WATER USE IN KENTUCKY, 1990

By Clyde J. Sholar *and* Pamla A. Wood

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CONVERSION FACTORS

Multiply	By	To obtain
acre	4,047	square meter
acre-foot (acre-ft)	1,233	cubic meter
gallon per day (gal/d)	0.003785	cubic meter per day
inch per year (in./yr)	25.4	millimeter per year
million gallons per day (Mgal/d)	0.003785	million cubic meters per day
thousand acre-feet per year	0.003377	million cubic meters per year

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Abstract

Water-use information for 1990 was collected and reported, by county, for eight major categories of use. Seven of the categories were offstream uses, which included public supply, commercial, domestic, industrial, mining, thermoelectric, and agricultural uses. The agricultural category was subdivided into irrigation and livestock water use. Instream water-use data also were collected for hydroelectric-power generation.

Estimated average water use in Kentucky exceeded 4,300 million gallons per day during 1990 for all offstream uses. About 94 percent of this amount was from surface-water sources, and about 6 percent was from ground-water sources. Per capita use for all offstream uses was almost 1,200 gallons per day. Estimated average consumptive use was 309 million gallons per day. Estimated average instream water use for hydroelectric-power generation was 83,000 million gallons per day.

Ninety-seven percent of the offstream water withdrawals during 1990 were withdrawn for thermoelectric, public supply, and industrial use. Cooling water used in the production of thermoelectric power accounted for about 80 percent of the total offstream water use during 1990. Water withdrawn for public supplies was second largest at almost 10 percent of the total, and industrial water withdrawals were about 7 percent of the total.

Thermoelectric, domestic, and livestock uses accounted for almost 90 percent of the consumptive use during 1990. The thermoelectric category accounted for almost two-thirds of the total consumptive use in the State for all uses.

INTRODUCTION

The purpose of this report is to summarize and present 1990 estimated water use in Kentucky for eight categories. This report is part of a series of water-use information compiled every 5 years since 1980: 1980 information (Mull and Lee, 1984); 1985 information (Sholar and Lee, 1988). Water-use information was estimated and compiled through a cooperative program between the U.S. Geological Survey (USGS) and the Kentucky Natural Resources and Environmental Protection Cabinet (KNREPC), Division of Water.

Several sources of data were used to compile information for this report. The Water Withdrawal Permit File and Drinking Water File maintained by the KNREPC were used to obtain withdrawal data for public supply, commercial, industrial, and mining use categories. Population figures for each county were compiled by the USGS from U.S. Bureau of the Census data. Water-use data for the power-generation categories were obtained from the Kentucky Public Service Commission. Livestock numbers and irrigated acreage were obtained from the 1987 Census of Agriculture for Kentucky published by the U.S. Department of Commerce, Bureau of the Census (1989).

The reader is cautioned that all water-use data presented in this report are estimates. Numerical data are presented to two decimal places in the illustrations and tables so the sums of individual counties would equal the totals. The two decimal place reporting is not a level of precision.

The authors thank those agencies listed above that provided information for this report. In addition, special thanks are given to city and county officials and representatives of water systems and industries that continue to be very helpful by providing information and assistance to the Kentucky Water-Use Program.

WATER USE BY CATEGORY

Water-use information in this report is presented by category of use. The following offstream water-use categories are included: public supply, domestic, commercial, industrial, mining, thermoelectric, and agriculture. The agricultural category is further divided into irrigation and livestock water use. Quantitative data are also presented for one instream use—hydroelectric-power generation. It should be noted that the public-supply category is not a water use in the same sense as the other categories presented in this report. Only that amount used for public purposes is considered a use; the remainder is delivered to other users through a public-supply distribution system.

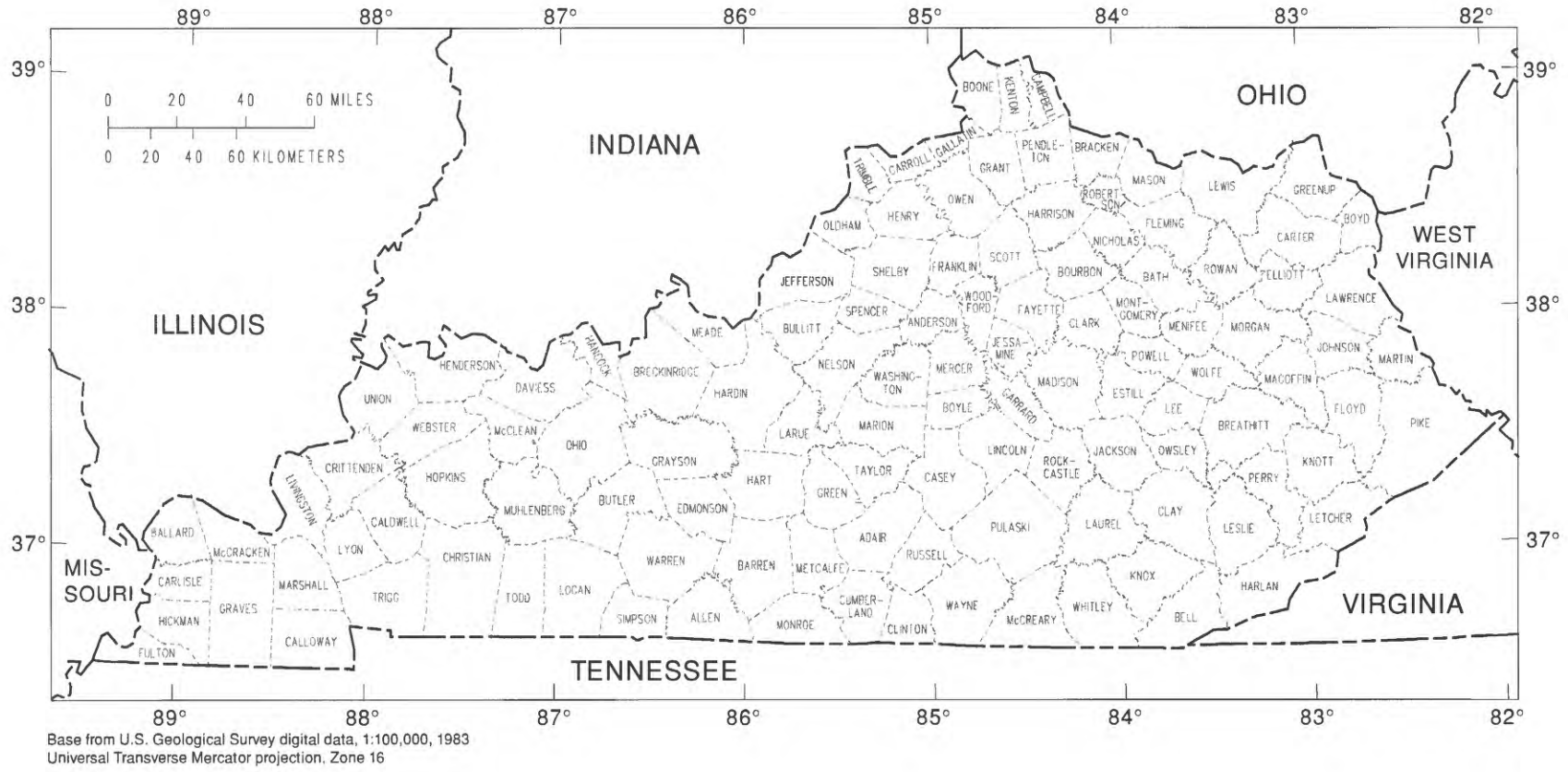
Within each category, water-use information is presented by county. A county map showing the county names (fig. 1) is included to assist the reader in locating specific counties on the water-withdrawal and consumptive use maps throughout the report.

Public Supply

About 427 Mgal/d of water was withdrawn for public-supply systems in Kentucky during 1990. This is a 6 percent increase from 1985 estimates published by Solley and others (1988) and represents almost 10 percent of all offstream water use during 1990. Of the total public-supplied withdrawals, about 372 Mgal/d (87 percent) was surface water and 54.6 Mgal/d (13 percent) was ground water (fig. 2). About 47 percent of the water from public-water systems was delivered to industrial users, about 42 percent to domestic users, and about 5 percent to commercial users (fig. 2). It is estimated that the remaining 6 percent of the water withdrawn for public supply included water lost in distribution systems and water for public uses, such as firefighting.

Patterns of public water-supply withdrawals differ geographically within the State (fig. 3). Public suppliers in Jefferson County, with its considerable domestic and industrial demand from the City of Louisville and surrounding suburbs, withdrew more than 122 Mgal/d or almost 29 percent of the total public-supply withdrawals in the State. About 97 percent of this amount was supplied from surface-water sources, which also makes Jefferson County the most intensive surface-water user for public supply in the State, furnishing almost one-third of all the public-supplied surface water in the State. Public suppliers in Fayette County withdrew the second largest amount of public-supplied water in the State, about 35 Mgal/d.

Most of the ground water for public supplies is withdrawn from the alluvial aquifer underlying the flood plain of the Ohio River. In the extreme western part of Kentucky, other aquifers also yield dependable quantities of ground water for public supply. Public suppliers in Daviess County, in the northcentral part of the State, withdrew 13 Mgal/d of ground water, the most of any county during 1990. This amount represents 24 percent of the State's total public-supplied ground water and is primarily because of domestic and industrial demand. There were no withdrawals for public supply in Metcalfe County because water was purchased from a supplier in Barren County. Public-water-supply data for 1990, by county, are shown in table 1.



Base from U.S. Geological Survey digital data, 1:100,000, 1983
Universal Transverse Mercator projection, Zone 16

Figure 1. Counties of Kentucky.

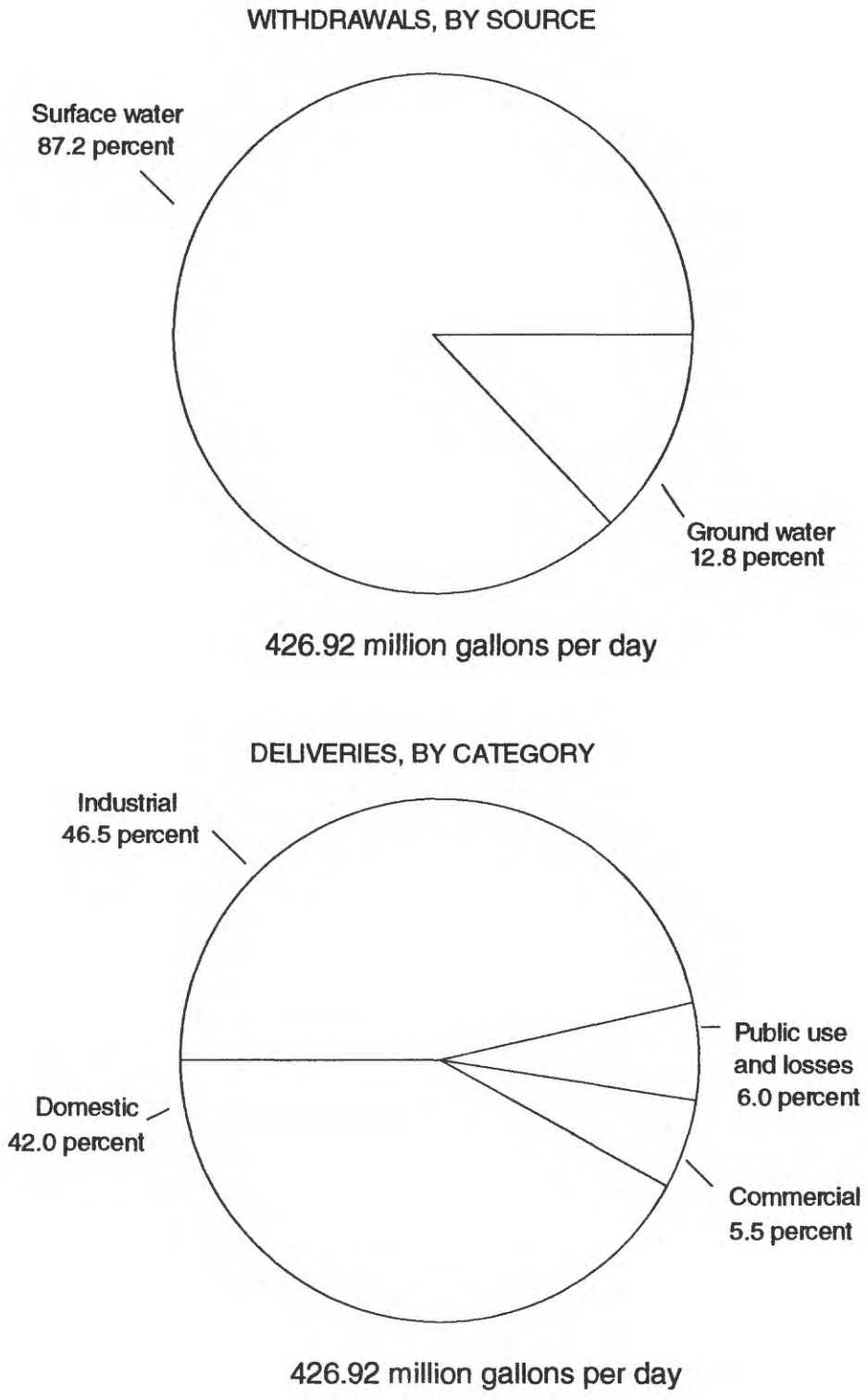


Figure 2. Public supply water use during 1990.

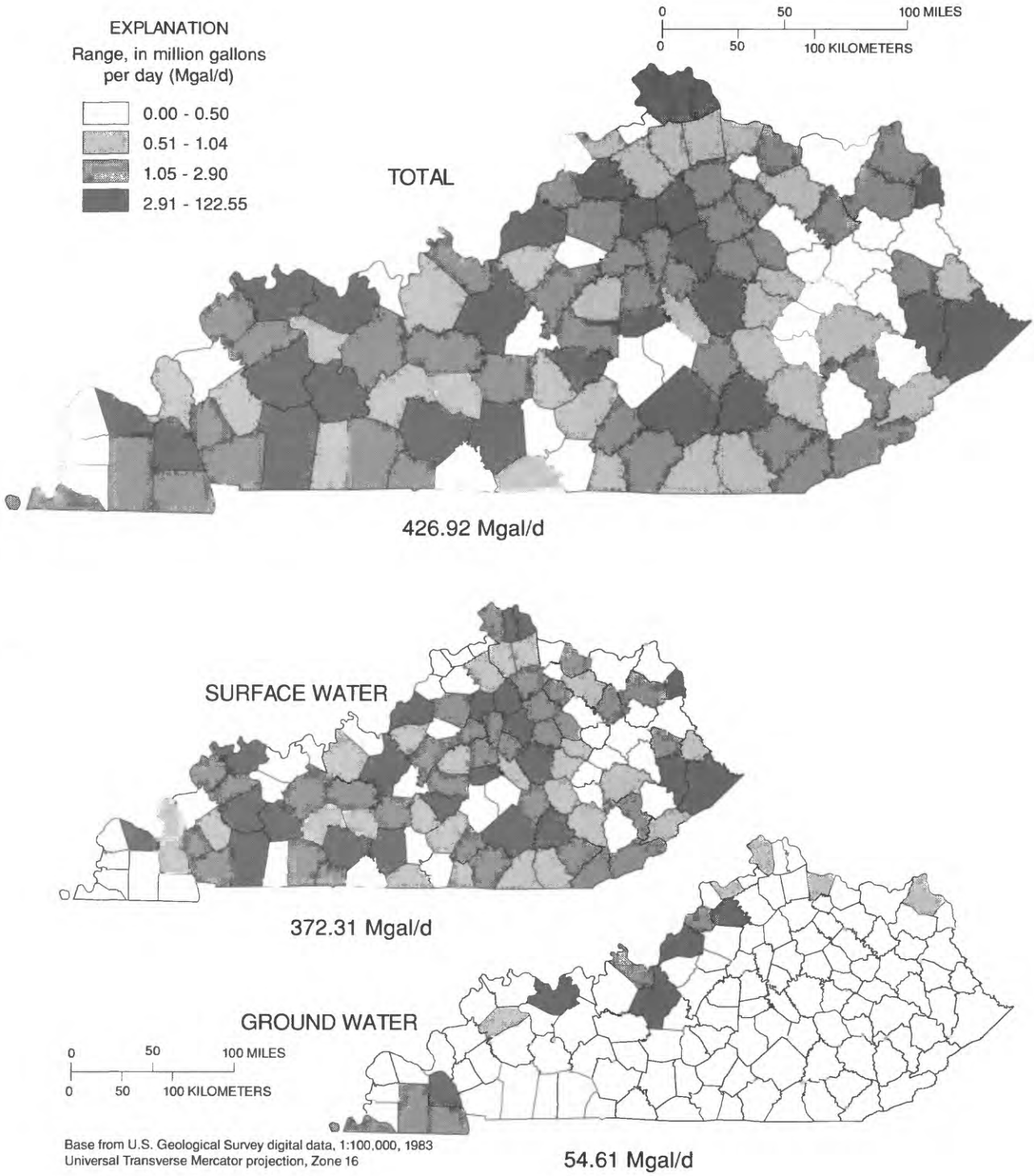


Figure 3. Public supply water withdrawals, by county, during 1990.

Table 1. Public-supplied water use in Kentucky, by county, during 1990

County	Water withdrawals, in million gallons per day			Water deliveries, by type of use, in million gallons per day					Per capita use, in gallons per day
	Source								
	Ground water	Surface water	Total	Commercial	Domestic	Industrial	Public use, losses, and transfer	Total deliveries[1]	
ADAIR	0.00	0.72	0.72	0.04	0.31	0.32	0.05	0.67	161.80
ALLEN	0.00	0.38	0.38	0.01	0.32	0.05	0.00	0.38	84.44
ANDERSON	0.00	1.61	1.61	0.09	0.64	0.78	0.10	1.51	175.38
BALLARD	0.27	0.00	0.27	0.00	0.25	0.02	0.00	0.27	75.42
BARREN	0.00	4.28	4.28	0.19	2.19	1.69	0.21	4.07	136.52
BATH	0.00	0.18	0.18	0.00	0.16	0.02	0.00	0.18	76.92
BELL	0.00	2.49	2.49	0.07	1.65	0.68	0.09	2.40	105.33
BOONE	0.60	2.58	3.18	0.05	2.65	0.43	0.05	3.13	84.04
BOURBON	0.00	1.34	1.34	0.04	0.99	0.28	0.03	1.31	94.37
BOYD	0.00	6.49	6.49	0.29	3.30	2.58	0.32	6.17	137.79
BOYLE	0.00	3.97	3.97	0.23	1.41	2.07	0.26	3.71	197.51
BRACKEN	0.83	0.00	0.83	0.05	0.21	0.50	0.07	0.76	273.03
BREATHITT	0.00	0.64	0.64	0.04	0.20	0.36	0.04	0.60	228.57
BRECKINRIDGE	0.12	0.60	0.72	0.02	0.48	0.20	0.02	0.70	104.80
BULLITT	0.00	0.73	0.73	0.04	0.32	0.33	0.04	0.69	158.01
BUTLER	0.00	0.85	0.85	0.05	0.39	0.37	0.04	0.81	152.88
CALDWELL	0.00	0.90	0.90	0.01	0.76	0.12	0.01	0.89	82.87
CALLOWAY	2.60	0.00	2.60	0.07	1.76	0.68	0.09	2.51	103.17
CAMPBELL	0.02	8.80	8.82	0.64	1.76	5.71	0.71	8.11	350.70
CARLISLE	0.35	0.00	0.35	0.01	0.20	0.11	0.03	0.32	124.11
CARROLL	1.03	0.00	1.03	0.06	0.58	0.34	0.05	0.98	123.50
CARTER	0.00	1.70	1.70	0.07	0.94	0.61	0.08	1.62	126.58
CASEY	0.00	0.40	0.40	0.02	0.18	0.18	0.02	0.38	156.86
CHRISTIAN	0.41	5.35	5.76	0.26	2.86	2.35	0.29	5.47	140.69
CLARK	0.00	2.49	2.49	0.08	1.62	0.70	0.09	2.40	107.79
CLAY	0.03	0.86	0.89	0.05	0.42	0.38	0.04	0.85	147.35
CLINTON	0.00	0.72	0.72	0.03	0.44	0.23	0.02	0.70	114.83
CRITTENDEN	0.00	0.41	0.41	0.01	0.33	0.07	0.00	0.41	86.50
CUMBERLAND	0.00	0.49	0.49	0.02	0.28	0.17	0.02	0.47	120.99
DAVIESS	13.10	0.00	13.10	0.77	4.57	6.91	0.85	12.25	200.46
EDMONSON	0.00	0.73	0.73	0.02	0.57	0.13	0.01	0.72	89.57
ELLIOTT	0.09	0.00	0.09	0.00	0.06	0.03	0.00	0.09	113.92
ESTILL	0.00	0.99	0.99	0.04	0.56	0.35	0.04	0.95	123.75
FAYETTE	0.00	34.99	34.99	1.76	15.40	15.87	1.96	33.03	159.05
FLEMING	0.00	0.55	0.55	0.02	0.34	0.17	0.02	0.53	112.94
FLOYD	0.05	3.27	3.32	0.19	1.21	1.71	0.21	3.11	191.69
FRANKLIN	0.00	6.41	6.41	0.32	2.77	2.95	0.37	6.04	161.87
FULTON	1.39	0.00	1.39	0.09	0.42	0.78	0.10	1.29	228.62
GALLATIN	0.16	0.00	0.16	0.01	0.10	0.05	0.00	0.16	114.29
GARRARD	0.00	0.72	0.72	0.04	0.34	0.31	0.03	0.69	146.04
GRANT	0.00	1.00	1.00	0.03	0.66	0.28	0.03	0.97	105.26
GRAVES	2.42	0.00	2.42	0.03	2.16	0.21	0.02	2.40	78.60
GRAYSON	0.00	1.62	1.62	0.09	0.60	0.83	0.10	1.52	187.50
GREEN	0.00	0.66	0.66	0.04	0.25	0.33	0.04	0.62	187.50
GREENUP	0.77	0.44	1.21	0.03	1.10	0.06	0.02	1.19	55.20
HANCOCK	0.42	0.00	0.42	0.00	0.40	0.02	0.00	0.42	73.17
HARDIN	6.44	4.21	10.65	0.43	5.84	3.90	0.48	10.17	127.68
HARLAN	0.17	1.55	1.72	0.00	1.69	0.03	0.00	1.72	71.19
HARRISON	0.00	1.61	1.61	0.09	0.58	0.84	0.10	1.51	195.15
HART	0.00	1.62	1.62	0.00	0.73	0.00	0.89	0.73	154.58
HENDERSON	0.00	6.05	6.05	0.35	2.16	3.15	0.39	5.66	196.43
HENRY	7.56	0.00	7.56	0.61	0.77	5.50	0.68	6.88	687.27
HICKMAN	0.18	0.00	0.18	0.00	0.15	0.02	0.01	0.17	66.42
HOPKINS	0.07	7.67	7.74	0.48	2.42	4.31	0.53	7.21	223.57
JACKSON	0.00	0.64	0.64	0.02	0.44	0.16	0.02	0.62	101.43
JEFFERSON	3.77	118.78	122.55	6.93	42.35	62.33	10.94	111.61	188.15
JESSAMINE	0.00	2.57	2.57	0.13	1.22	1.09	0.13	2.44	146.86
JOHNSON	0.00	1.51	1.51	0.09	0.52	0.80	0.10	1.41	201.33
KENTON	0.00	23.31	23.31	1.31	8.83	11.73	1.44	21.87	184.75
KNOTT	0.19	0.00	0.19	0.01	0.06	0.11	0.01	0.18	211.11

Table 1. Public-supplied water use in Kentucky, by county, during 1990--Continued

County	Water withdrawals, in million gallons per day			Water deliveries, by type of use, in million gallons per day					Per capita use, in gallons per day
	Source								
	Ground water	Surface water	Total	Commercial	Domestic	Industrial	Public use, losses, and transfer	Total deliveries[1]	
KNOX	0.00	1.56	1.56	0.05	1.06	0.40	0.05	1.51	103.04
LARUE	0.00	0.34	0.34	0.01	0.24	0.08	0.01	0.33	100.29
LAUREL	0.00	7.32	7.32	0.43	2.47	3.93	0.49	6.83	207.37
LAWRENCE	0.00	0.48	0.48	0.01	0.37	0.09	0.01	0.47	91.60
LEE	0.00	0.48	0.48	0.04	0.09	0.31	0.04	0.44	369.23
LESLIE	0.00	0.43	0.43	0.02	0.24	0.15	0.02	0.41	125.73
LETCHER	0.21	0.75	0.96	0.03	0.54	0.30	0.09	0.87	123.23
LEWIS	0.24	0.00	0.24	0.00	0.22	0.00	0.02	0.22	52.17
LINCOLN	0.00	0.49	0.49	0.02	0.28	0.17	0.02	0.47	123.74
LIVINGSTON	0.24	0.51	0.75	0.01	0.61	0.12	0.01	0.74	86.21
LOGAN	0.00	2.54	2.54	0.14	0.96	1.28	0.16	2.38	185.67
LYON	0.00	1.29	1.29	0.09	0.32	0.78	0.10	1.19	285.40
MCCRACKEN	0.36	6.09	6.45	0.22	4.07	1.93	0.23	6.22	110.90
MCCREARY	0.00	0.82	0.82	0.02	0.67	0.12	0.01	0.81	85.68
MCLEAN	0.08	0.49	0.57	0.02	0.38	0.15	0.02	0.55	104.78
MADISON	0.00	6.65	6.65	0.41	2.08	3.70	0.46	6.19	224.13
MAGOFFIN	0.36	0.02	0.38	0.02	0.14	0.20	0.02	0.36	194.87
MARION	0.00	1.48	1.48	0.09	0.49	0.80	0.10	1.38	210.53
MARSHALL	3.01	0.62	3.63	0.16	1.78	1.49	0.20	3.43	142.35
MARTIN	0.00	0.53	0.53	0.03	0.24	0.23	0.03	0.50	151.43
MASON	0.38	1.62	2.00	0.08	1.01	0.71	0.20	1.80	138.99
MEADE	1.96	0.13	2.09	0.08	1.20	0.72	0.09	2.00	121.94
MENIFEE	0.00	0.21	0.21	0.01	0.15	0.05	0.00	0.21	100.00
MERCER	0.00	1.66	1.66	0.08	0.74	0.75	0.09	1.57	157.20
METCALFE	0.00	0.00	0.00	0.00	0.11	0.00	-0.11	0.11	0.00
MONROE	0.00	0.69	0.69	0.04	0.29	0.32	0.04	0.65	166.27
MONTGOMERY	0.00	1.87	1.87	0.08	0.99	0.71	0.09	1.78	132.25
MORGAN	0.00	0.29	0.29	0.01	0.17	0.10	0.01	0.28	118.85
MUHLENBERG	0.00	3.14	3.14	0.20	0.92	1.80	0.22	2.92	238.24
NELSON	0.00	2.67	2.67	0.14	1.04	1.32	0.17	2.50	179.68
NICHOLAS	0.00	1.61	1.61	0.10	0.49	0.91	0.11	1.50	251.56
OHIO	0.09	1.78	1.87	0.04	1.43	0.36	0.04	1.83	91.40
OLDHAM	2.62	0.00	2.62	0.14	4.26	1.30	-3.08	5.70	181.94
OWEN	0.00	0.52	0.52	0.03	0.20	0.26	0.03	0.49	178.08
OWSLEY	0.00	0.23	0.23	0.00	0.18	0.05	0.00	0.23	92.00
PENDLETON	0.00	0.72	0.72	0.05	0.22	0.40	0.05	0.67	225.00
PERRY	0.00	1.88	1.88	0.10	0.79	0.89	0.10	1.78	166.96
PIKE	0.00	3.22	3.22	0.15	1.52	1.38	0.17	3.05	147.98
POWELL	0.00	0.70	0.70	0.02	0.45	0.21	0.02	0.68	108.19
PULASKI	0.00	3.98	3.98	0.23	1.46	2.04	0.25	3.73	190.70
ROBERTSON	0.00	0.05	0.05	0.00	0.05	0.00	0.00	0.05	60.98
ROCKCASTLE	0.00	1.12	1.12	0.06	0.42	0.57	0.07	1.05	184.82
ROWAN	0.00	2.48	2.48	0.12	1.18	1.05	0.13	2.35	146.92
RUSSELL	0.28	1.47	1.75	0.11	0.53	1.00	0.11	1.64	232.71
SCOTT	0.00	3.63	3.63	0.22	1.22	1.95	0.24	3.39	208.98
SHELBY	0.00	2.29	2.29	0.12	1.00	1.04	0.13	2.16	159.47
SIMPSON	0.00	2.23	2.23	1.01	0.99	0.11	0.12	2.11	157.04
SPENCER	0.00	0.43	0.43	0.00	0.39	0.00	0.04	0.39	69.02
TAYLOR	0.00	8.17	8.17	0.64	1.14	5.70	0.69	7.48	499.08
TODD	0.37	0.49	0.86	0.04	0.51	0.28	0.03	0.83	118.13
TRIGG	0.00	1.27	1.27	0.06	0.60	0.54	0.07	1.20	146.99
TRIMBLE	0.45	0.00	0.45	0.00	0.43	0.00	0.02	0.43	97.19
UNION	0.00	1.87	1.87	0.10	0.81	0.85	0.11	1.76	160.65
WARREN	0.23	10.85	11.08	0.50	5.60	4.44	0.54	10.54	145.27
WASHINGTON	0.00	0.60	0.60	0.05	0.21	0.29	0.05	0.55	196.72
WAYNE	0.00	1.38	1.38	0.08	0.51	0.70	0.09	1.29	188.01
WEBSTER	0.63	1.11	1.74	0.10	0.65	0.88	0.11	1.63	187.50
WHITLEY	0.00	0.95	0.95	0.05	0.43	0.42	0.05	0.90	155.23
WOLFE	0.00	0.18	0.18	0.01	0.08	0.08	0.01	0.17	163.64
WOODFORD	0.06	2.05	2.11	0.10	0.96	0.94	0.11	2.00	154.24
Total	54.61	372.31	426.92	23.24	179.45	198.64	25.59	401.33	166.25

[1]This column excludes public use, losses, and transfer.

Domestic Use

Water for domestic use is furnished to Kentucky's 3.7 million people by public-supplied and self-supplied systems. About 2.6 million people, or more than two-thirds of Kentucky's population, received water for domestic use from public systems during 1990. The remaining 1.1 million people depended on self-supplied withdrawals for domestic use.

Combined self-supplied withdrawals and public-supplied deliveries for domestic use totaled 235 Mgal/d during 1990. Self-supplied domestic withdrawals were about 90 percent from ground water and 10 percent from surface water (fig. 4). Domestic use from public water-supply systems was 179 Mgal/d or 76 percent of the water for the domestic water-use category (fig. 4). The most public-supplied deliveries for domestic use (42 Mgal/d) were in Jefferson County where the City of Louisville is located. The distribution of self-supplied domestic withdrawals, by county, is shown in figure 5.

Per capita use for domestic users of public supplies was estimated to be 70 gal/d during 1990 and for domestic users of self-supplied systems was estimated to be about 50 Mgal/d during 1990. In terms of consumptive use, domestic was estimated to be greater than all other categories of use except thermoelectric-power generation, which was more than 41 Mgal/d or 13 percent of the State's total consumptive use. Individual county data are shown for the domestic use category in table 2.

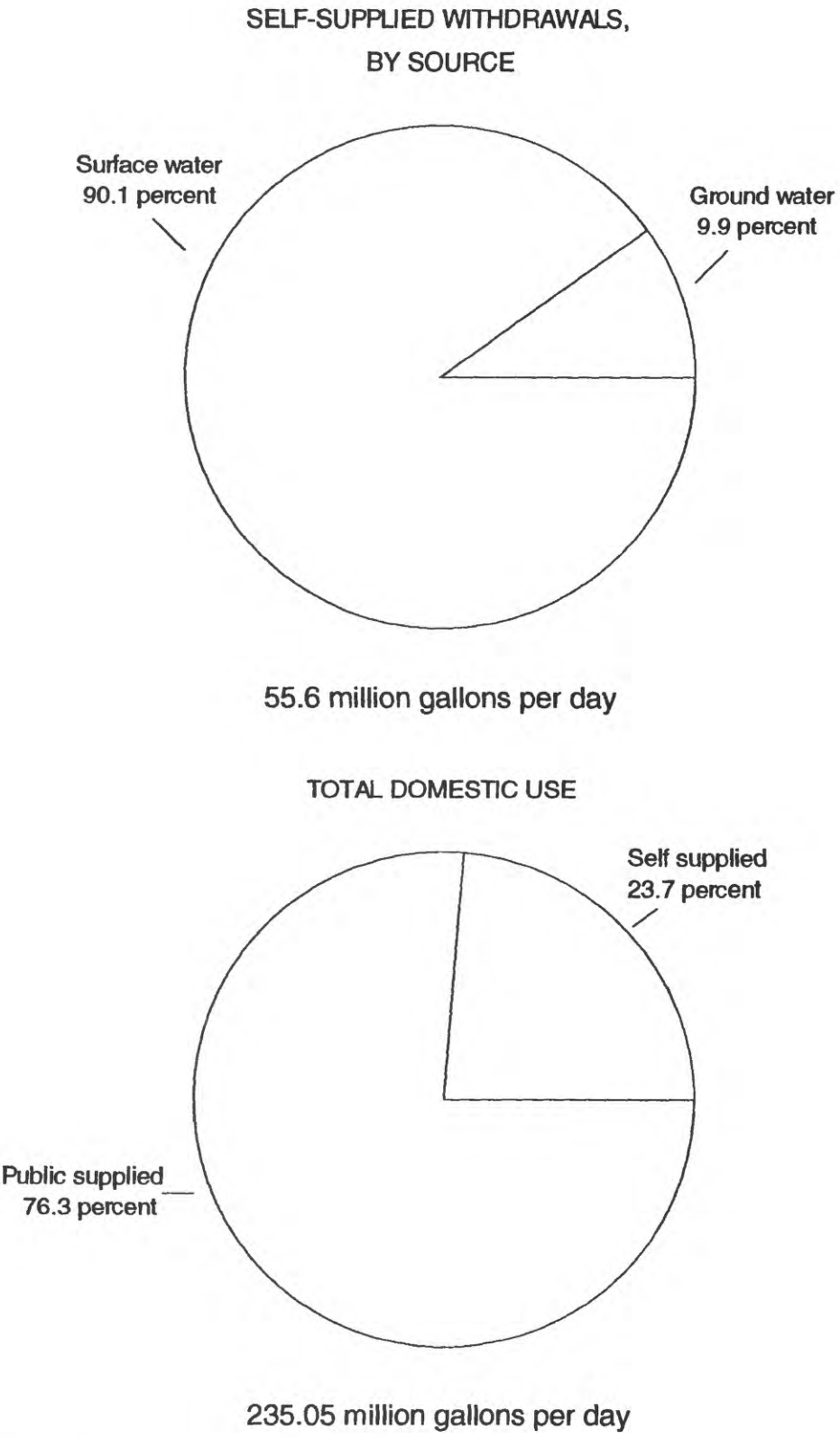


Figure 4. Domestic water use during 1990.

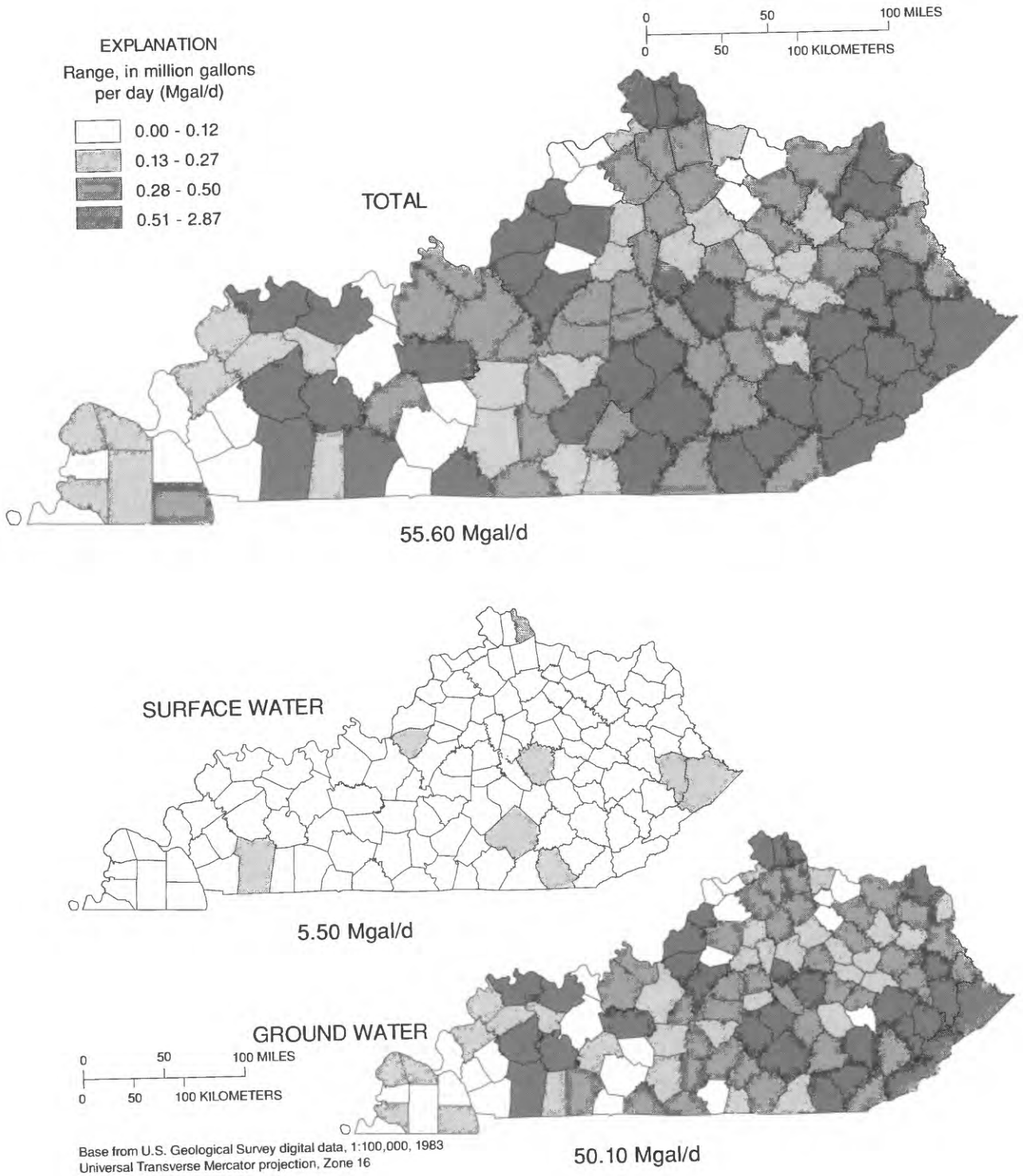


Figure 5. Self-supplied domestic water withdrawals, by county, during 1990.

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Table 2. Domestic water use in Kentucky, by county, during 1990

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

County	Self supplied					Public supplied			Total	
		Water withdrawals, in Mgal/d								
		Source								
	Population, in thousands	Ground water	Surface water	Total	Per capita use, in gal/d	Population served, in thousands	Deliveries from water supply, in Mgal/d	Per capita use, in gal/d	With-drawals and de-liveries, in Mgal/d	Consump-tive use, in Mgal/d
ADAIR	10.91	0.49	0.05	0.54	49.50	4.45	0.31	69.66	0.85	0.25
ALLEN	10.13	0.46	0.05	0.51	50.35	4.50	0.32	71.11	0.83	0.23
ANDERSON	5.39	0.24	0.03	0.27	50.09	9.18	0.64	69.72	0.91	0.17
BALLARD	4.32	0.19	0.03	0.22	50.93	3.58	0.25	69.83	0.47	0.03
BARREN	2.65	0.13	0.01	0.14	52.83	31.35	2.19	69.86	2.33	0.28
BATH	7.35	0.33	0.04	0.37	50.34	2.34	0.16	68.38	0.53	0.17
BELL	7.86	0.35	0.04	0.39	49.62	23.64	1.65	69.80	2.04	0.32
BOONE	19.75	0.89	0.10	0.99	50.13	37.84	2.65	70.03	3.64	0.66
BOURBON	5.04	0.22	0.03	0.25	49.60	14.20	0.99	69.72	1.24	0.20
BOYD	4.05	0.18	0.02	0.20	49.38	47.10	3.30	70.06	3.50	0.41
BOYLE	5.54	0.25	0.03	0.28	50.54	20.10	1.41	70.15	1.69	0.96
BRACKEN	4.72	0.21	0.03	0.24	50.85	3.04	0.21	69.08	0.45	0.12
BREATHITT	12.90	0.58	0.06	0.64	49.61	2.80	0.20	71.43	0.84	0.28
BRECKINRIDGE	9.44	0.42	0.05	0.47	49.79	6.87	0.48	69.87	0.95	0.07
BULLITT	42.95	1.93	0.22	2.15	50.06	4.62	0.32	69.26	2.47	0.89
BUTLER	5.68	0.26	0.02	0.28	49.30	5.56	0.39	70.14	0.67	0.15
CALDWELL	2.37	0.11	0.01	0.12	50.63	10.86	0.76	69.98	0.88	0.13
CALLOWAY	5.53	0.25	0.03	0.28	50.63	25.20	1.76	69.84	2.04	0.29
CAMPBELL	58.72	2.58	0.29	2.87	48.88	25.15	1.76	69.98	4.63	1.32
CARLISLE	2.42	0.11	0.01	0.12	49.59	2.82	0.20	70.92	0.32	0.07
CARROLL	0.95	0.04	0.01	0.05	52.63	8.34	0.58	69.54	0.63	0.08
CARTER	10.91	0.49	0.05	0.54	49.50	13.43	0.94	69.99	1.48	0.31
CASEY	11.66	0.53	0.05	0.58	49.74	2.55	0.18	70.59	0.76	0.25
CHRISTIAN	28.00	1.26	0.14	1.40	50.00	40.94	2.86	69.86	4.26	0.84
CLARK	6.40	0.29	0.03	0.32	50.00	23.10	1.62	70.13	1.94	0.29
CLAY	15.71	0.71	0.07	0.78	49.65	6.04	0.42	69.54	1.20	0.35
CLINTON	2.86	0.13	0.01	0.14	48.95	6.27	0.44	70.18	0.58	0.05
CRITTENDEN	4.46	0.20	0.02	0.22	49.33	4.74	0.33	69.62	0.55	0.11
CUMBERLAND	2.73	0.12	0.01	0.13	47.62	4.05	0.28	69.14	0.41	0.07
DAVIESS	21.84	0.98	0.11	1.09	49.91	65.35	4.57	69.93	5.66	0.89
EDMONSON	2.21	0.10	0.01	0.11	49.77	8.15	0.57	69.94	0.68	0.10
ELLIOTT	5.67	0.26	0.02	0.28	49.38	0.79	0.06	75.95	0.34	0.12
ESTILL	6.61	0.30	0.03	0.33	49.92	8.00	0.56	70.00	0.89	0.19
FAYETTE	5.37	0.24	0.03	0.27	50.28	220.00	15.40	70.00	15.67	1.65
FLEMING	7.42	0.33	0.03	0.36	48.52	4.87	0.34	69.82	0.70	0.16
FLOYD	26.27	1.18	0.13	1.31	49.87	17.32	1.21	69.86	2.52	1.44
FRANKLIN	4.18	0.19	0.02	0.21	50.24	39.60	2.77	69.95	2.98	0.36
FULTON	2.19	0.10	0.01	0.11	50.23	6.08	0.42	69.08	0.53	0.08
GALLATIN	3.99	0.18	0.02	0.20	50.13	1.40	0.10	71.43	0.30	0.09
GARRARD	6.65	0.29	0.04	0.33	49.62	4.93	0.34	68.97	0.67	0.16
GRANT	6.24	0.28	0.03	0.31	49.68	9.50	0.66	69.47	0.97	0.18
GRAVES	2.76	0.12	0.02	0.14	50.72	30.79	2.16	70.15	2.30	0.27
GRAYSON	12.41	0.56	0.06	0.62	49.96	8.64	0.60	69.44	1.22	0.30
GREEN	6.85	0.31	0.03	0.34	49.64	3.52	0.25	71.02	0.59	0.16
GREENUP	14.82	0.67	0.07	0.74	49.93	21.92	1.10	50.18	1.84	0.41
HANCOCK	2.12	0.09	0.01	0.10	47.17	5.74	0.40	69.69	0.50	0.08
HARDIN	5.83	0.26	0.03	0.29	49.74	83.41	5.84	70.02	6.13	0.70
HARLAN	12.41	0.56	0.06	0.62	49.96	24.16	1.69	69.95	2.31	0.42
HARRISON	8.00	0.36	0.04	0.40	50.00	8.25	0.58	70.30	0.98	0.22
HART	4.41	0.20	0.02	0.22	49.89	10.48	0.73	69.66	0.95	0.16
HENDERSON	12.24	0.55	0.06	0.61	49.84	30.80	2.16	70.13	2.77	0.46
HENRY	1.82	0.08	0.01	0.09	49.45	11.00	0.77	70.00	0.86	0.43
HICKMAN	2.86	0.13	0.01	0.14	48.95	2.71	0.15	55.35	0.29	0.06
HOPKINS	11.51	0.52	0.06	0.58	50.39	34.62	2.42	69.90	3.00	0.47
JACKSON	5.65	0.25	0.03	0.28	49.56	6.31	0.44	69.73	0.72	0.15
JEFFERSON	13.60	0.61	0.07	0.68	50.00	651.34	42.35	65.02	43.03	4.50
JESSAMINE	13.01	0.58	0.06	0.64	49.19	17.50	1.22	69.71	1.86	0.37
JOHNSON	15.75	0.71	0.08	0.79	50.16	7.50	0.52	69.33	1.31	0.36
KENTON	15.86	0.71	0.07	0.78	49.18	126.17	8.83	69.98	9.61	1.19
KNOTT	17.01	0.75	0.09	0.84	49.38	0.90	0.06	66.67	0.90	0.34

Table 2. Domestic water use in Kentucky, by county, during 1990--Continued

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

County	Self supplied					Public supplied			Total	
		Water withdrawals, in Mgal/d								
		Source								
	Population, in thousands	Ground water	Surface water	Total	Per capita use, in gal/d	Population served, in thousands	Deliveries from water supply, in Mgal/d	Per capita use, in gal/d	With-drawals and de-liveries, in Mgal/d	Consump-tive use, in Mgal/d
KNOX	14.54	0.65	0.07	0.72	49.52	15.14	1.06	70.01	1.78	0.39
LARUE	8.29	0.37	0.04	0.41	49.46	3.39	0.24	70.80	0.65	0.18
LAUREL	8.14	0.37	0.04	0.41	50.37	35.30	2.47	69.97	2.88	0.41
LAWRENCE	8.76	0.39	0.04	0.43	49.09	5.24	0.37	70.61	0.80	0.21
LEE	6.12	0.28	0.03	0.31	50.65	1.30	0.09	69.23	0.40	0.24
LESLIE	10.22	0.46	0.05	0.51	49.90	3.42	0.24	70.18	0.75	0.22
LETCHER	19.21	0.86	0.10	0.96	49.97	7.79	0.54	69.32	1.50	0.43
LEWIS	8.43	0.38	0.04	0.42	49.82	4.60	0.22	47.83	0.64	0.19
LINCOLN	16.08	0.72	0.08	0.80	49.75	3.96	0.28	70.71	1.08	0.35
LIVINGSTON	0.36	0.02	0.00	0.02	55.56	8.70	0.61	70.11	0.63	0.06
LOGAN	10.74	0.48	0.06	0.54	50.28	13.68	0.96	70.18	1.50	0.31
LYON	2.10	0.08	0.01	0.09	42.86	4.52	0.32	70.80	0.41	0.06
MCCRACKEN	4.72	0.21	0.03	0.24	50.85	58.16	4.07	69.98	4.31	0.50
MCCREARY	6.03	0.27	0.03	0.30	49.75	9.57	0.67	70.01	0.97	0.18
MCLEAN	4.19	0.19	0.02	0.21	50.12	5.44	0.38	69.85	0.59	0.12
MADISON	27.84	1.22	0.13	1.35	48.49	29.67	2.08	70.10	3.43	0.74
MAGOFFIN	11.13	0.50	0.06	0.56	50.31	1.95	0.14	71.79	0.70	0.22
MARION	9.47	0.43	0.04	0.47	49.63	7.03	0.49	69.70	0.96	0.24
MARSHALL	1.70	0.07	0.01	0.08	47.06	25.50	1.78	69.80	1.86	0.05
MARTIN	9.03	0.41	0.04	0.45	49.83	3.50	0.24	68.57	0.69	0.20
MASON	2.28	0.10	0.01	0.11	48.25	14.39	1.01	70.19	1.12	0.14
MEADE	7.03	0.32	0.03	0.35	49.79	17.14	1.20	70.01	1.55	0.26
MENIFEE	2.99	0.13	0.02	0.15	50.17	2.10	0.15	71.43	0.30	0.07
MERCER	8.59	0.39	0.04	0.43	50.06	10.56	0.74	70.08	1.17	0.24
METCALFE	7.33	0.33	0.04	0.37	50.48	1.63	0.11	67.48	0.48	0.15
MONROE	7.25	0.33	0.03	0.36	49.66	4.15	0.29	69.88	0.65	0.17
MONTGOMERY	5.42	0.24	0.03	0.27	49.82	14.14	0.99	70.01	1.26	0.21
MORGAN	9.21	0.41	0.04	0.45	48.86	2.44	0.17	69.67	0.62	0.20
MUHLENBERG	18.14	0.82	0.09	0.91	50.17	13.18	0.92	69.80	1.83	0.45
NELSON	14.85	0.67	0.08	0.75	50.51	14.86	1.04	69.99	1.79	0.40
NICHOLAS	0.32	0.01	0.00	0.01	31.25	6.40	0.49	76.56	0.50	0.05
OHIO	0.64	0.03	0.00	0.03	46.88	20.46	1.43	69.89	1.46	0.14
OLDHAM	18.86	0.85	0.09	0.94	49.84	14.40	4.26	295.83	5.20	0.80
OWEN	6.12	0.28	0.03	0.31	50.65	2.92	0.20	68.49	0.51	0.14
OWSLEY	2.54	0.12	0.01	0.13	51.18	2.50	0.18	72.00	0.31	0.07
PENDLETON	8.84	0.40	0.04	0.44	49.77	3.20	0.22	68.75	0.66	0.20
PERRY	19.02	0.86	0.09	0.95	49.95	11.26	0.79	70.16	1.74	0.46
PIKE	50.82	2.29	0.24	2.53	49.78	21.76	1.52	69.85	4.05	1.16
POWELL	5.22	0.23	0.03	0.26	49.81	6.47	0.45	69.55	0.71	0.15
PULASKI	28.62	1.29	0.14	1.43	49.97	20.87	1.46	69.96	2.89	0.71
ROBERTSON	1.30	0.06	0.01	0.07	53.85	0.82	0.05	60.98	0.12	0.03
ROCKCASTLE	8.74	0.39	0.04	0.43	49.20	6.06	0.42	69.31	0.85	0.21
ROWAN	3.47	0.16	0.01	0.17	48.99	16.88	1.18	69.91	1.35	0.18
RUSSELL	7.20	0.32	0.04	0.36	50.00	7.52	0.53	70.48	0.89	0.19
SCOTT	6.50	0.29	0.03	0.32	49.23	17.37	1.22	70.24	1.54	0.25
SHELBY	10.46	0.47	0.05	0.52	49.71	14.36	1.00	69.64	1.52	0.31
SIMPSON	0.94	0.04	0.01	0.05	53.19	14.20	0.99	69.72	1.04	0.12
SPENCER	0.57	0.03	0.00	0.03	52.63	6.23	0.39	62.60	0.42	0.05
TAYLOR	4.78	0.22	0.02	0.24	50.21	16.37	1.14	69.64	1.38	0.21
TODD	3.66	0.16	0.02	0.18	49.18	7.28	0.51	70.05	0.69	0.12
TRIGG	1.72	0.08	0.01	0.09	52.33	8.64	0.60	69.44	0.69	0.10
TRIMBLE	1.46	0.07	0.01	0.08	54.79	4.63	0.43	92.87	0.51	0.07
UNION	4.92	0.22	0.03	0.25	50.81	11.64	0.81	69.59	1.06	0.18
WARREN	0.40	0.02	0.00	0.02	50.00	76.27	5.60	73.42	5.62	0.56
WASHINGTON	7.39	0.32	0.04	0.36	48.71	3.05	0.21	68.85	0.57	0.16
WAYNE	10.13	0.46	0.05	0.51	50.35	7.34	0.51	69.48	1.02	0.25
WEBSTER	4.68	0.20	0.03	0.23	49.15	9.28	0.65	70.04	0.88	0.15
WHITLEY	27.21	1.22	0.14	1.36	49.98	6.12	0.43	70.26	1.79	0.58
WOLFE	5.40	0.24	0.03	0.27	50.00	1.10	0.08	72.73	0.35	0.11
WOODFORD	6.28	0.27	0.03	0.30	47.77	13.68	0.96	70.18	1.26	0.22
Total	1,117.36	50.10	5.50	55.60	49.76	2,567.94	179.45	69.88	235.05	41.34

Commercial Use

About 37 Mgal/d was used for commercial purposes during 1990. Of this amount, more than 13 Mgal/d was self-supplied largely from surface-water sources (fig. 6). Public-water suppliers delivered about 23 Mgal/d or about 63 percent of the total water used for commercial purposes (fig. 6). The county distribution of self-supplied commercial withdrawals is shown in figure 7.

Commercial water use in Jefferson County was the largest in the State with an average of more than 15 Mgal/d. Public-supplied deliveries for commercial use in Jefferson County were almost 7 Mgal/d, the largest for the State.

Commercial use accounts for less than 1 percent of the State's total offstream water use; only mining, livestock, and irrigation use less. The commercial-use category accounted for less consumptive use than all other uses except mining. Individual county data are shown for the commercial water-use category in table 3.

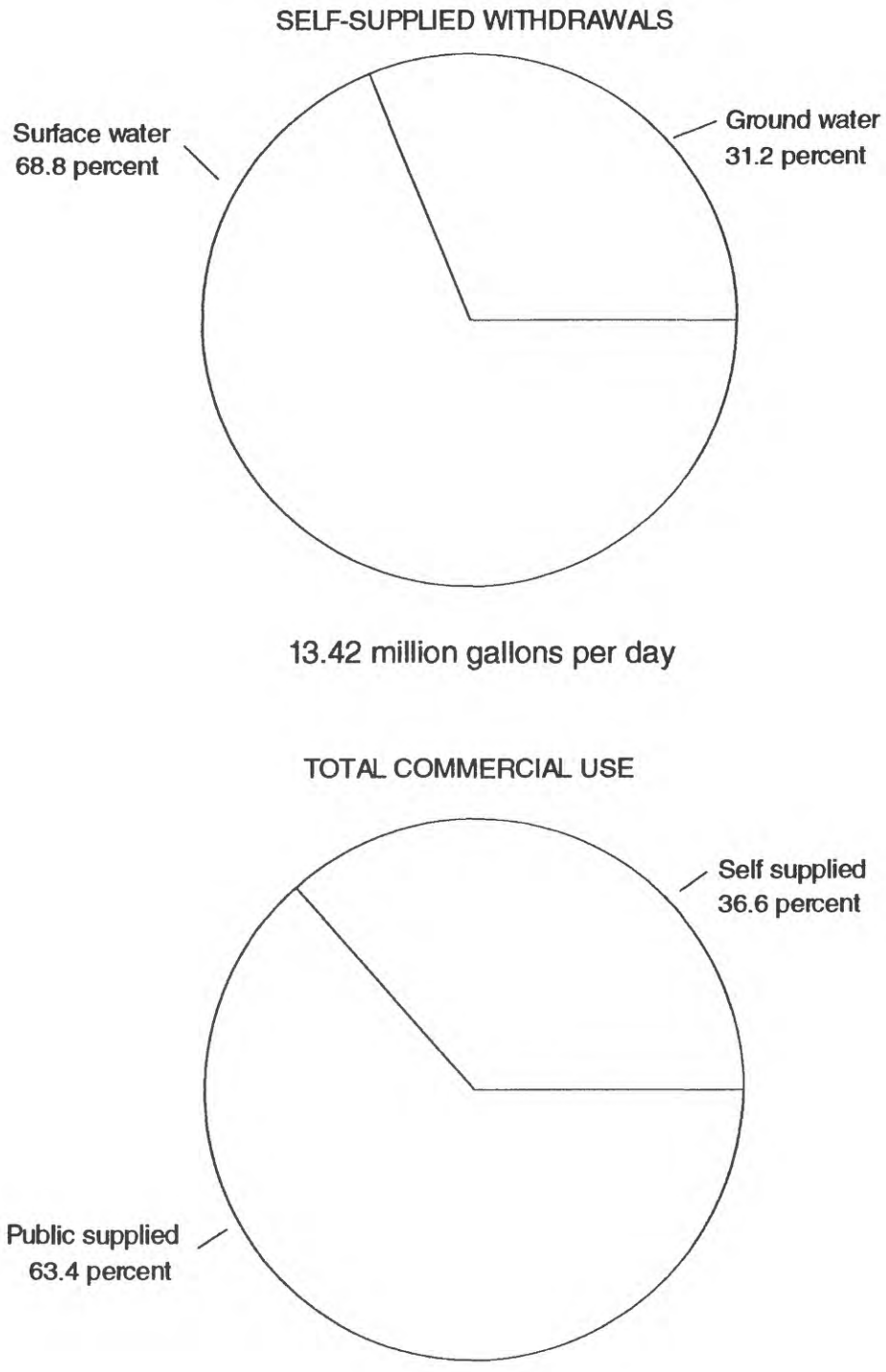

Figure 6. Commercial water use during 1990.

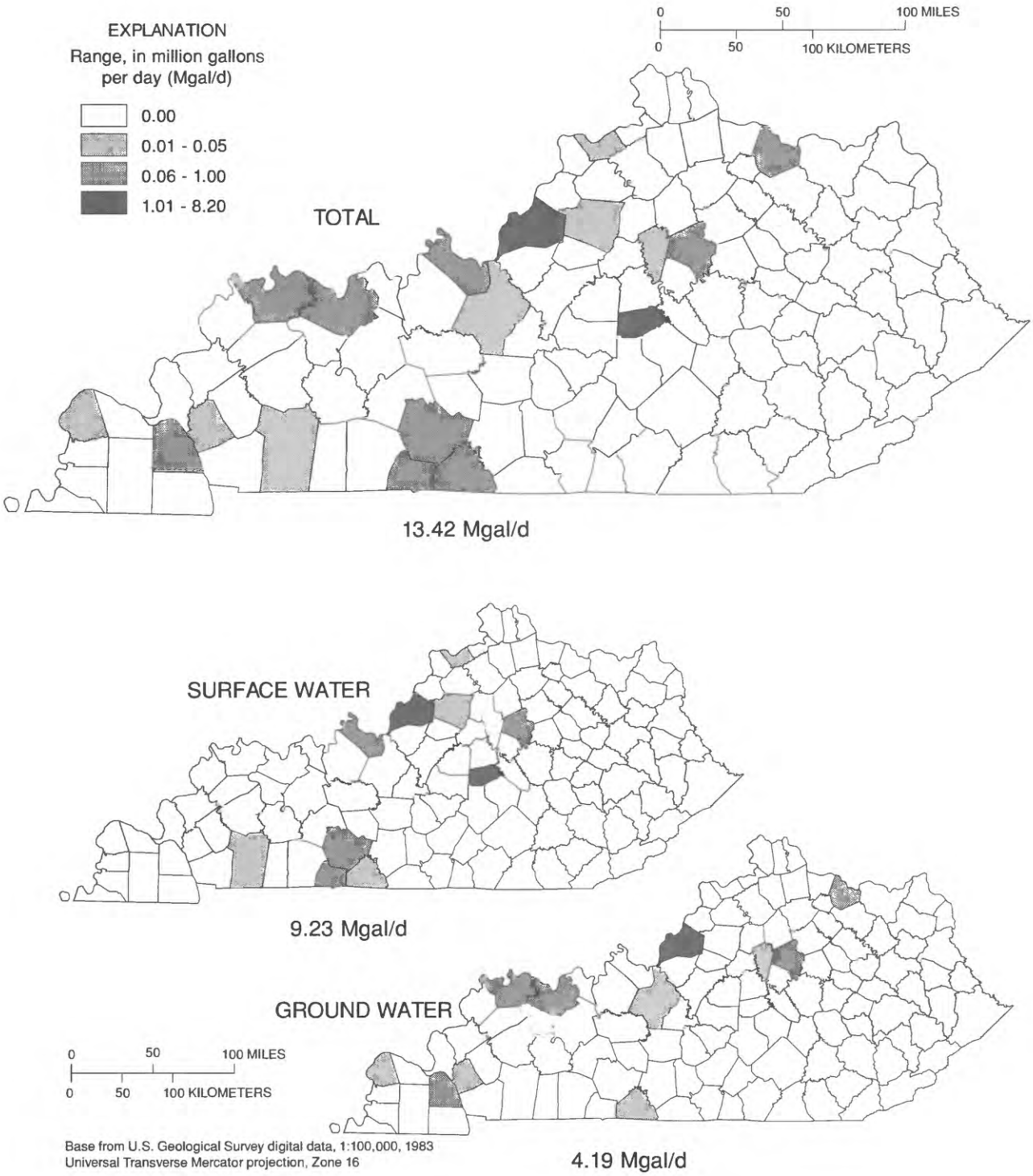

Figure 7. Self-supplied commercial water withdrawals, by county, during 1990.

(page 18 follows)


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Table 3. Commercial water use in Kentucky, by county, during 1990

County	Self-supplied water withdrawals, in million gallons per day			Public-supplied water deliveries, in million gallons per day	Total, in million gallons per day	
	Source					
	Ground water	Surface water	Total		Withdrawals and deliveries	Consumptive use
ADAIR	0.00	0.00	0.00	0.04	0.04	0.00
ALLEN	0.01	0.05	0.06	0.01	0.07	0.00
ANDERSON	0.00	0.00	0.00	0.09	0.09	0.00
BALLARD	0.01	0.00	0.01	0.00	0.01	0.00
BARREN	0.00	0.00	0.00	0.19	0.19	0.01
BATH	0.00	0.00	0.00	0.00	0.00	0.00
BELL	0.00	0.00	0.00	0.07	0.07	0.00
BOONE	0.00	0.00	0.00	0.05	0.05	0.00
BOURBON	0.00	0.00	0.00	0.04	0.04	0.00
BOYD	0.00	0.00	0.00	0.29	0.29	0.01
BOYLE	0.00	3.47	3.47	0.23	3.70	0.13
BRACKEN	0.00	0.00	0.00	0.05	0.05	0.00
BREATHITT	0.00	0.00	0.00	0.04	0.04	0.00
BRECKINRIDGE	0.00	0.00	0.00	0.02	0.02	0.00
BULLITT	0.00	0.00	0.00	0.04	0.04	0.00
BUTLER	0.00	0.00	0.00	0.05	0.05	0.00
CALDWELL	0.00	0.00	0.00	0.01	0.01	0.00
CALLOWAY	0.00	0.00	0.00	0.07	0.07	0.00
CAMPBELL	0.00	0.00	0.00	0.64	0.64	0.03
CARLISLE	0.00	0.00	0.00	0.01	0.01	0.00
CARROLL	0.00	0.02	0.02	0.06	0.08	0.00
CARTER	0.00	0.00	0.00	0.07	0.07	0.00
CASEY	0.00	0.00	0.00	0.02	0.02	0.00
CHRISTIAN	0.00	0.01	0.01	0.26	0.27	0.01
CLARK	0.00	0.00	0.00	0.08	0.08	0.00
CLAY	0.00	0.00	0.00	0.05	0.05	0.00
CLINTON	0.00	0.00	0.00	0.03	0.03	0.00
CRITTENDEN	0.00	0.00	0.00	0.01	0.01	0.00
CUMBERLAND	0.00	0.00	0.00	0.02	0.02	0.00
DAVIESS	0.22	0.00	0.22	0.77	0.99	0.04
EDMONSON	0.00	0.00	0.00	0.02	0.02	0.00
ELLIOTT	0.00	0.00	0.00	0.00	0.00	0.00
ESTILL	0.00	0.00	0.00	0.04	0.04	0.00
FAYETTE	0.08	0.13	0.21	1.76	1.97	0.08
FLEMING	0.00	0.00	0.00	0.02	0.02	0.00
FLOYD	0.00	0.00	0.00	0.19	0.19	0.01
FRANKLIN	0.00	0.00	0.00	0.32	0.32	0.01
FULTON	0.00	0.00	0.00	0.09	0.09	0.00
GALLATIN	0.00	0.00	0.00	0.01	0.01	0.00
GARRARD	0.00	0.00	0.00	0.04	0.04	0.00
GRANT	0.00	0.00	0.00	0.03	0.03	0.00
GRAVES	0.00	0.00	0.00	0.03	0.03	0.00
GRAYSON	0.00	0.00	0.00	0.09	0.09	0.00
GREEN	0.00	0.00	0.00	0.04	0.04	0.00
GREENUP	0.00	0.00	0.00	0.03	0.03	0.00
HANCOCK	0.00	0.00	0.00	0.00	0.00	0.00
HARDIN	0.01	0.00	0.01	0.43	0.44	0.00
HARLAN	0.00	0.00	0.00	0.00	0.00	0.00
HARRISON	0.00	0.00	0.00	0.09	0.09	0.00
HART	0.00	0.00	0.00	0.00	0.00	0.00
HENDERSON	0.44	0.00	0.44	0.35	0.79	0.03
HENRY	0.00	0.00	0.00	0.61	0.61	0.03
HICKMAN	0.00	0.00	0.00	0.00	0.00	0.00
HOPKINS	0.00	0.00	0.00	0.48	0.48	0.02
JACKSON	0.00	0.00	0.00	0.02	0.02	0.00
JEFFERSON	3.08	5.12	8.20	6.93	15.13	0.52
JESSAMINE	0.00	0.00	0.00	0.13	0.13	0.00
JOHNSON	0.00	0.00	0.00	0.09	0.09	0.00
KENTON	0.00	0.00	0.00	1.31	1.31	0.05
KNOTT	0.00	0.00	0.00	0.01	0.01	0.00

Table 3. Commercial water use in Kentucky, by county, during 1990--Continued

County	Self-supplied water withdrawals, in million gallons per day: Source: Ground water	Self-supplied water withdrawals, in million gallons per day: Source: Surface water	Self-supplied water withdrawals, in million gallons per day: Total	Public-supplied water deliveries, in million gallons per day	Total, in million gallons per day: Withdrawals and deliveries	Total, in million gallons per day: Consumptive use
KNOX	0.00	0.00	0.00	0.05	0.05	0.00
LARUE	0.00	0.00	0.00	0.01	0.01	0.00
LAUREL	0.00	0.00	0.00	0.43	0.43	0.02
LAWRENCE	0.00	0.00	0.00	0.01	0.01	0.00
LEE	0.00	0.00	0.00	0.04	0.04	0.00
LESLIE	0.00	0.00	0.00	0.02	0.02	0.00
LETCHER	0.00	0.00	0.00	0.03	0.03	0.00
LEWIS	0.00	0.00	0.00	0.00	0.00	0.00
LINCOLN	0.00	0.00	0.00	0.02	0.02	0.00
LIVINGSTON	0.00	0.00	0.00	0.01	0.01	0.00
LOGAN	0.00	0.00	0.00	0.14	0.14	0.01
LYON	0.01	0.00	0.01	0.09	0.10	0.00
MCCRACKEN	0.00	0.00	0.00	0.22	0.22	0.01
MCCREARY	0.00	0.00	0.00	0.02	0.02	0.00
MCLEAN	0.00	0.00	0.00	0.02	0.02	0.00
MADISON	0.00	0.00	0.00	0.41	0.41	0.02
MAGOFFIN	0.00	0.00	0.00	0.02	0.02	0.00
MARION	0.00	0.00	0.00	0.09	0.09	0.00
MARSHALL	0.11	0.00	0.11	0.16	0.27	0.01
MARTIN	0.00	0.00	0.00	0.03	0.03	0.00
MASON	0.18	0.00	0.18	0.08	0.26	0.01
MEADE	0.00	0.09	0.09	0.08	0.17	0.01
MENIFEE	0.00	0.00	0.00	0.01	0.01	0.00
MERCER	0.00	0.00	0.00	0.08	0.08	0.00
METCALFE	0.00	0.00	0.00	0.00	0.00	0.00
MONROE	0.00	0.00	0.00	0.04	0.04	0.00
MONTGOMERY	0.00	0.00	0.00	0.08	0.08	0.00
MORGAN	0.00	0.00	0.00	0.01	0.01	0.00
MUHLENBERG	0.00	0.00	0.00	0.20	0.20	0.01
NELSON	0.00	0.00	0.00	0.14	0.14	0.01
NICHOLAS	0.00	0.00	0.00	0.10	0.10	0.00
OHIO	0.00	0.00	0.00	0.04	0.04	0.00
OLDHAM	0.00	0.00	0.00	0.14	0.14	0.01
OWEN	0.00	0.00	0.00	0.03	0.03	0.00
OWSLEY	0.00	0.00	0.00	0.00	0.00	0.00
PENDLETON	0.00	0.00	0.00	0.05	0.05	0.00
PERRY	0.00	0.00	0.00	0.10	0.10	0.00
PIKE	0.00	0.00	0.00	0.15	0.15	0.01
POWELL	0.00	0.00	0.00	0.02	0.02	0.00
PULASKI	0.00	0.00	0.00	0.23	0.23	0.01
ROBERTSON	0.00	0.00	0.00	0.00	0.00	0.00
ROCKCASTLE	0.00	0.00	0.00	0.06	0.06	0.00
ROWAN	0.00	0.00	0.00	0.12	0.12	0.00
RUSSELL	0.00	0.00	0.00	0.11	0.11	0.00
SCOTT	0.00	0.00	0.00	0.22	0.22	0.01
SHELBY	0.00	0.03	0.03	0.12	0.15	0.01
SIMPSON	0.00	0.20	0.20	1.01	1.21	0.05
SPENCER	0.00	0.00	0.00	0.00	0.00	0.00
TAYLOR	0.00	0.00	0.00	0.64	0.64	0.03
TODD	0.00	0.00	0.00	0.04	0.04	0.00
TRIGG	0.00	0.00	0.00	0.06	0.06	0.00
TRIMBLE	0.00	0.00	0.00	0.00	0.00	0.00
UNION	0.00	0.00	0.00	0.10	0.10	0.00
WARREN	0.00	0.11	0.11	0.50	0.61	0.03
WASHINGTON	0.00	0.00	0.00	0.05	0.05	0.00
WAYNE	0.00	0.00	0.00	0.08	0.08	0.00
WEBSTER	0.00	0.00	0.00	0.10	0.10	0.00
WHITLEY	0.00	0.00	0.00	0.05	0.05	0.00
WOLFE	0.00	0.00	0.00	0.01	0.01	0.00
WOODFORD	0.04	0.00	0.04	0.10	0.14	0.01
Total	4.19	9.23	13.42	23.24	36.66	1.26

Industrial Use

Water used during 1990 for industrial purposes totaled 512 Mgal/d, a 26 percent increase from 1985. Of that amount, self-supplied industrial withdrawals were 313 Mgal/d (about 7 percent of the total withdrawals), and about 70 percent of the self-supplied withdrawals came from surface-water sources (fig. 8). About 199 Mgal/d or 39 percent of the water used in industry came from public-supply systems (fig. 8).

Industrial water data, by county, are listed in table 4. Jefferson County was the leading user of water for industrial purposes (142 Mgal/d). Boyd County was second in industrial water use at more than 60 Mgal/d. Statewide, industrial use of water (including public-supply deliveries) represented almost 12 percent of the total offstream water use, surpassed only by the thermoelectric-power-generation category. Consumptive use of industrial water was only 6 percent of the total consumptive use in the State, ranking fourth behind the thermoelectric, domestic, and agricultural (livestock) categories.

The distribution of self-supplied industrial withdrawals are shown in figure 9. Most of the major water-using industries are along the Ohio River. Many industries that use public-water supplies are in Fayette County (central part of the State). The extreme western part of the State, with plentiful ground-water sources, also attracts industries that use large quantities of water. The industries that are the greatest users of water in Kentucky include those that manufacture or produce food, textile, pulp and paper, chemical, metal, and distillery products.

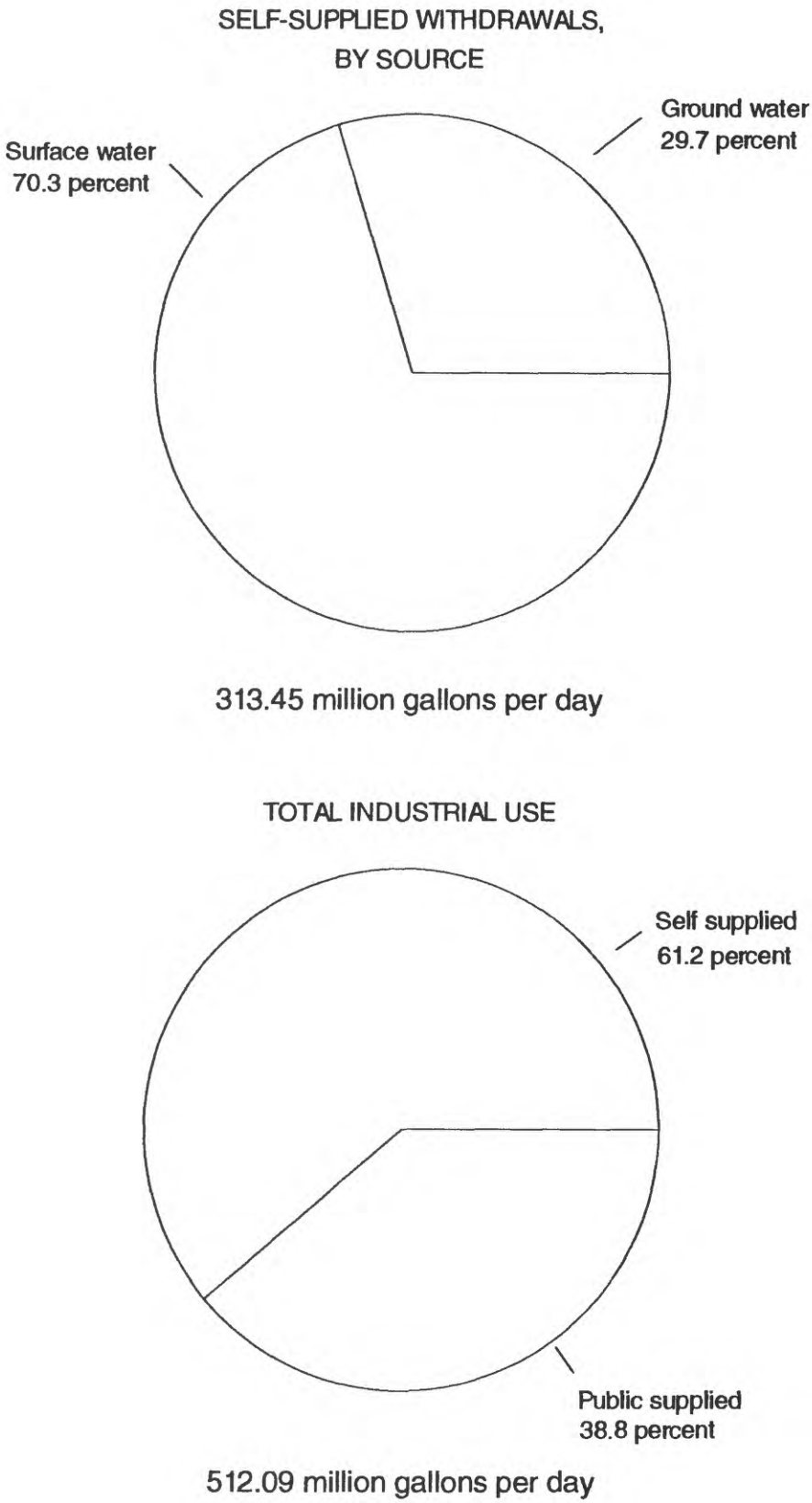

Figure 8. Industrial water use during 1990.

Table 4. Industrial water use in Kentucky, by county, during 1990

County	Self-supplied withdrawals, in million gallons per day			Public-supplied deliveries, in million gallons per day	Total, in million gallons per day	
	Source					
	Ground water	Surface water	Total		Withdrawals and deliveries	Consumptive use
ADAIR	0.00	0.00	0.00	0.32	0.32	0.01
ALLEN	0.00	0.00	0.00	0.05	0.05	0.00
ANDERSON	0.00	3.72	3.72	0.78	4.50	0.16
BALLARD	1.36	24.10	25.46	0.02	25.48	0.92
BARREN	0.00	0.00	0.00	1.69	1.69	0.07
BATH	0.00	0.00	0.00	0.02	0.02	0.00
BELL	0.00	0.16	0.16	0.68	0.84	0.04
BOONE	0.00	0.00	0.00	0.43	0.43	0.02
BOURBON	0.00	0.00	0.00	0.28	0.28	0.01
BOYD	0.25	57.60	57.85	2.58	60.43	2.19
BOYLE	0.00	0.00	0.00	2.07	2.07	0.08
BRACKEN	0.00	0.00	0.00	0.50	0.50	0.02
BREATHITT	0.00	0.00	0.00	0.36	0.36	0.02
BRECKINRIDGE	0.00	0.00	0.00	0.20	0.20	0.01
BULLITT	0.00	1.05	1.05	0.33	1.38	0.01
BUTLER	0.00	0.00	0.00	0.37	0.37	0.02
CALDWELL	0.04	0.00	0.04	0.12	0.16	0.00
CALLOWAY	0.98	0.00	0.98	0.68	1.66	0.06
CAMPBELL	0.00	1.70	1.70	5.71	7.41	0.29
CARLISLE	0.00	0.00	0.00	0.11	0.11	0.01
CARROLL	11.82	0.00	11.82	0.34	12.16	0.44
CARTER	0.00	0.00	0.00	0.61	0.61	0.03
CASEY	0.00	0.00	0.00	0.18	0.18	0.01
CHRISTIAN	0.00	0.00	0.00	2.35	2.35	0.09
CLARK	0.00	0.03	0.03	0.70	0.73	0.03
CLAY	0.00	0.00	0.00	0.38	0.38	0.02
CLINTON	0.00	0.00	0.00	0.23	0.23	0.01
CRITTENDEN	0.00	0.00	0.00	0.07	0.07	0.00
CUMBERLAND	0.00	0.00	0.00	0.17	0.17	0.01
DAVIESS	4.56	0.00	4.56	6.91	11.47	0.44
EDMONSON	0.00	0.00	0.00	0.13	0.13	0.00
ELLIOTT	0.00	0.00	0.00	0.03	0.03	0.00
ESTILL	0.00	0.00	0.00	0.35	0.35	0.02
FAYETTE	0.00	0.00	0.00	15.87	15.87	0.58
FLEMING	0.00	0.00	0.00	0.17	0.17	0.01
FLOYD	0.00	0.49	0.49	1.71	2.20	0.09
FRANKLIN	0.00	1.37	1.37	2.95	4.32	0.17
FULTON	0.00	0.00	0.00	0.78	0.78	0.03
GALLATIN	0.00	0.00	0.00	0.05	0.05	0.00
GARRARD	0.00	0.00	0.00	0.31	0.31	0.01
GRANT	0.00	0.00	0.00	0.28	0.28	0.01
GRAVES	11.12	0.00	11.12	0.21	11.33	0.41
GRAYSON	0.05	0.00	0.05	0.83	0.88	0.04
GREEN	0.00	0.00	0.00	0.33	0.33	0.01
GREENUP	0.24	10.91	11.15	0.06	11.21	0.41
HANCOCK	25.38	0.00	25.38	0.02	25.40	0.91
HARDIN	19.63	0.00	19.63	3.90	23.53	0.86
HARLAN	0.00	0.00	0.00	0.03	0.03	0.00
HARRISON	0.00	0.00	0.00	0.84	0.84	0.04
HART	0.00	0.00	0.00	0.00	0.00	0.00
HENDERSON	0.37	0.57	0.94	3.15	4.09	0.16
HENRY	0.00	0.00	0.00	5.50	5.50	0.22
HICKMAN	0.00	0.00	0.00	0.02	0.02	0.00
HOPKINS	0.00	3.93	3.93	4.31	8.24	0.31
JACKSON	0.00	0.00	0.00	0.16	0.16	0.01
JEFFERSON	8.44	71.35	79.79	62.33	142.12	5.36
JESSAMINE	0.00	0.00	0.00	1.09	1.09	0.05
JOHNSON	0.00	0.00	0.00	0.80	0.80	0.04
KENTON	0.00	0.00	0.00	11.73	11.73	0.47
KNOTT	0.00	0.00	0.00	0.11	0.11	0.00

Table 4. Industrial water use in Kentucky, by county, during 1990--Continued

County	Self-supplied withdrawals, in million gallons per day			Public-supplied deliveries, in million gallons per day	Total, in million gallons per day	
	Source					
	Ground water	Surface water	Total		Withdrawals and deliveries	Consumptive use
KNOX	0.00	0.00	0.00	0.40	0.40	0.02
LARUE	0.00	0.00	0.00	0.08	0.08	0.00
LAUREL	0.00	0.00	0.00	3.93	3.93	0.15
LAWRENCE	0.01	10.71	10.72	0.09	10.81	0.39
LEE	0.00	0.00	0.00	0.31	0.31	0.01
LESLIE	0.00	0.00	0.00	0.15	0.15	0.01
LETCHER	0.00	0.00	0.00	0.30	0.30	0.01
LEWIS	0.00	0.00	0.00	0.00	0.00	0.00
LINCOLN	0.00	0.00	0.00	0.17	0.17	0.01
LIVINGSTON	0.00	0.08	0.08	0.12	0.20	0.01
LOGAN	0.00	0.55	0.55	1.28	1.83	0.07
LYON	0.00	0.00	0.00	0.78	0.78	0.03
MCCRACKEN	0.00	13.09	13.09	1.93	15.02	0.55
MCCREARY	0.00	0.00	0.00	0.12	0.12	0.00
MCLEAN	0.00	0.00	0.00	0.15	0.15	0.01
MADISON	0.00	0.00	0.00	3.70	3.70	0.14
MAGOFFIN	0.00	0.00	0.00	0.20	0.20	0.01
MARION	0.00	0.06	0.06	0.80	0.86	0.04
MARSHALL	1.52	15.32	16.84	1.49	18.33	0.67
MARTIN	0.00	0.74	0.74	0.23	0.97	0.04
MASON	0.34	0.00	0.34	0.71	1.05	0.01
MEADE	6.82	0.00	6.82	0.72	7.54	0.27
MENIFEE	0.00	0.00	0.00	0.05	0.05	0.00
MERCER	0.00	0.00	0.00	0.75	0.75	0.03
METCALFE	0.00	0.00	0.00	0.00	0.00	0.00
MONROE	0.00	0.00	0.00	0.32	0.32	0.01
MONTGOMERY	0.00	0.00	0.00	0.71	0.71	0.03
MORGAN	0.00	0.00	0.00	0.10	0.10	0.00
MUHLENBERG	0.00	0.00	0.00	1.80	1.80	0.07
NELSON	0.00	2.57	2.57	1.32	3.89	0.14
NICHOLAS	0.00	0.00	0.00	0.91	0.91	0.04
OHIO	0.10	0.00	0.10	0.36	0.46	0.02
OLDHAM	0.00	0.00	0.00	1.30	1.30	0.05
OWEN	0.00	0.00	0.00	0.26	0.26	0.01
OWSLEY	0.00	0.00	0.00	0.05	0.05	0.00
PENDLETON	0.00	0.00	0.00	0.40	0.40	0.02
PERRY	0.00	0.00	0.00	0.89	0.89	0.04
PIKE	0.00	0.00	0.00	1.38	1.38	0.05
POWELL	0.00	0.00	0.00	0.21	0.21	0.01
PULASKI	0.00	0.29	0.29	2.04	2.33	0.09
ROBERTSON	0.00	0.00	0.00	0.00	0.00	0.00
ROCKCASTLE	0.00	0.00	0.00	0.57	0.57	0.02
ROWAN	0.00	0.00	0.00	1.05	1.05	0.05
RUSSELL	0.00	0.00	0.00	1.00	1.00	0.04
SCOTT	0.00	0.00	0.00	1.95	1.95	0.08
SHELBY	0.00	0.00	0.00	1.04	1.04	0.05
SIMPSON	0.00	0.02	0.02	0.11	0.13	0.00
SPENCER	0.00	0.00	0.00	0.00	0.00	0.00
TAYLOR	0.00	0.00	0.00	5.70	5.70	0.22
TODD	0.00	0.00	0.00	0.28	0.28	0.01
TRIGG	0.00	0.00	0.00	0.54	0.54	0.02
TRIMBLE	0.00	0.00	0.00	0.00	0.00	0.00
UNION	0.00	0.00	0.00	0.85	0.85	0.04
WARREN	0.00	0.00	0.00	4.44	4.44	0.18
WASHINGTON	0.00	0.00	0.00	0.29	0.29	0.02
WAYNE	0.00	0.00	0.00	0.70	0.70	0.03
WEBSTER	0.00	0.00	0.00	0.88	0.88	0.04
WHITLEY	0.00	0.00	0.00	0.42	0.42	0.02
WOLFE	0.00	0.00	0.00	0.08	0.08	0.00
WOODFORD	0.00	0.01	0.01	0.94	0.95	0.04
Total	93.03	220.42	313.45	198.64	512.09	19.16

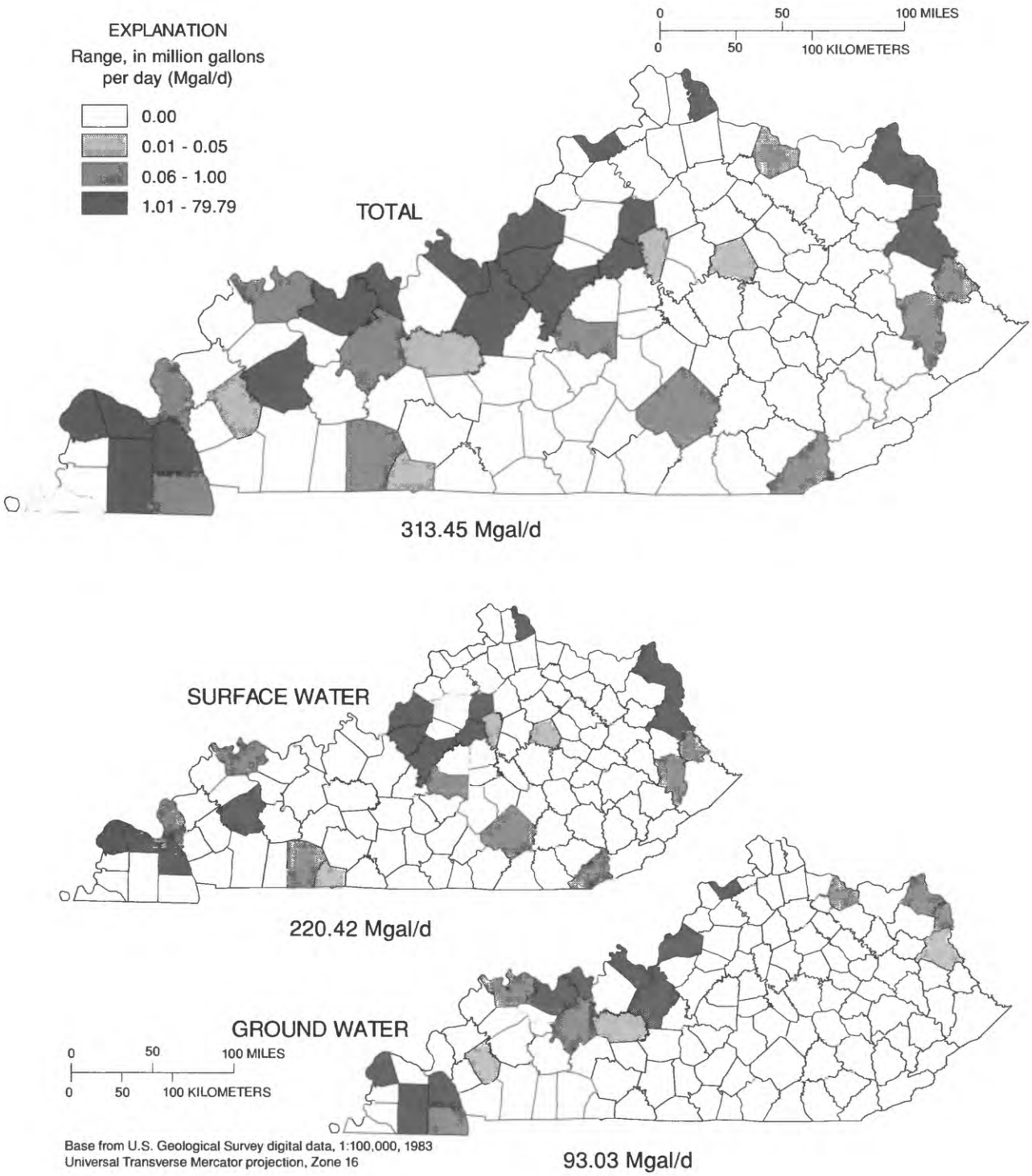

Figure 9. Self-supplied industrial water withdrawals, by county, during 1990.

Mining Use

The primary uses of water for mining are withdrawals for dewatering deep-mine operations and for coal washing. Water used in conjunction with mining in the State was 18 Mgal/d during 1990, which was 7 Mgal/d less than 1985 withdrawals. More than 71 percent of this amount came from surface-water sources (fig. 10). No public-supply deliveries were reported for the mining category during 1990.

The distribution of mining withdrawals is shown in figure 11. Hopkins County led the State during 1990 mining water use where more than 4 Mgal/d was withdrawn. Withdrawals in Hopkins County, when combined with withdrawals in Muhlenberg, Harlan, and Pike Counties, accounted for 60 percent of the water used for mining in the State. A detailed listing of mining water use, by county, is contained in table 5.

Statewide, less water is used in mining than any other category except irrigation. However, because of the high consumptive-use rate in irrigation, mining consumes less water than irrigation or any other category.

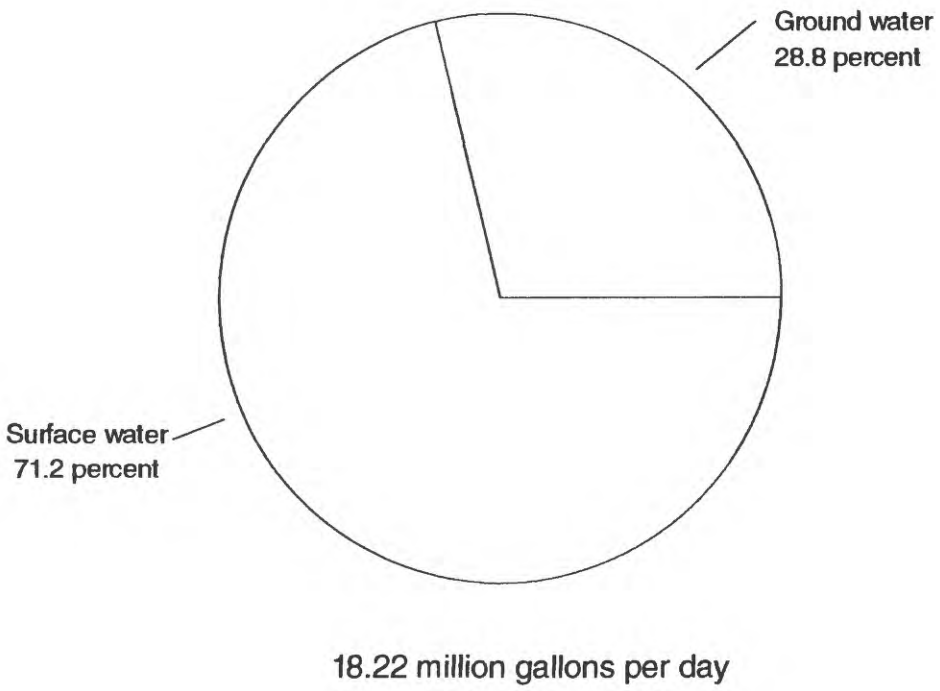

Figure 10. Water withdrawn for mining, by source, during 1990.

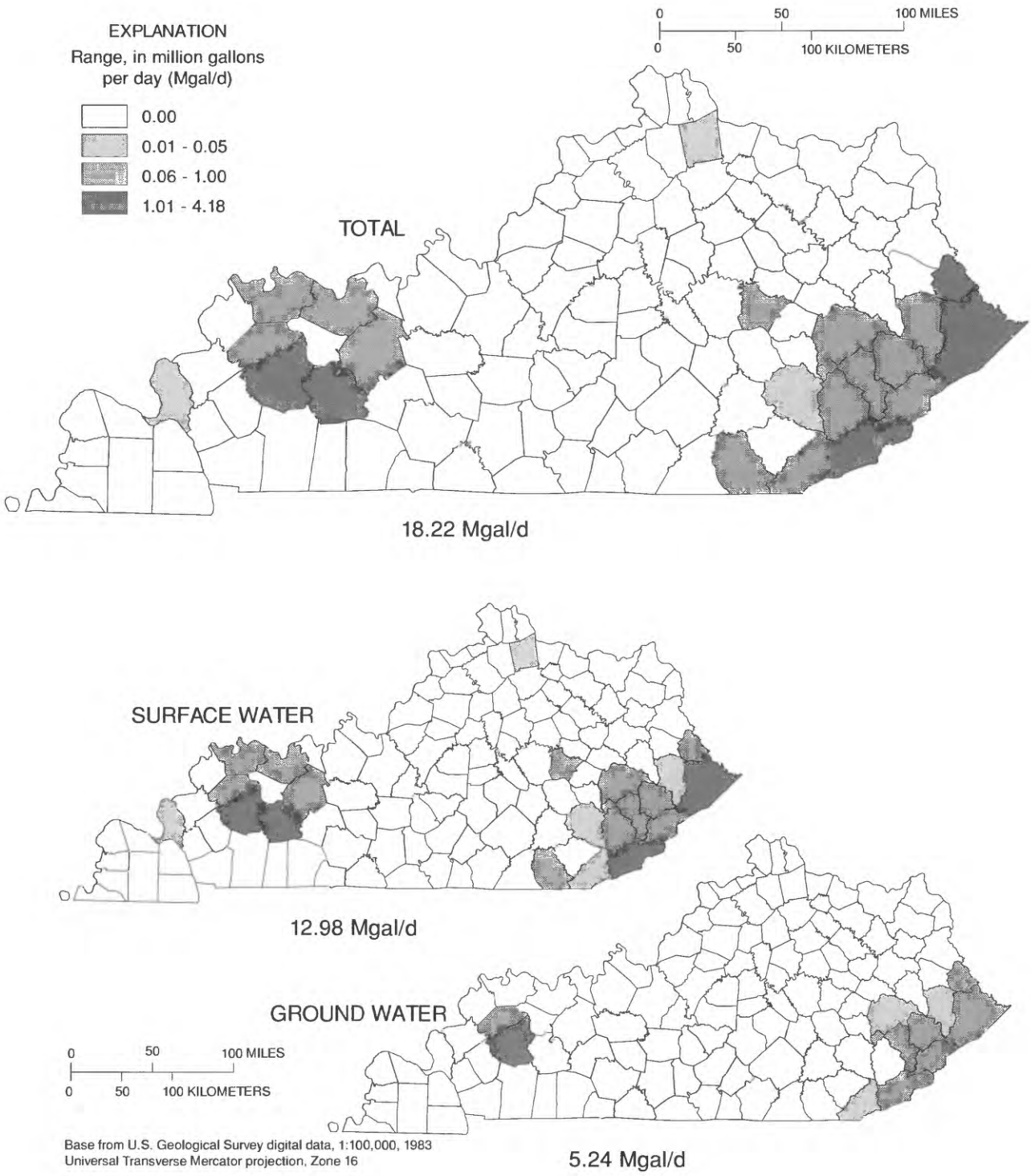

Figure 11. Mining water withdrawals, by county, during 1990.

Table 5. Mining water use in Kentucky, by county, during 1990

County	Withdrawals, in million gallons per day			
	Source			
	Ground water	Surface water	Total	Consumptive use
ADAIR	0.00	0.00	0.00	0.00
ALLEN	0.00	0.00	0.00	0.00
ANDERSON	0.00	0.00	0.00	0.00
BALLARD	0.00	0.00	0.00	0.00
BARREN	0.00	0.00	0.00	0.00
BATH	0.00	0.00	0.00	0.00
BELL	0.04	0.02	0.06	0.00
BOONE	0.00	0.00	0.00	0.00
BOURBON	0.00	0.00	0.00	0.00
BOYD	0.00	0.00	0.00	0.00
BOYLE	0.00	0.00	0.00	0.00
BRACKEN	0.00	0.00	0.00	0.00
BREATHITT	0.05	0.08	0.13	0.00
BRECKINRIDGE	0.00	0.00	0.00	0.00
BULLITT	0.00	0.00	0.00	0.00
BUTLER	0.00	0.00	0.00	0.00
CALDWELL	0.00	0.00	0.00	0.00
CALLOWAY	0.00	0.00	0.00	0.00
CAMPBELL	0.00	0.00	0.00	0.00
CARLISLE	0.00	0.00	0.00	0.00
CARROLL	0.00	0.00	0.00	0.00
CARTER	0.00	0.00	0.00	0.00
CASEY	0.00	0.00	0.00	0.00
CHRISTIAN	0.00	0.00	0.00	0.00
CLARK	0.00	0.00	0.00	0.00
CLAY	0.00	0.02	0.02	0.00
CLINTON	0.00	0.00	0.00	0.00
CRITTENDEN	0.00	0.00	0.00	0.00
CUMBERLAND	0.00	0.00	0.00	0.00
DAVIESS	0.00	0.91	0.91	0.03
EDMONSON	0.00	0.00	0.00	0.00
ELLIOTT	0.00	0.00	0.00	0.00
ESTILL	0.00	0.99	0.99	0.03
FAYETTE	0.00	0.00	0.00	0.00
FLEMING	0.00	0.00	0.00	0.00
FLOYD	0.03	0.03	0.06	0.00
FRANKLIN	0.00	0.00	0.00	0.00
FULTON	0.00	0.00	0.00	0.00
GALLATIN	0.00	0.00	0.00	0.00
GARRARD	0.00	0.00	0.00	0.00
GRANT	0.00	0.00	0.00	0.00
GRAVES	0.00	0.00	0.00	0.00
GRAYSON	0.00	0.00	0.00	0.00
GREEN	0.00	0.00	0.00	0.00
GREENUP	0.00	0.00	0.00	0.00
HANCOCK	0.00	0.00	0.00	0.00
HARDIN	0.00	0.00	0.00	0.00
HARLAN	0.82	1.40	2.22	0.07
HARRISON	0.00	0.00	0.00	0.00
HART	0.00	0.00	0.00	0.00
HENDERSON	0.00	0.20	0.20	0.01
HENRY	0.00	0.00	0.00	0.00
HICKMAN	0.00	0.00	0.00	0.00
HOPKINS	2.56	1.62	4.18	0.12
JACKSON	0.00	0.00	0.00	0.00
JEFFERSON	0.00	0.00	0.00	0.00
JESSAMINE	0.00	0.00	0.00	0.00
JOHNSON	0.00	0.00	0.00	0.00
KENTON	0.00	0.00	0.00	0.00
KNOTT	0.08	0.06	0.14	0.00

Table 5. Mining water use in Kentucky, by county, during 1990--Continued

County	Withdrawals, in million gallons per day			
	Source			
	Ground water	Surface water	Total	Consumptive use
KNOX	0.00	0.00	0.00	0.00
LARUE	0.00	0.00	0.00	0.00
LAUREL	0.00	0.00	0.00	0.00
LAWRENCE	0.00	0.00	0.00	0.00
LEE	0.00	0.00	0.00	0.00
LESLIE	0.00	0.55	0.55	0.02
LETCHER	0.29	0.53	0.82	0.02
LEWIS	0.00	0.00	0.00	0.00
LINCOLN	0.00	0.00	0.00	0.00
LIVINGSTON	0.00	0.05	0.05	0.00
LOGAN	0.00	0.00	0.00	0.00
LYON	0.00	0.00	0.00	0.00
MCCRACKEN	0.00	0.00	0.00	0.00
MCCREARY	0.00	0.00	0.00	0.00
MCLEAN	0.00	0.00	0.00	0.00
MADISON	0.00	0.00	0.00	0.00
MAGOFFIN	0.00	0.00	0.00	0.00
MARION	0.00	0.00	0.00	0.00
MARSHALL	0.00	0.00	0.00	0.00
MARTIN	0.42	1.00	1.42	0.04
MASON	0.00	0.00	0.00	0.00
MEADE	0.00	0.00	0.00	0.00
MENIFEE	0.00	0.00	0.00	0.00
MERCER	0.00	0.00	0.00	0.00
METCALFE	0.00	0.00	0.00	0.00
MONROE	0.00	0.00	0.00	0.00
MONTGOMERY	0.00	0.00	0.00	0.00
MORGAN	0.00	0.00	0.00	0.00
MUHLENBERG	0.00	2.45	2.45	0.07
NELSON	0.00	0.00	0.00	0.00
NICHOLAS	0.00	0.00	0.00	0.00
OHIO	0.00	1.00	1.00	0.03
OLDHAM	0.00	0.00	0.00	0.00
OWEN	0.00	0.00	0.00	0.00
OWSLEY	0.00	0.00	0.00	0.00
PENDLETON	0.00	0.01	0.01	0.00
PERRY	0.24	0.27	0.51	0.02
PIKE	0.60	1.46	2.06	0.06
POWELL	0.00	0.00	0.00	0.00
PULASKI	0.00	0.00	0.00	0.00
ROBERTSON	0.00	0.00	0.00	0.00
ROCKCASTLE	0.00	0.00	0.00	0.00
ROWAN	0.00	0.00	0.00	0.00
RUSSELL	0.00	0.00	0.00	0.00
SCOTT	0.00	0.00	0.00	0.00
SHELBY	0.00	0.00	0.00	0.00
SIMPSON	0.00	0.00	0.00	0.00
SPENCER	0.00	0.00	0.00	0.00
TAYLOR	0.00	0.00	0.00	0.00
TODD	0.00	0.00	0.00	0.00
TRIGG	0.00	0.00	0.00	0.00
TRIMBLE	0.00	0.00	0.00	0.00
UNION	0.00	0.00	0.00	0.00
WARREN	0.00	0.00	0.00	0.00
WASHINGTON	0.00	0.00	0.00	0.00
WAYNE	0.00	0.00	0.00	0.00
WEBSTER	0.11	0.12	0.23	0.01
WHITLEY	0.00	0.21	0.21	0.01
WOLFE	0.00	0.00	0.00	0.00
WOODFORD	0.00	0.00	0.00	0.00
Total	5.24	12.98	18.22	0.54

Thermoelectric-Power-Generation Use

Water used for thermoelectric-power generation in the State accounted for almost 80 percent of the total offstream withdrawals during 1990. More than 3,440 Mgal/d was used in 22 thermoelectric power plants in 17 counties. All thermoelectric withdrawals were from self-supplied sources; no public-water suppliers delivered water to Kentucky's thermoelectric-power-generation plants during 1990. Almost 99 percent of the withdrawals came from surface water and 1 percent from ground water (fig. 12).

The distribution and ranges of withdrawals for thermoelectric-power-generation water use are shown in figure 13. The largest amount for thermoelectric-power generation (981 Mgal/d) was withdrawn in McCracken County, but the most energy (13,200 gWh), or almost 19 percent of the State's total was produced in Muhlenberg County. The only thermoelectric plant that withdrew ground water was in Mason County. Thermoelectric water-use and power-generation data are shown, by county, in table 6.

During 1990, fossil fuel was used in all of the thermoelectric plants in Kentucky. Water is used in these plants mainly for cooling purposes. Less than 6 percent of the water was lost through evaporation. Even though only 203 Mgal/d of the 3,440 Mgal/d withdrawn was not returned to the streams for reuse, this user category accounted for almost two-thirds of the consumptive water use in the State during 1990. Consumptive use in the production of thermoelectric power in Webster County was 48 Mgal/d, the most of any county in the State. Five counties (Webster, Muhlenberg, Henderson, Carroll, and Jefferson) accounted for 78 percent of the consumptive use in this category and accounted for 51 percent of the total consumptive use for all categories.

(page 32 follows)


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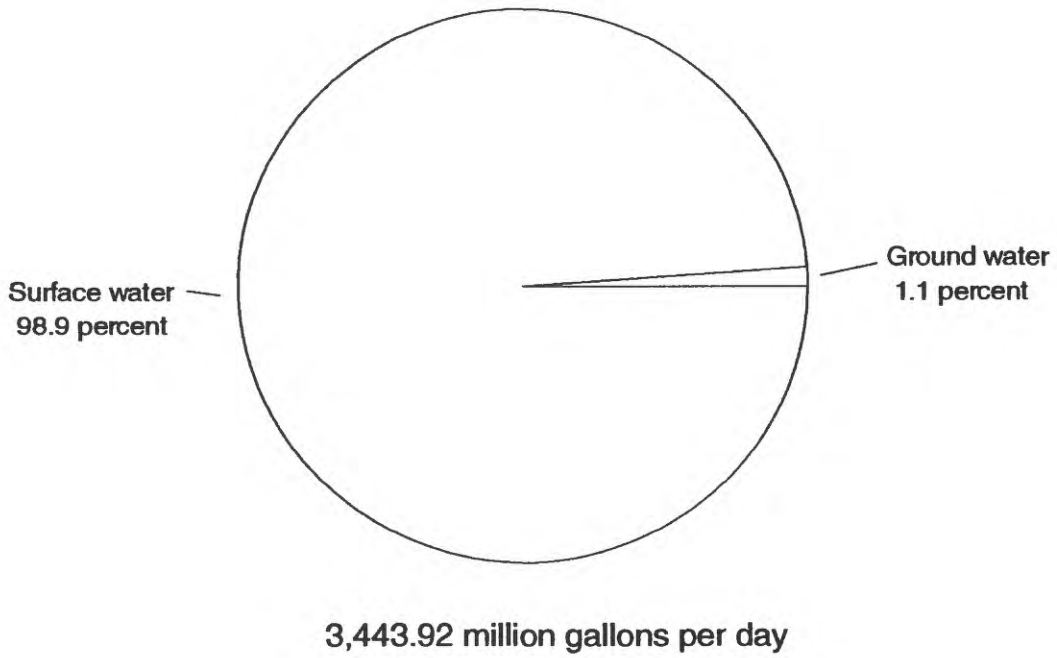

Figure 12. Water withdrawn for generation of thermoelectric power, by source, during 1990.

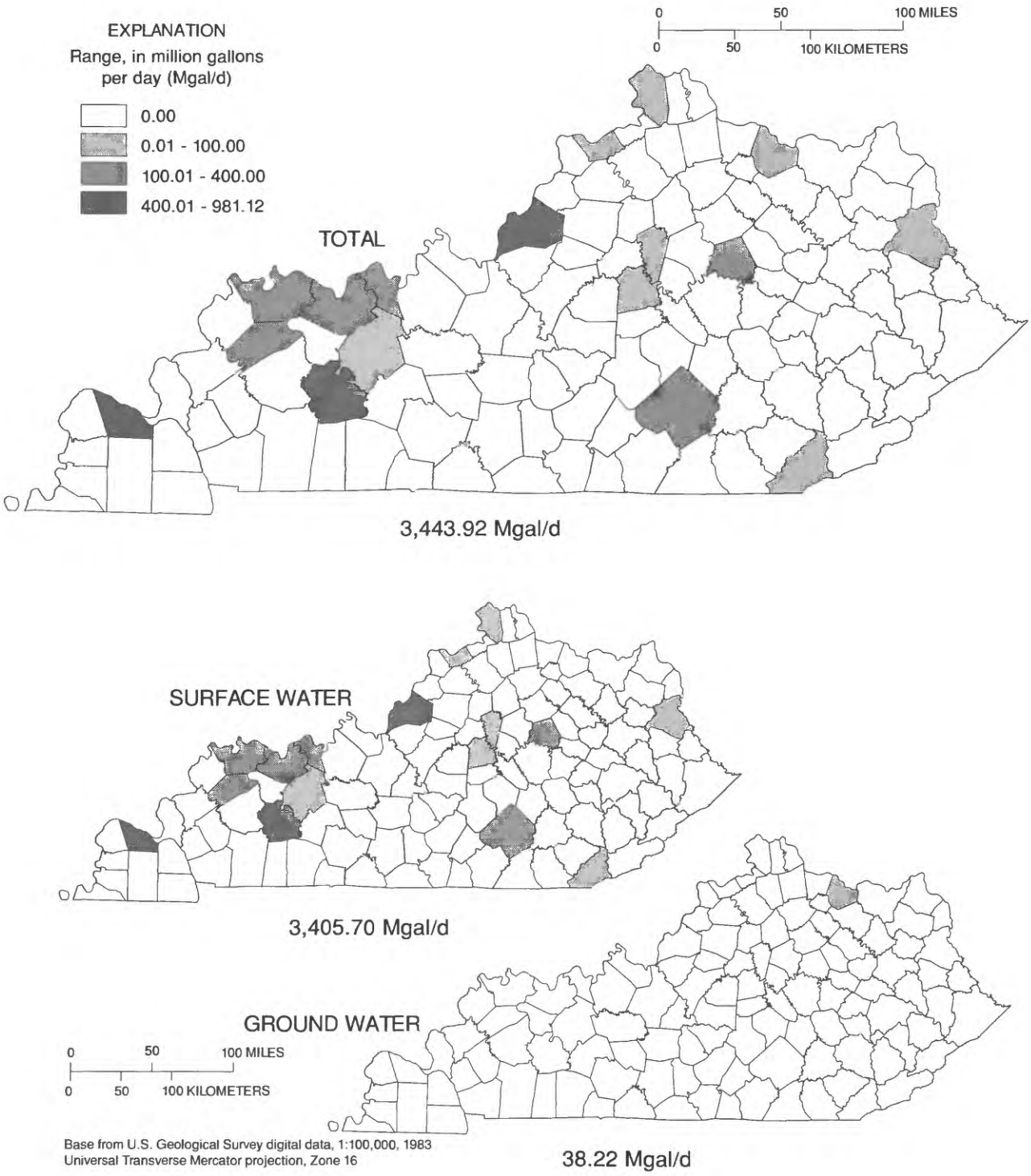

Figure 13. Thermoelectric power water withdrawals, by county, during 1990.

Table 6. Thermoelectric-power water use in Kentucky, by county, during 1990

County	By source, in million gallons per day			Total, in million gallons per day		Total power generated, in gigawatthours
	Self-supplied withdrawals		Public-supplied deliveries	Withdrawals and deliveries	Consumptive use	
	Ground water	Surface water				
ADAIR	0.00	0.00	0.00	0.00	0.00	0.00
ALLEN	0.00	0.00	0.00	0.00	0.00	0.00
ANDERSON	0.00	0.00	0.00	0.00	0.00	0.00
BALLARD	0.00	0.00	0.00	0.00	0.00	0.00
BARREN	0.00	0.00	0.00	0.00	0.00	0.00
BATH	0.00	0.00	0.00	0.00	0.00	0.00
BELL	0.00	0.28	0.00	0.28	0.07	34.99
BOONE	0.00	6.85	0.00	6.85	5.43	3,273.47
BOURBON	0.00	0.00	0.00	0.00	0.00	0.00
BOYD	0.00	0.00	0.00	0.00	0.00	0.00
BOYLE	0.00	0.00	0.00	0.00	0.00	0.00
BRACKEN	0.00	0.00	0.00	0.00	0.00	0.00
BREATHITT	0.00	0.00	0.00	0.00	0.00	0.00
BRECKINRIDGE	0.00	0.00	0.00	0.00	0.00	0.00
BULLITT	0.00	0.00	0.00	0.00	0.00	0.00
BUTLER	0.00	0.00	0.00	0.00	0.00	0.00
CALDWELL	0.00	0.00	0.00	0.00	0.00	0.00
CALLOWAY	0.00	0.00	0.00	0.00	0.00	0.00
CAMPBELL	0.00	0.00	0.00	0.00	0.00	0.00
CARLISLE	0.00	0.00	0.00	0.00	0.00	0.00
CARROLL	0.00	25.79	0.00	25.79	21.98	8,739.03
CARTER	0.00	0.00	0.00	0.00	0.00	0.00
CASEY	0.00	0.00	0.00	0.00	0.00	0.00
CHRISTIAN	0.00	0.00	0.00	0.00	0.00	0.00
CLARK	0.00	103.00	0.00	103.00	1.38	447.89
CLAY	0.00	0.00	0.00	0.00	0.00	0.00
CLINTON	0.00	0.00	0.00	0.00	0.00	0.00
CRITTENDEN	0.00	0.00	0.00	0.00	0.00	0.00
CUMBERLAND	0.00	0.00	0.00	0.00	0.00	0.00
DAVIESS	0.00	196.51	0.00	196.51	0.00	1,830.21
EDMONSON	0.00	0.00	0.00	0.00	0.00	0.00
ELLIOTT	0.00	0.00	0.00	0.00	0.00	0.00
ESTILL	0.00	0.00	0.00	0.00	0.00	0.00
FAYETTE	0.00	0.00	0.00	0.00	0.00	0.78
FLEMING	0.00	0.00	0.00	0.00	0.00	0.00
FLOYD	0.00	0.00	0.00	0.00	0.00	0.00
FRANKLIN	0.00	0.00	0.00	0.00	0.00	0.00
FULTON	0.00	0.00	0.00	0.00	0.00	0.00
GALLATIN	0.00	0.00	0.00	0.00	0.00	0.00
GARRARD	0.00	0.00	0.00	0.00	0.00	0.00
GRANT	0.00	0.00	0.00	0.00	0.00	0.00
GRAVES	0.00	0.00	0.00	0.00	0.00	0.00
GRAYSON	0.00	0.00	0.00	0.00	0.00	0.00
GREEN	0.00	0.00	0.00	0.00	0.00	0.00
GREENUP	0.00	0.00	0.00	0.00	0.00	0.00
HANCOCK	0.00	225.01	0.00	225.01	0.00	3,119.68
HARDIN	0.00	0.00	0.00	0.00	0.00	0.00
HARLAN	0.00	0.00	0.00	0.00	0.00	0.00
HARRISON	0.00	0.00	0.00	0.00	0.00	0.00
HART	0.00	0.00	0.00	0.00	0.00	0.00
HENDERSON	0.00	105.45	0.00	105.45	35.10	2,020.66
HENRY	0.00	0.00	0.00	0.00	0.00	0.00
HICKMAN	0.00	0.00	0.00	0.00	0.00	0.00
HOPKINS	0.00	0.00	0.00	0.00	0.00	0.00
JACKSON	0.00	0.00	0.00	0.00	0.00	0.00
JEFFERSON	0.00	705.04	0.00	705.04	13.25	10,755.96
JESSAMINE	0.00	0.00	0.00	0.00	0.00	0.00
JOHNSON	0.00	0.00	0.00	0.00	0.00	0.00
KENTON	0.00	0.00	0.00	0.00	0.00	0.00
KNOTT	0.00	0.00	0.00	0.00	0.00	0.00

Table 6. Thermoelectric-power water use in Kentucky, by county, during 1990--Continued

County	By source, in million gallons per day			Total, in million gallons per day		Total power generated, in gigawatthours
	Self-supplied withdrawals		Public-supplied deliveries	Withdrawals and deliveries	Consumptive use	
	Ground water	Surface water				
KNOX	0.00	0.00	0.00	0.00	0.00	0.00
LARUE	0.00	0.00	0.00	0.00	0.00	0.00
LAUREL	0.00	0.00	0.00	0.00	0.00	0.00
LAWRENCE	0.00	6.85	0.00	6.85	6.85	6,291.88
LEE	0.00	0.00	0.00	0.00	0.00	0.00
LESLIE	0.00	0.00	0.00	0.00	0.00	0.00
LETCHER	0.00	0.00	0.00	0.00	0.00	0.00
LEWIS	0.00	0.00	0.00	0.00	0.00	0.00
LINCOLN	0.00	0.00	0.00	0.00	0.00	0.00
LIVINGSTON	0.00	0.00	0.00	0.00	0.00	0.00
LOGAN	0.00	0.00	0.00	0.00	0.00	0.00
LYON	0.00	0.00	0.00	0.00	0.00	0.00
MCCRACKEN	0.00	981.12	0.00	981.12	0.00	5,683.90
MCCREARY	0.00	0.00	0.00	0.00	0.00	0.00
MCLEAN	0.00	0.00	0.00	0.00	0.00	0.00
MADISON	0.00	0.00	0.00	0.00	0.00	0.00
MAGOFFIN	0.00	0.00	0.00	0.00	0.00	0.00
MARION	0.00	0.00	0.00	0.00	0.00	0.00
MARSHALL	0.00	0.00	0.00	0.00	0.00	0.00
MARTIN	0.00	0.00	0.00	0.00	0.00	0.00
MASON	38.22	0.00	0.00	38.22	7.40	4,499.81
MEADE	0.00	0.00	0.00	0.00	0.00	0.00
MENIFEE	0.00	0.00	0.00	0.00	0.00	0.00
MERCER	0.00	17.19	0.00	17.19	12.60	3,293.46
METCALFE	0.00	0.00	0.00	0.00	0.00	0.00
MONROE	0.00	0.00	0.00	0.00	0.00	0.00
MONTGOMERY	0.00	0.00	0.00	0.00	0.00	0.00
MORGAN	0.00	0.00	0.00	0.00	0.00	0.00
MUHLENBERG	0.00	482.74	0.00	482.74	40.66	13,190.91
NELSON	0.00	0.00	0.00	0.00	0.00	0.00
NICHOLAS	0.00	0.00	0.00	0.00	0.00	0.00
OHIO	0.00	4.72	0.00	4.72	4.33	2,549.90
OLDHAM	0.00	0.00	0.00	0.00	0.00	0.00
OWEN	0.00	0.00	0.00	0.00	0.00	0.00
OWSLEY	0.00	0.00	0.00	0.00	0.00	0.00
PENDLETON	0.00	0.00	0.00	0.00	0.00	0.00
PERRY	0.00	0.00	0.00	0.00	0.00	0.00
PIKE	0.00	0.00	0.00	0.00	0.00	0.00
POWELL	0.00	0.00	0.00	0.00	0.00	0.00
PULASKI	0.00	383.06	0.00	383.06	6.01	1,480.45
ROBERTSON	0.00	0.00	0.00	0.00	0.00	0.00
ROCKCASTLE	0.00	0.00	0.00	0.00	0.00	0.00
ROWAN	0.00	0.00	0.00	0.00	0.00	0.00
RUSSELL	0.00	0.00	0.00	0.00	0.00	0.00
SCOTT	0.00	0.00	0.00	0.00	0.00	0.00
SHELBY	0.00	0.00	0.00	0.00	0.00	0.00
SIMPSON	0.00	0.00	0.00	0.00	0.00	0.00
SPENCER	0.00	0.00	0.00	0.00	0.00	0.00
TAYLOR	0.00	0.00	0.00	0.00	0.00	0.00
TODD	0.00	0.00	0.00	0.00	0.00	0.00
TRIGG	0.00	0.00	0.00	0.00	0.00	0.00
TRIMBLE	0.00	0.00	0.00	0.00	0.00	0.00
UNION	0.00	0.00	0.00	0.00	0.00	0.00
WARREN	0.00	0.00	0.00	0.00	0.00	0.00
WASHINGTON	0.00	0.00	0.00	0.00	0.00	0.00
WAYNE	0.00	0.00	0.00	0.00	0.00	0.00
WEBSTER	0.00	148.90	0.00	148.90	48.09	3,337.50
WHITLEY	0.00	0.00	0.00	0.00	0.00	0.00
WOLFE	0.00	0.00	0.00	0.00	0.00	0.00
WOODFORD	0.00	13.19	0.00	13.19	0.00	91.45
Total	38.22	3,405.70	0.00	3,443.92	203.15	70,641.93

Agricultural Use

Water used for agricultural purposes (irrigation and livestock) in Kentucky was 44 Mgal/d. Of this amount, about 74 percent was used for livestock production (fig. 14).

Water withdrawn for supplemental irrigation was about 12 Mgal/d during 1990. Ninety-six percent of the water used for irrigation was surface water (fig. 15). Withdrawals and irrigated acreage more than doubled from values in 1980 to values in 1990 for this category. About 32,000 acres were irrigated with about 98 percent of the acres being irrigated by spray-type irrigation systems (fig. 15). It was estimated that in Scott County more water was used for irrigation than any other county in the State during 1990, averaging 0.65 Mgal/d. Nearly one-third of all water used for irrigation in the State was used by eight north-central counties (Scott, Fayette, Harrison, Owen, Bourbon, Woodford, Henry, and Shelby). Most of the water was used for supplemental irrigation of tobacco. The distribution of irrigation withdrawals is shown in figure 16 and individual county data are listed in table 7.

Water used for livestock production was about 33 Mgal/d. Surface-water sources, such as streams and ponds, accounted for about 95 percent of the water (fig. 15). Barren County led all Kentucky counties in livestock water use at 1.3 Mgal/d. Withdrawals are fairly uniform across the State except for the mountainous areas of eastern Kentucky where the rugged terrain is not suited to livestock production. The distribution of livestock withdrawals for the State is shown in figure 17; specific county withdrawal data for livestock are shown in table 8.

Water withdrawn for agricultural uses does not seem significant when compared to overall water use in the State. During 1990, about 1 percent of Kentucky's total offstream withdrawals were attributable to irrigation and livestock use. Even though withdrawals for the irrigation and livestock categories were a small amount, these categories accounted for more than 14 percent of the total consumptive use during 1990.

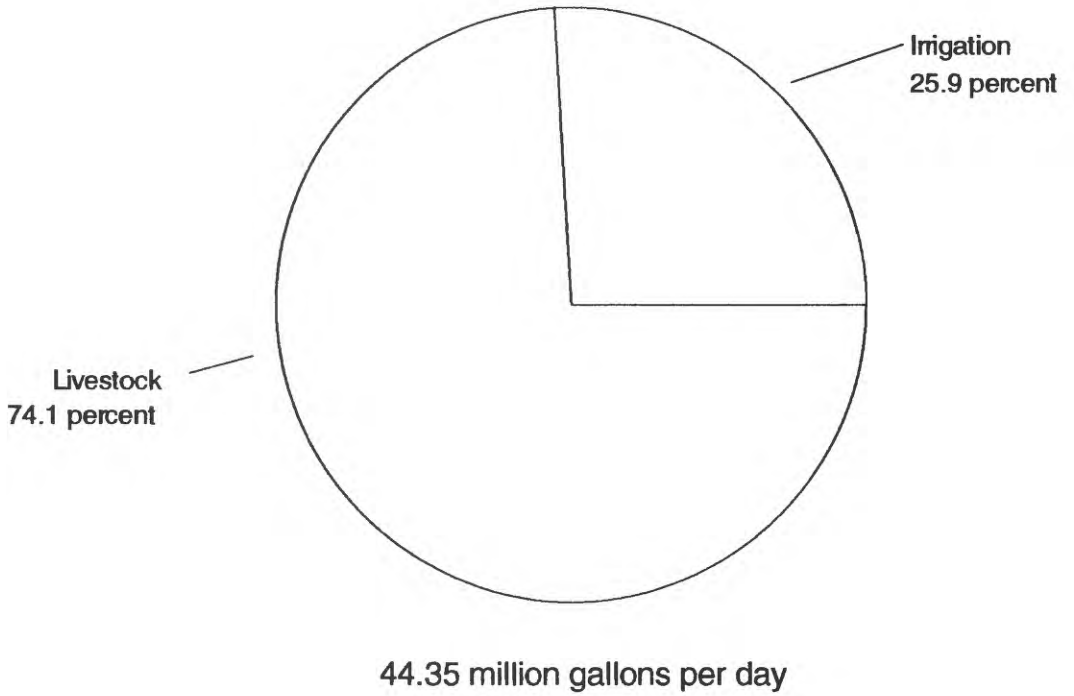

Figure 14. Water withdrawn for agricultural purposes, by category, during 1990.

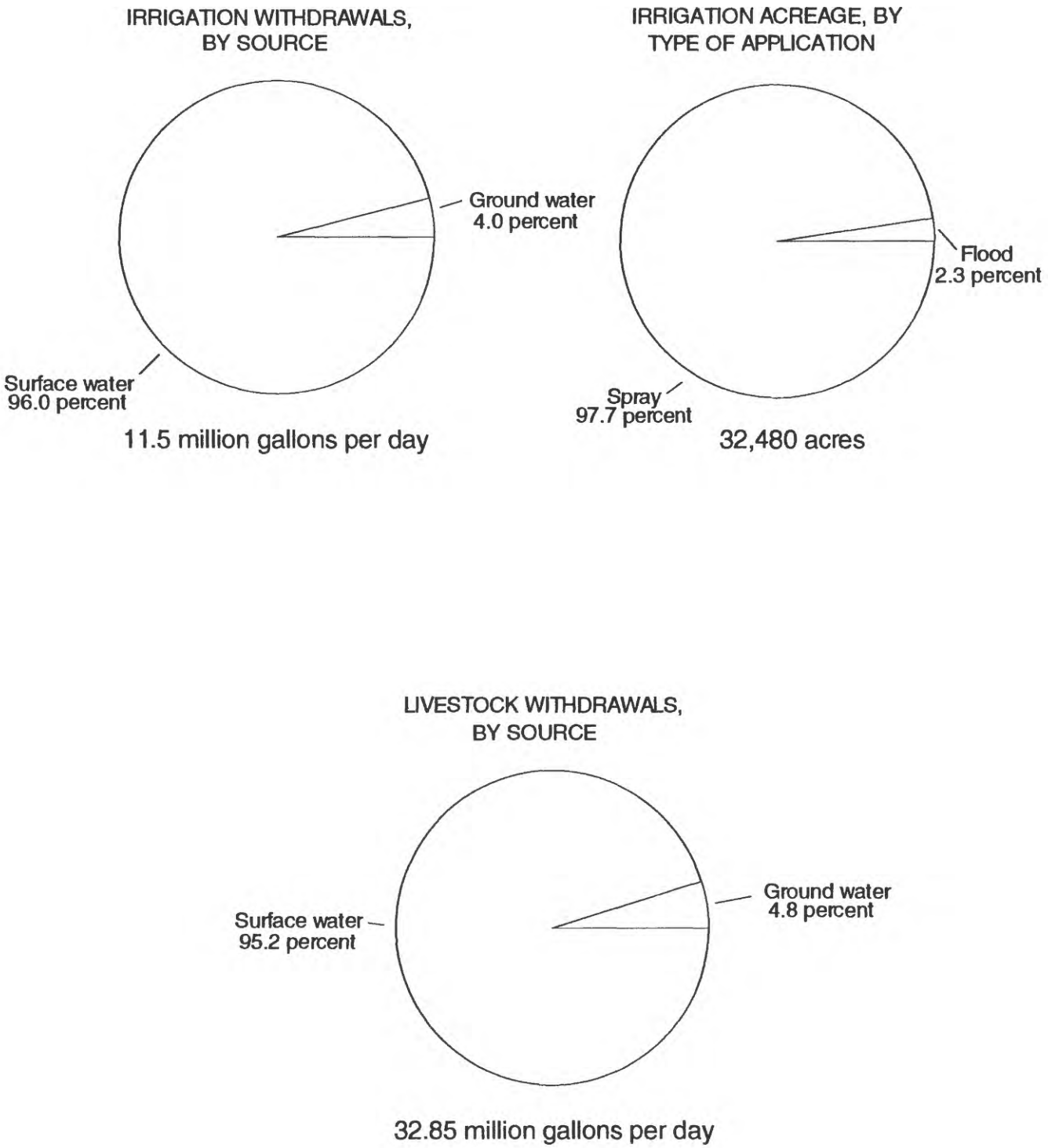

Figure 15. Water use for agricultural purposes, by category, during 1990.

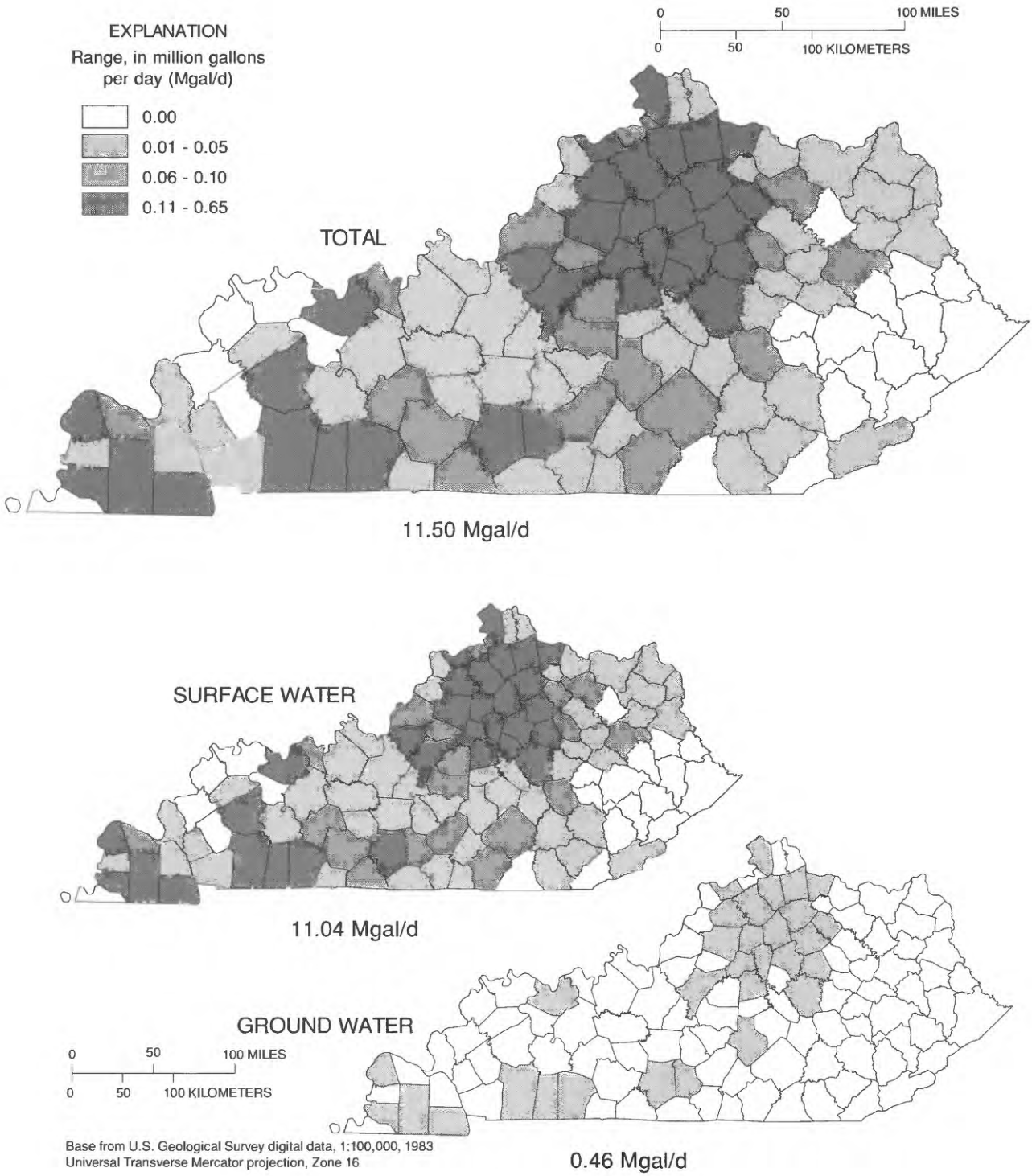

Figure 16. Irrigation water withdrawals, by county, during 1990.

Table 7. Irrigation water use in Kentucky, by county, during 1990

County	Irrigated land by type, in thousand acres		Thousand acre-feet per year					Millions gallons per day				
			Withdrawals					Withdrawals				
			Source					Source				
	Spray	Flood	Ground water	Surface water	Total	Conveyance losses	Consumptive use fresh water	Ground water	Surface water	Total	Conveyance losses	Consumptive use fresh water
ADAIR	0.30	0.00	0.00	0.11	0.11	0.01	0.11	0.00	0.10	0.10	0.01	0.10
ALLEN	0.17	0.00	0.00	0.07	0.07	0.00	0.07	0.00	0.06	0.06	0.00	0.06
ANDERSON	0.36	0.00	0.01	0.13	0.15	0.01	0.13	0.01	0.12	0.13	0.01	0.12
BALLARD	1.14	0.00	0.02	0.44	0.46	0.02	0.44	0.02	0.39	0.41	0.02	0.39
BARREN	0.37	0.00	0.01	0.13	0.15	0.01	0.13	0.01	0.12	0.13	0.01	0.12
BATH	0.15	0.00	0.00	0.06	0.06	0.00	0.06	0.00	0.05	0.05	0.00	0.05
BELL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BOONE	0.62	0.00	0.01	0.24	0.25	0.01	0.24	0.01	0.21	0.22	0.01	0.21
BOURBON	1.14	0.00	0.02	0.44	0.46	0.02	0.44	0.02	0.39	0.41	0.02	0.39
BOYD	0.06	0.00	0.00	0.02	0.02	0.00	0.02	0.00	0.02	0.02	0.00	0.02
BOYLE	0.10	0.00	0.00	0.03	0.03	0.00	0.03	0.00	0.03	0.03	0.00	0.03
BRACKEN	0.38	0.00	0.01	0.15	0.16	0.01	0.15	0.01	0.13	0.14	0.01	0.13
BREATHITT	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BRECKINRIDGE	0.13	0.00	0.00	0.04	0.04	0.00	0.04	0.00	0.04	0.04	0.00	0.04
BULLITT	0.31	0.00	0.00	0.12	0.12	0.01	0.12	0.00	0.11	0.11	0.01	0.11
BUTLER	0.20	0.00	0.00	0.08	0.08	0.00	0.08	0.00	0.07	0.07	0.00	0.07
CALDWELL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CALLOWAY	0.65	0.00	0.01	0.25	0.26	0.01	0.25	0.01	0.22	0.23	0.01	0.22
CAMPBELL	0.15	0.00	0.00	0.06	0.06	0.00	0.06	0.00	0.05	0.05	0.00	0.05
CARLISLE	0.02	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.01	0.01	0.00	0.01
CARROLL	0.37	0.00	0.01	0.13	0.15	0.01	0.13	0.01	0.12	0.13	0.01	0.12
CARTER	0.12	0.00	0.00	0.04	0.04	0.00	0.04	0.00	0.04	0.04	0.00	0.04
CASEY	0.14	0.00	0.06	0.06	0.11	0.00	0.06	0.05	0.05	0.10	0.00	0.05
CHRISTIAN	1.04	0.00	0.01	0.40	0.41	0.02	0.39	0.01	0.36	0.37	0.02	0.35
CLARK	0.34	0.00	0.01	0.12	0.13	0.01	0.12	0.01	0.11	0.12	0.01	0.11
CLAY	0.05	0.00	0.00	0.02	0.02	0.00	0.02	0.00	0.02	0.02	0.00	0.02
CLINTON	0.12	0.00	0.00	0.04	0.04	0.00	0.04	0.00	0.04	0.04	0.00	0.04
CRITTENDEN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CUMBERLAND	0.05	0.00	0.00	0.02	0.02	0.00	0.01	0.00	0.02	0.02	0.00	0.01
DAVIESS	1.10	0.00	0.02	0.43	0.45	0.02	0.41	0.02	0.38	0.40	0.02	0.37
EDMONSON	0.10	0.00	0.00	0.03	0.03	0.00	0.03	0.00	0.03	0.03	0.00	0.03
ELLIOTT	0.09	0.00	0.00	0.03	0.03	0.00	0.03	0.00	0.03	0.03	0.00	0.03
ESTILL	0.05	0.00	0.00	0.02	0.02	0.00	0.02	0.00	0.02	0.02	0.00	0.02
FAYETTE	1.70	0.09	0.03	0.68	0.72	0.03	0.68	0.03	0.61	0.64	0.03	0.61
FLEMING	0.25	0.00	0.00	0.09	0.09	0.00	0.09	0.00	0.08	0.08	0.00	0.08
FLOYD	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FRANKLIN	0.38	0.00	0.01	0.15	0.16	0.01	0.15	0.01	0.13	0.14	0.01	0.13
FULTON	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GALLATIN	0.19	0.00	0.00	0.07	0.07	0.00	0.07	0.00	0.06	0.06	0.00	0.06
GARRARD	0.16	0.00	0.00	0.06	0.06	0.00	0.06	0.00	0.05	0.05	0.00	0.05
GRANT	0.35	0.01	0.01	0.13	0.15	0.01	0.13	0.01	0.12	0.13	0.01	0.12
GRAVES	0.42	0.20	0.01	0.24	0.25	0.01	0.24	0.01	0.21	0.22	0.01	0.21
GRAYSON	0.07	0.01	0.00	0.03	0.03	0.00	0.03	0.00	0.03	0.03	0.00	0.03
GREEN	0.07	0.00	0.00	0.02	0.02	0.00	0.02	0.00	0.02	0.02	0.00	0.02
GREENUP	0.09	0.00	0.00	0.03	0.03	0.00	0.03	0.00	0.03	0.03	0.00	0.03
HANCOCK	0.24	0.00	0.00	0.09	0.09	0.00	0.09	0.00	0.08	0.08	0.00	0.08
HARDIN	0.06	0.00	0.00	0.02	0.02	0.00	0.02	0.00	0.02	0.02	0.00	0.02
HARLAN	0.02	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.01	0.00	0.00
HARRISON	1.67	0.00	0.03	0.64	0.67	0.03	0.64	0.03	0.57	0.60	0.03	0.57
HART	0.06	0.00	0.00	0.02	0.02	0.00	0.02	0.00	0.02	0.02	0.00	0.02
HENDERSON	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HENRY	0.80	0.00	0.01	0.30	0.31	0.01	0.30	0.01	0.27	0.28	0.01	0.27
HICKMAN	0.91	0.00	0.01	0.35	0.36	0.02	0.35	0.01	0.31	0.32	0.02	0.31
HOPKINS	0.34	0.00	0.00	0.13	0.13	0.01	0.13	0.00	0.12	0.12	0.01	0.12
JACKSON	0.21	0.00	0.00	0.08	0.08	0.00	0.08	0.00	0.07	0.07	0.00	0.07
JEFFERSON	0.25	0.01	0.00	0.10	0.10	0.00	0.10	0.00	0.09	0.09	0.00	0.09
JESSAMINE	0.39	0.00	0.00	0.15	0.15	0.01	0.15	0.00	0.13	0.13	0.01	0.13
JOHNSON	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
KENTON	0.02	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.01	0.01	0.00	0.01
KNOTT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 7. Irrigation water use in Kentucky, by county, during 1990--Continued

County	Irrigated land by type, in thousand acres		Thousand acre-feet per year					Millions gallons per day				
			Withdrawals					Withdrawals				
			Source					Source				
	Spray	Flood	Ground water	Surface water	Total	Conveyance losses	Consumptive use fresh water	Ground water	Surface water	Total	Conveyance losses	Consumptive use fresh water
KNOX	0.16	0.00	0.00	0.06	0.06	0.00	0.06	0.00	0.05	0.05	0.00	0.05
LARUE	0.13	0.00	0.00	0.04	0.04	0.00	0.04	0.00	0.04	0.04	0.00	0.04
LAUREL	0.04	0.04	0.00	0.03	0.03	0.00	0.03	0.00	0.03	0.03	0.00	0.03
LAWRENCE	0.08	0.00	0.00	0.03	0.03	0.00	0.03	0.00	0.03	0.03	0.00	0.03
LEE	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LESLIE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LETCHER	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LEWIS	0.13	0.00	0.00	0.04	0.04	0.00	0.04	0.00	0.04	0.04	0.00	0.04
LINCOLN	0.14	0.00	0.00	0.06	0.06	0.00	0.06	0.00	0.05	0.05	0.00	0.05
LIVINGSTON	0.11	0.00	0.00	0.04	0.04	0.00	0.04	0.00	0.04	0.04	0.00	0.04
LOGAN	0.76	0.14	0.01	0.35	0.36	0.02	0.35	0.01	0.31	0.32	0.02	0.31
LYON	0.08	0.00	0.00	0.03	0.03	0.00	0.02	0.00	0.03	0.03	0.00	0.02
MCCRACKEN	0.20	0.00	0.00	0.08	0.08	0.00	0.08	0.00	0.07	0.07	0.00	0.07
MCCREARY	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MCLEAN	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MADISON	0.47	0.00	0.01	0.18	0.19	0.01	0.18	0.01	0.16	0.17	0.01	0.16
MAGOFFIN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MARION	0.24	0.00	0.00	0.09	0.09	0.00	0.09	0.00	0.08	0.08	0.00	0.08
MARSHALL	0.09	0.00	0.00	0.03	0.03	0.00	0.03	0.00	0.03	0.03	0.00	0.03
MARTIN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MASON	0.06	0.00	0.00	0.02	0.02	0.00	0.02	0.00	0.02	0.02	0.00	0.02
MEADE	0.14	0.00	0.00	0.06	0.06	0.00	0.06	0.00	0.05	0.05	0.00	0.05
MENIFEE	0.02	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.01	0.01	0.00	0.01
MERCER	0.32	0.00	0.01	0.12	0.13	0.01	0.12	0.01	0.11	0.12	0.01	0.11
METCALFE	0.28	0.00	0.01	0.11	0.12	0.01	0.11	0.01	0.10	0.11	0.01	0.10
MONROE	0.09	0.00	0.00	0.03	0.03	0.00	0.03	0.00	0.03	0.03	0.00	0.03
MONTGOMERY	0.19	0.00	0.00	0.07	0.07	0.00	0.07	0.00	0.06	0.06	0.00	0.06
MORGAN	0.24	0.00	0.00	0.09	0.09	0.00	0.09	0.00	0.08	0.08	0.00	0.08
MUHLENBERG	0.06	0.00	0.00	0.02	0.02	0.00	0.02	0.00	0.02	0.02	0.00	0.02
NELSON	0.47	0.00	0.01	0.18	0.19	0.01	0.18	0.01	0.16	0.17	0.01	0.16
NICHOLAS	0.29	0.00	0.01	0.11	0.12	0.01	0.11	0.01	0.10	0.11	0.01	0.10
OHIO	0.07	0.00	0.00	0.02	0.02	0.00	0.02	0.00	0.02	0.02	0.00	0.02
OLDHAM	0.12	0.00	0.00	0.04	0.04	0.00	0.04	0.00	0.04	0.04	0.00	0.04
OWEN	1.17	0.00	0.02	0.45	0.47	0.02	0.45	0.02	0.40	0.42	0.02	0.40
OWSLEY	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PENDLETON	0.68	0.00	0.01	0.26	0.27	0.01	0.26	0.01	0.23	0.24	0.01	0.23
PERRY	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PIKE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
POWELL	0.03	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.01	0.01	0.00	0.01
PULASKI	0.21	0.00	0.00	0.08	0.08	0.00	0.08	0.00	0.07	0.07	0.00	0.07
ROBERTSON	0.13	0.00	0.00	0.04	0.04	0.00	0.04	0.00	0.04	0.04	0.00	0.04
ROCKCASTLE	0.04	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.01	0.01	0.00	0.01
ROWAN	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RUSSELL	0.14	0.00	0.00	0.06	0.06	0.00	0.06	0.00	0.05	0.05	0.00	0.05
SCOTT	1.64	0.18	0.03	0.70	0.73	0.03	0.70	0.03	0.62	0.65	0.03	0.62
SHELBY	0.60	0.00	0.01	0.24	0.25	0.01	0.22	0.01	0.21	0.22	0.01	0.20
SIMPSON	0.09	0.00	0.00	0.03	0.03	0.00	0.03	0.00	0.03	0.03	0.00	0.03
SPENCER	0.28	0.00	0.00	0.11	0.11	0.00	0.10	0.00	0.10	0.10	0.00	0.09
TAYLOR	0.08	0.00	0.00	0.03	0.03	0.00	0.03	0.00	0.03	0.03	0.00	0.03
TODD	0.86	0.00	0.01	0.33	0.34	0.02	0.33	0.01	0.29	0.30	0.02	0.29
TRIGG	0.10	0.00	0.00	0.04	0.04	0.00	0.03	0.00	0.04	0.04	0.00	0.03
TRIMBLE	0.15	0.00	0.00	0.06	0.06	0.00	0.06	0.00	0.05	0.05	0.00	0.05
UNION	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WARREN	0.26	0.00	0.00	0.10	0.10	0.00	0.10	0.00	0.09	0.09	0.00	0.09
WASHINGTON	0.25	0.00	0.00	0.10	0.10	0.00	0.09	0.00	0.09	0.09	0.00	0.08
WAYNE	0.18	0.06	0.00	0.09	0.09	0.00	0.09	0.00	0.08	0.08	0.00	0.08
WEBSTER	0.06	0.00	0.00	0.02	0.02	0.00	0.02	0.00	0.02	0.02	0.00	0.02
WHITLEY	0.08	0.00	0.00	0.03	0.03	0.00	0.03	0.00	0.03	0.03	0.00	0.03
WOLFE	0.10	0.00	0.00	0.04	0.04	0.00	0.03	0.00	0.04	0.04	0.00	0.03
WOODFORD	1.09	0.00	0.02	0.41	0.44	0.02	0.41	0.02	0.37	0.39	0.02	0.37
Total	31.74	0.74	0.52	12.38	12.89	0.55	12.26	0.46	11.04	11.50	0.49	10.94

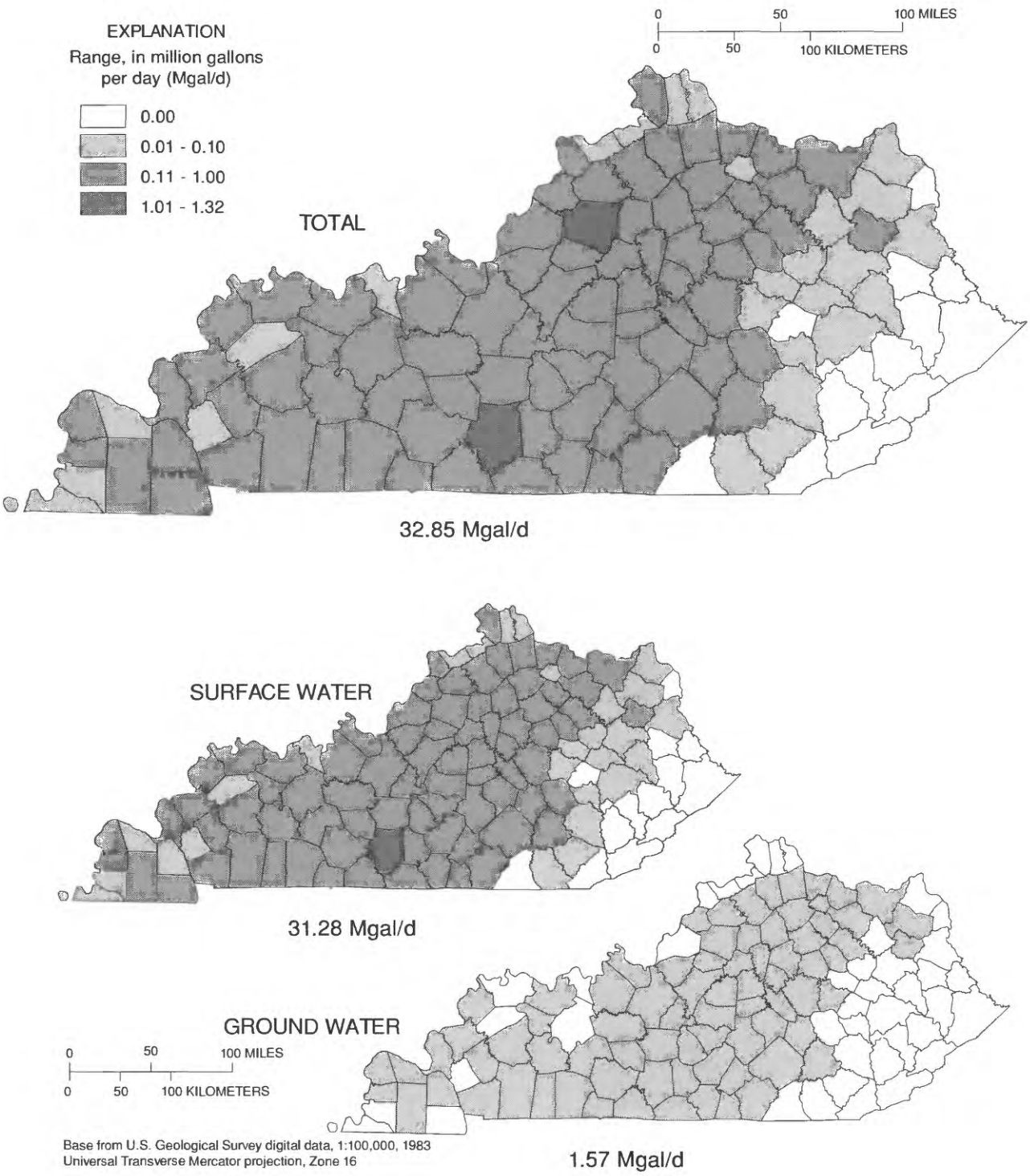

Figure 17. Livestock water withdrawals, by county, during 1990.

(page 44 follows)


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Table 8. Livestock water use in Kentucky, by county, during 1990

County	Withdrawals, in million gallons per day			
	Source			
	Ground water	Surface water	Total	Consumptive use
ADAIR	0.04	0.75	0.79	0.79
ALLEN	0.02	0.43	0.45	0.45
ANDERSON	0.02	0.44	0.46	0.46
BALLARD	0.01	0.20	0.21	0.21
BARREN	0.07	1.25	1.32	1.32
BATH	0.01	0.31	0.32	0.32
BELL	0.00	0.00	0.00	0.00
BOONE	0.00	0.17	0.17	0.17
BOURBON	0.02	0.42	0.44	0.44
BOYD	0.00	0.00	0.00	0.00
BOYLE	0.01	0.24	0.25	0.25
BRACKEN	0.02	0.24	0.26	0.26
BREATHITT	0.00	0.01	0.01	0.01
BRECKINRIDGE	0.02	0.48	0.50	0.50
BULLITT	0.01	0.17	0.18	0.18
BUTLER	0.01	0.20	0.21	0.21
CALDWELL	0.01	0.32	0.33	0.33
CALLOWAY	0.00	0.14	0.14	0.14
CAMPBELL	0.00	0.07	0.07	0.07
CARLISLE	0.01	0.18	0.19	0.19
CARROLL	0.00	0.09	0.09	0.09
CARTER	0.01	0.09	0.10	0.10
CASEY	0.02	0.50	0.52	0.52
CHRISTIAN	0.02	0.32	0.34	0.34
CLARK	0.01	0.27	0.28	0.28
CLAY	0.00	0.03	0.03	0.03
CLINTON	0.02	0.29	0.31	0.31
CRITTENDEN	0.01	0.19	0.20	0.20
CUMBERLAND	0.01	0.14	0.15	0.15
DAVIESS	0.01	0.26	0.27	0.27
EDMONSON	0.02	0.46	0.48	0.48
ELLIOTT	0.01	0.14	0.15	0.15
ESTILL	0.01	0.06	0.07	0.07
FAYETTE	0.02	0.29	0.31	0.31
FLEMING	0.02	0.26	0.28	0.28
FLOYD	0.00	0.00	0.00	0.00
FRANKLIN	0.03	0.57	0.60	0.60
FULTON	0.00	0.02	0.02	0.02
GALLATIN	0.00	0.07	0.07	0.07
GARRARD	0.02	0.37	0.39	0.39
GRANT	0.03	0.68	0.71	0.71
GRAVES	0.02	0.34	0.36	0.36
GRAYSON	0.03	0.56	0.59	0.59
GREEN	0.03	0.47	0.50	0.50
GREENUP	0.00	0.08	0.08	0.08
HANCOCK	0.00	0.08	0.08	0.08
HARDIN	0.03	0.61	0.64	0.64
HARLAN	0.00	0.00	0.00	0.00
HARRISON	0.02	0.32	0.34	0.34
HART	0.04	0.71	0.75	0.75
HENDERSON	0.00	0.14	0.14	0.14
HENRY	0.03	0.46	0.49	0.49
HICKMAN	0.00	0.09	0.09	0.09
HOPKINS	0.01	0.14	0.15	0.15
JACKSON	0.00	0.12	0.12	0.12
JEFFERSON	0.00	0.13	0.13	0.13
JESSAMINE	0.01	0.18	0.19	0.19
JOHNSON	0.00	0.00	0.00	0.00
KENTON	0.00	0.08	0.08	0.08
KNOTT	0.00	0.00	0.00	0.00

Table 8. Livestock water use in Kentucky, by county, during 1990--Continued

County	Withdrawals, in million gallons per day			
	Source			
	Ground water	Surface water	Total	Consumptive use
KNOX	0.00	0.04	0.04	0.04
LARUE	0.03	0.46	0.49	0.49
LAUREL	0.01	0.18	0.19	0.19
LAWRENCE	0.00	0.05	0.05	0.05
LEE	0.00	0.00	0.00	0.00
LESLIE	0.00	0.00	0.00	0.00
LETCHER	0.00	0.00	0.00	0.00
LEWIS	0.01	0.25	0.26	0.26
LINCOLN	0.03	0.64	0.67	0.67
LIVINGSTON	0.01	0.18	0.19	0.19
LOGAN	0.02	0.47	0.49	0.49
LYON	0.00	0.08	0.08	0.08
MCCRACKEN	0.01	0.08	0.09	0.09
MCCREARY	0.00	0.00	0.00	0.00
MCLEAN	0.01	0.17	0.18	0.18
MADISON	0.02	0.34	0.36	0.36
MAGOFFIN	0.00	0.01	0.01	0.01
MARION	0.04	0.66	0.70	0.70
MARSHALL	0.01	0.10	0.11	0.11
MARTIN	0.00	0.00	0.00	0.00
MASON	0.03	0.58	0.61	0.61
MEADE	0.02	0.26	0.28	0.28
MENIFEE	0.00	0.03	0.03	0.03
MERCER	0.02	0.50	0.52	0.52
METCALFE	0.03	0.60	0.63	0.63
MONROE	0.03	0.51	0.54	0.54
MONTGOMERY	0.01	0.26	0.27	0.27
MORGAN	0.00	0.07	0.07	0.07
MUHLENBERG	0.01	0.19	0.20	0.20
NELSON	0.05	0.90	0.95	0.95
NICHOLAS	0.01	0.17	0.18	0.18
OHIO	0.00	0.16	0.16	0.16
OLDHAM	0.01	0.27	0.28	0.28
OWEN	0.02	0.26	0.28	0.28
OWSLEY	0.00	0.01	0.01	0.01
PENDLETON	0.01	0.20	0.21	0.21
PERRY	0.00	0.00	0.00	0.00
PIKE	0.00	0.00	0.00	0.00
POWELL	0.00	0.03	0.03	0.03
PULASKI	0.04	0.81	0.85	0.85
ROBERTSON	0.01	0.08	0.09	0.09
ROCKCASTLE	0.01	0.19	0.20	0.20
ROWAN	0.00	0.04	0.04	0.04
RUSSELL	0.03	0.43	0.46	0.46
SCOTT	0.01	0.27	0.28	0.28
SHELBY	0.05	0.97	1.02	1.02
SIMPSON	0.01	0.21	0.22	0.22
SPENCER	0.02	0.41	0.43	0.43
TAYLOR	0.02	0.46	0.48	0.48
TODD	0.02	0.42	0.44	0.44
TRIGG	0.01	0.23	0.24	0.24
TRIMBLE	0.00	0.11	0.11	0.11
UNION	0.02	0.31	0.33	0.33
WARREN	0.04	0.69	0.73	0.73
WASHINGTON	0.03	0.62	0.65	0.65
WAYNE	0.02	0.31	0.33	0.33
WEBSTER	0.00	0.10	0.10	0.10
WHITLEY	0.00	0.06	0.06	0.06
WOLFE	0.00	0.02	0.02	0.02
WOODFORD	0.01	0.20	0.21	0.21
Total	1.57	31.28	32.85	32.85

Instream Use

Instream uses for water such as navigation, wastewater dilution, recreation, fish and wildlife, and esthetic concerns are all legitimate uses of water that must be considered along with the offstream uses. These categories are different from the offstream-use categories previously presented in this report because the water is not actually withdrawn from the stream. These instream uses are important to the overall accounting of water use in the State, but are not evaluated in this report because of the difficulty in quantifying them.

Hydroelectric-power-generation water use is the one instream use that is more easily quantified. It refers to the water used in the generation of electricity at plants where turbine generators are driven by water power. Hydroelectric-power-generation water use was 83,000 Mgal/d during 1990 or 95 percent of all quantified water use in the State, including all of the offstream uses.

Water was used to generate hydroelectric power in seven counties in Kentucky. Figure 18 shows the distribution of hydroelectric-power water use and table 9 lists data, by county, for this category. Hydroelectric-power plants in Kentucky produced about 2,900 gigawatthour of electricity during 1990. This amount represented only 4 percent of all power generated in the State, but accounted for more than 96 percent of the water used for power generation. Consumptive use for hydroelectric-power generation is negligible.

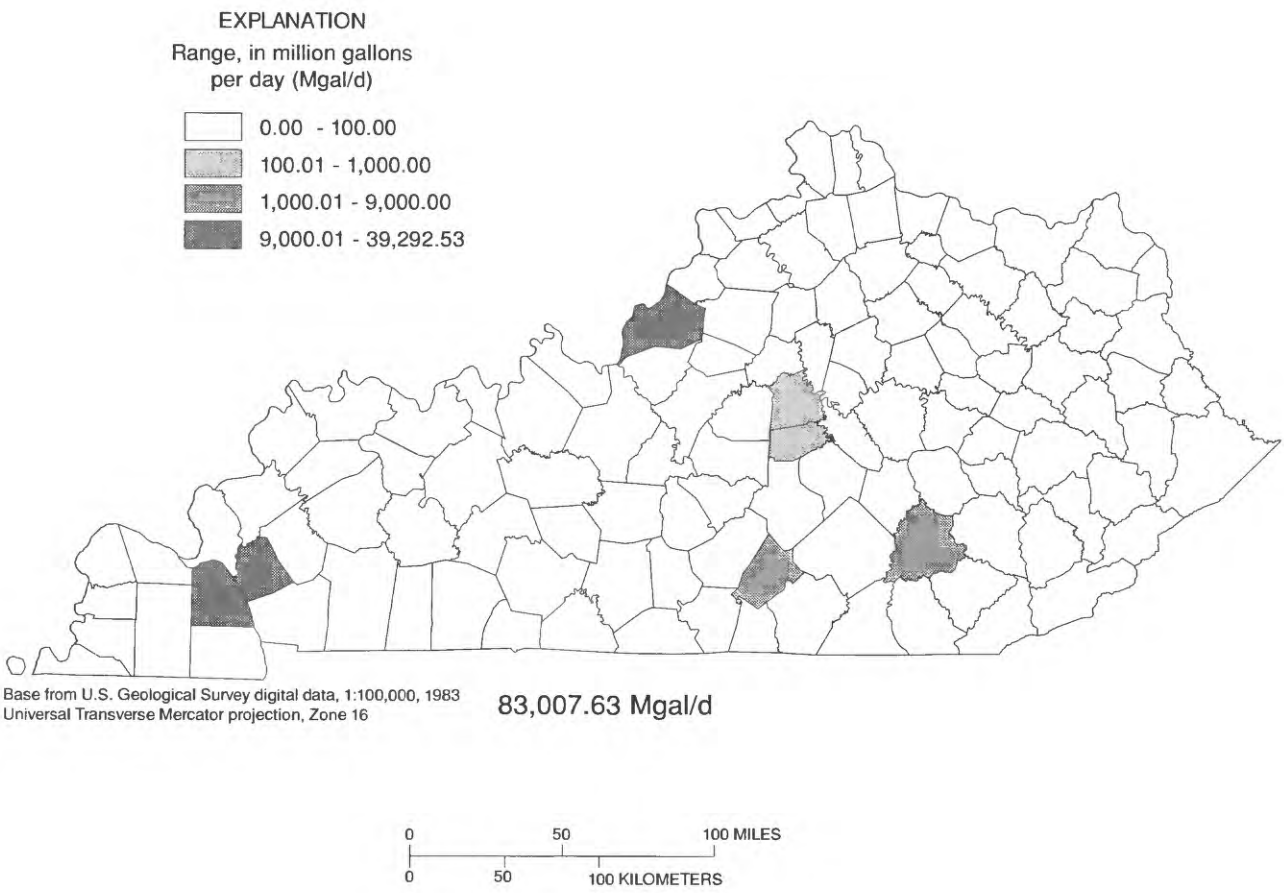

Figure 18. Hydroelectric power water withdrawals, by county, during 1990.

Table 9. Hydroelectric-power water use in Kentucky, by county, during 1990

County	Water use		Power generated, in gigawatthours
	Million gallons per day	Thousand acre-feet per year	
ADAIR	0.00	0.00	0.00
ALLEN	0.00	0.00	0.00
ANDERSON	0.00	0.00	0.00
BALLARD	0.00	0.00	0.00
BARREN	0.00	0.00	0.00
BATH	0.00	0.00	0.00
BELL	0.00	0.00	0.00
BOONE	0.00	0.00	0.00
BOURBON	0.00	0.00	0.00
BOYD	0.00	0.00	0.00
BOYLE	227.76	255.32	8.57
BRACKEN	0.00	0.00	0.00
BREATHITT	0.00	0.00	0.00
BRECKINRIDGE	0.00	0.00	0.00
BULLITT	0.00	0.00	0.00
BUTLER	0.00	0.00	0.00
CALDWELL	0.00	0.00	0.00
CALLOWAY	0.00	0.00	0.00
CAMPBELL	0.00	0.00	0.00
CARLISLE	0.00	0.00	0.00
CARROLL	0.00	0.00	0.00
CARTER	0.00	0.00	0.00
CASEY	0.00	0.00	0.00
CHRISTIAN	0.00	0.00	0.00
CLARK	0.00	0.00	0.00
CLAY	0.00	0.00	0.00
CLINTON	0.00	0.00	0.00
CRITTENDEN	0.00	0.00	0.00
CUMBERLAND	0.00	0.00	0.00
DAVIESS	0.00	0.00	0.00
EDMONSON	0.00	0.00	0.00
ELLIOTT	0.00	0.00	0.00
ESTILL	0.00	0.00	0.00
FAYETTE	0.00	0.00	0.00
FLEMING	0.00	0.00	0.00
FLOYD	0.00	0.00	0.00
FRANKLIN	0.00	0.00	0.00
FULTON	0.00	0.00	0.00
GALLATIN	0.00	0.00	0.00
GARRARD	0.00	0.00	0.00
GRANT	0.00	0.00	0.00
GRAVES	0.00	0.00	0.00
GRAYSON	0.00	0.00	0.00
GREEN	0.00	0.00	0.00
GREENUP	0.00	0.00	0.00
HANCOCK	0.00	0.00	0.00
HARDIN	0.00	0.00	0.00
HARLAN	0.00	0.00	0.00
HARRISON	0.00	0.00	0.00
HART	0.00	0.00	0.00
HENDERSON	0.00	0.00	0.00
HENRY	0.00	0.00	0.00
HICKMAN	0.00	0.00	0.00
HOPKINS	0.00	0.00	0.00
JACKSON	0.00	0.00	0.00
JEFFERSON	13,402.70	15,024.43	298.63
JESSAMINE	0.00	0.00	0.00
JOHNSON	0.00	0.00	0.00
KENTON	0.00	0.00	0.00
KNOTT	0.00	0.00	0.00

Table 9. Hydroelectric-power water use in Kentucky, by county, during 1990--Continued

County	Water use		Power generated, in gigawatthours
	Million gallons per day	Thousand acre-feet per year	
KNOX	0.00	0.00	0.00
LARUE	0.00	0.00	0.00
LAUREL	2,078.78	2,330.31	78.22
LAWRENCE	0.00	0.00	0.00
LEE	0.00	0.00	0.00
LESLIE	0.00	0.00	0.00
LETCHER	0.00	0.00	0.00
LEWIS	0.00	0.00	0.00
LINCOLN	0.00	0.00	0.00
LIVINGSTON	0.00	0.00	0.00
LOGAN	0.00	0.00	0.00
LYON	39,292.53	44,046.93	638.21
MCCRACKEN	0.00	0.00	0.00
MCCREARY	0.00	0.00	0.00
MCLEAN	0.00	0.00	0.00
MADISON	0.00	0.00	0.00
MAGOFFIN	0.00	0.00	0.00
MARION	0.00	0.00	0.00
MARSHALL	22,661.95	25,404.05	953.86
MARTIN	0.00	0.00	0.00
MASON	0.00	0.00	0.00
MEADE	0.00	0.00	0.00
MENIFEE	0.00	0.00	0.00
MERCER	316.71	355.03	66.37
METCALFE	0.00	0.00	0.00
MONROE	0.00	0.00	0.00
MONTGOMERY	0.00	0.00	0.00
MORGAN	0.00	0.00	0.00
MUHLENBERG	0.00	0.00	0.00
NELSON	0.00	0.00	0.00
NICHOLAS	0.00	0.00	0.00
OHIO	0.00	0.00	0.00
OLDHAM	0.00	0.00	0.00
OWEN	0.00	0.00	0.00
OWSLEY	0.00	0.00	0.00
PENDLETON	0.00	0.00	0.00
PERRY	0.00	0.00	0.00
PIKE	0.00	0.00	0.00
POWELL	0.00	0.00	0.00
PULASKI	0.00	0.00	0.00
ROBERTSON	0.00	0.00	0.00
ROCKCASTLE	0.00	0.00	0.00
ROWAN	0.00	0.00	0.00
RUSSELL	5,027.20	5,635.49	836.01
SCOTT	0.00	0.00	0.00
SHELBY	0.00	0.00	0.00
SIMPSON	0.00	0.00	0.00
SPENCER	0.00	0.00	0.00
TAYLOR	0.00	0.00	0.00
TODD	0.00	0.00	0.00
TRIGG	0.00	0.00	0.00
TRIMBLE	0.00	0.00	0.00
UNION	0.00	0.00	0.00
WARREN	0.00	0.00	0.00
WASHINGTON	0.00	0.00	0.00
WAYNE	0.00	0.00	0.00
WEBSTER	0.00	0.00	0.00
WHITLEY	0.00	0.00	0.00
WOLFE	0.00	0.00	0.00
WOODFORD	0.00	0.00	0.00
Total	83,007.63	93,051.56	2,879.87

TOTAL WATER USE

About 4,300 Mgal/d was withdrawn in Kentucky during 1990 for all offstream uses. This amount was 100 Mgal/d more than the offstream use values reported for 1985 (Solley and others, 1988). More than 94 percent of the withdrawals during 1990 came from surface-water sources, with less than 6 percent from ground water (fig. 19). Ninety-seven percent of the offstream water withdrawals during 1990 were used for thermoelectric-power-generation, public-supply, and industrial use. Average per-capita use was almost 1,200 gal/d for all offstream uses. Hydroelectric-power-generation water use, the only instream use reported during 1990, used 83,000 Mgal/d.

Withdrawals in McCracken County were larger than that of any other county in Kentucky during 1990. More than 1,000 Mgal/d was withdrawn in McCracken County; 981 Mgal/d was used for thermoelectric-power generation. The geographic distribution of the total offstream withdrawals, by county, and the total surface- and ground-water withdrawals are shown in figure 20. Offstream water use, by county, is summarized in table 10.

Water used in the production of thermoelectric-power generation accounted for almost 80 percent of the offstream water use during 1990. Offstream water withdrawals, by category, are summarized in figure 21.

Consumptive use during 1990 was slightly more than it was during 1985. It was estimated that consumptive use was about 309 Mgal/d during 1990, as compared to 260 Mgal/d during 1985. The thermoelectric, domestic, and livestock categories accounted for almost 90 percent of the consumptive use in the State. These categories were led by thermoelectric-power generation with two-thirds of the total consumptive use in the State during 1990. Consumptive use in Webster County (more than 48 Mgal/d) was the largest of any county in the State, and most of the consumption was attributed to evaporation losses from thermoelectric-power generation cooling water. Total offstream consumptive water use, by county and by category, is shown in figure 22.

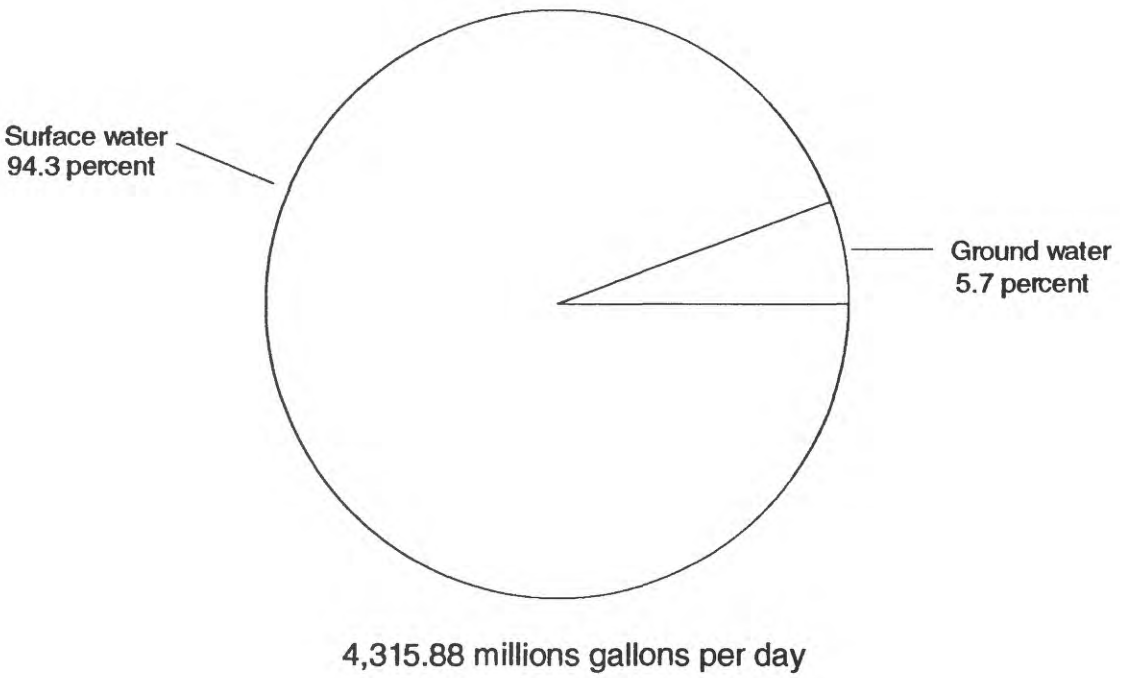

Figure 19. Total offstream water withdrawals, by source, during 1990.

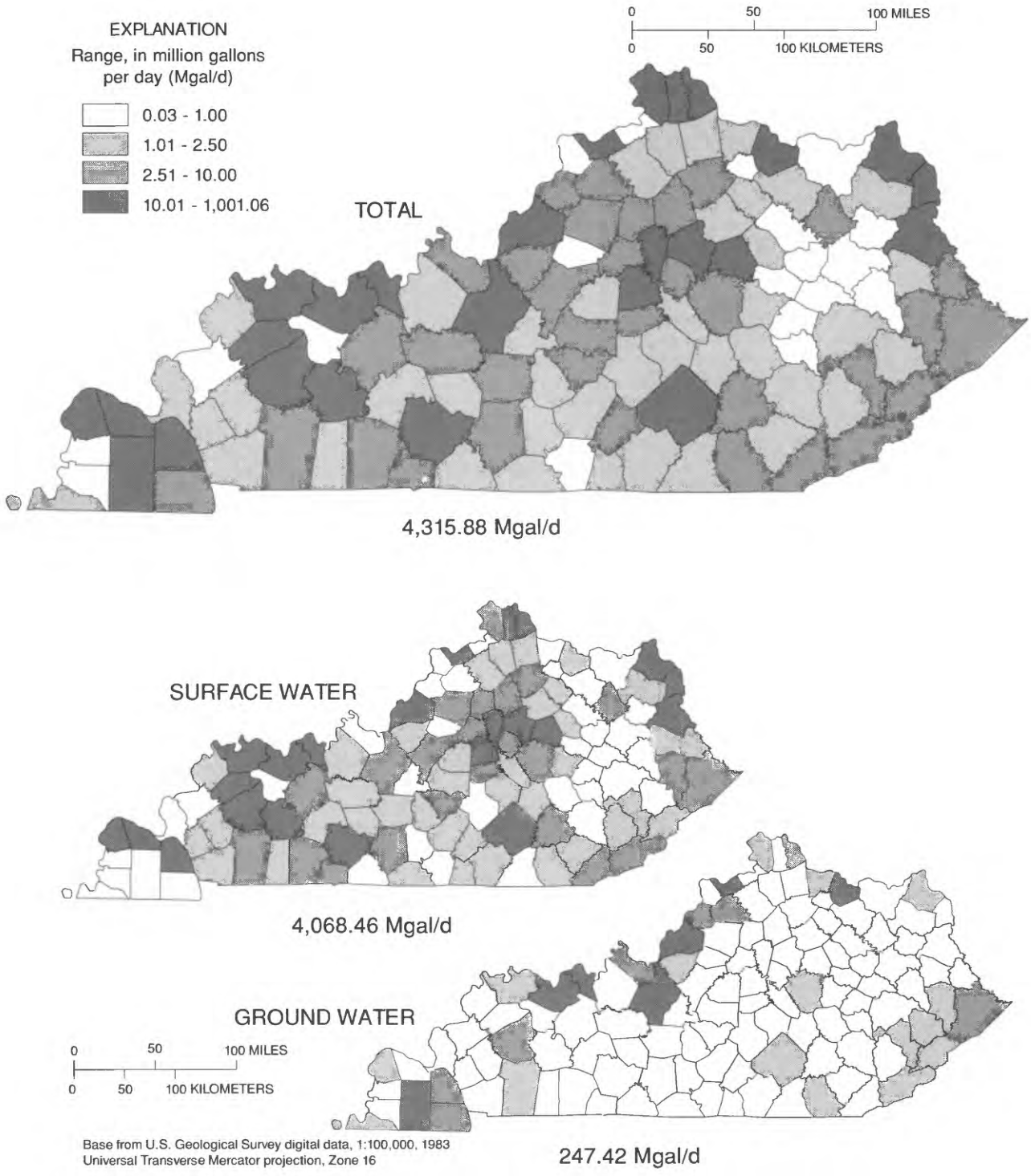

Figure 20. Offstream water withdrawals, by county, during 1990.

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Table 10. Total offstream water use in Kentucky, by county, during 1990

County	Total population, in thousands	Withdrawals, in million gallons per day (includes irrigation conveyance losses)			Conveyance losses, in million gallons per day	Consumptive use, in million gallons per day
		Source				
		Ground water	Surface water	Total		
ADAIR	15.36	0.53	1.62	2.15	0.01	1.15
ALLEN	14.63	0.49	0.97	1.46	0.00	0.74
ANDERSON	14.57	0.27	5.92	6.19	0.01	0.91
BALLARD	7.90	1.86	24.72	26.58	0.02	1.55
BARREN	34.00	0.21	5.66	5.87	0.01	1.80
BATH	9.69	0.34	0.58	0.92	0.00	0.54
BELL	31.50	0.39	2.99	3.38	0.00	0.43
BOONE	57.59	1.50	9.91	11.41	0.01	6.49
BOURBON	19.24	0.26	2.18	2.44	0.02	1.04
BOYD	51.15	0.43	64.13	64.56	0.00	2.63
BOYLE	25.64	0.26	7.74	8.00	0.00	1.45
BRACKEN	7.76	1.07	0.40	1.47	0.01	0.53
BREATHITT	15.70	0.63	0.79	1.42	0.00	0.31
BRECKINRIDGE	16.31	0.56	1.17	1.73	0.00	0.62
BULLITT	47.57	1.94	2.28	4.22	0.01	1.19
BUTLER	11.24	0.27	1.14	1.41	0.00	0.45
CALDWELL	13.23	0.16	1.23	1.39	0.00	0.46
CALLOWAY	30.73	3.84	0.39	4.23	0.01	0.71
CAMPBELL	83.87	2.60	10.91	13.51	0.00	1.76
CARLISLE	5.24	0.47	0.20	0.67	0.00	0.28
CARROLL	9.29	12.90	26.03	38.93	0.01	22.71
CARTER	24.34	0.50	1.88	2.38	0.00	0.48
CASEY	14.21	0.60	1.00	1.60	0.00	0.83
CHRISTIAN	68.94	1.70	6.18	7.88	0.02	1.63
CLARK	29.50	0.31	105.93	106.24	0.01	2.09
CLAY	21.75	0.74	1.00	1.74	0.00	0.42
CLINTON	9.13	0.15	1.06	1.21	0.00	0.41
CRITTENDEN	9.20	0.21	0.62	0.83	0.00	0.31
CUMBERLAND	6.78	0.13	0.66	0.79	0.00	0.24
DAVIESS	87.19	18.89	198.17	217.06	0.02	2.04
EDMONSON	10.36	0.12	1.23	1.35	0.00	0.61
ELLIOTT	6.46	0.36	0.19	0.55	0.00	0.30
ESTILL	14.61	0.31	2.09	2.40	0.00	0.33
FAYETTE	225.37	0.37	36.05	36.42	0.03	3.23
FLEMING	12.29	0.35	0.92	1.27	0.00	0.53
FLOYD	43.59	1.26	3.92	5.18	0.00	1.54
FRANKLIN	43.78	0.23	8.50	8.73	0.01	1.27
FULTON	8.27	1.49	0.03	1.52	0.00	0.13
GALLATIN	5.39	0.34	0.15	0.49	0.00	0.22
GARRARD	11.58	0.31	1.18	1.49	0.00	0.61
GRANT	15.74	0.32	1.83	2.15	0.01	1.02
GRAVES	33.55	13.69	0.57	14.26	0.01	1.25
GRAYSON	21.05	0.64	2.27	2.91	0.00	0.96
GREEN	10.37	0.34	1.18	1.52	0.00	0.69
GREENUP	36.74	1.68	11.53	13.21	0.00	0.93
HANCOCK	7.86	25.89	225.18	251.07	0.00	1.15
HARDIN	89.24	26.37	4.87	31.24	0.00	2.22
HARLAN	36.57	1.55	3.02	4.57	0.00	0.49
HARRISON	16.25	0.41	2.54	2.95	0.03	1.17
HART	14.89	0.24	2.37	2.61	0.00	0.93
HENDERSON	43.04	1.36	112.47	113.83	0.00	35.90
HENRY	12.82	7.68	0.74	8.42	0.01	1.44
HICKMAN	5.57	0.32	0.41	0.73	0.02	0.46
HOPKINS	46.13	3.16	13.54	16.70	0.01	1.19
JACKSON	11.96	0.25	0.86	1.11	0.00	0.35
JEFFERSON	664.94	15.90	900.58	916.48	0.00	23.85
JESSAMINE	30.51	0.59	2.94	3.53	0.01	0.74
JOHNSON	23.25	0.71	1.59	2.30	0.00	0.40
KENTON	142.03	0.71	23.47	24.18	0.00	1.80
KNOTT	17.91	1.02	0.15	1.17	0.00	0.34

Table 10. Total offstream water use in Kentucky, by county, during 1990--Continued

County	Total population, in thousands	Withdrawals, in million gallons per day (includes irrigation conveyance losses)			Conveyance losses, in million gallons per day	Consumptive use, in million gallons per day
		Source				
		Ground water	Surface water	Total		
KNOX	29.68	0.65	1.72	2.37	0.00	0.50
LARUE	11.68	0.40	0.88	1.28	0.00	0.71
LAUREL	43.44	0.38	7.57	7.95	0.00	0.80
LAWRENCE	14.00	0.40	18.16	18.56	0.00	7.53
LEE	7.42	0.28	0.51	0.79	0.00	0.25
LESLIE	13.64	0.46	1.03	1.49	0.00	0.25
LETCHER	27.00	1.36	1.38	2.74	0.00	0.46
LEWIS	13.03	0.63	0.33	0.96	0.00	0.49
LINCOLN	20.04	0.75	1.26	2.01	0.00	1.08
LIVINGSTON	9.06	0.27	0.86	1.13	0.00	0.30
LOGAN	24.42	0.51	3.93	4.44	0.02	1.19
LYON	6.62	0.09	1.41	1.50	0.00	0.19
MCCRACKEN	62.88	0.58	1,000.48	1,001.06	0.00	1.22
MCCREARY	15.60	0.27	0.85	1.12	0.00	0.18
MCLEAN	9.63	0.28	0.68	0.96	0.00	0.31
MADISON	57.51	1.25	7.28	8.53	0.01	1.42
MAGOFFIN	13.08	0.86	0.09	0.95	0.00	0.24
MARION	16.50	0.47	2.32	2.79	0.00	1.06
MARSHALL	27.20	4.72	16.08	20.80	0.00	0.87
MARTIN	12.53	0.83	2.31	3.14	0.00	0.28
MASON	16.67	39.25	2.23	41.48	0.00	8.19
MEADE	24.17	9.12	0.56	9.68	0.00	0.87
MENIFEE	5.09	0.13	0.27	0.40	0.00	0.11
MERCER	19.15	0.42	19.50	19.92	0.01	13.50
METCALFE	8.96	0.37	0.74	1.11	0.01	0.88
MONROE	11.40	0.36	1.26	1.62	0.00	0.75
MONTGOMERY	19.56	0.25	2.22	2.47	0.00	0.57
MORGAN	11.65	0.41	0.48	0.89	0.00	0.35
MUHLENBERG	31.32	0.83	488.63	489.46	0.00	41.48
NELSON	29.71	0.73	6.38	7.11	0.01	1.66
NICHOLAS	6.72	0.03	1.88	1.91	0.01	0.37
OHIO	21.10	0.22	7.68	7.90	0.00	4.70
OLDHAM	33.26	3.48	0.40	3.88	0.00	1.18
OWEN	9.04	0.32	1.21	1.53	0.02	0.83
OWSLEY	5.04	0.12	0.25	0.37	0.00	0.08
PENDLETON	12.04	0.42	1.20	1.62	0.01	0.66
PERRY	30.28	1.10	2.24	3.34	0.00	0.52
PIKE	72.58	2.89	4.92	7.81	0.00	1.28
POWELL	11.69	0.23	0.77	1.00	0.00	0.20
PULASKI	49.49	1.33	388.35	389.68	0.00	7.74
ROBERTSON	2.12	0.07	0.18	0.25	0.00	0.16
ROCKCASTLE	14.80	0.40	1.36	1.76	0.00	0.44
ROWAN	20.35	0.16	2.53	2.69	0.00	0.27
RUSSELL	14.72	0.63	1.99	2.62	0.00	0.74
SCOTT	23.87	0.33	4.55	4.88	0.03	1.24
SHELBY	24.82	0.53	3.55	4.08	0.01	1.59
SIMPSON	15.14	0.05	2.70	2.75	0.00	0.42
SPENCER	6.80	0.05	0.94	0.99	0.00	0.57
TAYLOR	21.15	0.24	8.68	8.92	0.00	0.97
TODD	10.94	0.56	1.22	1.78	0.02	0.86
TRIGG	10.36	0.09	1.55	1.64	0.00	0.39
TRIMBLE	6.09	0.52	0.17	0.69	0.00	0.23
UNION	16.56	0.24	2.21	2.45	0.00	0.55
WARREN	76.67	0.29	11.74	12.03	0.00	1.59
WASHINGTON	10.44	0.35	1.35	1.70	0.00	0.91
WAYNE	17.47	0.48	1.82	2.30	0.00	0.69
WEBSTER	13.96	0.94	150.28	151.22	0.00	48.41
WHITLEY	33.33	1.22	1.39	2.61	0.00	0.70
WOLFE	6.50	0.24	0.27	0.51	0.00	0.16
WOODFORD	19.96	0.40	15.85	16.25	0.02	0.85
Total	3,685.30	247.42	4,068.46	4,315.88	0.49	309.24

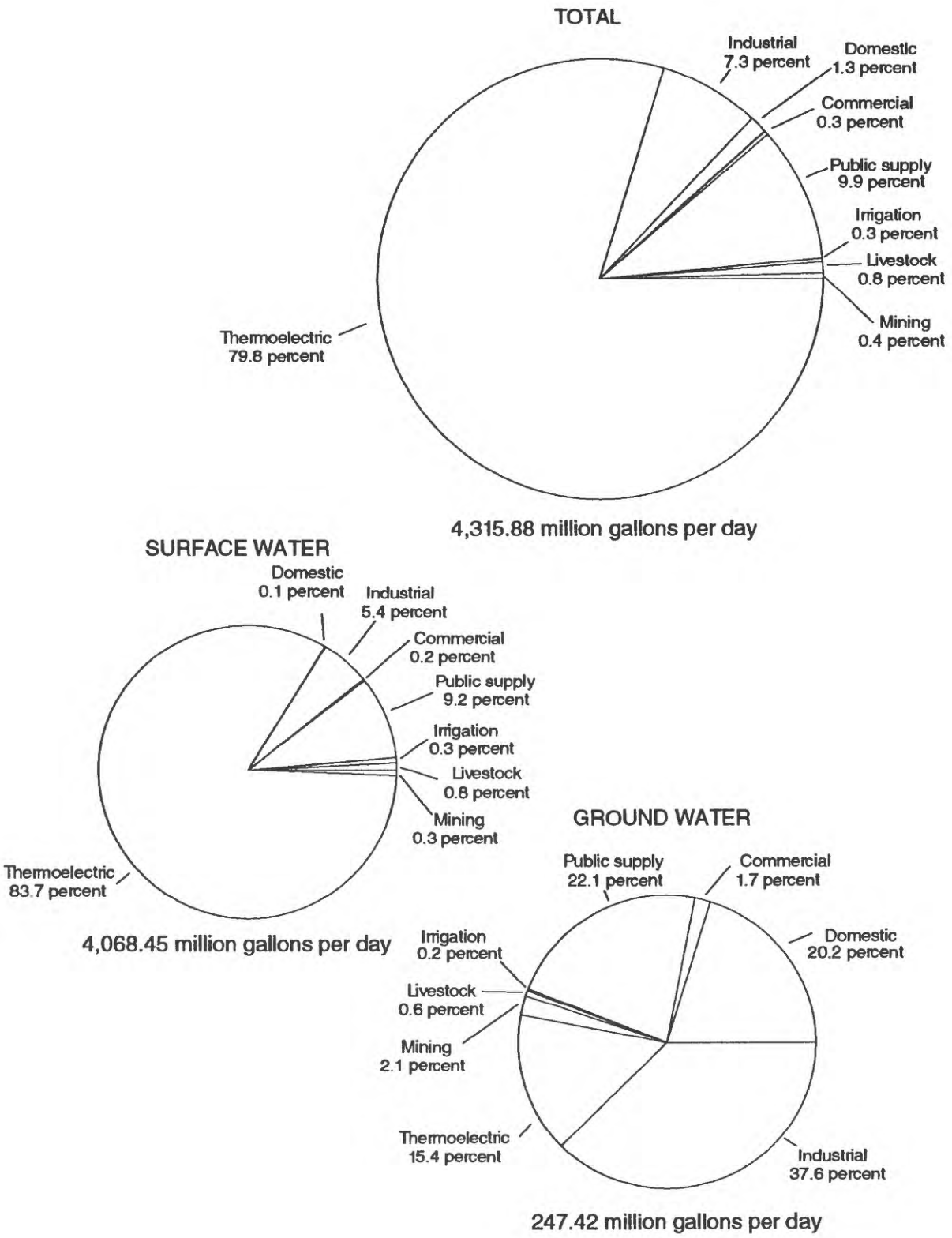
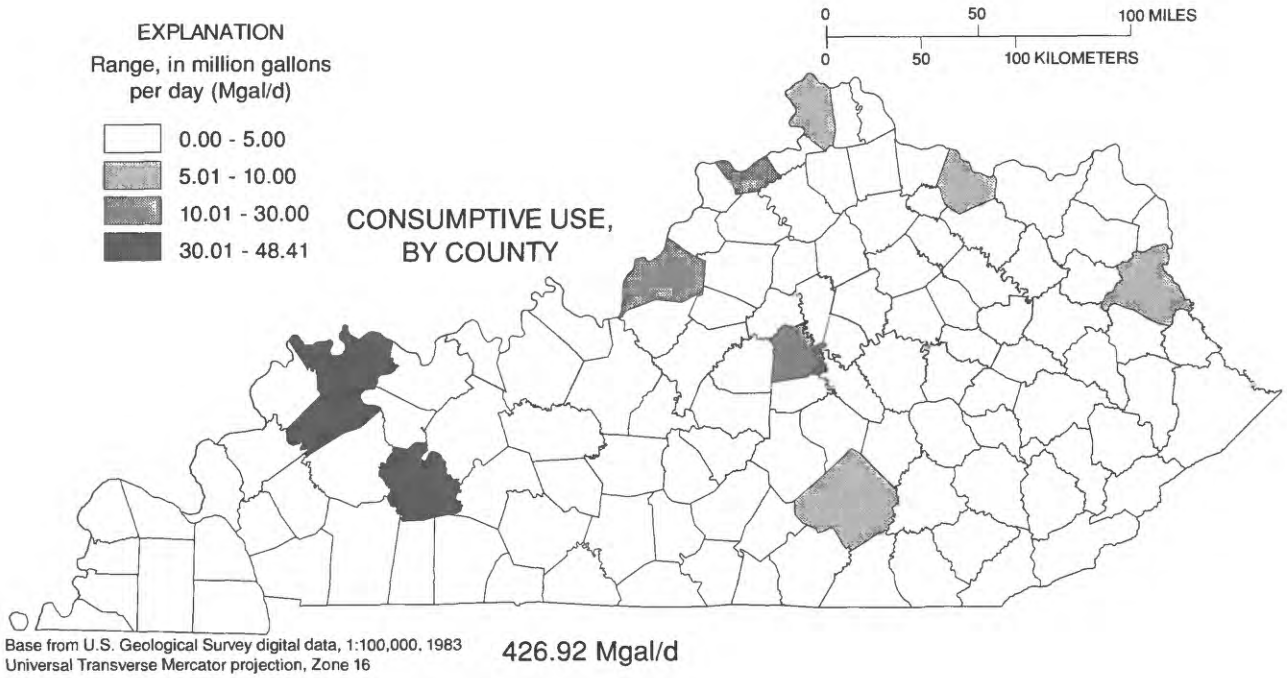


Figure 21. Offstream water withdrawals, by category, during 1990.



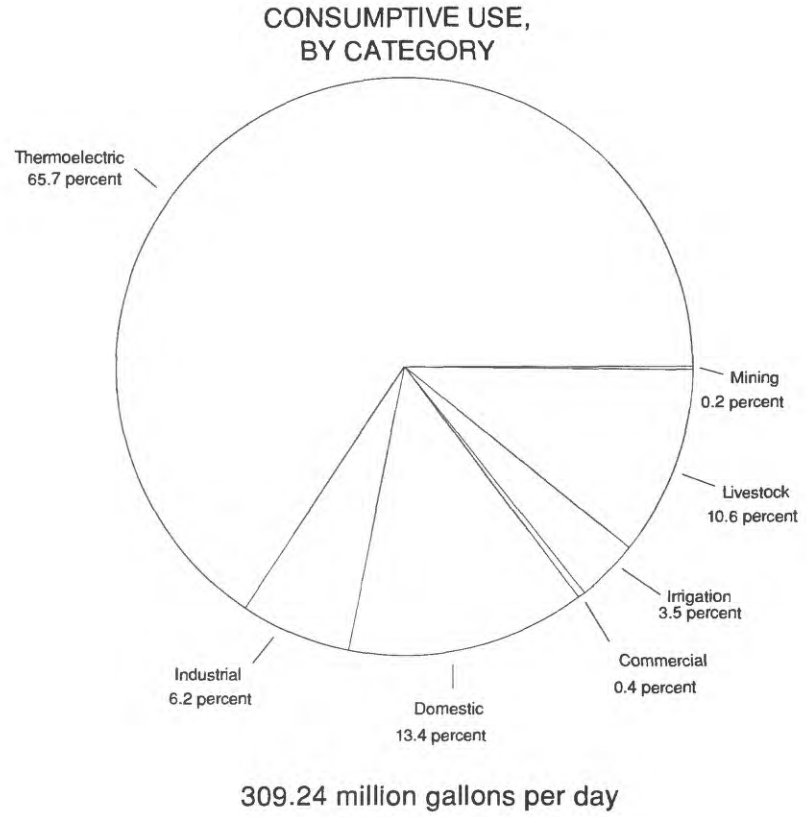


Figure 22. Total offstream consumptive water use during 1990.

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GLOSSARY

Significant terms, defined according to their meaning in this report, are listed below.

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

Agricultural water use. Water used for livestock watering and irrigation.

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 used by motels, hotels, restaurants, office buildings, commercial facilities, and institutions, both civilian and military. The water may be obtained from a public supply or may be self-supplied.

Consumptive use. Water that is no longer available because it has been evaporated, transpired, incorporated into products or crops, consumed by man or livestock, or otherwise removed from the immediate water environment.

Conveyance loss. Water that is lost in transit from a pipe, canal, conduit, or ditch by leakage or evaporation. Generally, the water is not available for further use; however, leakage from an irrigation ditch, for example, may percolate to a ground-water source and be available for use.

Cooling water. Water used for cooling purposes, such as condensers for heat exchangers.

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

Evaporation. Process by which water is changed from the liquid state to the vapor state.

Gigawatthour (gWh). Unit of measurement for power generation which equals one billion watthours or one million kilowatthours.

Ground water. Generally, all subsurface water as distinct from surface water; specifically, that part of the subsurface water in the saturated zone.

Hydroelectric-power water use. The use of water to drive turbines and generate electric power.

Industrial water use. Water used to produce items such as steel, chemical and allied products, paper and allied products, and to refine petroleum. The water may be obtained from a public supply or may be self-supplied.

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

Irrigation water use. Artificial application of water on lands to assist in the growing of crops and pastures.

Livestock water use. Watering of cattle, sheep, horses, hogs, and poultry.

Million gallons per day (Mgal/d). A rate of flow of water.

Mining water use. Water used in the extraction of minerals occurring naturally: solids, such as coal and ores; liquids, such as crude petroleum; and gases, such as natural gas. Also includes quarrying, well operation, milling (crushing, screening, washing, flotation, and so forth), and other preparation customarily done at the mine site or as part of a mining activity.

Offstream use. Water withdrawn or diverted from a ground- or surface-water source for public-supply, commercial, domestic, thermoelectric-power, industry, irrigation, and livestock uses. Sometimes called off-channel use or withdrawal.

Per capita use. The average amount of water used per person, generally, per day.

Public supply. Water withdrawn for all uses by public and private water suppliers and delivered to users. Water suppliers provide water for a variety of uses, such as domestic, commercial, industrial, and public water use.

Public water use. Water supplied from a public supply and used for firefighting, street washing, and municipal parks and swimming pools.

Return flow. The amount of water that reaches a ground- or surface-water source after release from the point of use and thus becomes available for further use.

Self-supplied water. Water withdrawn from a surface- or ground-water source by a user and not obtained from a public supply.

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

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

Water use. (1) In a restrictive sense, the term refers to water that is actually used for a specific purpose, such as for domestic use, irrigation, or industrial processing. (2) More broadly, water use pertains to human's interaction with and influence on the hydrologic cycle, and includes elements such as water withdrawal, delivery, consumptive use, wastewater release, reclaimed wastewater, return flow, and instream use. See also, offstream use and instream use.

Withdrawal. Water removed from the ground or diverted from a surface-water source for use. See also, offstream use and self-supplied water.