DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

Prepared in cooperation with the
LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
OFFICE OF PUBLIC WORKS

WATER-RESOURCES INVESTIGATIONS
REPORT 87-4059

INTRODUCTION

The U.S. Geological Survey, in cooperation with the Louisiana Department of Transportation and Development, Office of Public Works, has collected and published water-use information on a 5-year basis since 1950. Results of previous investigations have been published in reports entitled "Pumpage of water in Louisiana" for the appropriate year (Bieber and Forbes, 1966; Dial, 1970; Cardwell and Walter, 1979; and Walter, 1982). Water use information continues to be collected, stored, and made available to the public. An inventory of water withdrawals was conducted by the Louisiana District in 1985.

The purpose of this report is to present the information collected in the 1985 inventory. Totals for ground- and surface-water withdrawals by parish are shown in figure 1, and totals for water withdrawals by hydrologic unit (drainage basin) are shown in figure 2. A comparison of water withdrawn from 1950 to 1985 for major use categories is shown in figure 3. The 1980 withdrawal data are compared throughout this report with 1985 withdrawal data to show changes in withdrawal during that 5-year period. The data for 1980 are published in "Pumpage of water in Louisiana, 1980," by William H. Walter (1982).

Questionnaires were used to collect data on the source, amount, and category of water withdrawn. The withdrawal data were then processed into the State Water Use Data System (SWUDS). Compilation of the data by parish, source, and major categories was accomplished through SWUDS computer programs to produce table 1. All computations for water withdrawals in 1985 (figs. 3-6) were made with data from table 1. Values reported in tables 1 through 3 and figures 1 through 6 are in terms of average daily withdrawals during 1985. Withdrawals for seasonal industries, such as sugar mills, and for irrigation were prorated for the entire year. Round-off errors occasionally occur when tabulating the amounts of water withdrawn by different groupings.

Water withdrawals were separated into categories on the basis of the purpose for which the water was withdrawn. For the purposes of this report, the water-withdrawal categories tabulated are: public supply, industrial, power generation, rural domestic, livestock, irrigation, and aquaculture.

ACKNOWLEDGMENTS

Personnel of the Water Resources Section of the Office of Public Works, Louisiana Department of Transportation and Development, assisted in preparing the inventory of water-withdrawal information. George Cardwell of the Capital Area Groundwater Conservation Commission provided great assistance in preparing the inventory of water-withdrawal information on the five-parish area covered by the commission. The U.S. Agricultural Stabilization and Conservation Service, county agents with the Louisiana Cooperative Extension Service, municipalities, industries, and many individuals cooperated by supplying data for the inventory of water-withdrawal information. Water-withdrawal information for the Sabine River-Toledo Bend Reservoir System was provided by the Sabine River Compact Administration (Milton Cook, Sabine River Compact Administration, written commun., 1985).

PUBLIC SUPPLY

Table 1 shows that Orleans Parish withdrew the most water for public supply in 1985, most of which (135 Mgal/d) was from the Mississippi River. Forty-four parishes used public-supply water from ground-water sources only. Nine parishes used public-supply water from surface-water sources only. Eleven parishes used public-supply water from a combination of ground- and surface-water sources. Total water withdrawal for public supply in 1985 increased by approximately 27 Mgal/d from that in 1980. Ground-water withdrawal for public supply increased by approximately 11 Mgal/d, and surface-water withdrawal for public supply increased by approximately 15 Mgal/d. Total water withdrawn for public supply in 1985 was about 629 Mgal/d or about 6 percent of the total water withdrawn in the State (fig. 6).

INDUSTRIAL

Iberville Parish withdrew the most water for industrial purposes in 1985, of which 445 Mgal/d was from the Mississippi River. St. Charles Parish withdrew the second largest amount of water for industrial purposes, of which 348 Mgal/d was from the Mississippi River. Iberville Parish withdrew 210 Mgal/d less in 1985 than in 1980, and St. Charles Parish withdrew 364 Mgal/d less in 1985 than in 1980. The largest decrease in the amount of water used for industrial purposes was in St. Bernard Parish, which withdrew 529 Mgal/d less in 1985 than in 1980.

The total industrial use decreased by 1,580 Mgal/d from 1980 to 1985; this reflects a decrease of 43 percent from 1980. Ground-water use decreased from 392 Mgal/d in 1980 to 303 Mgal/d in 1985, and surface-water use decreased from 3,280 Mgal/d in 1980 to 1,790 Mgal/d in 1985. Industrial withdrawals in 1985 decreased because of economic pressures and plant closures during the early 1980's.

POWER GENERATION

The only hydroelectric power plant utilizing water from Louisiana is located on the Toledo Bend Reservoir. Water from the Sabine River is impounded in Toledo Bend Reservoir and released to turn turbines at the /powerhouse near Burkeville, Texas. Because the Sabine River forms the Louisiana-Texas boundary, half of the water flowing through the power plant is counted in Louisiana's water withdrawal inventory. Total flow through the powerplant in 1985 was 2,767 Mgal/d. One half of this amount, 1,380 Mgal/d, was for Louisiana hydroelectric power generation instream use; this amount is not included in surface-water withdrawals because it is not withdrawn.

Total water withdrawn for power generation increased by 2 percent from 1980 to 1985. Ground-water withdrawals for power generation cooling purposes decreased from 47 Mgal/d in 1980 to 30 Mgal/d in 1985. Surface-water withdrawals for power generation cooling purposes increased from 5,800 Mgal/d in 1980 to 5,930 Mgal/d in 1985. Water withdrawn for power generation purposes in 1985 totaled about 5,960 Mgal/d or about 57 percent of the total water withdrawn in the State. St. Charles Parish withdrew the largest amount of water for power generation in 1985, 2,410 Mgal/d from the Mississippi River. St. Charles Parish became the largest water user for power generation when the Waterford III powerplant became operational in 1983. Jefferson Parish withdrew 938 Mgal/d of Mississippi River water and Orleans Parish withdrew 880 Mgal/d of Mississippi River water for power generation purposes.

RURAL DOMESTIC

Rural-domestic water use is household use of water in areas that are not served by a public-water supplier. All rural-domestic use is assumed to be from ground water, and this is true except for a few local areas where cisterns that collect rainwater are used because no fresh ground water is available. The average-withdrawal rate may vary according to locale. For the purposes of this report an average withdrawal of 80 gallons per person per day was assumed. Data reporting the number of households in each parish served by a private well were supplied by the National Water Well Association (Carol Amsterdam, National Water Well Association, written commun., 1986).

Water withdrawn for rural-domestic purposes in 1985 totaled about 46 Mgal/d. Ten parishes have water districts that are extensive enough to supply all of the population. In another 10 parishes there was no significant rural-domestic use: Assumption, Jefferson, Lafourche, Orleans, Plaquemines, St. Charles, St. James, St. John, Tensas, and Terrebonne. Rural-domestic water withdrawals decreased from 54 Mgal/d in 1980 to 46 Mgal/d in 1985.

LIVESTOCK

Water withdrawn for livestock in 1985 totaled about 11 Mgal/d. County agents and the 1982 Census of Agriculture (U.S. Department of Commerce, Bureau of Census, 1982, p. 227-267) were sources of data for livestock populations. These population figures were multiplied by average-withdrawal rates to determine the amount of water withdrawn for consumption by livestock.

The county agents also supplied estimates of the percentages of water supplied by surface- and ground-water sources in each parish. Livestock withdrawals decreased from 15 Mgal/d in 1980 to 11 Mgal/d in 1985. Due to rounding, the amount of surface-water withdrawn is too small (about 0.2 percent) to be shown in figure 5 but is included in figure 6 and table 1.

IRRIGATION

Rice irrigation is the principal use of water in this category. Certified rice acreage figures were obtained through the cooperation of the U.S. Agricultural Stabilization and Conservation Service (Willie Cooper, U.S. Agricultural Stabilization and Conservation Service, written commun., 1986). All rice is irrigated. The average seasonal application rate for acreage irrigated by ground-water sources is 3 ft/yr. The average application for surface-water sources is 5 ft/yr. The percentages of acreages irrigated by surface water and ground water were supplied by the county agents. The amount of water applied for seasonal irrigation was prorated over the year to be expressed as average millions of gallons per day.

Water withdrawn for irrigation purposes in 1985 totaled about 1,480 Mgal/d. Withdrawals for rice irrigation totaled about 1,440 Mgal/d; Jefferson Davis Parish withdrew the most water, 219 Mgal/d. Rice irrigation withdrawals decreased from 2,030 Mgal/d in 1980 to 1,440 Mgal/d in 1985. Miscellaneous irrigation withdrawals for other crops remained at 43 Mgal/d.

AQUACULTURE

The aquaculture category includes water withdrawn for aquatic food production, principally catfish and crawfish farming, and fish hatcheries. Estimated application rates were obtained along with acreages by parish, and the percentages of water withdrawn from surface-water and ground-water sources were obtained from county agents. Water withdrawn for aquaculture purposes in 1985 totaled about 190 Mgal/d. St. Martin Parish withdrew the most water for aquaculture purposes in 1985, about 45 Mgal/d, and Evangeline Parish withdrew about 23 Mgal/d.

TOTAL WATER WITHDRAWALS

In 1985, about 10,420 Mgal/d of water was withdrawn for various purposes in Louisiana (fig. 6). About 1,450 Mgal/d was withdrawn from ground-water sources (fig. 4), and about 8,970 Mgal/d was withdrawn from surface-water sources (fig. 5).

Total water withdrawn in the State decreased by 16 percent from 1980 to 1985 (fig. 3). For 1980 and 1985, ground-water withdrawals were 14 percent, and surface-water withdrawals were 86 percent of the total withdrawals in the State. From 1980 to 1985, ground-water withdrawals decreased by 19 percent; whereas, surface-water withdrawals decreased by 16 percent.

Ground-water withdrawals were about 14 percent of the total water withdrawn. Of this, 54 percent was withdrawn for irrigation and aquaculture, 21 percent was withdrawn for industry, 19 percent was withdrawn for public supply, 4 percent was withdrawn for rural domestic, and 2 percent was withdrawn for power generation (fig. 4). Compared to 1980 figures, ground-water withdrawals in 1985 decreased 28 percent for industry, 22 percent for irrigation and aquaculture, 15 percent for rural domestic, and 36 percent for power generation. Ground-water withdrawals increased 8 percent for public supply.

The Chicot aquifer in southwestern Louisiana supplied about 43 percent of the total ground water withdrawn in 1985. Of the total water withdrawn from the Chicot, 88 percent was for irrigation and aquaculture. Table 2 shows withdrawals of ground water by aquifer.

Surface-water withdrawals were about 86 percent of the total water withdrawn. Of this, 66 percent was withdrawn for power generation, 20 percent was withdrawn by industry, 10 percent was withdrawn for irrigation and aquaculture, and 4 percent was withdrawn for public supply (fig. 5). Compared to 1980, withdrawals for power generation increased 2 percent, public-supply withdrawals increased by 5 percent, industry withdrawals decreased 45 percent, and irrigation and aquaculture withdrawals decreased 27 percent. Instream water use for power generation at Toledo Bend Reservoir, 1,380 Mgal/d, is not included in these figures because water is not withdrawn from the source.

The Mississippi River supplied 76 percent of the total surface water withdrawn. Of this, power generation plants withdrew 66 percent, industry withdrew 21 percent, and the remaining 13 percent was withdrawn for public supply. The 1985 withdrawals from major surface-water sources in the State are listed in table 3.

SELECTED REFERENCES

Bieber, P.P., and Forbes, M.J., Jr., 1966, Pumpage of water in Louisiana, 1965: Louisiana Department of Conservation and Louisiana Department of Public Works Water Resources Pamphlet 20, 8 p.

Cardwell, G.T., and Walter, W.H., 1979, Pumpage of water in Louisiana, 1975: Louisiana Department of Transportation and Development, Office of Public Works Water Resources Special Report No. 2, 15 p.

Executive Office of the President-Office of Management and Budget, 1972, Standard industrial classification manual: Washington, D.C., U.S. Government Printing Office, 64 p.

Dial, D.C., 1970, Pumpage of water in Louisiana, 1970: Louisiana Department of Conservation and Louisiana Department of Public Works Water Resources Pamphlet 26, 10 p.

Louisiana Department of Commerce, 1986, Directory of Louisiana manufacturers: 422 p.

Louisiana Department of Public Works, 1956, Water--a special report to the Legislature: Baton Rouge, La., 36 p.

Louisiana Municipal Association, 1983, Directory of Louisiana municipal officials: Baton Rouge, La., 31 p.

Lurry, D.L., 1985, Public water supplies in Louisiana, volume 1: northern Louisiana: Louisiana Department of Transportation and Development, Office of Public Works Water Resources Basic Records Report No. 13, 119 p.

Nyman, D.J., and Fayard, L.D., 1978, Ground-water resources of Tangipahoa and St. Tammany Parishes, southeastern Louisiana: Louisiana Department of Transportation and Development, Office of Public Works Water Resources Technical Report No. 15, 76 p.

Snider, J.L., and Forbes, M.J., Jr., 1961, Pumpage of water in Louisiana, 1960: Louisiana Department of Public Works and Louisiana Department of Conservation, 6 p.

U.S. Department of Commerce, Bureau of Census, 1982, Census of Agriculture: U.S. Government Printing Office, v. 1, part 18, 348 p.

----- 1982, Water use in manufacturing: 72 p.

----- 1982, Water use in mineral industries: 32 p.

----- 1982, The characteristics of the population from the 1980 census: 237 p.

Walter, W.H., 1982, Pumpage of water in Louisiana, 1980: Louisiana Department of Transportation and Development, Office of Public Works Water Resources Special Report No. 3, 15 p.

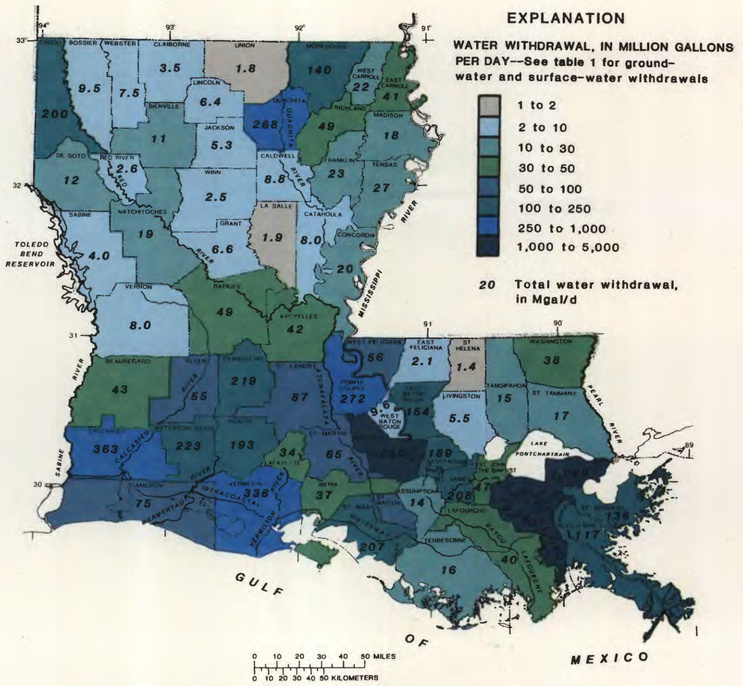

Figure 1.--Total water withdrawal in Louisiana by parish, 1985.

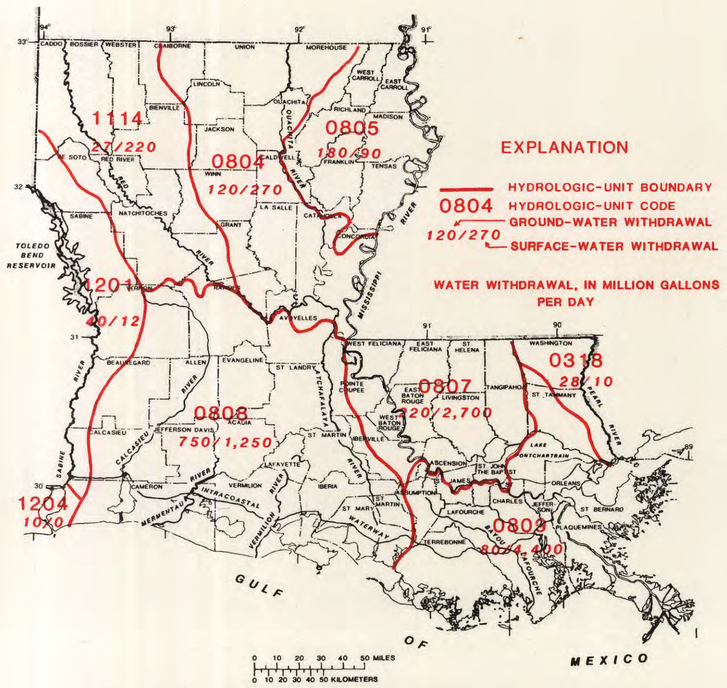

Figure 2.--Water withdrawal in major hydrologic units in Louisiana, 1985.

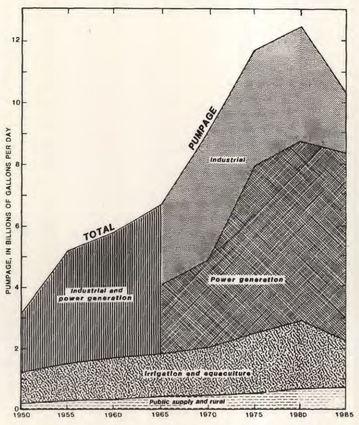

Figure 3.--Water withdrawal in Louisiana by major use categories, 1950-85.

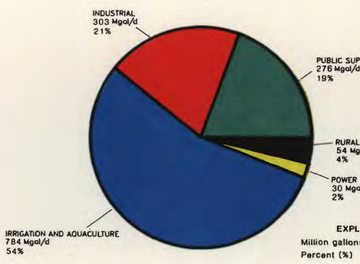

Figure 4.--Ground-water withdrawal, 1985.

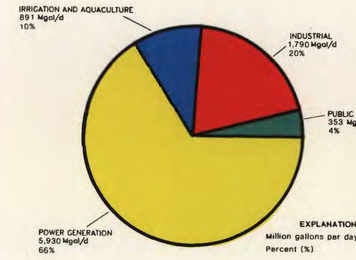

Figure 5.--Surface-water withdrawal, 1985.

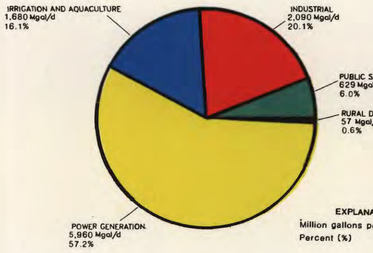

Figure 6.--Total water withdrawal, 1985.

Table 1.--Water withdrawal in Louisiana by parish, source, and principal use, 1985
(In million gallons per day, Mgal/d; GW, ground water; SW, surface water)

Parish	Public supply GW	Public supply SW	Industrial GW	Industrial SW	Power generation GW	Power generation SW	Rural domestic GW	Livestock GW	Livestock SW	Irrigation: Rice GW	Irrigation: Rice SW	Irrigation: General GW	Irrigation: General SW	Aquaculture GW	Aquaculture SW	Total withdrawn by source GW	Total withdrawn by source SW	Total water
Acadia	6.32		2.31				1.30	0.06	0.06	89.0	73.0	4.48		8.0	8.0	111.47	81.06	192.53
Allen	1.18		.48				.40	.06	.06	44.0	9.0					46.12	9.06	55.18
Ascension	1.77	1.68	3.77	178			1.97	.06	.01					1.02	.75	8.59	180.44	189.03
Assumption		2.83	4.27	5.06				.01	.01						1.50	4.28	9.40	13.86
Avoyelles	2.41						.33	.20		12.0	27.0					14.94	27.00	41.94
Beauregard	4.34		30.0				1.16	.15	.15	5.45	2.20					41.10	2.35	43.45
Bienville	.62		10.0				.50	.13	.09							11.25	.09	11.34
Bossier	1.20	6.27	.49				1.04	.11	.06	.30		.06				3.20	6.33	9.53
Caddo	1.33	36.4		.68		158	1.90	.19	.13	.67		.72				4.81	195.21	200.02
Calcasieu	22.5		41.6	179	9.54	12.0	2.88	.12	.12	31.5	64.0					108.14	255.12	363.26
Caldwell	.75						.22		.09	7.50				.27		8.74	.09	8.83
Cameron	3.29			22.0			.36		.28	5.00	44.0					8.65	66.28	74.93
Catahoula	.68						.35		.10	5.40					1.43	6.43	1.53	7.96
Claiborne	2.40		.43				.33	.18	.12							3.34	.12	3.46
Concordia	1.49						.08		.06	15.0	2.70			.14		16.71	2.76	19.47
De Soto	.91	.97	.09	9.43			.60	.17	.13							1.77	10.53	12.30
E. Baton Rouge	57.1		57.0	33.7	3.00	2.25	.42	.15	.01			.06		.42		118.15	35.96	154.11
E. Carroll	1.91						.08	.13		34.6	3.00	1.21	.13	.23		38.16	3.13	41.29
E. Feliciana	1.29		.03				.30	.05	.15			.24				1.91	.15	2.06
Evangeline	1.57		1.74			83.6	.61	.10	.10	90.9	16.8	.50		11.3	11.3	106.72	111.80	218.52
Franklin	.96						1.24	.06	.01	8.60		3.55	.40	8.12		22.53	.41	22.94
Grant	1.91	2.36	.02	1.75			.46	.10								2.49	4.11	6.60
Iberia	9.25		2.26	6.29			.82	.07	.02	2.54	2.48	6.18	.87	5.16	1.29	26.28	10.95	37.23
Iberville	2.14		25.6	445	1.50	765	.19	.09			1.02				6.30	29.52	1,217.32	1,246.84
Jackson	1.53		3.31				.17	.23	.08							5.24	.08	5.32
Jefferson		79.6	6.76	11.3	1.88	938			.02			.18				8.82	1,028.92	1,037.74
Jefferson Davis	2.99		.39				.64	.07		120	99.0					124.09	99.0	223.09
Lafayette	16.0		.03		.78		2.75	.16	.01	10.5	2.16			1.05	.12	31.27	2.29	33.56
Lafourche		18.8	1.01	9.64				.03	.18						10.5	1.04	39.12	40.19
La Salle	1.36			.24			.20	.03	.11							1.59	.35	1.94
Lincoln	4.93		.97				.26[a]	.26				.02				6.42	.02	6.44
Livingston	3.59						1.72[a]	.17				.03				5.51	.0	5.51
Madison	1.20		.06				.08	.04		13.8	1.50	1.13		.10		16.41	1.50	17.91
Morehouse	3.05		5.11	20.0			0.46	0.09		41.0	61.4	6.70	1.70	0.13		56.54	83.10	139.64
Natchitoches	.51	5.89		7.26			.84	.48			4.16		.23			1.83	17.54	19.37
Orleans		135	30.7		10.1	880						.08	.01			40.88	1,015.01	1,055.89
Ouachit	8.06	9.13	9.38	20.2		211	.64	.11			8.30	.50	.60			18.69	249.23	267.92
Plaquemines		7.10		109					0.07				.27		0.72	.0	117.16	117.16
Pointe Coupee	.35		2.29		1.10	262	.40	.07	.07	5.48				.36		10.05	262.07	272.12
Rapides	29.5					1.70	1.18	.24	.06		15.7		.72			30.92	18.18	49.10
Red River	.76		.06				.29	.02	.14	.50		.80				2.43	.14	2.57
Richland	2.24						.93	.11	.05	40.3		2.20	.55	2.52	.44	48.30	1.04	49.34
Sabine	.25	.98	.33	.04		.90[b]	1.43	.10								2.11	1.92	4.03
St. Bernard		10.5	.90	125				.01								.91	135.50	136.41
St. Charles		7.56	15.5	348		2,410[c]			.06						.63	15.50	2,766.25	2,781.75
St. Helena	.29						.60	.31	.04			.07		.04		1.31	.04	1.35
St. James		2.54	7.38	180											17.9	7.38	200.44	207.82
St. John	1.60	3.66	6.21	35.0											.31	7.81	38.97	46.78
St. Landry	9.59		.56				.91	.03	.15	31.6	28.2			12.4	3.10	55.09	31.45	86.54
St. Martin	4.75		.97	.03			.75	.04	.01	13.6				8.95	35.8	29.06	35.84	64.90
St. Mary	.88	9.91	2.70	2.36	1.87	182	.12	.01	.01		.36			3.35	3.35	8.93	197.99	206.92
St. Tammany	10.9		.18				4.30[d]	.12	.08			.69	.46			16.19	.54	16.73
Tangipahoa	9.45		.43				2.70[e]	.64	.35			1.26	.36	.08		14.56	.71	15.27
Tensas	.45	.60					.29		.01	26.0		.02				26.76	.61	27.37
Terrebonne		10.7	.07						.04						5.41	.07	16.15	16.22
Union	.91						.36	.53								1.80	.0	1.80
Vermilion	3.38		4.32	4.43			1.80	.37	.04	17.1	288			3.80	15.0	30.77	307.47	338.24
Vernon	6.03						1.68	.25								7.96	.0	7.96
Washington	9.88		15.0	10.1			1.57[f]	.63	.03			.36				27.44	10.13	37.57
Webster	5.87		.98				.41	.08	.12							7.34	.12	7.46
W. Baton Rouge	5.10		4.26				.18	.01								9.55	.0	9.55
W. Carroll	1.11						.23	.10	.01	10.0	4.33	3.54	2.44			14.98	6.78	21.76
W. Feliciana	1.48		1.84	27.7	.16	24.5	.11	.02	.13							3.61	52.33	55.94
Winn	1.13		.90				.37	.09								2.49	.0	2.49
Subtotals	276.44	352.48	302.69	1,791.21	29.93	5,930.95	45.91	7.64	3.63	682.34	758.31	34.58	8.74	67.44	123.85	1,446.95	8,969.19	
Grand totals	628.92		2,093.90		5,960.88		45.91	11.27		1,440.65		43.32		191.29		10,416.14		10,416.14

[a] Does not include 0.39 Mgal/d flowing to waste (unused).
[b] Does not include 1,384 Mgal/d instream use for hydroelectric power generation.
[c] Includes 1,059 Mgal/d for nuclear power generation.
[d] Does not include 7.15 Mgal/d flowing to waste (unused).
[e] Does not include 1.43 Mgal/d flowing to waste (unused).
[f] Does not include 0.98 Mgal/d flowing to waste (unused).

Table 2.--Withdrawal of ground water by aquifer, 1985

Aquifer	Million gallons per day[1]
Chicot aquifer	616
Alluvial aquifer	284
Pleistocene aquifer (exclusive of Chicot)	275
Pliocene and Miocene aquifers	204
Cockfield and Sparta aquifers	61.5
Carrizo-Wilcox aquifer	9
Total (rounded)	1,450

[1] Measurements rounded to the nearest million gallons per day.

Table 3.--Withdrawal from major surface-water sources, 1985

Source	Million gallons per day[1]
Mississippi River and tributaries	6,824
Intracoastal Waterway and associated canals	413
Mermentau River	402
Ouachita River	275
Calcasieu River	227
Red River, Caddo Lake, and Twelvemile Bayou	218
Vermilion River	171
Miscellaneous streams, lakes, and ponds throughout the State	120
Atchafalaya River and Bayou Teche	112
Bayou Boeuf	86
Bayou Lafourche	62
Sabine River and Toledo Bend Reservoir	50
Pearl River	10
Total	8,970

[1] Measurements rounded to the nearest million gallons per day.

CONVERSION FACTORS AND ABBREVIATIONS

For the convenience of readers who may prefer to use metric (International System) units rather than the inch-pound units used in this report, values may be converted by using the following factors:

Multiply inch-pound unit	By	To obtain metric unit
acre-foot (acre-ft)	0.001233	cubic hectometer (hm^3)
foot per year (ft/yr)	0.3048	meter per year (m/yr)
gallon per day (gal/d)	0.003785	cubic meter per day (m^3/d)
gallon per minute (gal/min)	0.06309	liter per second (L/s)
million gallons per day (Mgal/d)	3,785	cubic meter per day (m^3/d)

Other conversion factors that may be helpful in using this report:

Multiply	By	To obtain
million gallons per day (Mgal/d)	3.069	acre-foot per day
	1,120	acre-foot per year
	1.547	cubic foot per second (ft^3/s)
	694.4	gallon per minute (gal/min)
	0.1337	million cubic feet per year (Mft^3/yr)

PUMPAGE OF WATER IN LOUISIANA, 1985

By Dee L. Lurry

1987

For additional information write to:

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