

STATE OF ARKANSAS
ARKANSAS DEPARTMENT OF COMMERCE
ARKANSAS GEOLOGICAL COMMISSION

WATER RESOURCES SUMMARY NUMBER 7

USE OF WATER IN ARKANSAS, 1970

By

H. N. Halberg

U.S. Geological Survey



Prepared by the U.S. Geological Survey in cooperation
with the Arkansas Geological Commission

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USE OF WATER IN ARKANSAS, 1970

By H. N. Halberg

ABSTRACT

Arkansas used an average of 3,061 mgd (million gallons per day) of surface water and ground water in 1970, 28 percent more than in 1965. This total does not include the 24,700 mgd used in the production of hydroelectric power. Half the water supplied was ground water and half was drawn from streams and reservoirs. The principal categories of use are public supply, self-supplied industrial use, rural domestic and livestock use, irrigation, fish and minnow farming, water for wildlife impoundments, and fuel-electric-power production. The principal use was irrigation, which used 1,293 mgd, or a little less than half the total, and 82 percent of which was ground water. Cooling water for fuel-electric power production required 956 mgd, 31 percent of the total. Practically all of it was surface water. Fish and minnow farming, a rapidly growing industry, used 314 mgd, 10 percent of the total. Consumption of water was 1,226 mgd, 40 percent of withdrawals.

Surface-water supplies are commonly used in the northwestern half of the State; ground-water supplies are more common in the southeastern half, or Coastal Plain, where the two principal underground reservoirs, the deposits of Quaternary age, and the Sparta Sand, of Eocene age, furnished practically all the ground water used. The deposits of Quaternary age provided most of the ground water used for irrigation; the Sparta Sand provided much of the ground water used for industry.

INTRODUCTION

Water is one of Arkansas' most important natural resources; the high annual rainfall of 49 inches makes the State attractive to agriculture and many industries. However, no plans can be made for expansion of either agriculture or industry unless it is known if enough water is available to support these activities. This report provides water-use and water-consumption data for 1970 that can be used for future planning.

The information in this report has been collected by the U.S. Geological Survey in cooperation with the Arkansas Geological Commission. The writer expresses his appreciation to the many public agencies, industries, other organizations, and individuals that provided data. Especially, he is indebted to the Arkansas State Department of Health; the Cooperative

Extension Service, College of Agriculture, University of Arkansas; the Soil Conservation Service and other bureaus of the U.S. Department of Agriculture; the Bureau of Sport Fisheries and Wildlife, U.S. Department of the Interior; the Corps of Engineers, U.S. Army; and the Arkansas Power & Light Company. Glen T. Kellogg, Chief Sanitary Engineer, Bureau of Environmental Engineering, Arkansas State Department of Health; James L. Gattis, Extension Agricultural Engineer, Cooperative Extension Service; and Roy A. Grizzel, Jr., Biologist, Soil Conservation Service, furnished detailed data for public-supply systems, irrigated-crop acreages, and acreages of fish and minnow ponds.

In this report, "use" is defined as "withdrawal of water from a source, for use." Some of the water is returned to the source after use and is withdrawn again. It is tallied each time it is withdrawn. If the water is recirculated, it is counted only once, when it is withdrawn from the source. Part of the water withdrawn is consumed. In this report "consumed water" is defined as water that is evaporated or transpired, incorporated into a product, or is ingested by humans and animals; it is not returned to a source and cannot be used again. This report is similar to those for 1960 (Stephens and Halberg, 1961) and 1965 (Halberg and Stephens, 1966), but this report includes data on consumption of water.

The only saline water used in Arkansas at the present time is associated with the petroleum and bromine industries of southern Arkansas. Wells are drilled specifically for the purpose of producing saline water, some of which contains enough bromine to warrant processing for bromine recovery. Other saline water is pumped into disposal wells to maintain oil-field pressures and to assist in petroleum recovery. Saline-water use in Arkansas is not tabulated in this report.

Water used for recreational activities, such as boating or fishing, or for navigation is not included in the report.

WATER USE AND CONSUMPTION

Arkansas used an average of 3,061 mgd of fresh ground and surface water in 1970, exclusive of that used for production of hydroelectric power (fig. 1 and table 1). This represents a 28 percent increase in water use since 1965. Nearly half (42 percent) of the water was used to irrigate crops, principally in the eastern part of the State; 82 percent of the irrigation water was well water. More water (546 mgd) was used in Hot Spring County than in any other county (fig. 2 and table 2). However, this figure includes 535 mgd of surface water used for cooling in fuel-electric power production. Arkansas County's 233 mgd is the highest for all uses exclusive of fuel-electric power production. The smallest quantity (0.7 mgd) was used in Newton

Table 1.--Use and consumption of water in Arkansas, 1970

[Million gallons per day]

Category	Water use in 1970		Changes in water use since 1965 ^a	
	Ground water	Surface water	Ground water	Surface water
Public supply	71	95	+17	+22
Self-supplied industry	115	94	+41	+38
Rural use	49	0	+18	0
Domestic	15	19	+2	+3
Livestock	34	49	+18	0
Irrigation	803	159	+13	-8
Rice	261	70	-111	-14
Other crops	212	102	+108	+5
Fish and minnow farms ^b	40	314	0	+113
Wildlife impoundments	0	40	0	0
Subtotal	1,526	579	+88	+46
Fuel-electric power	4	952	-2	+535
Total use	1,530	1,531	+86	+581
Hydroelectric power	--	24,700	--	+13,700
Total consumption of water	943	1,226	--	--

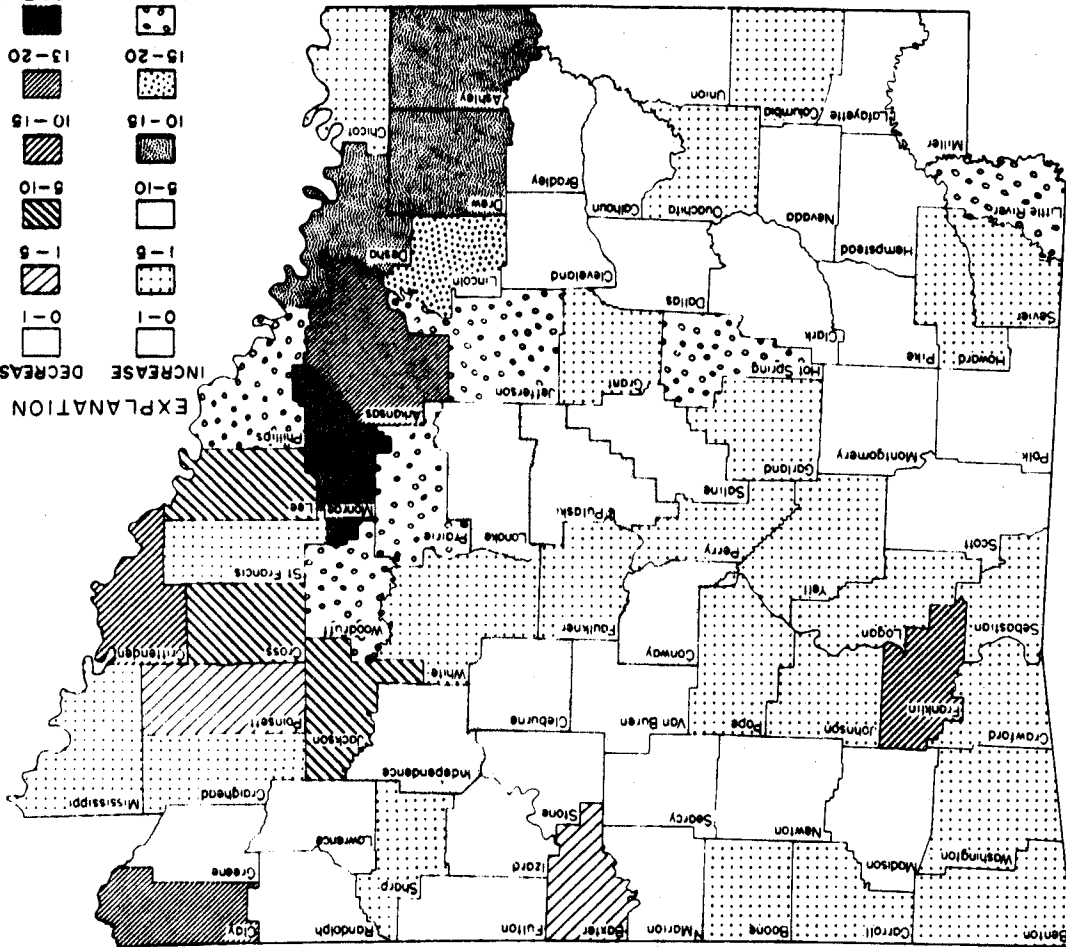
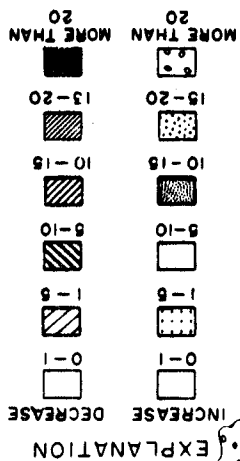
a. Computed on basis of revised 1965 figures. b. Figures include 25 mgd used at National Fish Hatcheries.

County. The greatest increase in use since 1965 was in the central and southeastern part of the State (fig. 3). The increases are due to use of much more water in 1970 by industry, for fish and minnow farming, and for cooling at fuel-electric power plants than in 1965. The use figure of 3,061 mgd is the equivalent of supplying 1,592 gpd (gallons per day) to each resident of the State, as compared with 1,257^a gpd in 1965.

a. Revised figure.

Figure 3

CHANGES IN WATER USE IN ARKANSAS COUNTIES, 1965 TO 1970
IN MILLION GALLONS PER DAY



In addition to the above uses of water, 24,700 mgd was used in the production of hydro-electric power. Arkansas consumed an average of 1,226 mgd of ground and surface water in 1970 (tables 1, 3, and 4), or 40 percent of the total use. About 77 percent of the consumed water was drawn from ground-water sources.

Water use is tabulated by county, category of use, and source, in table 2. Water use is also tabulated by Water Resources Council (1970) subregions (table 3), for use in studies of individual river basins. The principal categories are public supply, self-supplied industrial use, use in rural households and by livestock, irrigation, fish and minnow farming, water for wildlife impoundments, and fuel-electric power production. The data are given in average million gallons per day; for example, the water used to irrigate rice may have been applied in 40 days, but it is tabulated as though the water were applied at a constant rate throughout the entire year. Although the detailed data are given to the nearest 0.01 mgd (10,000 gallons per day), this precision was used only in order to facilitate tabulation.

Water consumption is tabulated by county and source in table 4. It is also summarized by Water Resources Council (WRC) subregions in table 3. Water use and consumption are tabulated under the county or subregion where the water is used, not under the location of the source. For example, in 1970, Little Rock drew about 23 mgd from Lake Winona, which is in Saline County, on the Alum Fork of the Saline River (WRC subregion 0804). The water was used in Pulaski County, in the Arkansas River basin (WRC subregion 1111).

Public Supplies

The supply systems of 441 cities, towns, and other water districts in the State, both publicly and privately owned, drew 166 mgd from their sources during 1970 (table 2). Three hundred thirty seven systems supplied 70 mgd of ground water, 102 supplied 95 mgd of surface water, and 2 supplied 1 mgd of ground and surface water. The water was distributed to about 1,240,000 people and the commercial and industrial establishments in the municipalities. The total supplied includes water used for public facilities and fire fighting; it also includes leakage and wastage. About 38 mgd of the water was used by commerce and industry. Supplying 166 mgd is the equivalent of furnishing 133 gallons per day to each resident of the municipalities. Consumption of water is believed to be about 20 percent of withdrawals. This figure, or more precise data furnished by municipalities, was used to compute the quantity of water consumed. Consumption of water in communities that have no sewers was assumed to be 100 percent

Table 2.--Use of water in Arkansas counties, 1976
 [By principal use and source, in million gallons per day^a]

County	Rank according to quantity of water used	Public supply		Self-supplied industry		Domestic		Irrigation		Other crops		Fish and minor farms		Wildlife impoundments		Fuel-electric power		County Total		Total
		Ground water	Surface water	Ground water	Surface water	Ground water	Surface water	Ground water	Surface water	Ground water	Surface water	Ground water	Surface water	Ground water	Surface water	Ground water	Surface water	Ground water	Surface water	
Arkansas	3	2.14	0.00	2.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.14	233.15
Baxter	30	1.43	0.00	1.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.43	78.06
Benton	34	2.00	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	12.28
Boone	51	0.05	1.10	1.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.20	4.26
Bradley	56	0.64	0.00	0.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.64	3.14
Brazos	55	1.13	0.00	1.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.13	3.20
Carlisle	68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.71
Carroll	55	1.11	0.00	1.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.11	3.20
Chicot	17	0.73	0.00	0.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.73	55.25
Clark	50	0.02	1.31	1.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.35	5.25
Clarendon	46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.22
Crawford	46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.07
Craighead	13	4.38	0.00	4.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.38	67.11
Crittenden	21	3.54	0.00	3.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.54	88.92
Crosby	10	1.06	0.00	1.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.06	1.72
Dallas	65	0.63	0.00	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.63	1.72
Desham	9	0.85	0.00	0.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.85	37.05
Desha	20	2.06	0.00	2.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.06	37.05
Drew	20	2.06	0.00	2.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.06	37.05
Franklin	29	1.26	0.00	1.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.26	18.55
Franklin	29	1.26	0.00	1.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.26	18.55
Garland	38	0.01	5.17	5.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.19	9.28
Grant	59	1.80	0.00	1.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.80	2.06
Greene	25	1.90	0.00	1.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.90	2.22
Hot Spring	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.67
Howard	53	0.06	2.02	2.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.08	2.12
Independence	35	1.10	0.00	1.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.10	10.40
Jackson	14	0.89	0.00	0.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.89	60.92
Jackson	14	0.89	0.00	0.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.89	60.92
Jarvis	60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.10
Jefferson	6	7.83	0.00	7.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.83	121.87
Johnson	52	1.30	0.00	1.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.30	4.18
Jones	40	0.04	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	2.55
Lawrence	24	0.90	0.00	0.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.90	25.31
Lee	23	0.59	0.00	0.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.59	25.41
Lincoln	11	4.42	0.00	4.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.42	81.41
Little River	22	4.49	1.03	5.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.51	26.46
Logan	54	1.11	0.00	1.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.11	3.32
Lonoke	4	1.38	0.00	1.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.38	186.86
Louisiana	5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.11
Madison	62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.94
Madison	62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.94
Madison	62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.94
Miller	48	4.83	0.00	4.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.83	51.83
Mississippi	19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.91
Mississippi	19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.91
Monroe	18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.79
Monroe	18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.79
Monroe	18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.79
Montgomery	73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.46
Montgomery	73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.46
Montgomery	73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.46
Nebraska	66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.70
Newton	75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.22
Newton	75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.22
Newton	75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.22
Northwest	26	1.44																		

Arkansas industry and commerce used 272 mgd of water during 1970, which includes 63 mgd furnished by the public-supply systems and 209 mgd furnished by industry itself. (See tables 2 and 5.) The industrial self-supplied water use in 1970 was 61 percent more than that supplied in

Industry and Commerce

of the use. Several Arkansas communities import water from other counties, river basins, or States. Little Rock, as mentioned previously, draws about 23 mgd from Lake Winona, which is in Saline County, in the Saline River basin (WRC subregion 0804). The water is used in Pulaski County and the effluent from the sewer systems flows into the Arkansas River (subregion 1111). Several communities in Benton and Washington Counties are supplied from Beaver Reservoir in the White River basin (subregion 1101). The water from some of the communities is used in and wasted into the Arkansas River basin (subregions 1107 or 1111). The city of Texarkana imports its supply from Lake Texarkana, Texas.

WRC subregions	Water used in 1970		Water consumed in 1970		Total
	Ground water	Surface water	Ground water	Surface water	
0801.--Mississippi-Hatchie.	0.1	0	0.1	--	0.1
0802.--Mississippi-St. Francis.	1,030.4	587.3	1,617.7	160.0	813.1
0803.--Mississippi-Yazoo.	.1	.2	.3	.2	.3
0804.--Ouachita.	169.8	641.3	811.1	33.2	105.3
0805.--Mississippi-Texas.	173.6	53.2	226.8	112.0	149.7
1101.--White.	87.8	112.7	200.5	59.4	77.8
1107.--Verdigris-Neosho.	3.9	4.0	7.9	1.9	2.8
1111.--Lower Arkansas.	40.3	97.4	137.7	26.2	50.2
1114.--Lower Red.	24.1	35.3	59.4	17.5	26.5
Total	1,530.1	1,531.4	3,061.5	942.4	1,225.8

Table 3.--Use and consumption of water in Water Resources Council subregions in Arkansas, 1970 [Million gallons per day]

Table 4.--Consumption of water in Arkansas counties, 1970

County	Ground water	Surface water	Total
Arkansas	24.80	17.18	41.98
Ashley	14.07	1.80	15.87
Baxter	1.13	1.28	2.41
Benton	3.71	1.78	5.49
Boone	2.66	1.69	4.35
Bradley	1.21	1.16	2.37
Calhoun	1.36	1.14	2.50
Carroll	1.01	1.89	2.90
Chicot	16.04	21.35	37.39
Clark	1.78	1.99	3.77
Clay	13.18	1.27	14.45
Oleburne	1.90	1.34	3.24
Oleland	1.55	1.38	2.93
Columbia	4.30	1.02	5.32
Conway	3.67	1.07	4.74
Craighead	45.06	1.43	46.49
Crawford	2.21	1.25	3.46
Crittenden	21.04	1.78	22.82
Cross	56.10	2.50	58.60
Dallas	1.58	1.35	2.93
DeWitt	54.26	12.54	66.80
Drew	14.51	8.63	23.14
Faulkner	2.22	2.30	4.52
Franklin	1.17	1.72	2.89
Fulton	1.47	1.40	2.87
Garland	1.06	2.81	3.87
Grant	1.36	1.27	2.63
Greene	12.04	1.95	14.99
Hempstead	1.46	1.12	2.58
Hot Spring	1.46	2.24	3.70
Howard	1.15	1.31	2.46
Independence	4.31	2.30	6.61
Izard	1.50	1.41	2.91
Jackson	38.85	1.89	40.74
Jefferson	43.41	8.41	51.82
Johnson	1.38	1.48	2.86
Lafayette	5.02	1.91	6.93
Lawrence	15.43	1.54	16.97
Lee	15.34	2.85	18.19
Lincoln	43.87	8.49	52.36
Little River	2.84	3.46	6.30
Logan	1.34	1.89	3.23
Lonoke	105.12	7.11	112.23
Madison	1.05	1.60	2.65
Marion	1.94	1.37	3.31
Miller	2.48	1.78	4.26
Mississippi	6.15	1.19	7.34
Monroe	30.45	3.90	34.35
Montgomery	1.58	1.20	2.78
Nevada	1.97	1.22	3.19
Newton	1.47	1.23	2.70
Ouachita	4.24	1.91	6.15
Parry	1.23	1.57	2.80
Phillips	11.30	1.21	12.51
Pike	1.00	1.22	2.22
Poinsett	68.91	1.90	70.81
Polk	1.02	1.66	2.68
Pope	1.94	1.08	3.02
Pratt	50.37	49.66	100.03
Pulaski	11.96	9.12	21.08
Randolph	2.86	1.71	4.57
St. Francis	34.37	4.17	38.54
Saline	1.45	4.08	5.53
Scott	1.64	1.54	3.18
Searcy	1.50	1.26	2.76
Sebastian	1.70	2.35	4.05
Sewar	1.71	1.66	3.37
Sharp	1.50	1.58	3.08
Stone	1.48	1.33	2.81
Union	9.74	1.17	10.91
Van Buren	1.57	1.52	3.09
Washington	3.23	3.41	6.64
White	4.46	4.81	9.27
Woodruff	31.49	5.33	36.82
Yell	2.11	1.14	3.25
STATE TOTALS	942.50	283.36	1,225.86

[Million gallons per day]

A little less than half (1,293 mgd) of the water withdrawn in Arkansas in 1970 was used to irrigate crops, 82 percent (1,064 mgd) of which was ground water (tables 1 and 2). Irrigation of rice was slightly greater than in 1965. Depths of water applied, based on the author's field studies were used to compute the quantity of water used to irrigate rice in different parts of the State, as follows: east of Crowley's Ridge, 46 inches (3.83 acre-feet per acre); between the White River and Crowley's Ridge, 27 inches; between the Arkansas and White Rivers (the Grand Prairie), 24 inches; southeast Arkansas, 54 inches for the alluvial areas and 28 inches for the terraces in western Ashley and Drew Counties; and 24 inches for all other areas. Water-use figures for 1965 (Halberg and Stephens, 1966) were revised using the above figures in determining the increases and decreases shown in table 1 and figure 3. Most of the rest of the irrigation water was applied to cotton and soybeans; the 331 mgd used to water crops other than rice was 28 percent less than the use in 1965. Adequate rainfall during the 1970 growing season in parts of the State was reflected in decreased demands for irrigation water.

Irrigation

Farmers and others who furnish their own water supplies are classed as rural domestic users. In 1970 about 680,000 rural users withdrew 49 mgd from their own wells and springs (table 2). This withdrawal figure was computed on the basis of use of 77 gallons of water per day per capita by the 90 percent of people who have running water in their homes and on the basis of 20 gallons per day by the remaining 10 percent. The figure for Pulaski County was computed on the basis of all rural residents having running water. About 40 percent of the 34 mgd used to raise cattle, hogs, and poultry was drawn from wells, the rest was drawn from streams and ponds. The number of other domestic animals in the State was so small that their total water use was too small to tabulate.

In this report, although it is not strictly true, one hundred percent of the water used in rural households or by livestock is considered to be consumed.

Rural Households and Livestock

1965. The water was used by agricultural, chemical, metal, mining, paper, petroleum, and other types of manufacturing industries; also at mines, quarries, sand and gravel pits, and oil and gas wells. The self-supplied category also includes water used by those hospitals, insti- tutions, military establishments, schools, and recreation areas that have their own sources of supply. Construction of two new paper mills since 1965 and increased use of water at other plants account for the large increase in use of water by industry.

Most of the water used in the production of fuel-electric power is river water that is used once for cooling and then is returned to the stream. About the only effect on the water is an increase of its temperature, which is dissipated a few miles downstream. The comparatively small amount of ground water that is used for cooling is recirculated. The total of 956 mgd used in 1970 (table 2) represents an increase of 126 percent over the 1965 figure. Increased capacities of the power plants at Helena and Malvern, and construction of a new plant at Augusta, account for the increases.

Fuel-Electric Power

This category includes 40 mgd of water that was pumped from wells or diverted from streams and held in impoundments for the use of migrating and wintering ducks and geese. (See table 2.)

Wildlife Impoundments

Consumption of water at all fish ponds is estimated to be 3 feet. streams. raising trout at National Fish Hatcheries in Baxter and Cleburne Counties and returned to the mission. The use figures in table 2 include 25 mgd of surface water that was diverted for U.S. Bureau of Sport Fisheries and Wildlife at Stuttgart, and the Arkansas Game and Fish Commission of the U.S. Department of Agriculture, the Fish Farming Experimental Station of the application figures were arrived at by consultation with personnel of the Soil Conservation and 3 feet was applied to about 33,000 acres of "rough" fish ponds and fishing lakes. The and fishing lakes. In 1965, 6 feet was applied to 17,000 acres of catfish and minnow ponds, and minnow ponds, and about 3 feet of water was applied to 32,000 acres of "rough" fish ponds Grand Prairie region. About 7 feet (acre-foot per acre) was applied to 32,000 acres of catfish from wells. The fish and minnows are raised in large leveled ponds, most of which are in the total water withdrawal, was used for this purpose (table 2); 66 percent of the water was drawn activity, which uses large quantities of water. In 1970, 31 1/4 mgd, 10 percent of the State's Raising fish for food and minnows for bait is an economically important and fast-growing

Fish and Minnow Farms

because no allowances were made for infiltration losses. rice and two-thirds of that applied to all other crops. However, these figures may be high Consumption of irrigation water was estimated to be about three-fourths of that applied to and pasture," respectively. losses were used to compute withdrawals for irrigation of cotton, soybeans, and "other crops Application figures of 8 inches, 6 inches, and 4 inches plus 7 percent for conveyance

GROUND-WATER WITHDRAWALS

To assist future studies of ground water in relation to possible depletion of the supply in water-bearing formations, table 6 shows withdrawals from each aquifer in each county. About 96 percent of the water was withdrawn in the Coastal Plain, most of which was pumped from deposits of Quaternary age or the Sparta Sand of Eocene age. The Quaternary deposits supplied most of the ground water used for irrigation and fish farming. The Sparta Sand furnished much of the water used by industry and public-supply systems. The Wilcox Group supplied practically all the water used for public supply and by industry in Crittenden, Mississippi, and eastern Pointsett Counties, and much of the water used for public supply in eastern Craighead and Greene Counties. The Nacatoch Sand supplied small quantities of water for public supply in eastern Clay and Greene Counties; the Nacatoch Sand, Tokio Formation, and Trinity Group furnished much of the water used for public and domestic supplies in southwestern Arkansas. The Cockfield Formation furnished much of the water used for public and domestic supplies in Ashley, Chicot, and Desha Counties.

b Terrace deposits and alluvium comprise the deposits of Quaternary age. The Garretts Sand, the sandy facies of the Cane River Formation, and the Sparta Sand comprise the Memphis aquifer, a massive fine to medium sand extending northeastward from approximately latitude 36°N. (Homan, 1969).

County	Deposits of Quaternary age	Deposits of Pleistocene	Deposits of Holocene	Deposits of Recent	Deposits of Alluvium	Deposits of Terrace	Deposits of Garretts Sand	Deposits of Cane River Formation	Deposits of Sparta Sand	Deposits of Memphis Aquifer	Deposits of Other	Total
Arkansas	117.98											117.98
Benton	35.98											35.98
Benton	1.55											1.55
Benton	35.77											35.77
Benton	1.55											1.55
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