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Estimated Water Use In Arkansas, 2000



Prepared in cooperation with the
ARKANSAS SOIL AND WATER CONSERVATION COMMISSION

Scientific Investigations Report 2004-5230

U.S. Department of the Interior
U.S. Geological Survey



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By Terrance W. Holland

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U.S. Department of the Interior
Gale A. Norton, Secretary

U.S. Geological Survey
Charles G. Groat, Director

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Conversion Factors and Datum

Multiply	By	To obtain
Area		
acre	43,560	square foot (ft ²)
	4,047	square meter (m ²)
	0.001562	square mile (mi ²)

Flow rate		
gallon per day (gal/d)	3.785	liter per day (L/d)
million gallons per day (Mgal/d)	1.121	thousand acre-feet per year
	0.001547	thousand cubic feet per second
	0.6944	thousand gallons per minute
	0.003785	million cubic meters per day
	1.3815	million cubic meters per year
billion gallons per day (Bgal/d)	1.3815	million cubic meters per year
thousand acre-feet day per year	0.8921	million gallons per day
	0.001380	thousand cubic feet per second
	0.6195	thousand gallons per minute
	0.003377	million cubic meters per day

Some water relations in inch-pound units are shown below

1 gallon (gal)	8.34 pounds
1 million gallons (Mgal)	3.07 acre-feet
1 cubic foot (ft ³)	62.4 pounds
	7.48 gallons
1 acre-foot (acre-ft)	325,851 gallons
	43,450 cubic feet
1 inch of rain	17.4 million gallons per square mile
	27,200 gallons per acre
	100 tons per acre



Estimated Water Use in Arkansas, 2000

By Terrance W. Holland

Abstract

The water-use program in Arkansas is a cooperative effort between Arkansas Soil and Water Conservation Commission and the U.S. Geological Survey. During 2000, the amount of water withdrawn from ground- and surface-water sources in Arkansas was estimated to be 10,963 million gallons per day (Mgal/d). Of this amount, about 6,952 Mgal/d (63 percent) were from ground water and about 4,011 Mgal/d (37 percent) were from surface-water sources.

Approximately 87 percent of the population (2.3 million people) in Arkansas were served by public supply systems during 2000. These systems withdrew approximately 427 Mgal/d. Most of the water, 69 percent, was from surface-water sources. The statewide average for per-capita residential use from public supply systems was 181 gallons per day and increased about 57 percent between 1965 and 2000.

Introduction

Water is one of Arkansas' most valuable natural resources. Much of the State's agriculture and industry is dependent upon having an adequate supply of quality water. The Arkansas Soil and Water Conservation Commission (ASWCC) conducts an annual inventory of the ground- and surface-water withdrawals in Arkansas in cooperation with the U.S. Geological Survey (USGS). Data collected during this inventory are shared by State and Federal agencies to document the State's total water use and to facilitate planning the most effective use of Arkansas' water resources for the economic and social well being of the people of Arkansas and the Nation.

Every 5 years since 1950, the USGS has conducted an inventory of water use in the United States (MacKichan, 1951, 1957; MacKichan and Kammerer, 1961; Murray, 1968; Murray and Reeves, 1972, 1977; Solley and others, 1983, 1988, 1993, 1998; Hutson and others, 2004). In 1978, the USGS initiated the National Water-Use Information Program to establish a nationwide water-use database. In 1985, the ASWCC and the USGS began a water-use program that provides for the collection, storage, and dissemination of accurate water-use information for

Arkansas within a consistent national framework. The Arkansas data for 2000 have been aggregated with data for the rest of the United States and has been included in a report on water use for the Nation (Hutson and others, 2004).

Ground- and surface-water sources are important in Arkansas. The major aquifers include the aquifers in the deposits of Quaternary age, Sparta and Memphis Sands, Cane River Formation, Wilcox Group, undifferentiated, Nacatoch Sand, Tokio Formation, Trinity Formation, and the rocks of Paleozoic age, undifferentiated (Petersen and others, 1985). Hereafter, in the text, these aquifers are referred to as the alluvial, Sparta and Memphis, Cockfield, Cane River, Wilcox, Nacatoch, Tokio, Trinity, and Paleozoic aquifers. Major surface-water sources include the Arkansas, Saline, Ouachita Rivers, and Beaver, Bull Shoals, Maumelle, and Winona Lakes (fig. 1).

Purpose and Scope

The purpose of this report is to describe the total withdrawals from ground- and surface-water resources in Arkansas for 2000. This report compiles withdrawals by county (fig. 2). Nine categories of water use are described in this report—public supply, domestic (self-supplied), commercial (self-supplied), industrial (self-supplied), mining, livestock, aquaculture, irrigation, and thermoelectric power generation. Water-use trends in Arkansas from 1965 to 2000 also are described.

Data-Collection Methods

Site-specific water-use data for several categories are collected and compiled annually by the ASWCC in cooperation with the USGS. Water users that withdraw 1 acre-foot or more of surface water per year or wells with the capability of pumping 50,000 gallons per day (gal/d) or more of ground water report their withdrawals. Data for the irrigation, livestock, and aquaculture categories are reported through the Conservation District offices in selected counties (fig. 2). Water-use data for each of the other categories are reported directly to the ASWCC. Site-specific water-use data for irrigation, livestock,

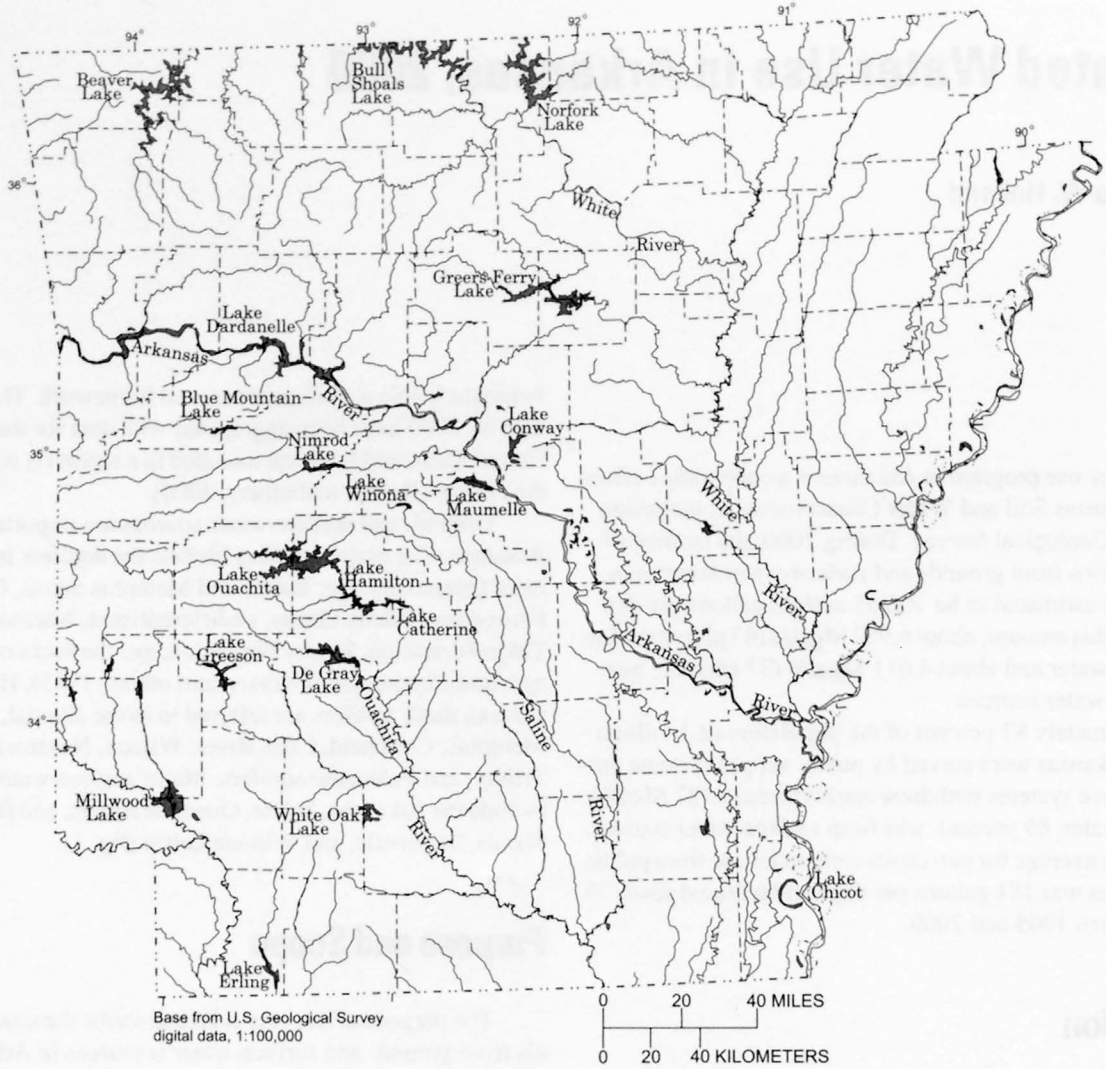


Figure 1. Major surface-water sources.

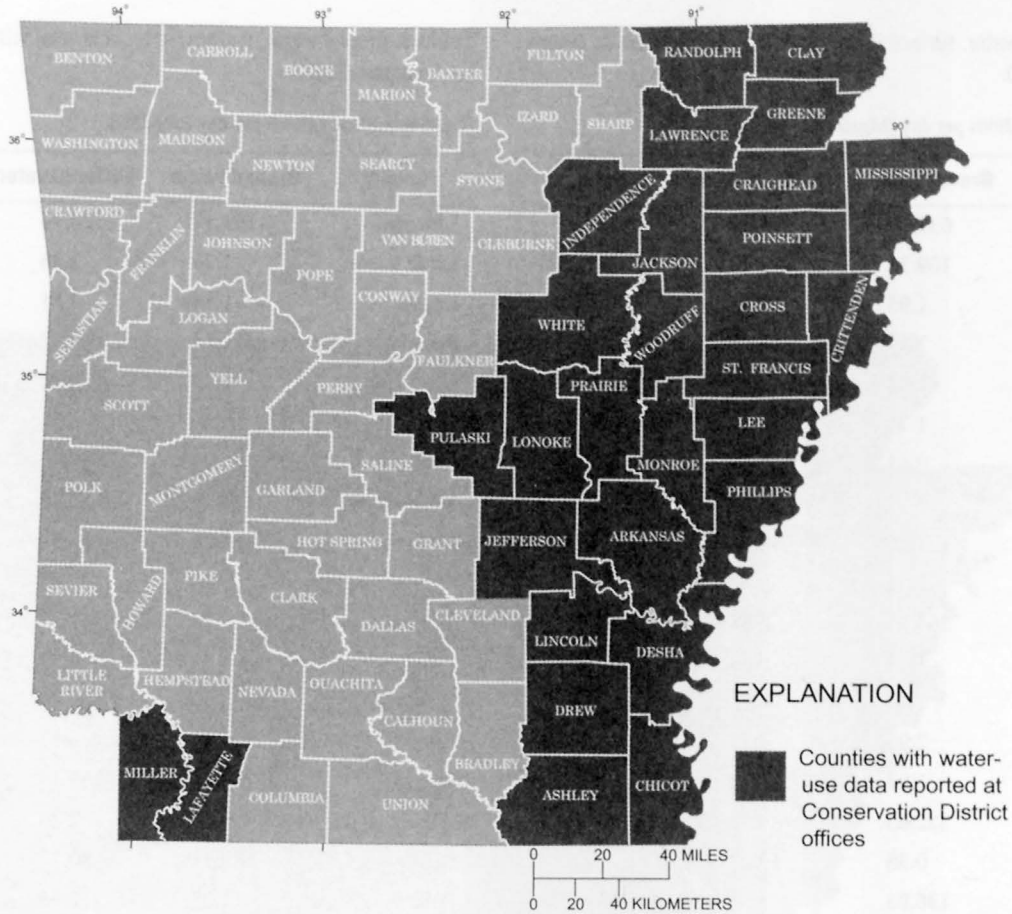


Figure 2. Counties where selected water-use data are reported at Conservation District offices.

public supply, commercial, industrial, mining, and power generation are stored in the Arkansas Water-Use Data Base (WUDBS) maintained by USGS. Information about amounts of water withdrawn, sources of water, how the water was used, and how much water was returned is available to water-resources managers and policy makers through WUDBS.

Because of incomplete reporting, in some cases it is necessary to supplement these data with data from other sources. These sources include public agencies, industries, public utilities, other organizations, and individuals. Principal contributors include the Arkansas Agricultural Experiment Station, Arkansas Department of Environmental Quality, Arkansas Department of Health, Arkansas Department of Parks and Tourism, Arkansas Electric Cooperative, Arkansas Geological Commission, Arkansas Industrial Development Commission, Arkansas Power and Light Company, Arkansas State Highway and Transportation Department, the Cooperative Extension Service, National Agricultural Statistics Service, Natural Resources Conservation Service, Southwest Power Administration, U.S. Army Corps of Engineers, U.S. Department of Energy, and the U.S. Fish and Wildlife Service.

Estimates are made by the USGS based on population (U.S. Bureau of Census) and average consumptive-use rates (Holland, 1987) for water-use categories for which data are not available or are incomplete. After sufficient data are collected from all available sources, these data are aggregated by county for each water-use category and by aquifer for each county.

Estimated Water Use by Category and Withdrawals by Source

During 2000, total withdrawals from ground-water and surface-water sources in Arkansas were 10,963 Mgal/d (table 1). This is an increase of about 25 percent from the total of 8,767 Mgal/d withdrawn in 1995 and about a 28 percent increase from that used in 1990 (Holland, 1999). Of the total withdrawn in 2000, about 63 percent (6,952 Mgal/d) was from ground water, and the remaining 37 percent (4,011 Mgal/d) was from surface water. The largest total withdrawals generally occurred in eastern Arkansas and in counties along major rivers (fig. 3). The five counties with the largest total water use are Arkansas, Pope, Poinsett, Jefferson, and Lonoke in order of decreasing use (table 1). The largest ground-water users were in eastern Arkansas (fig. 4). The highest ground-water use (631 Mgal/d) occurred in Arkansas County primarily for irrigation (table 1). The highest surface-water use occurred near the Arkansas River in Pope County primarily for thermoelectric power generation (998 Mgal/d) (fig. 5).

The distribution of total (both ground and surface) water use by category (fig. 6) illustrates the dominance of irrigation in Arkansas. Irrigation also is the dominant category of ground-water use in Arkansas (fig. 7). Thermoelectric power generation followed by irrigation are the dominant categories of surface-water use in Arkansas (fig. 8).

4 Estimated Water Use in Arkansas, 2000

Table 1. Ground water, surface water, and total withdrawals by county for Arkansas, 2000

[Units in million gallons per day (Mgal/d)]

County	Ground water	Surface water	Total
Arkansas	631.30	513.32	1,144.62
Ashley	109.36	42.93	152.29
Baxter	1.95	4.35	6.30
Benton	2.49	375.02	377.51
Boone	1.88	3.49	5.37
Bradley	1.76	1.20	2.96
Calhoun	0.61	0.11	0.72
Carroll	2.19	5.41	7.60
Chicot	174.26	48.02	222.28
Clark	0.54	3.50	4.04
Clay	264.93	5.58	270.51
Cleburne	1.03	9.53	10.56
Cleveland	1.44	0.26	1.70
Columbia	2.90	1.77	4.67
Conway	1.94	15.13	17.07
Craighead	352.65	39.48	392.13
Crawford	0.38	19.27	19.65
Crittenden	136.88	2.64	139.52
Cross	410.70	27.49	438.19
Dallas	1.15	0.09	1.24
Desha	328.93	85.75	414.68
Drew	55.58	17.37	72.95
Faulkner	1.80	12.39	14.19
Franklin	0.39	3.72	4.11
Fulton	0.99	1.54	2.53
Garland	1.21	16.53	17.74
Grant	1.92	0.19	2.11
Greene	159.57	5.81	165.38
Hempstead	5.29	6.80	12.09
Hot Spring	0.66	414.68	415.34
Howard	0.72	7.25	7.97
Independence	35.74	44.35	80.09
Izard	2.29	0.56	2.85
Jackson	364.56	21.75	386.31
Jefferson	471.79	99.80	571.59
Johnson	1.33	5.51	6.84
Lafayette	11.37	1.73	13.10
Lawrence	296.72	30.06	326.78
Lee	235.41	6.55	241.96

Table 1. Ground water, surface water, and total withdrawals by county for Arkansas, 2000.

[Units in million gallons per day (Mgal/d)]

County	Ground water	Surface water	Total
Lincoln	169.17	20.74	189.91
Little River	1.76	3.36	5.12
Logan	1.54	4.51	6.05
Lonoke	397.14	89.12	486.26
Madison	1.58	2.20	3.78
Marion	0.26	3.29	3.55
Miller	6.96	84.96	91.92
Mississippi	188.37	5.26	193.63
Monroe	235.86	20.09	255.95
Montgomery	0.96	0.81	1.77
Nevada	0.78	1.11	1.89
Newton	0.91	0.37	1.28
Ouachita	2.60	65.76	68.36
Perry	0.81	6.11	6.92
Phillips	205.90	263.19	469.09
Pike	0.70	2.20	2.90
Poinsett	585.71	80.72	666.43
Polk	1.03	2.65	3.60
Pope	2.63	997.95	1,000.58
Prairie	270.38	84.42	354.80
Pulaski	26.78	80.79	107.57
Randolph	86.12	30.62	116.74
Saline	3.35	10.94	14.29
Scott	0.95	2.44	3.39
Searcy	0.84	0.90	1.74
Sebastian	0.31	30.61	30.92
Sevier	2.36	3.58	5.94
Sharp	1.63	1.24	2.87
St. Francis	252.99	11.22	264.21
Stone	0.68	1.08	1.76
Union	17.98	0.42	18.40
Van Buren	0.23	2.56	2.79
Washington	2.52	29.16	31.68
White	49.75	81.05	130.80
Woodruff	352.94	79.72	432.66
Yell	1.16	4.74	5.90
Total	6,952.25	4,010.82	10,963.07

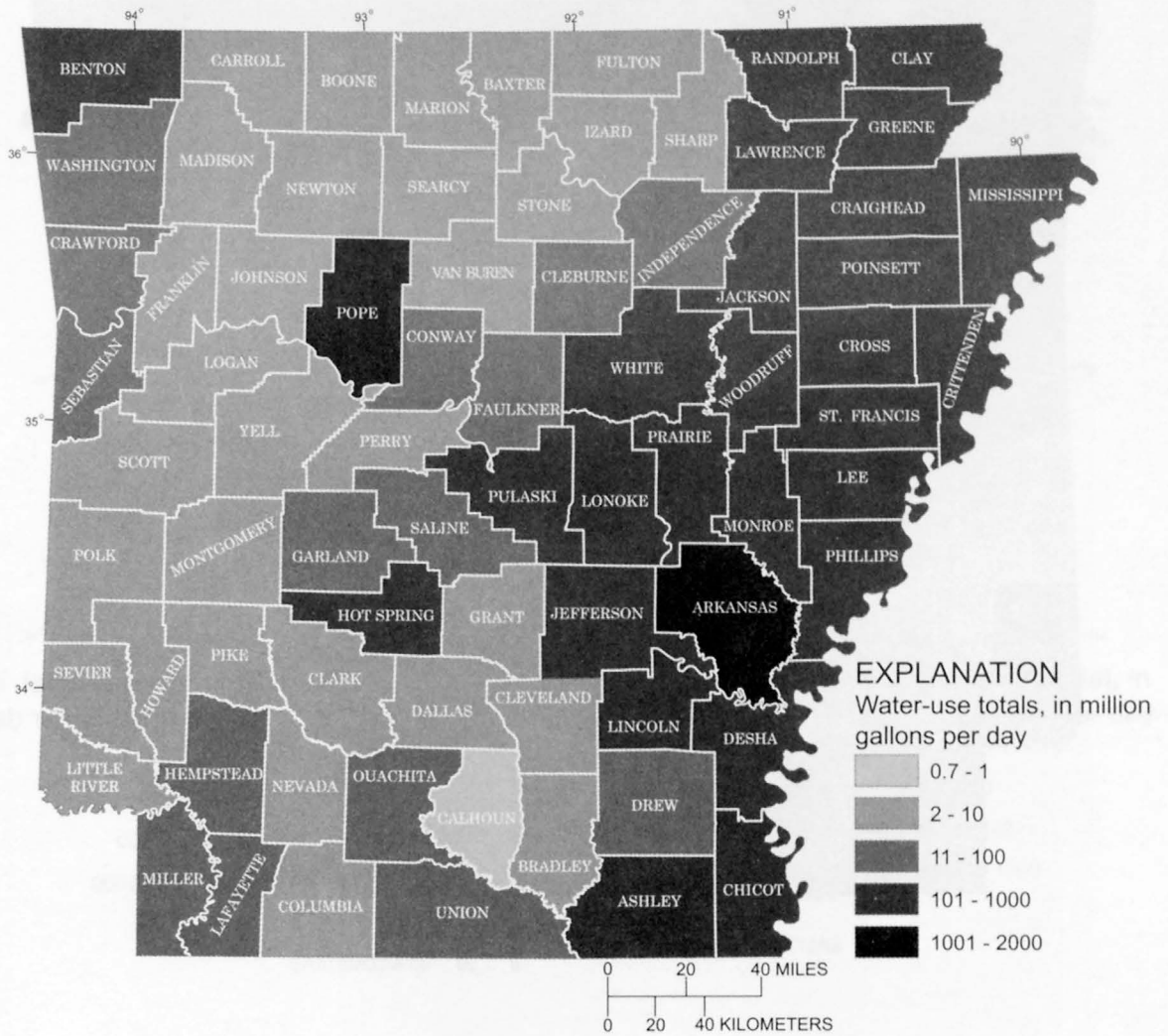


Figure 3. Total water use by county for Arkansas, 2000.

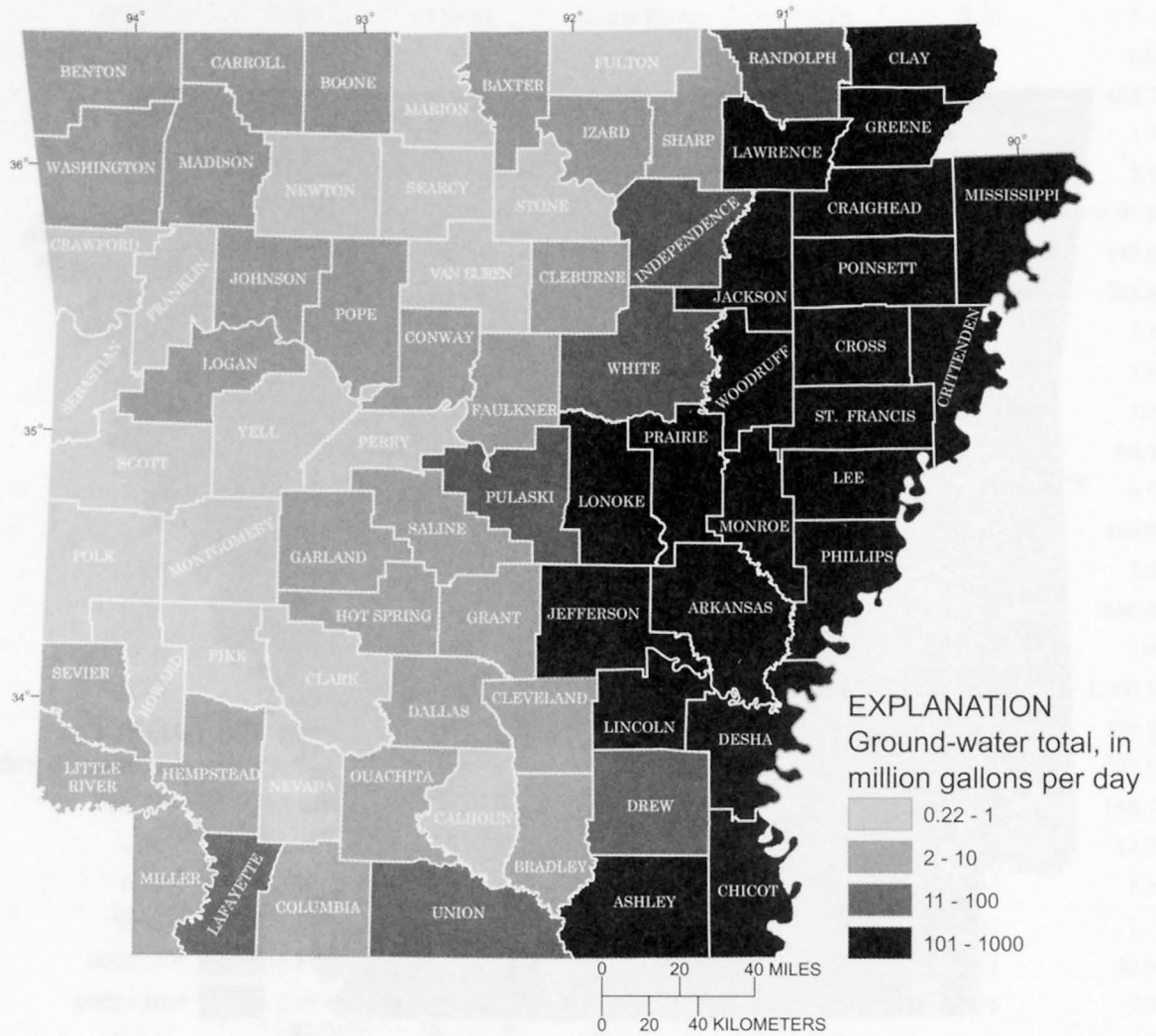


Figure 4. Ground-water use by county for Arkansas, 2000.

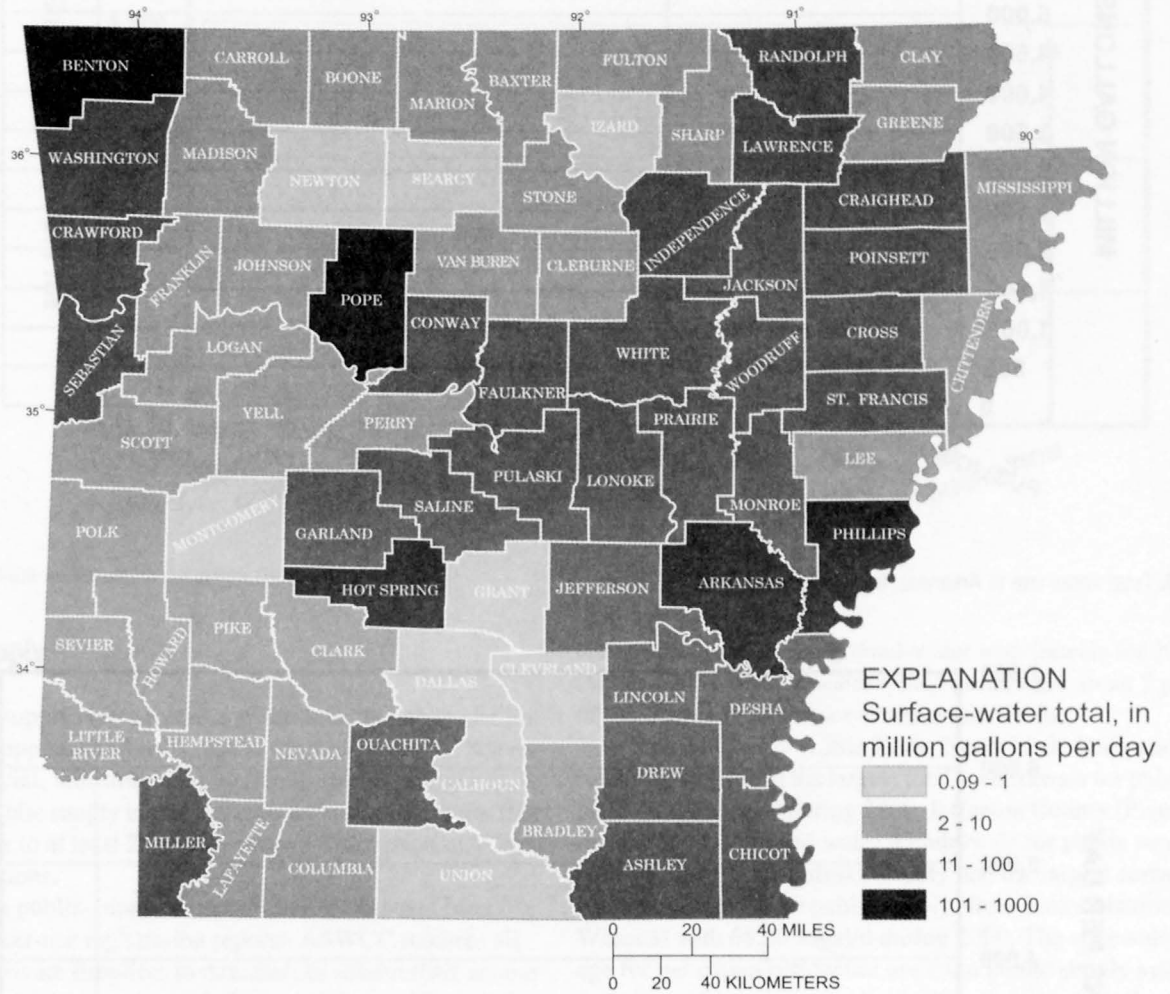


Figure 5. Surface-water use by county for Arkansas, 2000.

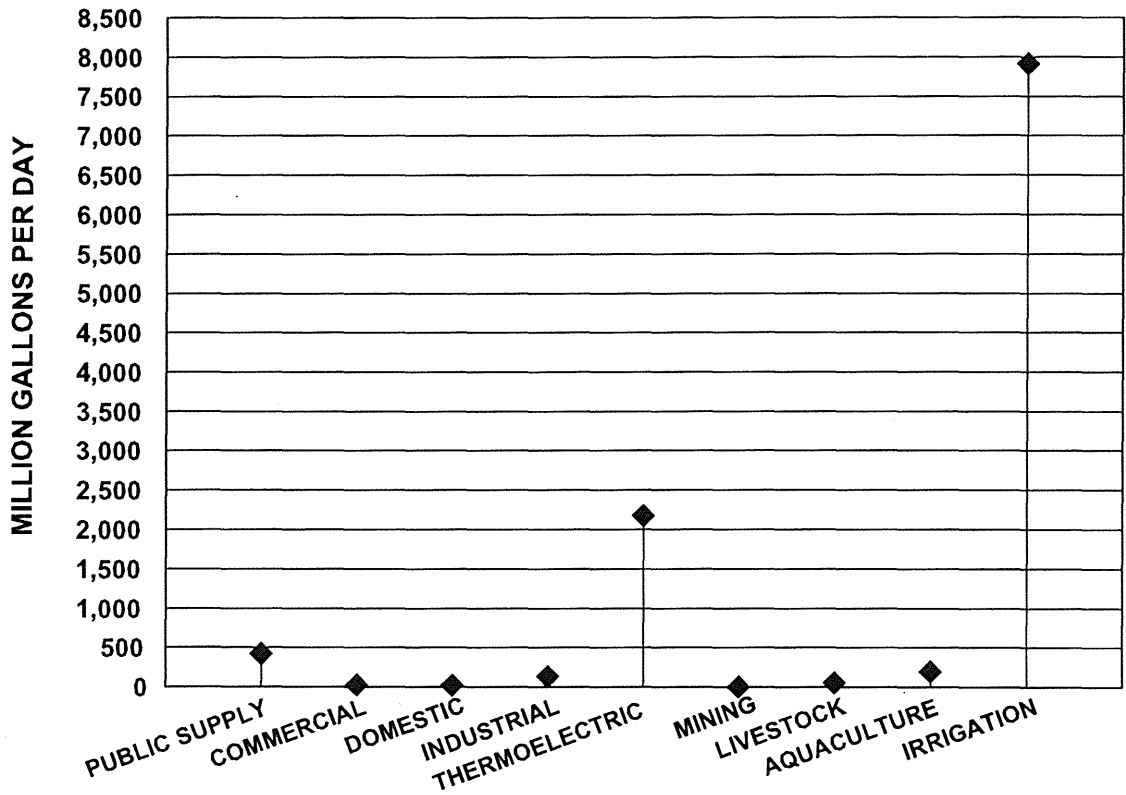


Figure 6. Total water use in Arkansas, by category, for 2000.

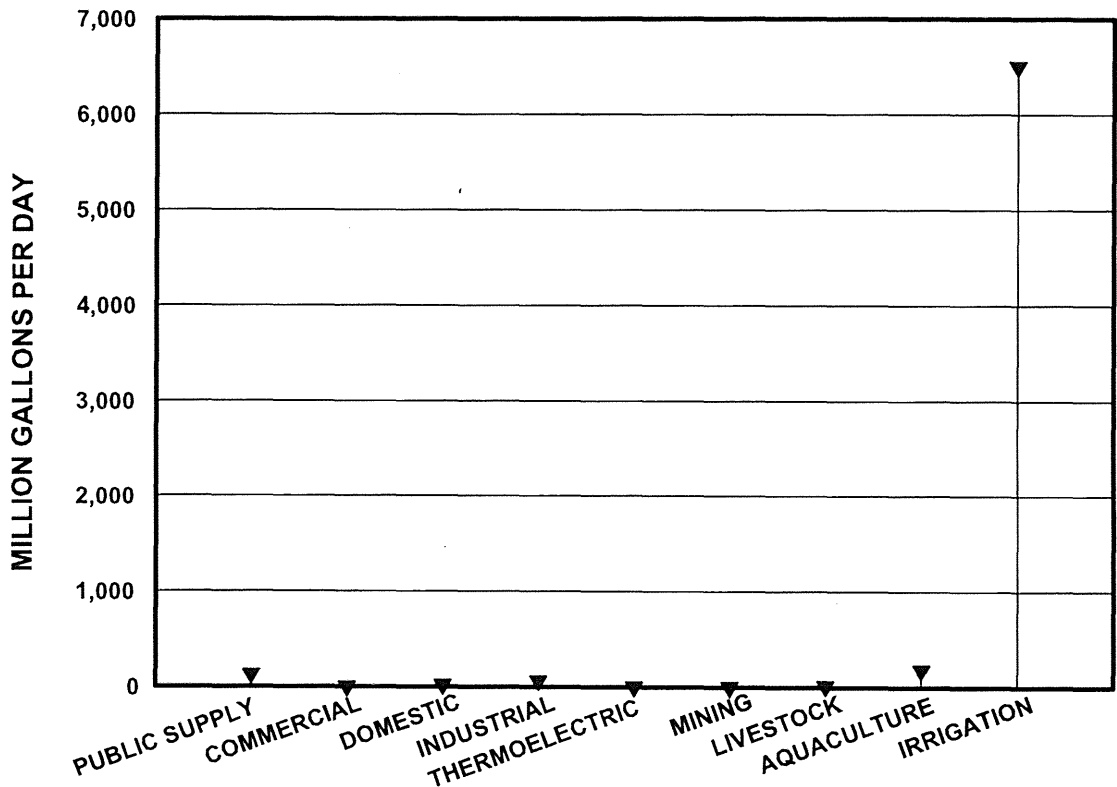


Figure 7. Ground-water use in Arkansas, by category, for 2000.

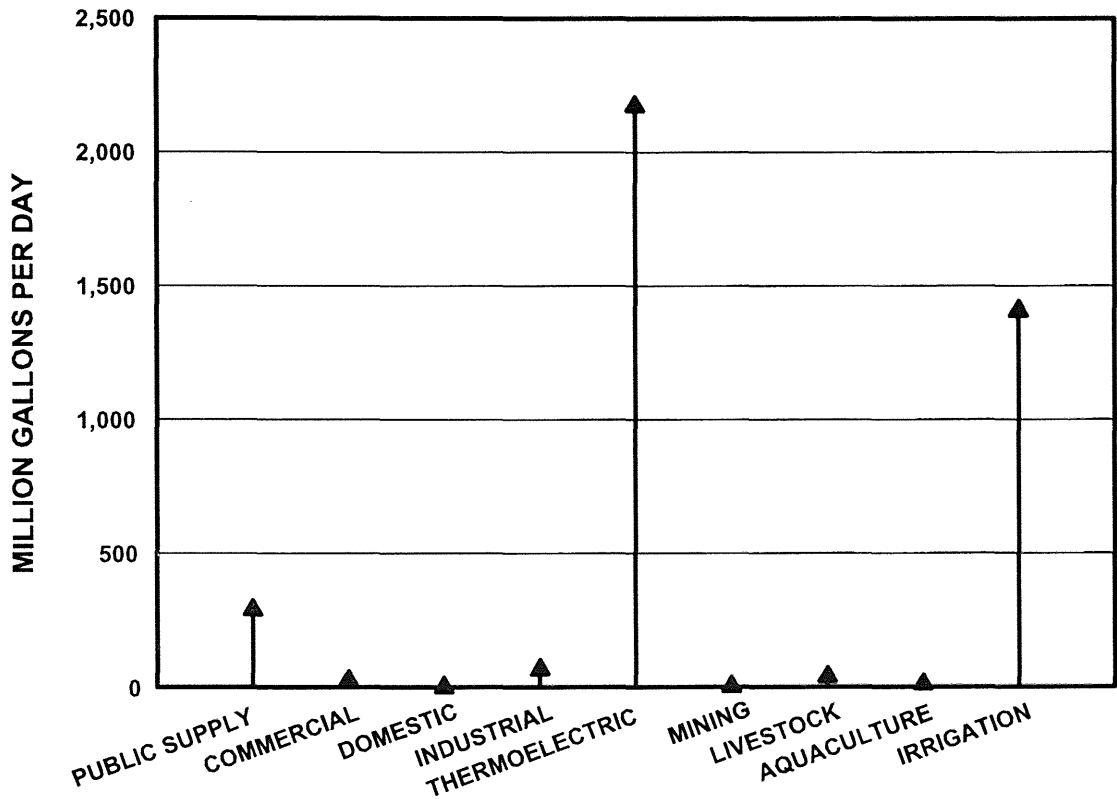


Figure 8. Surface-water use in Arkansas, by category, for 2000.

Public Supply

Public supply refers to water withdrawn by public and private water suppliers and delivered to multiple users for domestic, commercial, industrial, and thermoelectric power generation uses. Public supply includes public and private systems that furnish water to at least 25 people or have a minimum of 15 service connections.

Data on public-supply withdrawals are obtained from ASWCC water-use registration reports. ASWCC requires all public and private suppliers in Arkansas to submit their annual and monthly withdrawals and deliveries. Site-specific data for about 800 public- water suppliers are stored in the WUDBS maintained by USGS. Data reporting deficiencies are supplemented with information from monthly operation reports reported to the Arkansas Department of Health (ADH). Population served, source of water, facilities sold to, and purchased from other public suppliers are available on the ADH web site (Arkansas Department of Health, 2004).

Public supply systems served about 2.3 million people or about 87 percent of Arkansas' population in 2000. Public-supply withdrawals in 2000 in Arkansas were about 427 Mgal/d (table 2; fig. 6), about 69 percent are from surface-water sources. Public supply withdrawals account for about 4 percent of the total withdrawals of water in the State for all purposes. Ground-water withdrawals for public supply were about 2 per-

cent of the State's total ground-water withdrawals for 2000. Public supply surface-water withdrawals were about 7 percent of the State's total surface-water withdrawals.

Pulaski County (Little Rock, North Little Rock and surrounding areas) had the largest total withdrawals for public supply at 73.17 Mgal/d during 2000. Jefferson County (Pine Bluff) had the largest ground-water withdrawals for public supply with 15.98 Mgal/d, Pulaski County had the largest surface-water withdrawals for public supply (from Lakes Maumelle and Winona) with 68.20 Mgal/d during 2000. The statewide average for per capita residential use from public supply systems was about 181 gallons per day (gal/d). Scott County (in western Arkansas) had the highest per capita use at 487 gal/d.

10 Estimated Water Use in Arkansas, 2000

Table 2. Public supply and per capita water use in Arkansas, 2000.

[Mgal/d, million gallons per day; gal/d, gallons per day]

County	Population served (thousands)			Water withdrawals (Mgal/d)			Per capita water use (gal/d)
	Ground water	Surface water	Total	Ground water	Surface water	Total	
Arkansas	18.84	0.00	18.84	4.86	0.00	4.86	257.96
Ashley	17.76	0.00	17.76	2.18	0.00	2.18	122.75
Baxter	5.13	22.82	27.95	0.81	4.01	4.82	172.45
Benton	10.80	138.10	148.90	0.88	16.85	17.73	119.07
Boone	3.28	24.20	27.48	0.83	2.33	3.16	114.99
Bradley	10.06	0.00	10.06	1.11	1.06	2.17	215.71
Calhoun	3.60	0.00	3.60	0.32	0.00	0.32	88.89
Carroll	2.72	11.47	14.19	0.55	3.97	4.52	318.53
Chicot	14.12	0.00	14.12	1.74	0.00	1.74	123.23
Clark	4.46	17.73	22.19	0.06	2.56	2.62	118.07
Clay	17.61	0.00	17.61	1.83	0.00	1.83	103.92
Cleburne	0.52	23.41	23.93	0.06	6.71	6.77	282.91
Cleveland	8.57	0.00	8.57	1.33	0.00	1.33	155.19
Columbia	8.65	15.17	23.82	0.63	1.39	2.02	84.80
Conway	0.00	17.03	17.03	0.00	1.74	1.74	102.17
Craighead	76.91	0.00	76.91	13.76	0.00	13.76	178.91
Crawford	0.00	52.87	52.87	0.00	17.14	17.14	324.19
Crittenden	50.07	0.00	50.07	16.28	0.00	16.28	325.14
Cross	19.40	0.00	19.40	1.79	0.00	1.79	92.27
Dallas	6.18	0.00	6.18	0.84	0.00	0.84	135.92
Desha	11.91	0.00	11.91	1.88	0.00	1.88	157.85
Drew	17.91	0.00	17.91	3.03	0.00	3.03	169.18
Faulkner	1.80	78.12	79.92	0.16	8.45	8.61	107.73
Franklin	0.00	17.70	17.70	0.00	2.71	2.71	153.11
Fulton	3.92	0.00	3.92	0.03	0.81	0.84	214.29
Garland	0.85	77.30	78.15	0.19	13.40	13.59	173.90
Grant	11.83	0.00	11.83	1.20	0.00	1.20	101.44
Greene	36.81	0.00	36.81	4.17	0.00	4.17	113.28
Hempstead	13.48	0.00	13.48	4.01	1.04	5.05	374.63
Hot Spring	0.00	24.52	24.52	0.00	2.19	2.19	89.31
Howard	4.88	6.62	11.50	0.13	4.94	5.07	440.87
Independence	18.12	10.37	28.49	0.82	5.50	6.32	221.83
Izard	10.62	0.00	10.62	1.84	0.00	1.84	173.26
Jackson	15.28	0.00	15.28	1.96	0.00	1.96	128.27
Jefferson	84.00	0.00	84.00	15.98	0.00	15.98	190.24
Johnson	0.00	17.04	17.04	0.00	4.85	4.85	284.62
Lafayette	5.74	0.00	5.74	0.85	0.00	0.85	148.08
Lawrence	17.70	0.00	17.70	1.94	0.00	1.94	109.60

Table 2. Public supply and per capita water use in Arkansas, 2000.—Continued

[Mgal/d, million gallons per day; gal/d, gallons per day]

County	Population served (thousands)			Water withdrawals (Mgal/d)			Per capita water use (gal/d)
	Ground water	Surface water	Total	Ground water	Surface water	Total	
Lee	10.00	0.00	10.00	1.27	0.00	1.27	127.00
Lincoln	14.41	0.00	14.41	1.71	0.00	1.71	118.67
Little River	6.98	0.00	6.98	0.65	0.82	1.47	210.60
Logan	0.00	12.57	12.57	0.00	3.33	3.33	264.92
Lonoke	12.00	25.29	37.29	3.14	1.00	4.14	111.02
Madison	0.18	2.50	2.68	0.01	0.81	0.82	305.97
Marion	0.20	15.77	15.97	0.02	2.83	2.85	178.46
Miller	1.38	37.54	38.92	0.22	4.25	4.47	114.85
Mississippi	51.07	0.00	51.07	7.49	0.00	7.49	146.66
Monroe	9.81	0.00	9.81	1.74	0.00	1.74	177.37
Montgomery	0.31	3.63	3.94	0.30	0.34	0.64	162.44
Nevada	1.70	4.00	5.70	0.24	0.76	1.00	175.44
Newton	3.08	0.00	3.08	0.27	0.00	0.27	87.66
Ouachita	7.88	15.50	23.38	1.24	3.03	4.27	182.63
Perry	1.51	1.30	2.81	0.00	0.72	0.72	256.23
Phillips	25.91	0.00	25.91	4.46	0.00	4.46	172.13
Pike	1.71	4.49	6.20	0.05	1.64	1.69	272.58
Poinsett	21.74	0.00	21.74	2.80	0.00	2.80	128.79
Polk	0.00	11.87	11.87	0.01	1.71	1.72	144.90
Pope	3.97	35.34	39.31	0.00	12.21	12.21	310.61
Prairie	8.06	0.00	8.06	0.82	0.00	0.82	101.74
Pulaski	37.26	311.78	349.09	4.97	68.20	73.17	209.63
Randolph	7.88	6.80	14.68	0.15	1.16	1.31	89.24
St. Francis	27.84	0.00	27.84	4.10	0.00	4.10	147.27
Saline	18.55	47.11	65.66	1.65	9.39	11.04	168.14
Scott	0.00	3.57	3.57	0.00	1.74	1.74	487.39
Searcy	3.74	2.74	6.48	0.45	0.36	0.81	125.00
Sebastian	0.00	113.96	113.96	0.00	29.90	29.90	262.37
Sevier	2.25	5.86	8.11	1.30	2.63	3.93	484.59
Sharp	17.12	0.00	17.12	0.79	0.75	1.54	89.95
Stone	0.45	6.01	6.46	0.02	0.56	0.58	89.78
Union	38.50	0.00	38.50	8.00	0.00	8.00	207.79
Van Buren	0.00	16.10	16.10	0.00	2.00	2.00	124.22
Washington	0.00	142.04	142.04	0.00	24.65	24.65	173.54
White	2.54	47.04	49.58	0.88	9.27	10.15	204.72
Woodruff	8.41	0.00	8.41	1.02	0.00	1.02	121.28
Yell	3.97	11.30	15.27	0.20	2.91	3.11	203.67
Total	883.94	1,438.58	2,322.52	138.02	288.62	426.64	181.17

Domestic (self-supplied)

Domestic water use includes water for household purposes, such as drinking, food preparation, bathing, washing clothes and dishes, flushing toilets, and watering lawns and gardens. Most water used for domestic purposes in Arkansas is provided by public supply. However, about 351,000 people in Arkansas (or about 13 percent of the State's population) (U.S. Department of Commerce, U.S. Census Bureau, 2000, Census 2000 summary files (SF1)) furnish their own water supplies obtained from individual wells; these users are considered self-supplied. All self-supplied withdrawals were assumed to be obtained from ground-water sources.

The (self-supplied) domestic water use in each county was computed by multiplying the population (not served by a public-supply system) by a per-capita-use factor (89 gal/d per person) (U.S. Department of Commerce, U.S. Census Bureau, 2000, Census 2000 summary files (SF1)). Domestic use in Arkansas for 2000 (table 3) was 31.23 Mgal/d.

Table 3. Domestic (self-supplied) water use in Arkansas,

[Mgal/d, million gallons per day; gal/d, gallons per day]

County	Population (in thousands)	Per capita use (gal/d)	Ground water (Mgal/d)
Arkansas	1.91	89.00	0.17
Ashley	6.45	89.00	0.57
Baxter	10.44	89.00	0.93
Benton	4.51	89.00	0.40
Boone	6.47	89.00	0.58
Bradley	2.54	89.00	0.23
Calhoun	2.14	89.00	0.19
Carroll	11.17	89.00	0.99
Chicot	0.00	0.00	0.00
Clark	1.36	89.00	0.12
Clay	0.00	0.00	0.00
Cleburne	0.12	89.00	0.01
Cleveland	0.00	0.00	0.00
Columbia	1.78	89.00	0.16
Conway	3.31	89.00	0.29
Craighead	5.24	89.00	0.47
Crawford	0.38	89.00	0.03
Crittenden	0.80	89.00	0.07
Cross	0.13	89.00	0.01
Dallas	3.03	89.00	0.27
Desha	3.43	89.00	0.31
Drew	0.81	89.00	0.07
Faulkner	6.09	89.00	0.54

Table 3. Domestic (self-supplied) water use in Arkansas,

[Mgal/d, million gallons per day; gal/d, gallons per day]

County	Population (in thousands)	Per capita use (gal/d)	Ground water (Mgal/d)
Franklin	0.07	89.00	0.01
Fulton	7.72	89.00	0.69
Garland	9.92	89.00	0.88
Grant	4.63	89.00	0.41
Greene	0.52	89.00	0.05
Hempstead	10.11	89.00	0.90
Hot Spring	5.83	89.00	0.52
Howard	2.80	89.00	0.25
Independence	5.74	89.00	0.51
Izard	2.63	89.00	0.23
Jackson	3.14	89.00	0.28
Jefferson	0.28	89.00	0.02
Johnson	5.74	89.00	0.51
Lafayette	2.82	89.00	0.25
Lawrence	0.07	89.00	0.01
Lee	2.58	89.00	0.23
Lincoln	0.08	89.00	0.01
Little River	6.65	89.00	0.59
Logan	9.92	89.00	0.88
Lonoke	15.54	89.00	1.38
Madison	11.56	89.00	1.03
Marion	0.17	89.00	0.02
Miller	1.52	89.00	0.14
Mississippi	0.91	89.00	0.08
Monroe	0.44	89.00	0.04
Montgomery	5.31	89.00	0.47
Nevada	4.26	89.00	0.38
Newton	5.53	89.00	0.49
Ouachita	5.41	89.00	0.48
Perry	7.40	89.00	0.66
Phillips	0.54	89.00	0.05
Pike	5.10	89.00	0.45
Poinsett	3.87	89.00	0.34
Polk	8.36	89.00	0.74
Pope	15.16	89.00	1.35
Prairie	1.48	89.00	0.13
Pulaski	12.43	89.00	1.11
Randolph	3.52	89.00	0.31
St. Francis	1.49	89.00	0.13
Saline	17.87	89.00	1.59

Table 3. Domestic (self-supplied) water use in Arkansas,

[Mgal/d, million gallons per day; gal/d, gallons per day]

County	Population (in thousands)	Per capita use (gal/d)	Ground water (Mgal/d)
Scott	7.43	89.00	0.66
Searcy	1.78	89.00	0.16
Sebastian	1.11	89.00	0.10
Sevier	7.65	89.00	0.68
Sharp	0.00	0.00	0.00
Stone	5.04	89.00	0.45
Union	7.13	89.00	0.63
Van Buren	0.09	89.00	0.01
Washington	15.68	89.00	1.40
White	17.59	89.00	1.57
Woodruff	0.33	89.00	0.03
Yell	5.87	89.00	0.52
Total	350.93	89.00	31.23

Commercial (self-supplied)

Commercial water use includes water for motels, hotels, restaurants, office buildings, schools, and civilian and military institutions. Estimates of water supplied by public supply facilities to commercial users were obtained from data reported to the ASWCC by the public supply facilities.

Total (self-supplied) commercial water use in Arkansas for 2000 was 28.34 Mgal/d, of which about 86 percent (24.49 Mgal/d) was from surface-water and about 14 percent (3.85 Mgal/d) was from ground-water sources (table 4). The largest self-supplied commercial use of water occurred in Drew County at 8.66 Mgal/d of which 100 percent was from surface-water sources (Bayou Meto and Cut-Off Creek). The largest commercial use of ground water (alluvial aquifer) was in Crittenden County (1.07 Mgal/d).

Table 4. Commercial self-supplied withdrawals in Arkansas, 2000.

[Mgal/d, million gallons per day]

County	Ground water (Mgal/d)	Surface water (Mgal/d)	Total (Mgal/d)
Arkansas	0.91	5.15	6.06
Ashley	0.00	0.00	0.00
Baxter	0.07	0.00	0.07
Benton	0.02	0.00	0.02
Boone	0.01	0.00	0.01
Bradley	0.00	0.00	0.00
Calhoun	0.00	0.00	0.00
Carroll	0.07	0.00	0.07
Chicot	0.00	0.00	0.00

Table 4. Commercial self-supplied withdrawals in Arkansas, 2000.—Continued

County	Ground water (Mgal/d)	Surface water (Mgal/d)	Total (Mgal/d)
Clark	0.00	0.00	0.00
Clay	0.00	0.43	0.43
Cleburne	0.01	0.04	0.05
Cleveland	0.00	0.00	0.00
Columbia	0.02	0.00	0.02
Conway	0.00	0.04	0.04
Craighead	0.00	0.00	0.00
Crawford	0.00	0.00	0.00
Crittenden	1.07	0.00	1.07
Cross	0.05	0.00	0.05
Dallas	0.00	0.00	0.00
Desha	0.00	0.00	0.00
Drew	0.00	8.66	8.66
Faulkner	0.00	0.00	0.00
Franklin	0.00	0.11	0.11
Fulton	0.02	0.00	0.02
Garland	0.01	0.00	0.01
Grant	0.00	0.00	0.00
Greene	0.07	0.00	0.07
Hempstead	0.00	4.82	4.82
Hot Spring	0.01	0.04	0.05
Howard	0.01	0.00	0.01
Independence	0.01	0.00	0.01
Izard	0.00	0.00	0.00
Jackson	0.00	0.00	0.00
Jefferson	0.00	2.19	2.19
Johnson	0.01	0.00	0.01
Lafayette	0.00	0.00	0.00
Lawrence	0.00	0.89	0.89
Lee	0.00	0.00	0.00
Lincoln	0.00	0.00	0.00
Little River	0.04	0.00	0.04
Logan	0.00	0.00	0.00
Lonoke	0.30	0.00	0.30
Madison	0.02	0.00	0.02
Marion	0.04	0.00	0.04
Miller	0.00	0.80	0.80
Mississippi	0.00	0.39	0.39
Monroe	0.33	0.07	0.40
Montgomery	0.02	0.00	0.02
Nevada	0.01	0.00	0.01
Newton	0.01	0.00	0.01
Ouachita	0.00	0.00	0.00
Perry	0.00	0.26	0.26
Phillips	0.08	0.00	0.08

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Table 4. Commercial self-supplied withdrawals in Arkansas, 2000.—Continued

County	Ground water (Mgal/d)	Surface water (Mgal/d)	Total (Mgal/d)
Pike	0.00	0.02	0.02
Poinsett	0.51	0.00	0.51
Polk	0.00	0.00	0.00
Pope	0.04	0.07	0.11
Prairie	0.00	0.00	0.00
Pulaski	0.01	0.00	0.01
Randolph	0.01	0.00	0.01
St. Francis	0.00	0.00	0.00
Saline	0.00	0.22	0.22
Scott	0.01	0.00	0.01
Searcy	0.01	0.00	0.01
Sebastian	0.00	0.00	0.00
Sevier	0.00	0.00	0.00
Sharp	0.00	0.00	0.00
Stone	0.00	0.00	0.00
Union	0.00	0.12	0.12
Van Buren	0.00	0.00	0.00
Washington	0.03	0.17	0.20
White	0.00	0.00	0.00
Woodruff	0.00	0.00	0.00
Yell	0.01	0.00	0.01
Total	3.85	24.49	28.34

Industrial (self-supplied)

Industrial water use includes water for such purposes as fabrication, processing, washing, and cooling in facilities that manufacture products. Estimates of water supplied by public supply systems to industrial users were obtained from data reported to the ASWCC by the public supply systems.

Total (self-supplied) industrial water use in Arkansas for 2000 was 133.91 Mgal/d, of which about 50 percent (67.07 Mgal/d) was from ground-water and about 50 percent (66.84 Mgal/d) was from surface-water sources (table 5). The largest self-supplied use of water occurred in Ashley County at 42.66 Mgal/d. The largest industrial use of ground water (Sparta aquifer) occurred in Jefferson County (37.13 Mgal/d) and the largest industrial use of surface water (Lake Georgia Pacific) occurred in Ashley County (33.93 Mgal/d).

Table 5. Industrial self-supplied water use in Arkansas, 2000.

[Mgal/d, million gallons per day]

County	Ground water (Mgal/d)	Surface water (Mgal/d)	Total (Mgal/d)
Arkansas	0.00	0.00	0.00
Ashley	8.73	33.93	42.66
Baxter	0.00	0.00	0.00
Benton	0.00	0.00	0.00
Boone	0.00	0.00	0.00
Bradley	0.37	0.01	0.38
Calhoun	0.06	0.00	0.06
Carroll	0.00	0.00	0.00
Chicot	0.00	0.00	0.00
Clark	0.23	0.01	0.24
Clay	0.00	0.00	0.00
Cleburne	0.00	0.00	0.00
Cleveland	0.00	0.00	0.00
Columbia	2.05	0.08	2.13
Conway	0.00	7.82	7.82
Craighead	0.00	0.00	0.00
Crawford	0.00	0.45	0.45
Crittenden	0.19	0.00	0.19
Cross	0.17	0.00	0.17
Dallas	0.00	0.00	0.00
Desha	2.92	12.34	15.26
Drew	0.00	0.00	0.00
Faulkner	0.00	0.00	0.00
Franklin	0.00	0.00	0.00
Fulton	0.00	0.00	0.00
Garland	0.03	2.28	2.31
Grant	0.23	0.00	0.23
Greene	0.29	0.00	0.29
Hempstead	0.00	0.00	0.00
Hot Spring	0.01	0.02	0.03
Howard	0.00	1.00	1.00
Independence	0.00	0.04	0.04
Izard	0.00	0.00	0.00
Jackson	0.00	0.00	0.00
Jefferson	37.13	0.00	37.13
Johnson	0.00	0.01	0.01
Lafayette	0.00	0.00	0.00
Lawrence	0.00	0.00	0.00
Lee	0.00	0.00	0.00
Lincoln	0.00	0.00	0.00
Little River	0.24	1.31	1.55
Logan	0.00	0.00	0.00

Table 5. Industrial self-supplied water use in Arkansas, 2000.—Continued

County	Ground water (Mgal/d)	Surface water (Mgal/d)	Total (Mgal/d)
Lonoke	0.81	0.00	0.81
Madison	0.00	0.00	0.00
Marion	0.00	0.00	0.00
Miller	0.00	0.00	0.00
Mississippi	2.66	0.00	2.66
Monroe	0.00	0.00	0.00
Montgomery	0.00	0.00	0.00
Nevada	0.01	0.00	0.01
Newton	0.00	0.00	0.00
Ouachita	0.81	6.98	7.79
Perry	0.00	0.00	0.00
Phillips	0.00	0.00	0.00
Pike	0.00	0.00	0.00
Poinsett	0.11	0.00	0.11
Polk	0.00	0.00	0.00
Pope	0.00	0.00	0.00
Prairie	0.00	0.00	0.00
Pulaski	0.00	0.00	0.00
Randolph	0.00	0.00	0.00
St. Francis	0.07	0.00	0.07
Saline	0.00	0.52	0.52
Scott	0.00	0.00	0.00
Searcy	0.00	0.00	0.00
Sebastian	0.00	0.00	0.00
Sevier	0.00	0.03	0.03
Sharp	0.66	0.01	0.67
Stone	0.00	0.00	0.00
Union	9.23	0.00	9.23
Van Buren	0.00	0.00	0.00
Washington	0.00	0.00	0.00
White	0.04	0.00	0.04
Woodruff	0.00	0.00	0.00
Yell	0.02	0.00	0.02
Total	67.07	66.84	133.91

Mining

Mining water use includes, in part, water used for coal, sand and gravel washing operations, and saline withdrawals from oil and natural gas production wells. Total mining water use in Arkansas for 2000 was 2.78 Mgal/d, of which about 8 percent (0.21 Mgal/d) was from ground-water and about 92 percent (2.57 Mgal/d) was from surface-water sources (table 6). The largest use of mining water (sand and gravel operations)

occurred in Washington County at 1.68 Mgal/d of which 100 percent was from surface-water sources. The largest mining use of ground water (sand and gravel operations) occurred in Craighead and Poinsett Counties at 0.06 Mgal/d each.

Table 6. Mining water use in Arkansas, 2000.

[Mgal/d, million gallons per day]

County	Ground water (Mgal/d)	Surface water (Mgal/d)	Total (Mgal/d)
Arkansas	0.00	0.00	0.00
Ashley	0.00	0.00	0.00
Baxter	0.00	0.00	0.00
Benton	0.04	0.03	0.07
Boone	0.00	0.01	0.01
Bradley	0.00	0.00	0.00
Calhoun	0.00	0.00	0.00
Carroll	0.00	0.00	0.00
Chicot	0.00	0.00	0.00
Clark	0.00	0.00	0.00
Clay	0.00	0.00	0.00
Cleburne	0.00	0.00	0.00
Cleveland	0.00	0.00	0.00
Columbia	0.00	0.00	0.00
Conway	0.02	0.00	0.02
Craighead	0.06	0.00	0.06
Crawford	0.00	0.00	0.00
Crittenden	0.00	0.00	0.00
Cross	0.00	0.00	0.00
Dallas	0.00	0.00	0.00
Desha	0.00	0.00	0.00
Drew	0.00	0.00	0.00
Faulkner	0.00	0.02	0.02
Franklin	0.00	0.00	0.00
Fulton	0.00	0.00	0.00
Garland	0.00	0.00	0.00
Grant	0.00	0.00	0.00
Greene	0.02	0.00	0.02
Hempstead	0.00	0.00	0.00
Hot Spring	0.00	0.02	0.02
Howard	0.00	0.47	0.47
Independence	0.00	0.00	0.00
Izard	0.00	0.00	0.00
Jackson	0.00	0.00	0.00
Jefferson	0.00	0.05	0.05
Johnson	0.00	0.00	0.00
Lafayette	0.00	0.00	0.00
Lawrence	0.00	0.00	0.00
Lee	0.00	0.00	0.00

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Table 6. Mining water use in Arkansas, 2000.—Continued

[Mgal/d, million gallons per day]

County	Ground water (Mgal/d)	Surface water (Mgal/d)	Total (Mgal/d)
Lincoln	0.00	0.00	0.00
Little River	0.00	0.00	0.00
Logan	0.00	0.00	0.00
Lonoke	0.00	0.13	0.13
Madison	0.00	0.00	0.00
Marion	0.00	0.00	0.00
Miller	0.00	0.00	0.00
Mississippi	0.00	0.00	0.00
Monroe	0.00	0.00	0.00
Montgomery	0.00	0.00	0.00
Nevada	0.00	0.00	0.00
Newton	0.00	0.00	0.00
Ouachita	0.00	0.00	0.00
Perry	0.00	0.00	0.00
Phillips	0.00	0.00	0.00
Pike	0.00	0.03	0.03
Poinsett	0.06	0.00	0.06
Polk	0.00	0.00	0.00
Pope	0.00	0.00	0.00
Prairie	0.00	0.00	0.00
Pulaski	0.00	0.13	0.13
Randolph	0.01	0.00	0.01
St. Francis	0.00	0.00	0.00
Saline	0.00	0.00	0.00
Scott	0.00	0.00	0.00
Searcy	0.00	0.00	0.00
Sebastian	0.00	0.00	0.00
Sevier	0.00	0.00	0.00
Sharp	0.00	0.00	0.00
Stone	0.00	0.00	0.00
Union	0.00	0.00	0.00
Van Buren	0.00	0.00	0.00
Washington	0.00	1.68	1.68
White	0.00	0.00	0.00
Woodruff	0.00	0.00	0.00
Yell	0.00	0.00	0.00
Total	0.21	2.57	2.78

Livestock

Livestock water use includes water used for stock watering, feed lots, dairy farming, and other farm needs. Water users that report their usage of water for livestock represent a small portion of the livestock water users in the State. Many livestock water users fall below the ASWCC threshold for reporting either ground water or surface water. Therefore, the majority of the water volumes reported (table 8) for livestock water use were estimated based on water requirements (table 7). The data components required for estimation of water use for livestock include county livestock population and the appropriate water requirement, or water-use coefficient, for each type of livestock produced. Livestock population values for Arkansas were published by county by the U.S. Department of Agriculture Crop Reporting Service web site (for the year 2000) Water requirements are listed below (Holland, 1987). Livestock population was multiplied by the water requirement to obtain the water-use estimate.

Table 7. Livestock water requirements.

Livestock	Water required (gallons per day)
Dairy cattle	30
Other cattle	15
Hogs	2
Poultry	
100 broilers	4
100 hens	6
100 turkeys	8

Total livestock water use in Arkansas for 2000 was 54.04 Mgal/d, of which about 29 percent (15.46 Mgal/d) was from ground-water and about 71 percent (38.58 Mgal/d) was from surface-water sources (table 8). Consumptive use for livestock is considered to be 100 percent of withdrawals. The largest use of livestock water was in Washington County at 3.64 Mgal/d. Washington County also was the largest user of ground water and surface water at 1.04 Mgal/d and 2.60 Mgal/d, respectively. Other counties with notable livestock water use (greater than 2 Mgal/d) were Benton, Cleburne, and Carroll in order of decreasing use.

Table 8. Livestock water use in Arkansas, 2000.

[Mgal/d, million gallons per day]

County	Water withdrawals (Mgal/d)			Consumptive use (Mgal/d)
	Ground water	Surface water	Total	
Arkansas	0.03	0.08	0.11	0.11
Ashley	0.04	0.09	0.13	0.13
Baxter	0.14	0.34	0.48	0.48
Benton	1.03	2.57	3.60	3.60
Boone	0.46	1.15	1.61	1.61
Bradley	0.05	0.13	0.18	0.18
Calhoun	0.04	0.11	0.15	0.15
Carroll	0.58	1.44	2.02	2.02
Chicot	0.06	0.15	0.21	0.22
Clark	0.13	0.33	0.46	0.46
Clay	0.04	0.11	0.15	0.15
Cleburne	0.95	2.37	3.32	3.31
Cleveland	0.11	0.26	0.37	0.37
Columbia	0.12	0.30	0.42	0.42
Conway	0.33	0.82	1.15	1.14
Craighead	0.05	0.13	0.18	0.19
Crawford	0.25	0.62	0.87	0.87
Crittenden	0.01	0.03	0.04	0.04
Cross	0.04	0.09	0.13	0.13
Dallas	0.04	0.09	0.13	0.13
Desha	0.04	0.09	0.13	0.13
Drew	0.08	0.19	0.27	0.27
Faulkner	0.37	0.93	1.30	1.31
Franklin	0.36	0.89	1.25	1.25
Fulton	0.25	0.62	0.87	0.87
Garland	0.10	0.25	0.35	0.34
Grant	0.08	0.19	0.27	0.27
Greene	0.06	0.15	0.21	0.21
Hempstead	0.38	0.94	1.32	1.32
Hot Spring	0.12	0.30	0.42	0.42
Howard	0.33	0.84	1.17	1.17
Independence	0.31	0.78	1.09	1.09
Izard	0.22	0.56	0.78	0.78
Jackson	0.03	0.08	0.11	0.11
Jefferson	0.04	0.09	0.13	0.13
Johnson	0.25	0.64	0.89	0.89
Lafayette	0.23	0.57	0.80	0.80
Lawrence	0.14	0.34	0.48	0.48
Lee	0.02	0.05	0.07	0.07
Lincoln	0.11	0.28	0.39	0.39
Little River	0.23	0.58	0.81	0.81

Table 8. Livestock water use in Arkansas, 2000.

[Mgal/d, million gallons per day]

County	Water withdrawals (Mgal/d)			Consumptive use (Mgal/d)
	Ground water	Surface water	Total	
Logan	0.43	1.07	1.50	1.50
Lonoke	0.14	0.36	0.50	0.50
Madison	0.52	1.30	1.82	1.82
Marion	0.18	0.46	0.64	0.64
Miller	0.22	0.54	0.76	0.76
Mississippi	0.01	0.03	0.04	0.04
Monroe	0.01	0.02	0.03	0.03
Montgomery	0.17	0.42	0.59	0.59
Nevada	0.14	0.35	0.49	0.48
Newton	0.13	0.33	0.46	0.46
Ouachita	0.07	0.17	0.24	0.24
Perry	0.15	0.37	0.52	0.52
Phillips	0.02	0.05	0.07	0.06
Pike	0.20	0.50	0.70	0.70
Poinsett	0.02	0.05	0.07	0.07
Polk	0.28	0.69	0.97	0.97
Pope	0.37	0.92	1.29	1.29
Prairie	0.05	0.12	0.17	0.17
Pulaski	0.09	0.23	0.32	0.32
Randolph	0.19	0.48	0.67	0.67
St. Francis	0.02	0.05	0.07	0.07
Saline	0.08	0.20	0.28	0.28
Scott	0.28	0.70	0.98	0.98
Searcy	0.22	0.54	0.76	0.76
Sebastian	0.21	0.52	0.73	0.73
Sevier	0.37	0.92	1.29	1.29
Sharp	0.18	0.46	0.64	0.64
Stone	0.21	0.52	0.73	0.73
Union	0.12	0.30	0.42	0.42
Van Buren	0.22	0.56	0.78	0.78
Washington	1.04	2.60	3.64	3.64
White	0.45	1.12	1.57	1.57
Woodruff	0.01	0.04	0.05	0.05
Yell	0.41	1.02	1.43	1.42
Total	15.46	38.58	54.04	54.04

Aquaculture

Aquaculture water use includes water used for farming of organisms that live in water, such as fish, shellfish, and algae. Total aquaculture water use in Arkansas for 2000 was 197.71 Mgal/d, of which about 95 percent (187.35 Mgal/d) was from ground water and about 5 percent (10.36 Mgal/d) was from surface-water sources (table 9). The largest use of aquacultural water was in Lonoke County at 57.36 Mgal/d of which 100 percent was from ground-water sources. The largest aquaculture use of surface water was in Greene County at 3.50 Mgal/d. Other counties with notable aquaculture water use (greater than 40 Mgal/d) were Chicot and Prairie in order of decreasing use.

Table 9. Aquaculture water use in Arkansas, 2000.

[Mgal/d, million gallons per day]

County	Ground water (Mgal/d)	Surface water (Mgal/d)	Total (Mgal/d)
Arkansas	8.88	0.00	8.88
Ashley	0.00	0.00	0.00
Baxter	0.00	0.00	0.00
Benton	0.00	0.00	0.00
Boone	0.00	0.00	0.00
Bradley	0.00	0.00	0.00
Calhoun	0.00	0.00	0.00
Carroll	0.00	0.00	0.00
Chicot	44.67	2.16	46.83
Clark	0.00	0.00	0.00
Clay	0.00	0.00	0.00
Cleburne	0.00	0.00	0.00
Cleveland	0.00	0.00	0.00
Columbia	0.00	0.00	0.00
Conway	0.00	0.00	0.00
Craighead	1.23	0.02	1.25
Crawford	0.00	0.00	0.00
Crittenden	0.07	0.00	0.07
Cross	0.00	0.00	0.00
Dallas	0.00	0.00	0.00
Desha	12.83	0.27	13.10
Drew	0.98	0.00	0.98
Faulkner	0.00	0.00	0.00
Franklin	0.00	0.00	0.00
Fulton	0.00	0.00	0.00
Garland	0.00	0.00	0.00
Grant	0.00	0.00	0.00
Greene	0.02	3.50	3.52
Hempstead	0.00	0.00	0.00
Hot Spring	0.00	0.00	0.00
Howard	0.00	0.00	0.00
Independence	0.00	0.02	0.02

Table 9. Aquaculture water use in Arkansas, 2000.—Continued

[Mgal/d, million gallons per day]

County	Ground water (Mgal/d)	Surface water (Mgal/d)	Total (Mgal/d)
Izard	0.00	0.00	0.00
Jackson	1.74	0.00	1.74
Jefferson	4.65	0.00	4.65
Johnson	0.00	0.00	0.00
Lafayette	0.02	0.00	0.02
Lawrence	0.00	0.00	0.00
Lee	0.14	0.00	0.14
Lincoln	0.00	0.00	0.00
Little River	0.01	0.03	0.04
Logan	0.00	0.00	0.00
Lonoke	57.36	0.00	57.36
Madison	0.00	0.01	0.01
Marion	0.00	0.00	0.00
Miller	0.00	0.00	0.00
Mississippi	0.08	0.27	0.35
Monroe	0.00	0.00	0.00
Montgomery	0.00	0.00	0.00
Nevada	0.00	0.00	0.00
Newton	0.00	0.00	0.00
Ouachita	0.00	0.00	0.00
Perry	0.00	0.00	0.00
Phillips	2.80	0.00	2.80
Pike	0.00	0.00	0.00
Poinsett	0.17	1.24	1.41
Polk	0.00	0.00	0.00
Pope	0.00	0.00	0.00
Prairie	42.87	1.90	44.77
Pulaski	0.17	0.00	0.17
Randolph	0.00	0.00	0.00
St. Francis	2.80	0.00	2.80
Saline	0.00	0.00	0.00
Scott	0.00	0.00	0.00
Searcy	0.00	0.00	0.00
Sebastian	0.00	0.00	0.00
Sevier	0.00	0.00	0.00
Sharp	0.00	0.00	0.00
Stone	0.00	0.00	0.00
Union	0.00	0.00	0.00
Van Buren	0.00	0.00	0.00
Washington	0.00	0.00	0.00
White	1.19	0.49	1.68
Woodruff	4.67	0.45	5.12
Yell	0.00	0.00	0.00
Total	187.35	10.36	197.71

Irrigation

Irrigation water use includes water applied on lands to assist in the growing of crops and pastures or to maintain vegetative growth in recreational lands, such as parks and golf courses. The major crops irrigated in Arkansas (in descending order of water use) are rice, soybeans, beans, cotton, corn, and milo. During 2000 there were over 4.5 million acres of irrigated land reported to ASWCC for Arkansas. The primary types of irrigation were flood, furrow, and to a lesser extent, sprinkler. Irrigation water use accounted for 94 percent (6,506 Mgal/d) of the ground water withdrawn in Arkansas. Rice totaled 1.66 million acres or about 37 percent of the total land irrigated in the State.

Irrigation water use totaled 7,913.37 Mgal/d, of which about 82 percent (6,506.46 Mgal/d) was from ground-water and about 18 percent (1,406.91 Mgal/d) was from surface-water sources (table 10). Water used for the growing of rice totaled 4,709.23

Mgal/d or about 43 percent of the total water used in Arkansas during 2000. The largest use of water for irrigation was Arkansas County with 1,124.54 Mgal/d, of which about 55 percent (616.45 Mgal/d) was from ground-water and about 45 percent (508.09 Mgal/d) was from surface-water sources. Other counties with notable total irrigation water use (greater than 400 Mgal/d) were Poinsett, Jefferson, Cross, and Lonoke in order of decreasing use.

Table 10. Irrigation water use in Arkansas, 2000.

[Mgal/d, million gallons per day]

County	Water withdrawals (Mgal/d)			Irrigated land (thousand acres)		
	Ground water	Surface water	Total	Sprinkler	Surface	Total
Arkansas	616.45	508.09	1,124.54	57.22	386.33	443.55
Ashley	97.84	8.91	106.75	13.08	80.33	93.41
Baxter	0.00	0.00	0.00	0.00	0.00	0.00
Benton	0.12	0.07	0.19	0.19	0.03	0.22
Boone	0.00	0.00	0.00	0.00	0.00	0.00
Bradley	0.00	0.00	0.00	0.00	0.00	0.00
Calhoun	0.00	0.00	0.00	0.00	0.00	0.00
Carroll	0.00	0.00	0.00	0.00	0.00	0.00
Chicot	127.79	45.71	173.50	18.06	102.41	120.47
Clark	0.00	0.60	0.60	0.13	0.72	0.85
Clay	263.06	5.04	268.10	50.98	288.90	339.88
Cleburne	0.00	0.41	0.41	0.14	0.76	0.90
Cleveland	0.00	0.00	0.00	0.00	0.00	0.00
Columbia	0.00	0.00	0.00	0.00	0.00	0.00
Conway	1.30	4.71	6.01	1.01	6.73	7.74
Craighead	337.08	39.33	376.41	34.60	212.53	247.13
Crawford	0.10	1.06	1.16	1.28	0.21	1.49
Crittenden	119.42	2.61	122.03	16.17	99.35	115.52
Cross	408.64	27.40	436.04	32.56	200.36	232.92
Dallas	0.00	0.00	0.00	0.00	0.00	0.00
Desha	310.95	73.05	384.00	29.07	178.54	207.61
Drew	51.42	8.52	59.94	7.15	43.93	51.08
Faulkner	0.73	2.99	3.72	0.32	2.01	2.33
Franklin	0.00	0.01	0.01	0.04	0.08	0.12
Fulton	0.00	0.11	0.11	0.03	0.09	0.12
Garland	0.00	0.60	0.60	0.02	0.10	0.12
Grant	0.00	0.00	0.00	0.00	0.00	0.00
Greene	154.89	2.16	157.05	18.05	110.90	128.95

Table 10. Irrigation water use in Arkansas, 2000.—Continued

[Mgal/d, million gallons per day]

County	Water withdrawals (Mgal/d)			Irrigated land (thousand acres)		
	Ground water	Surface water	Total	Sprinkler	Surface	Total
Hempstead	0.00	0.00	0.00	0.00	0.00	0.00
Hot Spring	0.00	3.38	3.38	0.16	1.02	1.18
Howard	0.00	0.00	0.00	0.00	0.00	0.00
Independence	33.62	8.78	42.40	3.44	21.14	24.58
Izard	0.00	0.00	0.00	0.00	0.00	0.00
Jackson	360.55	21.67	382.22	24.99	153.51	178.50
Jefferson	413.34	80.92	494.26	23.71	145.65	169.36
Johnson	0.56	0.01	0.57	0.17	1.17	1.34
Lafayette	9.12	1.16	10.28	1.05	6.44	7.49
Lawrence	294.63	28.83	323.46	17.12	112.29	129.41
Lee	233.75	6.50	240.25	20.32	124.80	145.12
Lincoln	167.34	20.46	187.80	14.94	91.80	106.74
Little River	0.00	0.62	0.62	0.02	0.10	0.12
Logan	0.23	0.11	0.34	0.06	0.33	0.39
Lonoke	334.01	87.63	421.64	32.70	200.85	233.55
Madison	0.00	0.08	0.08	0.02	0.09	0.11
Marion	0.00	0.00	0.00	0.00	0.00	0.00
Miller	6.38	79.37	85.75	4.88	29.95	34.83
Mississippi	178.05	4.57	182.62	21.75	133.61	155.36
Monroe	233.74	20.00	253.74	21.50	132.08	153.58
Montgomery	0.00	0.05	0.05	0.01	0.06	0.07
Nevada	0.00	0.00	0.00	0.00	0.00	0.00
Newton	0.01	0.04	0.05	0.01	0.04	0.05
Ouachita	0.00	0.00	0.00	0.00	0.00	0.00
Perry	0.00	4.76	4.76	0.34	2.10	2.44
Phillips	198.07	0.86	198.93	22.26	136.72	158.98
Pike	0.00	0.01	0.01	0.01	0.03	0.04
Poinsett	581.70	79.43	661.13	48.39	297.25	345.64
Polk	0.00	0.25	0.25	0.06	0.32	0.38
Pope	0.87	0.15	1.02	0.14	0.85	0.99
Prairie	226.51	82.40	308.91	27.57	169.38	196.95
Pulaski	20.43	12.23	32.66	3.33	20.47	23.80
Randolph	85.45	28.98	114.43	7.14	43.82	50.96
St. Francis	245.51	11.17	256.68	21.44	133.74	155.18
Saline	0.03	0.61	0.64	0.05	0.34	0.39
Scott	0.00	0.00	0.00	0.00	0.00	0.00
Searcy	0.00	0.00	0.00	0.00	0.00	0.00
Sebastian	0.00	0.19	0.19	0.02	0.11	0.13
Sevier	0.01	0.00	0.01	0.01	0.05	0.06
Sharp	0.00	0.02	0.02	0.02	0.11	0.13
Stone	0.00	0.00	0.00	0.00	0.00	0.00

Table 10. Irrigation water use in Arkansas, 2000.—Continued

[Mgal/d, million gallons per day]

County	Water withdrawals (Mgal/d)			Irrigated land (thousand acres)		
	Ground water	Surface water	Total	Sprinkler	Surface	Total
Union	0.00	0.00	0.00	0.00	0.00	0.00
Van Buren	0.00	0.00	0.00	0.00	0.00	0.00
Washington	0.05	0.06	0.11	0.04	0.25	0.29
White	45.62	70.17	115.79	7.83	48.08	55.91
Woodruff	347.09	19.25	366.34	25.06	153.96	179.02
Yell	0.00	0.81	0.81	0.10	0.59	0.69
Total	6,506.46	1,406.91	7,913.37	630.76	3,877.41	4,508.17

Thermoelectric Power Generation

Thermoelectric power generation includes power generated using fossil fuel, geothermal, or nuclear and thermoelectric power water use include water used in the process of power generation, such as boiler makeup, cooling, and domestic purposes. Surface water generally is diverted for “once through” cooling and then returned to the stream. Total thermoelectric power water use in Arkansas for 2000 was 2,175.37 Mgal/d of which over 99 percent (2,172.45 Mgal/d) was from surface water and less than 1 percent (2.92 Mgal/d) was from ground-water sources (table 11). Water used for thermoelectric power generation was about 20 percent of the total water used in Arkansas during 2000 and 54 percent of the total surface water used. About 45 percent (984.60 Mgal/d) of the water used in this category was used for cooling at a nuclear power plant in Pope County. About 92 percent (2,011.53 Mgal/d) of the water used in this category was used in Pope (Lake Dardanelle), Hot Spring (Lake Catherine and Ouachita River), Benton (Swepco Lake), and Phillips (L’Anguille River) Counties in order of decreasing use.

Table 11. Thermoelectric power water use in Arkansas, 2000.

[Mgal/d, million gallons per day]

County	Ground water (Mgal/d)	Surface water (Mgal/d)	Total (Mgal/d)
Arkansas	0.00	0.00	0.00
Ashley	0.00	0.00	0.00
Baxter	0.00	0.00	0.00
Benton	0.00	355.50	355.50
Boone	0.00	0.00	0.00
Bradley	0.00	0.00	0.00
Calhoun	0.00	0.00	0.00
Carroll	0.00	0.00	0.00
Chicot	0.00	0.00	0.00

Table 11. Thermoelectric power water use in Arkansas, 2000.—Continued

County	Ground water (Mgal/d)	Surface water (Mgal/d)	Total (Mgal/d)
Clark	0.00	0.00	0.00
Clay	0.00	0.00	0.00
Cleburne	0.00	0.00	0.00
Cleveland	0.00	0.00	0.00
Columbia	0.00	0.00	0.00
Conway	0.00	0.00	0.00
Craighead	0.00	0.00	0.00
Crawford	0.00	0.00	0.00
Crittenden	0.00	0.00	0.00
Cross	0.00	0.00	0.00
Dallas	0.00	0.00	0.00
Desha	0.00	0.00	0.00
Drew	0.00	0.00	0.00
Faulkner	0.00	0.00	0.00
Franklin	0.02	0.00	0.02
Fulton	0.00	0.00	0.00
Garland	0.00	0.00	0.00
Grant	0.00	0.00	0.00
Greene	0.00	0.00	0.00
Hempstead	0.00	0.00	0.00
Hot Spring	0.00	408.73	408.73
Howard	0.00	0.00	0.00
Independence	0.47	29.23	29.70
Izard	0.00	0.00	0.00
Jackson	0.00	0.00	0.00
Jefferson	0.63	16.55	17.18
Johnson	0.00	0.00	0.00
Lafayette	0.90	0.00	0.90

Table 11. Thermoelectric power water use in Arkansas, 2000.—Continued

County	Ground water (Mgal/d)	Surface water (Mgal/d)	Total (Mgal/d)
Lawrence	0.00	0.00	0.00
Lee	0.00	0.00	0.00
Lincoln	0.00	0.00	0.00
Little River	0.00	0.00	0.00
Logan	0.00	0.00	0.00
Lonoke	0.00	0.00	0.00
Madison	0.00	0.00	0.00
Marion	0.00	0.00	0.00
Miller	0.00	0.00	0.00
Mississippi	0.00	0.00	0.00
Monroe	0.00	0.00	0.00
Montgomery	0.00	0.00	0.00
Nevada	0.00	0.00	0.00
Newton	0.00	0.00	0.00
Ouachita	0.00	55.58	55.58
Perry	0.00	0.00	0.00
Phillips	0.42	262.28	262.70
Pike	0.00	0.00	0.00
Poinsett	0.00	0.00	0.00
Polk	0.00	0.00	0.00
Pope	0.00	984.60	984.60
Prairie	0.00	0.00	0.00
Pulaski	0.00	0.00	0.00
Randolph	0.00	0.00	0.00
St. Francis	0.36	0.00	0.36
Saline	0.00	0.00	0.00
Scott	0.00	0.00	0.00
Searcy	0.00	0.00	0.00
Sebastian	0.00	0.00	0.00
Sevier	0.00	0.00	0.00
Sharp	0.00	0.00	0.00
Stone	0.00	0.00	0.00
Union	0.00	0.00	0.00
Van Buren	0.00	0.00	0.00
Washington	0.00	0.00	0.00
White	0.00	0.00	0.00
Woodruff	0.12	59.98	60.10
Yell	0.00	0.00	0.00
Total	2.92	2,172.45	2,175.37

Changes in Water Use, 1965-2000

Total water use in Arkansas has increased about 412 percent between 1965 and 2000 (table 12). Total ground-water use in Arkansas between 1965 and 2000 has increased from 1,231 to 6,952 Mgal/d, an increase of about 465 percent. Total surface-water use in Arkansas between 1965 and 2000 increased from 911 to 4,011 Mgal/d, an increase of 340 percent. Ground-water irrigation use between 1965 and 2000 increased from 949 to 6,506 Mgal/d, an increase of about 586 percent. Surface-water irrigation use between 1965 and 2000 increased from 211 to 1,407 Mgal/d, an increase of about 567 percent (fig. 9). Public supply water use between 1965 and 2000 increased from 127 to 427 Mgal/d, an increase of 236 percent between 1965 and 2000 (fig. 10). As the population served by public supply (Arkansas Department of Health, 2004) between 1965 and 2000 increased 109 percent from approximately 1.1 to 2.3 million people, the per capita domestic use of public supply water increased from approximately 116 to 181 gal/d. An increase in public water supply usage for the 35-year period resulted from an increase in population combined with an increase in average per capita water use of 56 percent.

Table 12. Changes in water use for selected categories for Arkansas, 1965-2000.

Year	Irrigation		Population served	Public supply		Per capita use (gallon/day/person)	Total	
	Ground water	Surface water		Ground water	Surface water		Ground water	Surface water
1965	949	211	1,900,000	54	73	116	1,231	911
1970	1,064	229	1,920,000	71	95	133	1,530	1,531
1975	2,094	346	2,116,000	89	118	180	2,596	2,468
1980	3,484	597	2,283,733	110	153	155	4,053	2,166
1985	3,330	541	2,358,000	104	156	153	3,810	2,041
1990	4,296	949	2,353,000	119	190	173	4,708	3,128
1995	4,925	1,013	2,484,000	135	246	191	5,456	3,311
2000	6,506	1,407	2,322,520	138	289	181	6,952	4,011

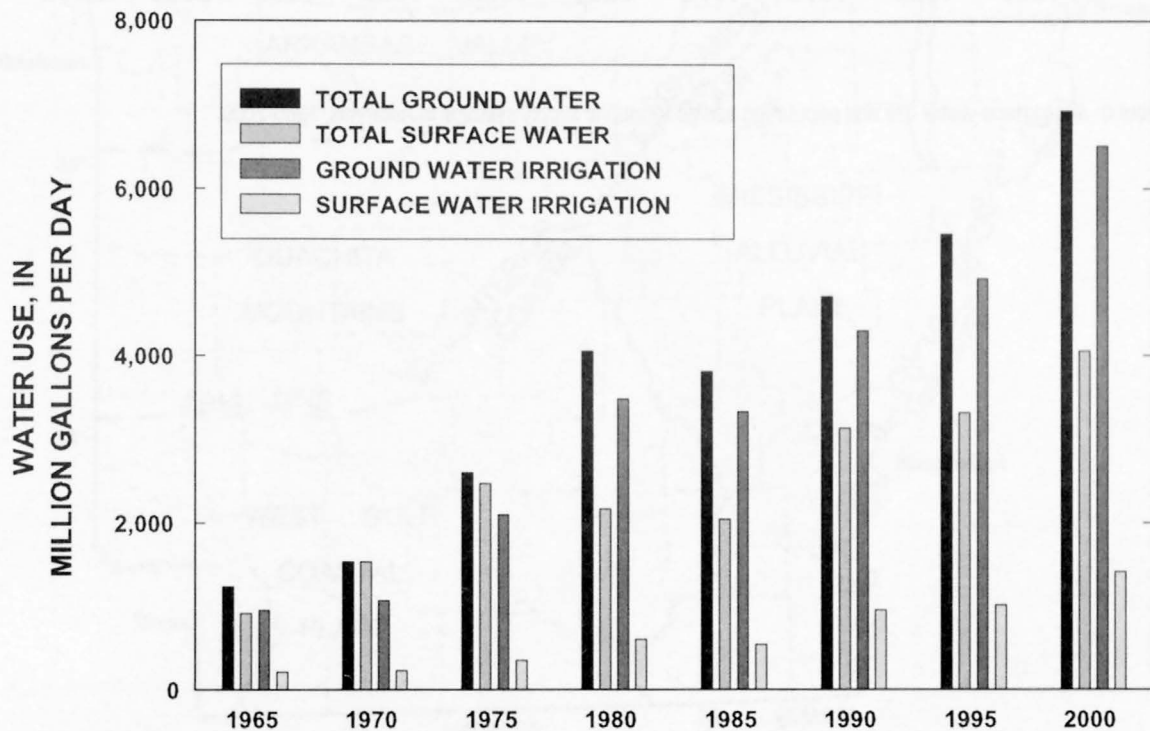


Figure 9. Total ground- and surface-water use compared to irrigation water use in Arkansas, 1965-2000.

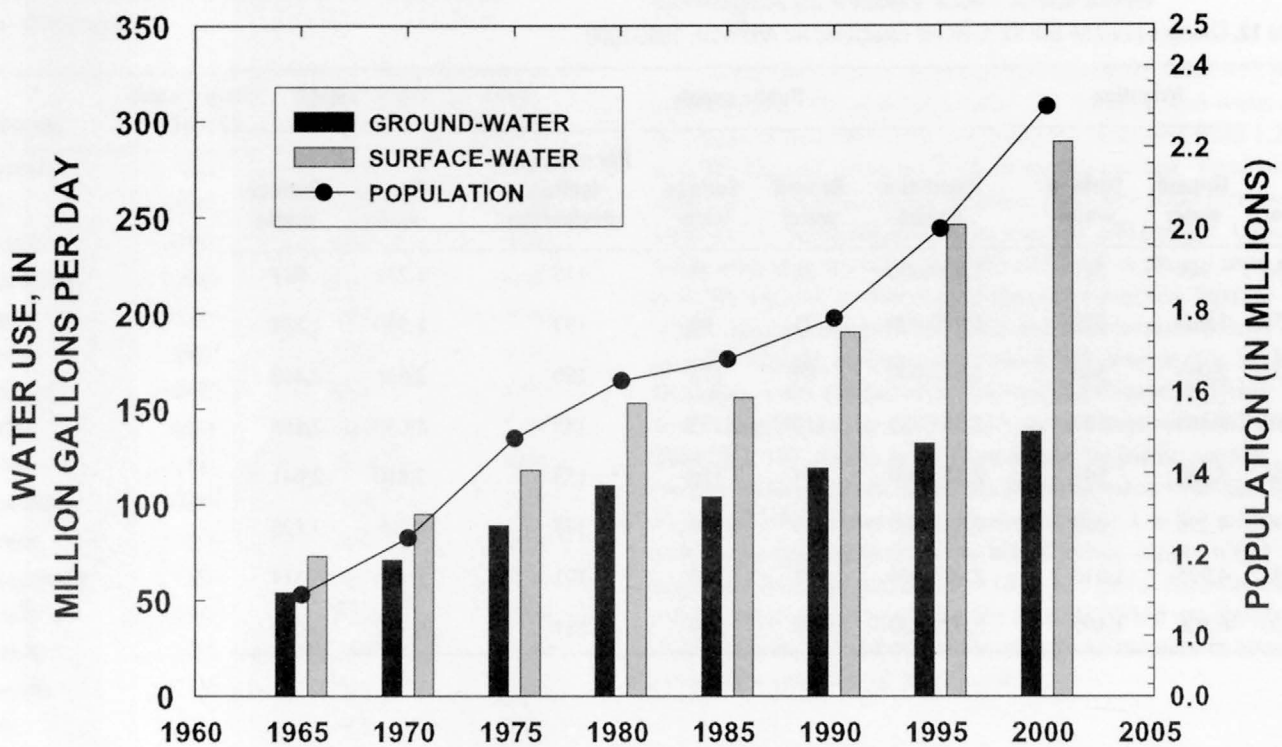


Figure 10. Ground- and surface-water use and population served for public supply systems in Arkansas, 1965-2000.

Sources of Ground-Water Withdrawals

Ground-water withdrawals comprised about 63 percent (6,955 Mgal/d) of the total amount of water used in Arkansas in 2000 (table 13). About 95 percent of the water was withdrawn from the Coastal Plain physiographic province, where most of the water was pumped from the alluvial and the Sparta (or Sparta-Memphis) aquifers (figs. 11 and 12).

The Sparta aquifer supplied much of the water used by industry and public-supply systems in south-central Arkansas. The counties with the highest use from the Sparta aquifer were Jefferson and Arkansas Counties using about 53 percent of the total water withdrawn from the aquifer. The alluvial aquifer in Poinsett and Arkansas Counties supplied about 95 percent of the water withdrawn from ground-water sources.

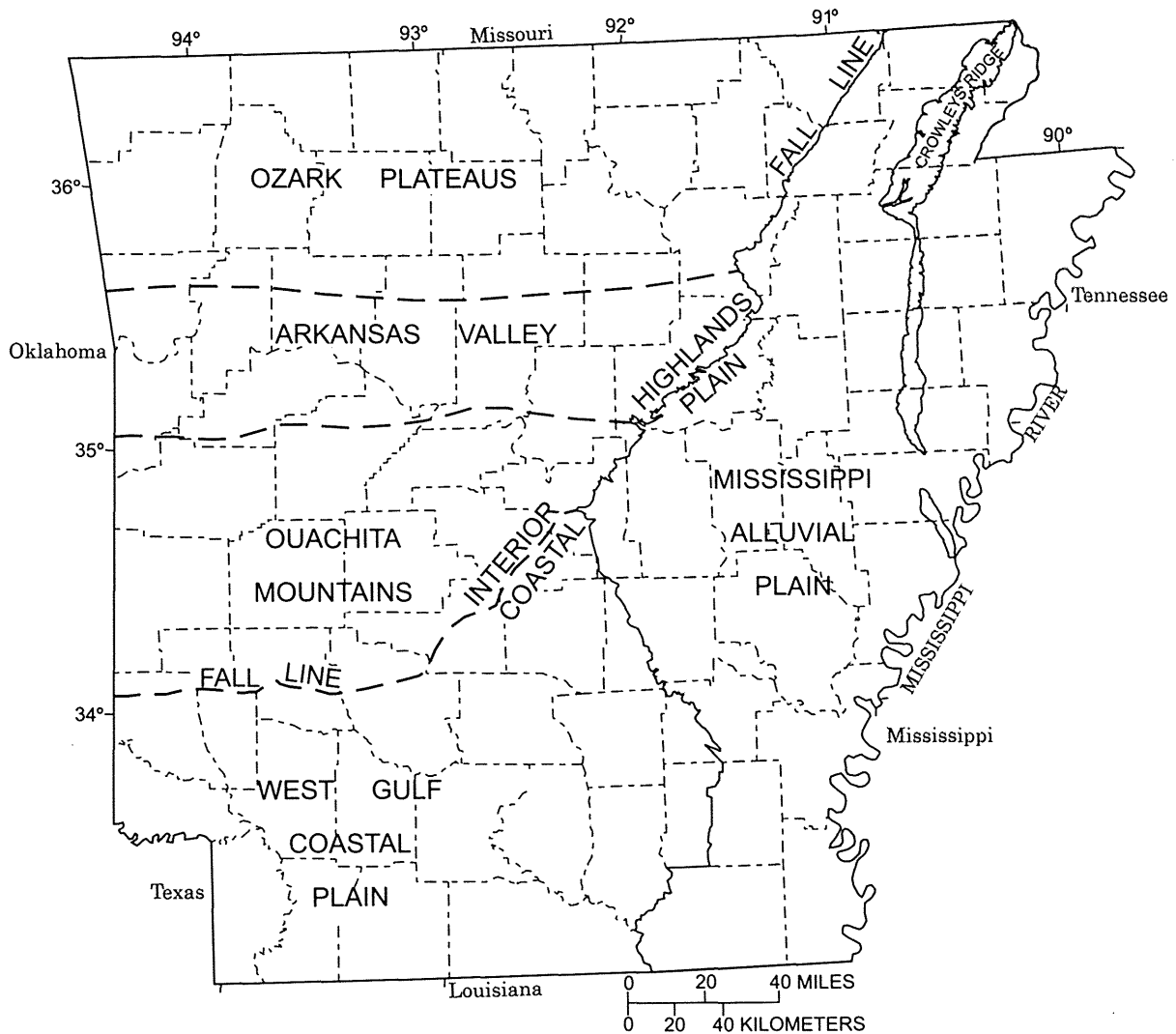


Figure 11. Physiographic provinces in Arkansas.

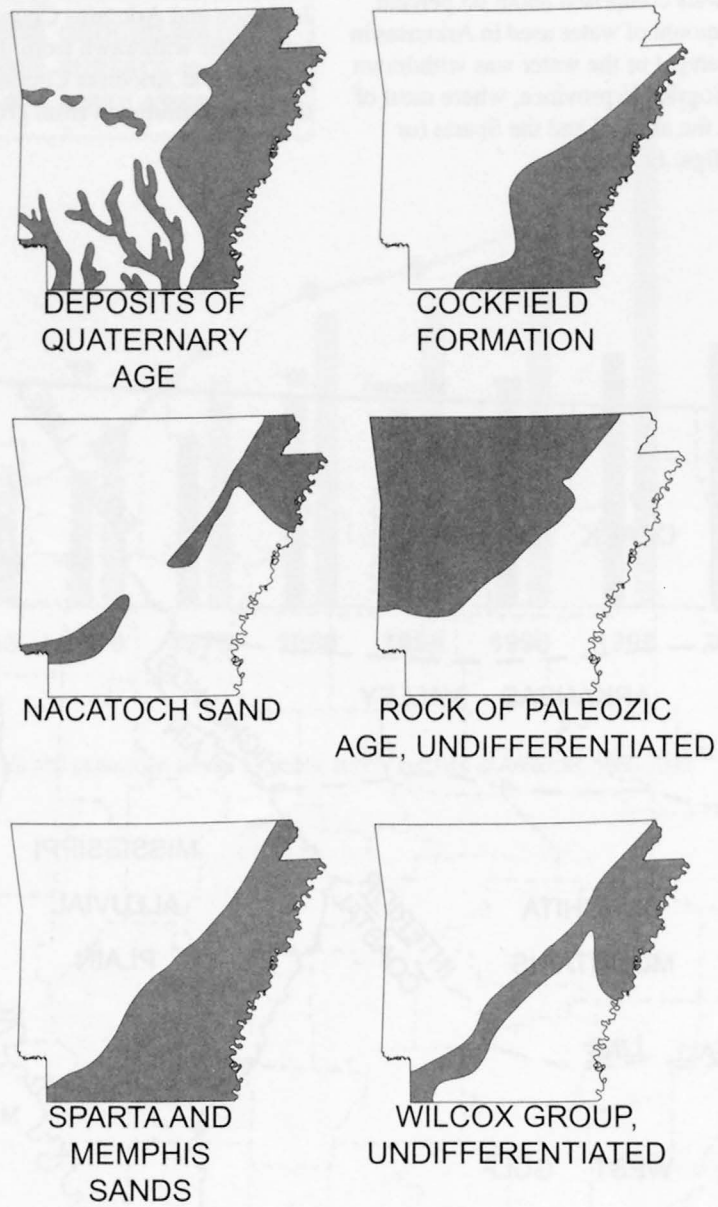


Figure 12. Major aquifers in Arkansas.

Table 13. Ground-water use by major aquifer in Arkansas, 2000.

[Units are in million gallons per day]

County	Aquifer in									County totals	County
	Deposits of Quaternary age	Cockfield Formation	Sparta and Memphis Sands	Cane River Formation	Wilcox Group, undifferentiated	Nacatoch Sand	Tokio Formation	Trinity Formation	Rock of Paleozoic age, undifferentiated		
Arkansas	567.33	0.57	63.40							631.30	Arkansas
Ashley	105.78	3.40	0.18							109.36	Ashley
Baxter								1.95		1.95	Baxter
Benton								2.49		2.49	Benton
Boone								1.88		1.88	Boone
Bradley			1.76							1.76	Bradley
Calhoun			0.61							0.61	Calhoun
Carroll								2.19		2.19	Carroll
Chicot	172.84	1.26	0.16							174.26	Chicot
Clark						0.54				0.54	Clark
Clay	260.94				2.97	0.41		0.61		264.93	Clay
Cleburne								1.03		1.03	Cleburne
Cleveland			1.44					0.00		1.44	Cleveland
Columbia			2.90							2.90	Columbia
Conway	1.94									1.94	Conway
Craighead	329.12		22.74		0.79					352.65	Craighead
Crawford	0.38									0.38	Crawford
Crittenden	130.06	0.57	0.5		5.75					136.88	Crittenden
Cross	406.53		4.17							410.70	Cross
Dallas			1.15							1.15	Dallas
Desha	324.84	0.24	3.85							328.93	Desha
Drew	54.70		0.88							55.58	Drew
Faulkner								1.80		1.80	Faulkner
Franklin								0.39		0.39	Franklin
Fulton								0.99		0.99	Fulton
Garland								1.21		1.21	Garland

Table 13. Ground-water use by major aquifer in Arkansas, 2000.—Continued

[Units are in million gallons per day]

County	Aquifer in									County totals	County
	Deposits of Quaternary age	Cockfield Formation	Sparta and Memphis Sands	Cane River Formation	Wilcox Group, undifferentiated	Nacatoch Sand	Tokio Formation	Trinity Formation	Rock of Paleozoic age, undifferentiated		
Grant			1.92							1.92	Grant
Greene	152.45				7.12					159.57	Greene
Hempstead						1.83	3.46			5.29	Hempstead
Hot Spring								0.66		0.66	Hot Spring
Howard								0.42	0.30	0.72	Howard
Independence	35.74									35.74	Independence
Izard									2.29	2.29	Izard
Jackson	363.38		1.18							364.56	Jackson
Jefferson	377.74	3.42	90.63							471.79	Jefferson
Johnson	1.33									1.33	Johnson
Lafayette	11.00		0.24	0.13						11.37	Lafayette
Lawrence	290.65		5.99					0.08		296.72	Lawrence
Lee	234.23		1.18							235.41	Lee
Lincoln	167.16		2.01							169.17	Lincoln
Little River	1.76									1.76	Little River
Logan	1.54									1.54	Logan
Lonoke	373.11	0.08	23.19		0.76					397.14	Lonoke
Madison								1.58		1.58	Madison
Marion								0.26		0.26	Marion
Miller	6.92		0.01		0.03					6.96	Miller
Mississippi	185.78		0.57		2.02					188.37	Mississippi
Monroe	235.69		0.17							235.86	Monroe
Montgomery								0.96		0.96	Montgomery
Nevada			0.01		0.76	0.01				0.78	Nevada
Newton								0.91		0.91	Newton
Ouachita			2.60							2.60	Ouachita

Table 13. Ground-water use by major aquifer in Arkansas, 2000.—Continued

[Units are in million gallons per day]

County	Aquifer in								County totals	County	
	Deposits of Quaternary age	Cockfield Formation	Sparta and Memphis Sands	Cane River Formation	Wilcox Group, undifferentiated	Nacatoch Sand	Tokio Formation	Trinity Formation			Rock of Paleozoic age, undifferentiated
Perry									0.81	0.81	Perry
Phillips	204.45	0.38	1.07							205.90	Phillips
Pike									0.70	0.70	Pike
Poinsett	583.84		1.28		0.59					585.71	Poinsett
Polk	1.03									1.03	Polk
Pope	2.32								0.31	2.63	Pope
Prairie	242.73		27.65							270.38	Prairie
Pulaski	26.35		0.43							26.78	Pulaski
Randolph	85.88								0.24	86.12	Randolph
St. Francis	252.22		0.77							252.99	St. Francis
Saline			3.35		0.00					3.35	Saline
Scott									0.95	0.95	Scott
Searcy									0.84	0.84	Searcy
Sebastian									0.31	0.31	Sebastian
Sevier			0				2.36			2.36	Sevier
Sharp	0								1.63	1.63	Sharp
Stone									0.68	0.68	Stone
Union	0.01		17.97							17.98	Union
Van Buren									0.23	0.23	Van Buren
Washington	0.01								2.51	2.52	Washington
White	48.32				1.43					49.75	White
Woodruff	351.46		1.48							352.94	Woodruff
Yell	1.16									1.16	Yell
Totals	6592.72	9.92	287.44	0.13	22.22	2.79	5.82	0.42	30.79	6,952.25	

Summary

The water-use program is a cooperative effort between Arkansas Soil and Water Conservation Commission and the U.S. Geological Survey. During 2000, the amount of water withdrawn from ground- and surface-water sources in Arkansas was estimated to be 10,963 Mgal/d. Of this amount, about 6,952 Mgal/d were from ground-water sources and about 4,011 Mgal/d were from surface-water sources. Irrigation accounted for 94 percent (6,506 Mgal/d) of the total ground water withdrawn while the largest surface-water users (thermoelectric power generation) accounted for 54 percent (2,172 Mgal/d) of the total amount of surface water used.

Approximately 87 percent of the population (2.3 million people) in Arkansas was served by public supply systems during 2000. These systems withdrew approximately 427 Mgal/d (fig. 10, table 2). Most of the water, 69 percent was from surface-water sources. The statewide average for per-capita residential use from public supply systems was 181 gal/d. Average for per capita residential water use increased from 1965 to 2000 by 57 percent.

Total water use in Arkansas increased about 412 percent between 1965 and 2000. Total ground-water use increased 465 percent and total surface-water use increased 340 percent between 1965 and 2000.

About 95 percent of the water was withdrawn from the Coastal Plain physiographic province, where most of the water was pumped from the alluvial and the Sparta (or Sparta-Memphis) aquifers. The alluvial aquifer in Poinsett and Arkansas Counties supplied about 95 percent of the water withdrawn from ground-water sources. The counties with the highest use from the Sparta aquifer were Jefferson and Arkansas Counties using about 53 percent of the total water withdrawn from the aquifer.

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Glossary

Water-use terminology continues to evolve as the field grows and expands. The following is a list of definitions for terms, phrases, and various data collection components commonly used in the process of water-use data collection and compilation.

Acre-foot of water (acre-ft)—The volume of water required to cover 1 acre of land (43,560 ft²) to a depth of 1 ft.

Acres irrigated—The total number of acres of the crop that was irrigated during the year.

Aquaculture—Farming of organisms that live in water, such as fish, shellfish, and algae.

Aquifer—A geologic formation, group of formations, or part of a formation that contains sufficient saturated permeable material to yield significant quantities of water to wells and springs.

Commercial water use—Water for motels, hotels, restaurants, office buildings, schools, and other commercial facilities and institutions, both civilian and military. The water may be obtained from a public-supply facility or may be self-supplied. See also public-supply and self-supplied water.

Cooling water—Water used for cooling purposes, such as cooling of condensers and nuclear reactors.

Domestic population served—The total number of people served by the public supplier during the calendar year.

Domestic water use—Water used for household purposes, such as drinking, food preparation, bathing, washing clothes and dishes, flushing toilets, and watering lawns and gardens, also called residential water use. The water may be obtained from a public-supply facility or may be self-supplied. See also public supply and self-supplied water.

Freshwater—Water that contains less than 1,000 mg/L (milligrams per liter) (but generally between less than 500 and 1,000 mg/L in Arkansas) of dissolved solids and is desirable for drinking and many industrial uses.

Ground water—Generally all subsurface water and springs as distinct from surface water; specifically, that part of the subsurface water in the saturated zone (a zone in which all voids are filled with water) where the water is under pressure greater than atmospheric.

Industrial water use—Water used for industrial purposes, such as fabrication, processing, washing, and cooling, and includes such industries as steel, chemical and allied products, paper and allied products, mining, and petroleum refining. The water may be obtained from a public-supply facility or may be self-supplied. See also public-supply and self-supplied water.

Instream use—Water use taking place within the stream channel for such purposes as hydroelectric power generation, navigation, water-quality improvement, fish propagation, and recreation. Sometimes called nonwithdrawal use or in-channel use.

Irrigation—Refers to the process of supplementing rainfall with water that is needed to produce a crop.

Irrigation water use—Artificial application of water on lands to assist in the growing of crops and pastures or to maintain vegetative growth in recreational lands, such as parks and golf courses.

Livestock water use—Water for stock watering, feed lots, dairy operations, fish farming, and other farm needs. Livestock as used here includes cattle, sheep, goats, hogs, and poultry. Also included are such animal specialties as horses, rabbits, bees, pets, and fur-bearing animals in captivity.

Mining water use—Water use for the extraction of minerals occurring naturally, including solids, such as coal, clay, and ores; liquids, such as crude petroleum; and gases, such as natural gas. Also includes uses associated with sand, gravel, and quarrying for rock aggregates, well operations (dewatering), milling (crushing, screening, washing, floatation, and other), and other preparations customarily done at the mine site or as part of a mining activity.

Per capita use—The average amount of water used per person during a standard time period, generally per day.

Public supply—Water withdrawn by public and private water suppliers and delivered to groups of users. Public suppliers provide water for a variety of uses, such as domestic, commercial, thermoelectric power, industrial and public water use. See also commercial water use, domestic water use, industrial water use, and public water use.

Public water use—Water supplied from a public water supply and used for such purposes as firefighting, street washing, and municipal parks and swimming pools. See also public supply.

Self-supplied water—Water withdrawn from a ground- or surface-water source by a user rather than being obtained from a public-supply facility.

Sewage—Wastewater carried off by sewers and drains.

Surface water—An open body of water, such as a stream, lake, or river.

Thermoelectric power generation—Electrical power generated using fossil-fuel (coal, oil, or natural gas), geothermal, or nuclear energy.

Thermoelectric power water use—Water used in the process of the generation of thermoelectric power. The water may be obtained from a public-supply facility or may be self-supplied. See also public-supply and self-supplied water.

Water consumed or consumptive use—Refers to that part of water withdrawn that is no longer available because it has evaporated, been incorporated into products and crops, consumed by man or livestock, or otherwise removed from the water environment.

Water use—Describes how and where the water was used and in what amounts.

Withdrawal—The amount of water withdrawn from a source (ground or surface, fresh or saline). This is equivalent to “intake,” “water diversion,” or “pumpage,” terms commonly used by industry and for irrigation and public supply, respectively.

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