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WATER USE IN ARKANSAS,1995

By Terrance W. Holland

INTRODUCTION

As part of the National Water-Use Information Program, the U.S. Geological Survey (USGS) stores water-use data in standardized format for different categories of water use. These data are aggregated by county, 4- and 8-digit hydrologic units, and aquifer in the Aggregated Water-Use Data System (AWUDS). Site-specific water-use data for public supply, commercial, industrial, mining, and power generation are stored in the Site-Specific Water-Use Data System (SSWUDS). Site-specific water-use for irrigation and livestock (stock and animal specialties) is stored in the Arkansas District's Water-Use Data Base System (WUDBS). Information about amounts of water withdrawn, sources of water, how the water was used, and how much was returned is available to water-resources managers and policy makers.

From 1960 until about 1985, water-use data were collected and compiled in cooperation with Arkansas Geological Commission (AGC). Since 1985, water-use data have been collected and stored in cooperation with the Arkansas Soil and Water Conservation Commission (ASWCC). Since 1960, seven 5-year water-use summary reports have been published (Stephens and Halberg, 1961; Halberg and Stephens, 1966; Halberg, 1972; Halberg, 1977; Holland and Ludwig, 1981; Holland, 1987; Holland, 1993). Updated reports are periodically required because water use changes with time. This report contains 1995 water-use data compiled as part of the National Water-Use Information Program.

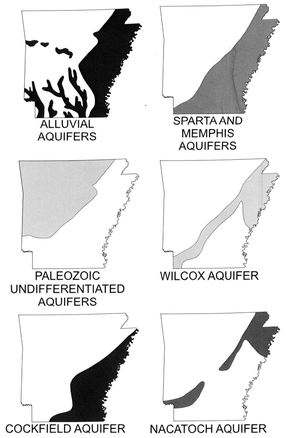
DATA COLLECTION

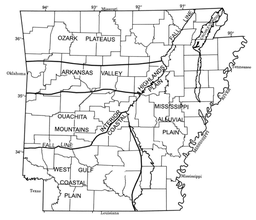
Site-specific water-use data for several categories are collected and compiled annually by the ASWCC in cooperation with the USGS. Data for the irrigation and livestock categories are reported through the Conservation District offices in each county. Water-use data for other categories are reported directly to the ASWCC. Because of incomplete reporting, in some categories it is necessary to supplement these data from other sources. These sources include public agencies, industries, public utilities, other organizations, and individuals. Principal contributors include the Arkansas Geological Commission; Arkansas Department of Health; Arkansas Department of Environmental Quality; the Cooperative Extension Service; Arkansas Agricultural Experiment Station; the Natural Resources Conservation Service and the National Agricultural Statistics Service, U.S. Department of Agriculture; the U.S. Fish and Wildlife Service; U.S. Army Corps of Engineers; Arkansas Department of Parks and Tourism; Arkansas State Highway and Transportation Department; Arkansas Industrial Development Commission; Arkansas Power and Light Company; Southwest Power Administration; Arkansas Electric Cooperative; and the U.S. Department of Energy. Estimates were made by the USGS based on population and average consumptive-use rates for water-use categories for which data were not available. After sufficient data are collected from all available sources, these data are aggregated by county, 4- and 8-digit hydrologic units, and aquifer for each water-use category.

SOURCE OF GROUND-WATER WITHDRAWALS

Ground-water withdrawals comprised 62 percent (5,456 million gallons per day (Mgal/d)) of the total amount (excluding water used for hydroelectric power generation) of water used in Arkansas in 1995. Practically all the water was withdrawn in the Coastal Plain, where most of it was pumped from alluvial deposits of Quaternary age and the Sparta Sand aquifer of Eocene age.

The most productive aquifers of Quaternary age underlie much of eastern Arkansas and the Arkansas and Red River Valleys. Quaternary age aquifers supplied most of the ground water used for irrigation and aquaculture. However, in many places in the Coastal Plain in south-central Arkansas and in the river valleys in the Interior Highlands, alluvial aquifers are important locally as sources of water for domestic wells. The Sparta aquifer supplied much of the water used by industry and public-supply systems in south-central Arkansas.



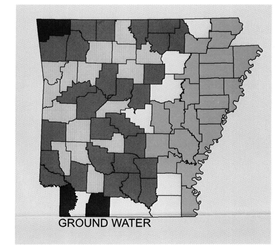


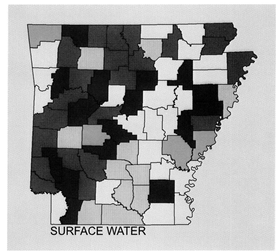
Water Use by Aquifer in Arkansas Counties, 1995

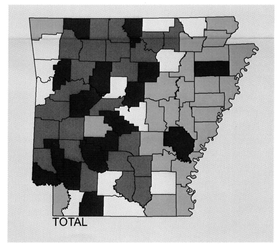
[Units are in million gallons per day; -- indicates no water use]

County	Aquifer in: Deposits of Quaternary age	Cockfield Formation	Sparta and Memphis Sands	Cane River Formation	Wilcox Group undifferentiated	Clayton Formation	Nacatoch Sand	Tokio Formation	Trinity Formation	Rock of Paleozoic age undifferentiated	County total	County
Arkansas	402.63	76.69	--	--	--	--	--	--	--	--	479.32	Arkansas
Ashley	90.77	2.81	--	--	--	--	--	--	--	--	93.58	Ashley
Baxter	--	--	--	--	--	--	--	--	--	1.70	1.70	Baxter
Benton	--	--	--	--	--	--	--	--	--	5.32	5.32	Benton
Boone	--	--	--	--	--	--	--	--	--	1.34	1.34	Boone
Bradley	0.37	0.10	0.91	--	--	--	--	--	--	--	1.38	Bradley
Calhoun	0.04	--	0.98	--	--	--	--	--	--	--	1.02	Calhoun
Carroll	--	--	--	--	--	--	--	--	--	1.61	1.61	Carroll
Chicot	149.52	6.23	--	--	--	--	--	--	--	--	155.75	Chicot
Clark	0.82	0.00	--	--	--	--	0.34	0.01	--	--	1.17	Clark
Clay	170.55	--	--	--	--	--	1.72	--	--	--	172.27	Clay
Cleburne	--	--	--	--	--	--	--	--	--	1.20	1.20	Cleburne
Cleveland	0.06	0.02	0.89	--	--	--	--	--	--	0.97	1.14	Cleveland
Columbia	0.85	--	5.24	--	--	--	--	--	--	--	6.09	Columbia
Conway	1.26	--	--	--	--	--	--	--	--	0.21	1.47	Conway
Craighead	314.73	--	0.76	--	2.42	--	--	--	--	--	317.91	Craighead
Crawford	0.37	--	--	--	--	--	--	--	--	0.22	0.59	Crawford
Crittenden	104.26	--	--	--	7.85	--	--	--	--	--	112.11	Crittenden
Cross	284.87	--	--	--	--	--	--	--	--	--	284.87	Cross
Dallas	0.20	--	0.93	--	--	--	--	--	--	--	1.13	Dallas
Desha	230.54	0.48	6.65	--	--	--	--	--	--	--	237.67	Desha
Drew	53.85	0.12	3.11	--	--	--	--	--	--	--	57.90	Drew
Faulkner	0.66	--	--	--	--	--	--	--	--	3.24	3.90	Faulkner
Franklin	0.47	--	--	--	--	--	--	--	--	0.48	0.95	Franklin
Fulton	--	--	--	--	--	--	--	--	--	1.29	1.29	Fulton
Garland	--	--	--	--	--	--	--	--	--	1.52	1.52	Garland
Grant	0.30	--	1.84	--	--	--	--	--	--	--	2.14	Grant
Greene	147.51	--	--	2.21	2.07	0.33	--	--	--	--	152.07	Greene
Hempstead	1.21	--	--	--	--	--	0.32	1.66	--	--	3.19	Hempstead
Hot Spring	0.04	--	--	--	--	0.02	--	--	--	0.51	0.57	Hot Spring
Howard	--	--	--	--	--	--	--	--	0.08	0.69	0.77	Howard
Independence	14.71	--	--	--	--	--	--	--	--	4.15	18.86	Independence
Izard	--	--	--	--	--	--	--	--	--	2.40	2.40	Izard
Jackson	284.1	--	--	--	--	--	--	--	--	--	284.10	Jackson
Jefferson	264.74	--	118.94	--	--	--	--	--	--	--	383.68	Jefferson
Johnson	0.61	--	--	--	--	--	--	--	--	0.28	0.89	Johnson
Lafayette	23.01	--	0.30	1.43	--	--	--	--	--	--	24.74	Lafayette
Lawrence	256.61	--	--	--	--	--	--	--	--	2.59	259.20	Lawrence
Lee	161.12	--	3.29	--	--	--	--	--	--	--	164.41	Lee
Lincoln	131.35	--	1.33	--	--	--	--	--	--	--	132.68	Lincoln
Little River	1.64	--	0.24	--	--	--	--	--	--	--	1.88	Little River
Logan	0.08	--	--	--	--	--	--	--	--	1.45	1.53	Logan
Lonoke	300.26	--	3.98	--	2.14	--	--	--	--	--	306.39	Lonoke
Madison	--	--	--	--	--	--	--	--	--	1.62	1.62	Madison
Marion	--	--	--	--	--	--	--	--	--	0.33	0.33	Marion
Miller	9.26	--	0.04	0.27	0.49	--	--	--	--	--	10.06	Miller
Mississippi	126.29	--	0.15	--	22.31	--	--	--	--	--	148.75	Mississippi
Monroe	177.85	--	1.80	--	--	--	--	--	--	--	179.65	Monroe
Montgomery	--	--	--	--	--	--	--	--	--	0.68	0.68	Montgomery
Nevada	0.27	--	--	0.02	--	--	0.36	--	--	--	0.65	Nevada
Newton	--	--	--	--	--	--	--	--	--	0.79	0.79	Newton
Ouachita	0.15	--	1.52	--	--	--	--	--	--	--	1.67	Ouachita
Perry	--	--	--	--	--	--	--	--	--	0.57	0.57	Perry
Phillips	128.81	--	9.70	--	--	--	--	--	--	--	138.50	Phillips
Pike	0.24	--	--	--	--	--	--	0.02	--	0.60	0.86	Pike
Poinsett	442.51	--	0.04	--	3.70	--	--	--	--	--	446.26	Poinsett
Polk	--	--	--	--	--	--	--	--	--	1.04	1.04	Polk
Pope	2.73	--	--	--	--	--	--	--	--	0.60	3.33	Pope
Prairie	200.04	--	24.72	--	--	--	--	--	--	--	224.76	Prairie
Pulaski	18.01	--	0.52	--	--	--	--	--	--	0.01	18.54	Pulaski
Randolph	57.090	--	--	--	--	--	--	--	--	3.01	60.10	Randolph
St. Francis	189.1	--	--	--	--	--	--	--	--	--	189.10	St. Francis
Saline	0.24	--	3.72	--	--	--	--	--	--	--	3.96	Saline
Scott	--	--	--	--	--	--	--	--	--	0.98	0.98	Scott
Searcy	--	--	--	--	--	--	--	--	--	0.62	0.62	Searcy
Sebastian	0.18	--	--	--	--	--	--	--	--	0.25	0.43	Sebastian
Sevier	0.16	--	--	--	--	--	--	0.54	--	0.62	1.32	Sevier
Sharp	--	--	--	--	--	--	--	--	--	1.01	1.01	Sharp
Stone	--	--	--	--	--	--	--	--	--	0.50	0.50	Stone
Union	0.47	--	15.23	--	--	--	--	--	--	--	15.70	Union
Van Buren	--	--	--	--	--	--	--	--	--	0.71	0.71	Van Buren
Washington	--	--	--	--	--	--	--	--	--	4.04	4.04	Washington
White	59.21	--	--	--	--	--	--	--	--	--	59.21	White
Woodruff	254.48	--	--	--	--	--	--	--	--	--	254.48	Woodruff
Yell	0.41	--	--	--	--	--	--	--	--	1.88	2.29	Yell
Totals	5,061.61	9.75	283.52	3.93	40.99	0.02	3.07	2.23	0.08	51.03	5,456.21	

WATER-USE TOTAL







Total Water Use by Category in Arkansas Counties, 1995

[Units are in million gallons per day]

County	Public supply	Self-supplied: Com-mercial	Domestic	Industrial	Thermo-electric	Mining	Irrigation	Live-stock	Totals
Arkansas	4.74	14.95	0.28	0	0	0	732.87	67.77	820.61
Ashley	2.75	0	0.38	40.31	0	0	77.42	13.89	134.75
Baxter	4.34	0	0.85	0	0	0	0	0.34	5.53
Benton	10.44	0	3.21	0	319.27	0	0.45	2.92	336.29
Boone	3.04	0	0.38	0	0	0	0.03	1.15	4.6
Bradley	1.14	0	0.19	0	0	0	0	0.13	1.46
Calhoun	0.86	0	0.12	0	0	0	0	0.11	1.09
Carroll	5.32	0	0.49	0	0	0.01	0.02	1.44	7.28
Chicot	2.28	0	0.22	0	0	0	197.91	33.04	233.45
Clark	3.04	0	0.29	0.54	0	0	0.96	0.33	5.16
Clay	1.6	0.46	0.10	0	0	0	173.06	0.88	176.1
Cleburne	4.12	0.05	0.1	0	0	0	0.10	2.37	6.74
Cleveland	1.03	0	0.01	0	0	0	0	0.26	1.3
Columbia	4.18	0	0.24	1.55	0	0	0	0.30	6.27
Conway	1.56	0.04	0.23	20.54	0	0	4.55	1.62	28.54
Craighead	11.9	0	0.60	0	0	0	336.69	0.45	349.64
Crawford	14.44	0	0.32	0.45	0	0	0.06	0.62	15.89
Crittenden	9.52	0	0.05	0.20	0	0	102.60	0.03	112.4
Cross	2.95	0	0.01	0	0	0	295.24	0.95	299.15
Dallas	0.85	0	0.24	0	0	0	0	0.09	1.18
Desha	2.28	0	0.08	18.67	0	0	280.69	28.62	330.34
Drew	2.04	3.40	0.34	0	0	0	64.15	1.07	71.0
Faulkner	8.46	0	1.88	0	0	0	0.63	0.93	11.9
Franklin	2.97	0.07	0.32	0	8.23	0	0.08	0.89	12.56
Fulton	0.41	72.0	0.63	0	0	0	0.09	0.62	73.75
Garland	14.66	0.01	1.28	2.41	247.15	0	0.01	0.76	266.28
Grant	1.8	0	0.26	0.01	0	0	0	0.19	2.26
Greene	3.43	0.07	1.05	0.37	0	0	148.66	0.15	153.73
Hempstead	2.96	2.59	0.94	0	0	0	0	2.95	9.44
Hot Spring	3.19	0.06	0.30	0.58	0	0	3.67	0.30	8.10
Howard	3.62	0	0.25	1.14	0	0	0	0.84	5.85
Independence	6.51	0	0.46	0.03	8.56	0	20.23	0.78	36.57
Izard	2.05	0	0.32	0	0	0	0	0.56	2.93
Jackson	1.89	0	0.25	0	0	0	288.42	7.72	298.28
Jefferson	16.54	1.34	0.04	75.57	20.37	0	331.56	9.10	454.52
Johnson	2.87	0.08	0.33	0	0	0	0.31	0.64	4.23
Lafayette	0.94	0	0.31	0	1.12	0	28.26	2.09	32.72
Lawrence	1.60	0.86	0.04	0	0	0	278.48	0.41	281.39
Lee	1.96	0	0.10	0	0	0	160.00	5.02	167.08
Lincoln	1.30	0	0.01	0	0	0	146.86	3.20	151.37
Little River	1.05	0	0.6	0	0	0	2.81	0.58	5.04
Logan	2.75	0	0.73	0	0	0	0.37	1.07	4.92
Lonoke	3.01	0	1.55	0.97	0	0	295.75	71.66	372.94
Madison	1.56	0	0.79	0	0	0	0	1.30	3.65
Marion	1.15	0	0.13	0	0	0	0	0.46	1.74
Miller	4.90	0.80	0.01	0	0	0	93.62	1.04	100.37
Mississippi	9.03	0.38	0.01	7.65	0	0	135.67	0.03	152.77
Monroe	1.80	0.01	0.02	0	0	0	192.16	0.02	194.01
Montgomery	0.67	0	0.51	0.02	0	0	0.04	0.42	1.66
Nevada	0.78	0	0.41	0	0	0	0	0.49	1.68
Newton	0.20	0	0.44	0	0	0	0.06	0.33	1.03
Ouachita	3.83	0	0.28	9.30	22.82	0	0	0.17	36.4
Perry	0.70	0	0.33	0	0	0	2.98	0.37	4.38
Phillips	4.53	0	0.11	0.01	176.02	0	133.01	0.05	313.73
Pike	0.81	0.01	0.55	0	0	0	0	0.50	1.87
Poinsett	3.37	0.16	0.23	0	0	0	479.08	17.7	500.54
Polk	3.18	0	0.76	0	0	0	0.23	0.69	4.86
Pope	8.95	0.32	1.77	0	967.12	0	1.22	0.92	980.3
Prairie	0.83	0	0.11	0	0	0	256.12	40.0	297.06
Pulaski	61.47	0	0.71	0	0	0	23.37	0.71	86.26
Randolph	1.26	0	0.54	0	0	0	78.14	0.49	80.43
St. Francis	3.65	0	0.31	0	0	0	192.98	4.06	201.0
Saline	6.39	0	2.26	0.60	0	0.12	0.07	0.25	9.69
Scott	1.34	0	0.70	0	0	0	0	0.70	2.74
Searcy	0.99	0	0.23	0	0	0	0	0.54	1.76
Sebastian	31.52	0	0.22	0	0	0	0.11	0.52	32.37
Sevier	2.75	0	0.70	0	0	0	0	0.92	4.37
Sharp	1.48	0	0.08	0	0	0	0	0.46	2.02
Stone	1.01	0	0.27	0	0	0	0	0.52	1.80
Union	8.90	0	0.27	6.41	0	0	0	0.30	15.88
Van Buren	1.47	0	0.49	0	0	0	0	0.56	2.52
Washington	21.66	0.02	2.97	0	0	0	0.12	2.60	27.37
White	7.39	0	1.04	0	0	0	102.46	3.13	114.02
Woodruff	0.96	0	0.2	0.12	0.07	0	269.81	3.49	274.65
Yell	3.76	2.68	0.41	0	0	0	1.83	1.02	9.70
Total	380.68	100.36	38.24	187.45	1,770.73	0.13	5,936.07	353.60	8,767.26

U.S. GEOLOGICAL SURVEY
OPEN-FILE REPORT 99-188

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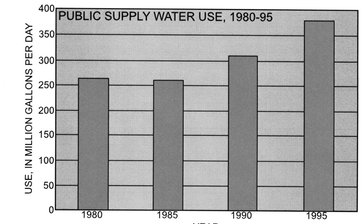
Arkansas Soil and Water Conservation Commission

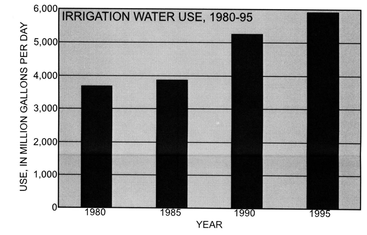
TRENDS IN WATER USE

Total water withdrawal for all categories of use in Arkansas has increased by 24 percent since 1980. Public supply and irrigation water use have increased by 46 and 61 percent, respectively.

A total of 381 Mgal/d was withdrawn by public suppliers in 1995. In Arkansas, public water-supply systems served about 2 million people in 1995. There has been an increase of 46 percent in total public supply water use in Arkansas since 1980. The apparent increases in public supply water use can be attributed to a 17 percent increase in population served by public suppliers between 1980 and 1995 and more accurate water-use information because of the greater availability of site-specific water-use data.

During 1995, water withdrawals for irrigation in Arkansas were estimated to be 5,936 Mgal/d. Irrigation water use increased by about 61 percent since 1980. There was a 94 percent increase in irrigated acreage in Arkansas between 1980 (1.8 million acres) and 1995 (3.5 million acres). Water use for irrigation did not increase proportionally. The average application rate has decreased from 3.2 acre-feet per acre in 1980 to 1.9 acre-feet per acre during 1995. This represents a decrease in application rate of about 41 percent. Since 1990, site-specific water-use data indicate that water was applied more conservatively to crops.





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EXPLANATION

WATER USE,
IN MILLION GALLONS PER DAY

- LESS THAN 0.01
- 0.01 - 1.00
- 1.01 - 5.00
- 5.01 - 15.00
- 15.01 - 100.00
- 100.01 - 500.00
- GREATER THAN 500

0 50 100 MILES
0 50 100 KILOMETERS

WATER USE BY CATEGORY

PUBLIC SUPPLY

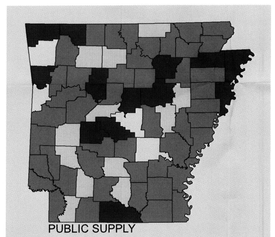
Public supplies are defined as systems or wells that furnish water for drinking or general domestic use in incorporated municipalities or unincorporated communities having 10 or more connections or serving 25 or more people for a period of 60 days or more each year. Public-water supplies also serve commercial and industrial users. The public uses and losses category refers to uses not specifically categorized, such as water use in public parks, schools, and buildings, water used for fire control, water-main flushing, water lost from broken water mains, and from transfer and distribution systems.

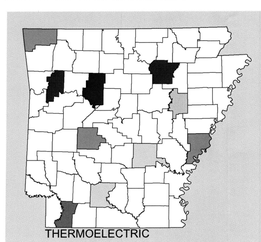
Public supplies served about 2 million people or 80 percent of the State's population in 1995. A total of 381 Mgal/d was withdrawn by public suppliers. Pulaski County is the State's largest user of surface water for public supply (57.7 Mgal/d). Jefferson County is the State's largest user of ground water for public supply (16.5 Mgal/d).

THERMOELECTRIC AND HYDROELECTRIC

A total of 1,765 Mgal/d of surface water and 5 Mgal/d of ground water was withdrawn for thermoelectric-power generation. Pope County was the State's largest user of surface water for thermoelectric-power generation (967 Mgal/d). The nuclear power generation facility in Pope County was the State's largest individual water user. About 28 Mgal/d of water used for thermoelectric-power generation was consumed. Most of the water used for thermoelectric-power generation is for once-through cooling and is returned to the source fairly quickly. The remainder is eventually returned to the natural source, making it available for other uses.

About 42,728 Mgal/d of water was used by hydroelectric powerplants. Water used for hydroelectric power generation is considered an instream use, hence, no water is actually consumed.



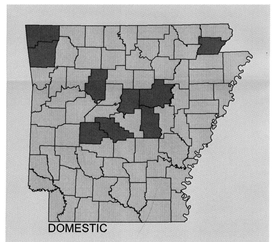


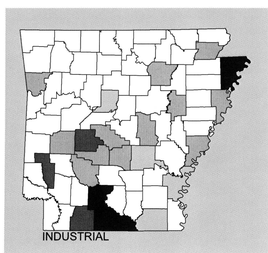
DOMESTIC (SELF-SUPPLIED)

An estimated 38 Mgal/d, exclusively ground water, was withdrawn for self-supplied domestic use. This is an estimated per capita use of about 78 gallons per day (gal/d). The domestic use in each county was computed by multiplying the population not served by public-supply system by a per-capita-use factor. Approximately 488,000 (20 percent) of the people in the State obtain their domestic water from a self-supplied source.

INDUSTRIAL

About 245 Mgal/d of surface and ground water was used for industrial purposes (total includes deliveries from public suppliers.). About 76 percent or 187 Mgal/d was self-supplied. Rates for consumptive use differed widely among industry types but was estimated to be about 6 percent overall.



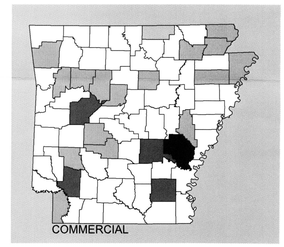


COMMERCIAL

About 158 Mgal/d of surface and ground water was used for commercial purposes (Totals include deliveries from public suppliers.). About 63 percent or 100 Mgal/d was self-supplied. Rates for consumptive use differed widely among commercial types but was estimated to be about 7 percent overall.

MINING

The mining industry in Arkansas withdrew a total of 0.13 Mgal/d. All of the water was withdrawn from surface-water sources. The primary use of mining water was for sand and gravel operations in the State.



IRRIGATION

Withdrawals for irrigation during 1995 were estimated to be 5,936 Mgal/d. Of this amount, 83 percent (4,925 Mgal/d) was ground water and 17 percent (1,013 Mgal/d) was from surface-water sources. There were 3.5 million acres of irrigated land (total from water-use data base system) in Arkansas in 1995; rice accounted for 1.35 million acres. Nearly 67 percent (3,995 Mgal/d) of total irrigation use was for rice irrigation. Irrigation conveyance losses in 1995 were 415 Mgal/d. Consumptive use accounted for 4,393 Mgal/d.

LIVESTOCK

Livestock water use includes stock watering, feedlots, daily operations, fish farming (animal specialities), and other farm needs. Livestock water use accounted for approximately 354 Mgal/d. Water use for stock watering, feedlots, and daily operations was 38.6 Mgal/d. Use for fish farming (animal specialties) was 315 Mgal/d. Consumptive use for livestock was about 215 Mgal/d.