwoods	4,750.4	639.5	971.2	2,150.7	989.0
Total	25,289.8	3,356.9	6,002.7	10,798.6	5,131.5
Total all species	70,735.2	10,450.9	14,513.5	40,639.3	5,131.5

[1] Rows and columns may not sum due to rounding.

[2] Includes white, swamp chestnut, swamp white, and chinkapin oak (Durand and bur oak are select white oaks but did not occur in the Louisiana sample).

[3] Includes cherrybark and Shumard oak (northern red oak is a select red oak but did not occur in the Louisiana sample).

[4] International ¼-inch rule.

Table 16.—*Periodic net annual growth and removals of growing stock on timberland by species, Louisiana, 1974-1984*[1]

Species	Periodic net annual growth	Periodic annual removals
	Million cubic feet	
Softwood:		
Yellow pines	520.4	426.9
Cypress	24.7	4.7
Redcedar	0.3	...
Total	545.3	431.6
Hardwood:		
Select white[2] and red oaks[3]	33.1	17.3
Other white and red oaks	105.7	65.8
Hickory	17.4	16.1
Hard maple	0.1	...
Sweetgum	58.7	36.4
Tupelo and blackgum	10.4	8.4
Ash, walnut, and black cherry	11.9	7.9
Yellow-poplar	2.8	0.3
Other commercial hardwoods	54.0	26.1
Total	294.0	178.4
Total all species	839.4	610.0

[1] Rows and columns may not sum due to rounding.

[2] Includes white, swamp chestnut, swamp white, and chinkapin oak (Durand and bur oak are select white oaks but did not occur in the Louisiana sample).

[3] Includes cherrybark and Shumard oak (northern red oak is a select red oak but did not occur in the Louisiana sample).

Table 17.—*Periodic net annual growth and removals of growing stock on timberland by species group and ownership classes, Louisiana, 1974-1984*[1]

Ownership class	Periodic net annual growth			Periodic annual removals		
	All species	Softwood	Hardwood	All species	Softwood	Hardwood
	Million cubic feet					
National Forest	40.9	29.6	11.3	30.2	25.6	4.6
Other public	30.8	10.6	20.1	15.7	9.9	5.9
Forest industry	238.2	175.8	62.4	229.6	173.7	55.9
Farmer	49.2	24.1	25.0	39.2	20.3	18.9
Miscellaneous private	480.3	305.2	175.1	295.3	202.2	93.1
All ownerships	839.4	545.3	294.0	610.0	431.6	178.4

[1] Rows and columns may not sum due to rounding.

Table 18.—*Periodic net annual growth and removals of sawtimber on timberland by species, Louisiana, 1974-1984*[1]

Species	Periodic net annual growth	Periodic annual removals
	Million board feet[4]	
Softwood:		
Yellow pines	2,548.8	1,884.9
Cypress	128.1	19.2
Redcedar	0.8	...
Total	2,677.7	1,904.1
Hardwood:		
Select white[2] and red oaks[3]	118.5	57.0
Other white and red oaks	416.3	199.4
Hickory	70.2	53.8
Hard maple	0.3	...
Sweetgum	176.1	108.0
Tupelo and blackgum	65.7	29.5
Ash, walnut, and black cherry	41.7	22.8
Yellow-poplar	11.6	1.1
Other commercial hardwoods	189.6	78.3
Total	1,090.0	550.0
Total all species	3,767.7	2,454.1

[1] Rows and columns may not sum due to rounding.

[2] Includes white, swamp chestnut, swamp white, and chinkapin oak (Durand and bur oak are select white oaks but did not occur in the Louisiana sample).

[3] Includes cherrybark and Shumard oak (northern red oak is a select red oak but did not occur in the Louisiana sample).

[4] International ¼-inch rule.

Table 19.—*Periodic net annual growth and removals of sawtimber on timberland by ownership classes and by softwoods and hardwoods, Louisiana, 1974-1984*[1]

Ownership class	Periodic net annual growth			Periodic annual removals		
	All species	Softwood	Hardwood	All species	Softwood	Hardwood
	Million board feet[2]					
National Forest	207.5	170.7	36.7	128.6	114.4	14.1
Other public	151.0	61.5	89.6	67.6	48.1	19.5
Forest industry	1,033.0	795.7	237.3	984.7	804.8	179.9
Farmer	218.7	134.6	84.1	138.2	80.8	57.3
Miscellaneous private	2,157.5	1,515.2	642.3	1,135.1	856.0	279.1
All *ownerships*	3,767.7	2,677.7	1,090.0	2,454.1	1,904.1	550.0

[1] Rows and columns may not sum due to rounding.
[2] International ¼-inch rule.

Table 20.—*Periodic annual mortality of growing stock and sawtimber on timberland by species, Louisiana, 1974-1984*[1]

Species	Growing stock	Sawtimber
	Million cubic feet	*Million board feet*[4]
Softwood:		
Yellow pines	53.7	169.1
Cypress	0.8	2.4
Redcedar	0.1	0.5
Total	54.6	171.9
Hardwood:		
Select white[2] and red oaks[3]	3.0	7.8
Other white and red oaks	16.9	48.1
Hickory	4.8	16.7
Sweetgum	12.0	33.6
Tupelo and blackgum	10.2	28.9
Ash, walnut, and black cherry	3.9	8.7
Other commercial hardwoods	23.2	64.5
Total	74.1	208.3
Total all species	128.8	380.2

[1] Rows and columns may not sum due to rounding.
[2] Includes white, swamp chestnut, swamp white, and chinkapin oak (Durand and bur oak are select white oaks but did not occur in the Louisiana sample).
[3] Includes cherrybark and Shumard oak (northern red oak is a select red oak but did not occur in the Louisiana sample).
[4] International ¼-inch rule.

Table 21.—*Periodic annual mortality of growing stock and sawtimber on timberland by ownership classes and by softwoods and hardwoods, Louisiana, 1984*[1]

Ownership class	Growing stock			Sawtimber		
	All species	Softwood	Hardwood	All species	Softwood	Hardwood
	Million cubic feet			*Million board feet*[2]		
National Forest	4.1	2.9	1.2	10.9	9.2	1.7
Other public	6.4	1.3	5.1	21.1	4.2	16.8
Forest industry	27.4	14.0	13.4	96.5	52.9	43.6
Farmer	9.6	3.0	6.5	26.5	8.2	18.3
Miscellaneous private	81.3	33.4	47.8	225.2	97.4	127.8
All ownerships	128.8	54.6	74.1	380.2	171.9	208.3

[1] Rows and columns may not sum due to rounding.
[2] International ¼-inch rule.

Table 22.—*Periodic annual mortality of growing stock and sawtimber on timberland by cause of death and by softwoods and hardwoods, Louisiana, 1984*[1]

Cause of death	Growing stock			Sawtimber		
	All species	Softwood	Hardwood	All species	Softwood	Hardwood
	Million cubic feet			*Million board feet*[2]		
Bark beetles	21.2	21.0	0.2	68.7	68.1	0.6
Other insects	0.5	0.4	0.1	1.7	1.7	...
Disease	58.2	15.8	42.4	170.9	47.7	123.2
Fire	2.0	1.2	0.8	5.4	4.3	1.1
Beaver	0.4	...	0.4	0.5	...	0.5
Weather	35.6	10.3	25.4	128.2	46.4	81.8
Suppression	8.0	4.4	3.5	1.8	1.1	0.7
Other	2.9	1.6	1.4	3.0	2.7	0.4
All causes	128.8	54.6	74.1	380.2	171.9	208.3

[1] Rows and columns may not sum due to rounding.
[2] International ¼-inch rule.

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This report presents the principal findings of the fifth forest survey of Louisiana (1984) and changes that have occurred since earlier surveys. Trends in forest area, ownership, forest type, stand structure, stocking, species importance, volume, growth, removals, mortality, management opportunities, and timber products output are discussed.

Additional keywords: forest inventory, forest productivity, tree distribution, basal area.