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Forest Resource Trends and Current Conditions in the Lower Mississippi Valley

Victor A. Rudis and Richard A. Birdsey

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INTRODUCTION

Forest resources in the lower Mississippi Valley occupy some of the best areas suited to supplying multiple benefits. The forests constitute some of the more productive timber sites in the United States; provide important wintering areas for migratory birds; supply essential habitat for a variety of fish, birds, and mammals; and aid in erosion control, water retention, and water purification. Past land clearing and projected declines in bottomland hardwood acreage, however, have caused widespread concern over the future of these forests (Spencer 1981). Moreover, many remaining stands are in a degraded condition due to past high-grading practices (Smith and Linnartz 1980). This paper documents trends and current conditions from periodic surveys of timberland in the lower Mississippi Valley, also described as the Delta (fig. 1).

Forest resource information has been gathered by the Forest Inventory and Analysis unit (formerly Forest Survey) of the U.S. Forest Service since the 1930's. Data are obtained by a sampling method involving a forest-nonforest classification on aerial photographs and on-the-ground measurements of trees at sample locations. Sample locations are at the intersections of perpendicular grid lines spaced at 3-mile intervals. Surveys are conducted periodically in each State at approximately 10-year intervals. Detailed tree information is derived from measurements on land classified as timberland. Timberland, synonymous with commercial forest land, is forest land capable of producing crops of industrial wood and not withdrawn from timber utilization by statute or administrative regulation. Descriptions of survey procedures are provided in Frayer and Beltz (1986), Murphy (1978), and van Hees (1980).

Current conditions and trends in the Delta have been compiled from available survey records. Due to changes in survey procedures and information needs over time (Frayer and Beltz 1986), inclusion of some of the older survey data in this current assessment was not possible.

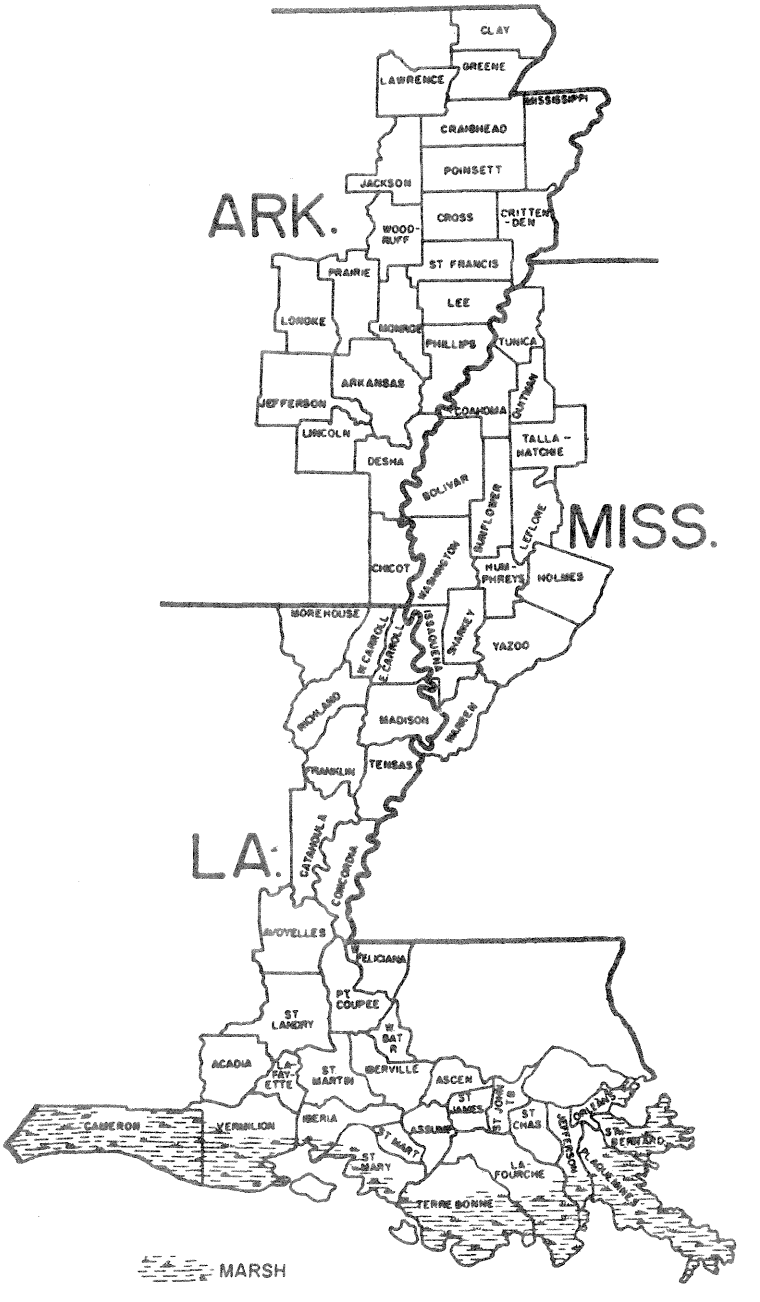

Figure 1.—*Counties of the Delta Region.*

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AREA CHANGES

In the mid-1930's, 11.8 million acres in the Delta were classified as timberland (Sternitzke and Christopher 1970). In a 1976 report, Sternitzke (1976) had recorded 7.2 million acres of timberland. The latest survey statistics show 6.6 million acres of timberland, just more than half the 1930's estimate, and an 8 percent decline in the past decade. The loss of bottomland hardwood acreage accounts for virtually all of the decline (fig. 2). The total acreage of other forest types, loblolly-shortleaf and upland hardwood, has remained virtually unchanged since the 1947–54 survey period.

Since the time of the earliest surveys, bottomland hardwood acreage has declined 65 percent in Arkansas, 50 percent in Mississippi, and 45 percent in Louisiana (table 1). The rate of decline has slowed considerably in recent years, however.

In the past two decades, shifts to nonforest land uses have been attributable mainly to conversion of bottomland hardwood forests to agricultural crops (table 2). Soybeans constitute the major crop on converted bottomland acres (MacDonald and others 1979). More recently, rice and milo have been replacing soybeans as agricultural crops. Much of the remaining acreage in bottomland hardwood forest is currently unsuitable for crop production, primarily due to a lack of flood or drainage control (MacDonald and others 1979).

Table 1.—*Area of bottomland hardwoods in the Delta by State and year of survey*

Survey year	State		
	Arkansas	Louisiana	Mississippi
		Thousand acres	
1932	.....	.....	1,906.5
1935	3,604.0	5,229.0	.....
1947	.....	.....	1,601.5
1950	2,594.9	.....	.....
1954	.....	4,583.9	.....
1957	.....	.....	1,471.9
1959	2,490.2	.....	.....
1964	.....	4,294.2	.....
1967	.....	.....	1,013.1
1969	1,369.9	.....	.....
1974	.....	3,427.4[2]	.....
1977	.....	.....	954.5[1]
1978	1,264.1	.....	.....
1984	.....	2,897.8	.....

[1]Revised from Murphy (1978) (956.1)
[2]Revised from Sternitzke (1973) (3427.8)

STAND CHANGES

Shifts in the Delta's forest stand structure and species composition have occurred as stands matured and as selective land clearing and timber removals were practiced. Changes in water flow dynamics have also affected species composition in the Delta forests.

Currently, species common in Delta bottomland hardwood forests include: oaks, sweetgum, tupelo, and cypress. These species comprise 46 percent of all trees. Hackberry, maples, ashes, and hickories represent an additional 34 percent of the trees. The remaining 20 percent is spread out over many other species (table 3). Trends in the diameter distribution of live trees reflect the increasing age of remaining stands (table 4).

In the Louisiana portion of the Delta, major reductions in oaks, sweetgum, ash, and hickory have occurred between 1974 and 1984. Increases have occurred principally in cypress and red maple, with

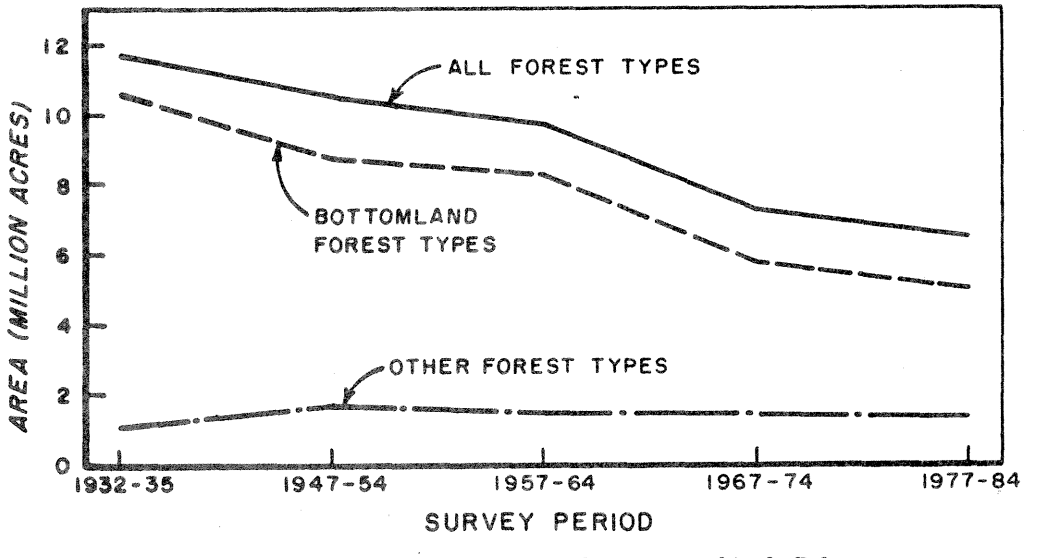

Figure 2.—*Timberland area by forest type and survey period in the Delta.*

Table 2.—*Timberland changes in the Delta by State, intersurvey period, and type of land use change*

State	Period of change	Net change	Additions from:		Diversions to:	
			Agriculture	Other[1]	Agriculture	Other[1]
			Thousand acres			
Arkansas						
	1959–1969	−1,274.2	41.6	32.8	−1,251.6	− 97.0
	1969–1978	− 149.4	160.7	34.7	− 285.5	− 59.3
Louisiana						
	1964–1974	− 894.2	42.5	75.9	− 873.3	−139.3
	1974–1984	− 446.7	125.4	93.7	− 437.6	−228.2
Mississippi						
	1957–1967	− 423.3	10.0	12.8	− 387.2	− 58.9
	1967–1977	− 12.4	190.3	63.7	− 213.1	− 53.3

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

Table 3.—*Number of live trees in the bottomland hardwood forest type for the most recent surveys by species and diameter class, Delta Region*[1]

Species	Diameter class			
	Total	5.0–10.9	11.0–18.9	19.0 and larger
	Thousand trees			
Softwoods:				
Cypress	76,529	42,955	27,816	5,758
Pines	59	.....	59	.....
Eastern redcedar	341	341	.....	.....
Hardwoods:				
White oaks:				
Overcup	27,045	16,652	7,795	2,598
Swamp chestnut	1,714	1,149	362	203
White	1,256	669	532	55
Post	1,044	684	338	22
Delta post	826	648	154	24
Bur	143	112	31	.....
Red oaks:				
Willow	24,829	17,297	5,854	1,678
Nuttall	19,452	11,790	5,217	2,445
Water	15,721	9,849	3,862	2,010
Cherrybark	3,348	1,442	1,180	726
Laurel	1,240	934	181	125
Shumard	930	631	236	63
Southern red	325	143	151	31
Pin	240	.....	197	43
Other red	295	177	104	14
Gums:				
Sweetgum	58,641	40,003	16,132	2,506
Water tupelo	84,378	52,567	30,163	1,649
Black tupelo	1,110	294	738	78
Swamp tupelo	411	238	157	16
Hackberry	69,959	49,147	18,479	2,334
Maples:				
Red maple	39,996	34,088	5,227	681
Boxelder	20,606	16,153	4,265	188
Silver maple	446	204	233	9
Other maples	121	72	44	5

Table 3.—*Number of live trees in the bottomland hardwood forest type for the most recent surveys by species and diameter class, Delta Region*[1]*—Continued*

Species	Diameter class			
	Total	5.0–10.9	11.0–18.9	19.0 and larger
	Thousand trees			
Ashes:				
White ash	2,335	1,724	440	172
Other ashes	58,736	41,769	14,309	2,659
Hickories:				
Water hickory	32,854	23,728	7,449	1,678
Pecan	5,281	2,965	1,766	550
Other hickories	8,411	6,560	1,681	169
Elms:				
American	28,117	20,922	6,138	1,058
Winged	5,095	4,758	300	37
Cedar	4,349	1,588	2,306	455
Slippery	4,052	3,109	803	140
Other elms	17	.....	17	.....
Willow	38,427	21,901	12,892	3,634
Cottonwood	14,850	9,196	4,002	1,653
Sycamore	9,085	6,114	2,361	609
Locusts	7,849	5,424	2,047	378
Persimmon	9,220	8,390	805	25
River birch	112	.....	89	23
Other commercial hardwoods	3,597	3,219	331	46
Noncommercial hardwoods	16,200	15,212	774	214
All species	699,591	474,815	188,015	36,762

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

Table 4.—*Number of live trees per acre in the Delta by State, year of survey, and diameter class*

State	Year of survey	Diameter class			
		1.0–4.9	5.0–10.9	11.0–18.9	19.0 and larger
		Trees per 100 acres			
Arkansas					
	1950	33,749	7,002	2,414	375
	1959	43,366	7,534	2,238	393
	1969	41,598	8,636	2,489	515
	1978	40,071	8,709	2,700	552
Louisiana					
	1954	41,667	8,395	2,776	545
	1964	32,901	8,467	3,023	529
	1974	40,441	9,534	3,363	573
	1984	36,188	10,056	4,098	710
Mississippi					
	1947	55,557	3,880	1,477	317
	1957	50,994	6,065	1,852	400
	1967	49,624	8,451	2,204	382
	1977	42,806	9,147	2,646	537

some increase in cottonwood and sycamore (table 5). Species typical of poorly-drained, heavy clay soils, such as Nuttall oak, overcup oak, and water hickory, are declining. Species typical of soils with abundant moisture, such as cypress, are increasing. Harvest of valued oaks and conversion of land to sycamore and cottonwood plantations have also contributed to species composition shifts.

Partial harvesting and lack of timber management, combined with natural aging of these stands, have left many stands with cull (rough and rotten) trees. Bottomland hardwoods with more than 40 percent stocking[1] of cull trees comprise 1.5 million acres, or 29 percent of the total area (table 6).

Trends in the Louisiana Delta between 1974 and 1984 suggest that more bottomland hardwood stands are becoming stocked with cull trees. Bottomland hardwoods with more than 40 percent stocking of cull trees represent 1.1 million acres in 1984, up from 0.8 million acres in 1974. Stands with more than 40 percent stocking of cull trees represent 37 percent of the bottomland hardwoods in 1984, compared with 24 percent in 1974.

ACCESS AND OWNERSHIP

Remote—roadless or relatively inaccessible—areas are highly valued because they supply scarce habitat for wildlife such as black bears in need of seclusion, and they provide opportunities for viewing wildlife in primitive or semi-primitive settings. Approximately 50 percent of the Delta's bottomland hardwoods is 1/2 mile or more from all-weather or potentially truck-operable unimproved roads; most are concentrated in the Atchafalaya Basin of Louisiana. Nationwide trends suggest a decline in remote areas, particularly on private land (Cordell and Hendee 1982).

Half the Delta's bottomland hardwoods are within 1/2 mile of roads; some other areas can be reached by boat. However, most of this timberland is in private ownership, so public use may be restricted. In the Louisiana Delta, more than half the land leased or owned for hunting is controlled by private hunting clubs (Louisiana Department of Culture, Recreation, and Tourism (DCRT), Baton Rouge, unpublished survey data for 1984).

Most of the public bottomland hardwoods are managed for multiple uses, with wildlife production being a primary use. Public ownership of bottomland hardwoods rose from 0.4 million acres for the 1957–64 period to 0.7 million acres for the 1977–84 period. The proportion of public bottomland increased from 6 percent to 13 percent of the total bottomland hardwood acres between periods. Private ownership declined from 6.4 million acres to 4.5 million acres during the same period, principally due to conversion of forests to agricultural uses. Despite the decline, private landowners, principally nonindustrial private landowners, continue to control the majority of bottomland hardwoods in every Delta state (table 7).

Based on past trends, increases in public ownership of bottomland hardwood stands are likely. The proportion of public holdings will increase markedly as private bottomland hardwood acreage is cleared for agriculture and other uses. Despite these shifts, however, private landowners will likely continue to be the major landowner group in the Delta.

DISCUSSION AND CONCLUSIONS

The Delta's timberland area has continued to decline but at a slower rate. Ten years ago, 26 percent of the land area was timberland (Sternitzke 1976). By 1984, timberland had declined to 23 percent of all land.

A simple straight line extension of trends from the past decade (fig. 2) suggests a loss of about 70,000 acres per year. For the entire lower Mississippi Valley, other projections vary between 60,000 (MacDonald and others 1979) and 120,000 (Forsythe 1985) acres per year. Based on survey data, the loss is equivalent to 190 acres per day, with other studies suggesting between 160 and 330 acres per day.

The acreage that will remain bottomland hardwoods in the Delta is uncertain. Modification of existing policies and programs, additional legislation that limits land clearing and drainage, and public acquisition and conversion of flood-prone, marginal agricultural lands to bottomland hardwoods have been suggested to reduce or reverse the projected decline in acreage (Forsythe 1985).

Noncommodity values of bottomland hardwoods—aesthetics, woodland wildlife habitat, and opportunities for primitive and semi-primitive recreation—are considerable. Hunting leases are believed to be an important source of income for landowners in this area. These values will continue to be lost with every acre of forest land cleared for other uses. Promotion of nonconsumptive uses of these areas through tourist development and purchase of easements might be used to offset agricultural opportunities foregone.

Many of the existing bottomland hardwood stands in the Delta contain an abundance of older, large diameter growing-stock trees suited to large-bodied birds (eagles) and cull trees suited to woodpecker species (pileated woodpeckers) and other cavity-nesting wildlife. Stands stocked with these trees, however, have limited potential for further timber production.

[1]Stocking is a measure of stand density that is used to relate the number of trees occupying a site to a specified standard. A stand with 100 percent stocking of growing-stock trees is fully stocked for timber purposes.

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Table 5.—*Number of live trees in bottomland hardwood forest type in the Louisiana Delta by species and diameter class, 1974, 1984, and change since 1974*[1]

Species	Change in totals since 1974	Diameter class, 1984				Diameter class, 1974			
		Total	5.0–10.9	11.0–18.9	19.0 and larger	Total	5.0–10.9	11.0–18.9	19.0 and larger
		Thousand trees							
Softwoods:									
Cypress	+ 9,969	70,618	39,587	26,093	4,938	60,649	35,252	21,606	3,791
Pines	− 105	59	.....	59	.....	164	75	56	33
Hardwoods:									
White oaks:									
Overcup	− 3,200	9,796	5,682	3,120	994	12,996	7,991	3,679	1,326
White	− 372	246	125	121	.....	618	507	84	27
Swamp chestnut and chinkapin	− 252	824	635	57	132	610	430	88	92
Post and Delta post	− 327	581	414	160	7	908	665	148	95
Red oaks:									
Water	+ 131	10,020	5,864	2,658	1,498	9,889	6,514	2,273	1,102
Willow	− 2,179	7,720	5,553	1,694	473	9,899	7,230	2,070	599
Nuttall	− 3,608	7,249	4,021	2,053	1,175	10,857	6,730	3,165	962
Laurel	+ 75	1,205	899	181	125	1,129	765	260	104
Cherrybark	+ 173	1,180	574	385	221	1,007	515	390	102
Other red	+ 2	160	99	48	13	158	44	82	32
Gums:									
Sweetgum	− 7,199	33,154	21,429	10,020	1,705	40,353	29,771	9,526	1,056
Other gums	+ 227	77,085	47,050	28,677	1,358	76,858	49,623	24,624	2,611
Maples:									
Red maple	+ 3,782	37,789	32,395	4,822	572	34,007	29,189	4,243	575
Other maples	+ 1,049	9,208	7,245	1,905	58	8,159	7,185	883	91
Ashes:									
White ash	+ 119	1,017	744	221	53	898	464	359	75
Other ashes	− 7,588	38,776	27,479	9,529	1,769	46,364	34,787	9,745	1,832
Hackberry	− 1,900	30,465	20,448	8,859	1,159	32,545	21,841	9,638	1,066
Willow	− 349	28,235	16,421	9,073	2,741	28,584	16,864	9,661	2,059
Elms:									
American elm	− 725	15,294	11,331	3,474	490	16,019	12,091	3,407	521
Cedar elm	− 999	2,403	999	1,241	163	3,402	1,607	1,542	253
Slippery elm	+ 755	2,090	1,517	455	118	1,335	714	465	156
Winged elm	− 1,382	788	667	121	.....	2,170	2,052	106	12
Hickories:									
Water hickory	− 5,569	16,956	12,612	3,639	706	22,525	16,343	5,312	870
Sweet pecan	− 1,619	2,054	891	905	258	3,673	2,682	769	222
Other hickories	+ 386	1,739	1,317	412	9	1,353	902	439	12
Cottonwood	+ 2,108	6,991	4,426	2,080	486	4,883	3,110	1,367	406
Sycamore	+ 1,862	5,502	3,938	1,311	253	3,640	3,095	375	170
Locusts	− 1,911	4,130	2,771	1,100	259	6,041	3,951	1,704	386
Persimmon	− 227	2,609	2,549	41	19	2,836	2,566	270	.....
Other commercial hardwoods	− 247	1,248	985	222	39	1,495	1,365	108	22
Water elm[2]		4,972	4,735	237	.....				
Live oak[2]	− 3,647	1,086	865	92	129	13,027	12,382	527	118
Other noncommercial hardwoods		3,321	3,218	103	.....				
All species	−22,501	436,568	289,483	125,166	21,920	459,051	319,302	118,971	20,778

[1]Rows and columns may not sum to totals due to rounding.
[2]Noncommercial species.

For the Delta to achieve a greater balance between sustainable timber resources along with wildlife resources, management strategies will be needed to deal effectively with existing cull trees.

Given the past trends and current condition of bottomland hardwood stands, intensive management on remaining timberland, the majority being in nonindustrial private ownership, is likely to be limited. Cull trees are occupying more of the stands, leaving less room for growing-stock trees. Hard mast producers important for wildlife—oaks and hickories—are declining. Assurance of future multiple benefits will require more active management to regenerate and retain hardwood stands with tree species that serve timber, wildlife, and other needs.

Table 6.—*Area of bottomland hardwoods in the Delta by percent growing-stock trees and cull trees for the most recent surveys*[1]

Growing-stock trees	Cull trees (percent stocking)				
	Total	0–20	21–40	41–60	Over 60
Percent stocking	*Thousand acres*				
60 or less	1,890.2	375.6	622.0	520.6	327.0
61–100	2,351.5	696.2	1,140.4	426.6	88.4
101–140	804.3	472.7	261.8	69.8	....
over 140	70.4	70.4	.....	.....	....
Total	5,116.4	1,615.0	2,024.2	1,016.9	460.4

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

Table 7.—*Area of bottomland hardwoods in the Delta by State and ownership class for the most recent surveys*[1]

State (year of survey)	Total	Ownership class		
		Public	Forest industry	Other private
		Thousand acres		
Arkansas (1978)	1,264.1	227.7	207.2	829.3
Louisiana (1984)	2,897.8	296.4	299.1	2,302.2
Mississippi (1977)	954.5	109.5	204.7	640.3
Total	5,116.4	633.7	711.0	3,771.8

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

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A summary of component trends in the forests of the lower Mississippi River Valley suggests bottomland hardwood acreage is declining by 190 acres per day and is shifting toward maturity in species and stand structure. Private landowners continue to control the remaining forests, despite recent acquisitions by public agencies.

Keywords: timberland, bottomland hardwoods, stand structure, species composition, cull occupancy.