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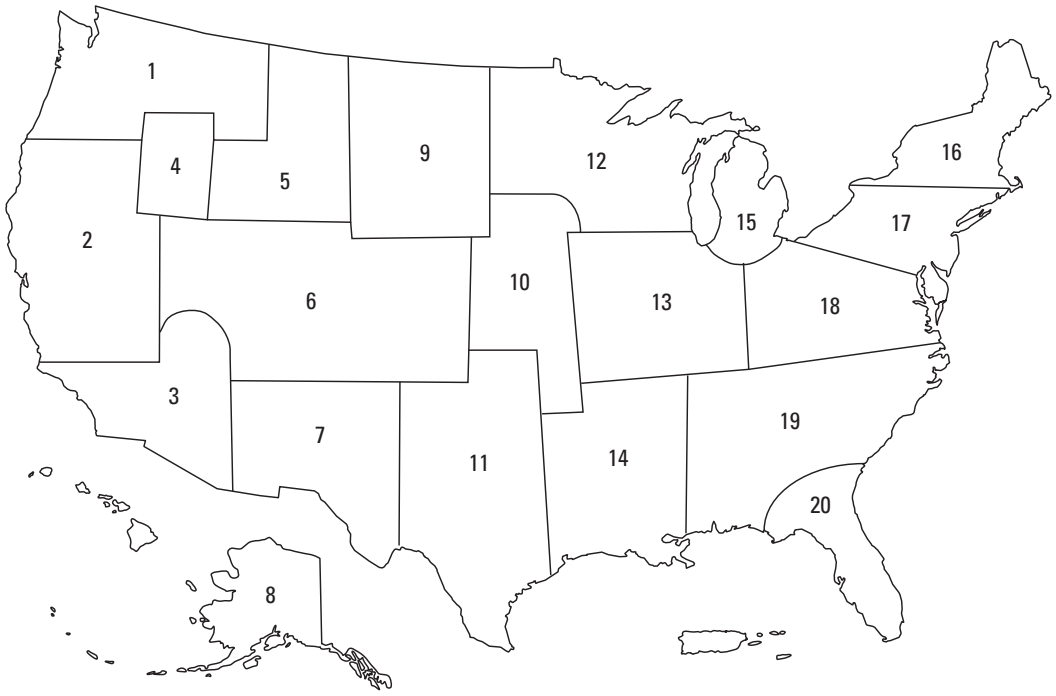
Estimated Use of Water in the United States in 2005

Circular 1344

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

Cover. Photo collage of water use and supply.



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U.S. Department of the Interior
KEN SALAZAR, Secretary

U.S. Geological Survey
Suzette M. Kimball, Acting Director

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Conversion Factors

Multiply	By	To obtain
	Area	
acre	4,047	square meter (m^2)
acre	0.4047	hectare (ha)
acre	.001562	square mile (mi^2)
	Volume	
acre-foot (acre-ft)	1,233	cubic meter (m^3)
acre-foot (acre-ft)	325,851	gallons (gal)
acre-foot (acre-ft)	43,450	cubic feet (ft^3)
cubic foot (ft^3)	7.48	gallons (gal)
gallon (gal)	3.785	liter (L)
gallon (gal)	3.785	cubic decimeter (dm^3)
million gallons (Mgal)	3,785	cubic meter (m^3)
million gallons (Mgal)	3.07	acre-feet (acre-ft)
	Flow rate	
acre-foot per year (acre-ft/yr)	1,233	cubic meter per year (m^3/yr)
billion gallons per day (Bgal/d)	1.3185	billion cubic meters per year
gallon per day (gal/d)	3.785	liter per day (L/d)
million gallons per day (Mgal/d)	0.04381	cubic meter per second (m^3/s)
million gallons per day (Mgal/d)	1.547	cubic feet per second (ft^3/sec)
million gallons per day (Mgal/d)	1.121	thousand acre-feet per year (acre-ft/yr)
million gallons per day (Mgal/d)	1.3185	million cubic meters per year
thousand acre-feet per year (acre-ft/yr)	0.8921	million gallons per day (Mgal/d)
	Energy	
gigawatthour (gWh)	3,600,000	Megajoule (MJ)
kilowatt-hour (kWh)	3,600,000	joule (J)
	Other	
cubic foot (ft^3)	62.4	pounds (lb)
gallon (gal)	8.34	pounds (lb)
gallons per day per square mile [(gal/d)/mi^2]	1.4614	cubic meter per day per square kilometer [(m^3/d)/km^2]
inch of rain (in)	27,200	gallons per acre (gal/ac)

Acronyms Used in this Report

SDWIS	Safe Drinking Water Information System
USDA ARS	U.S. Department of Agriculture, Agricultural Research Service
USDA NASS	U.S. Department of Agriculture, National Agricultural Statistics Service
USDA NRCS	U.S. Department of Agriculture, Natural Resources Conservation Service
USDOE EIA	U.S. Department of Energy, Energy Information Administration
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey

Estimated Use of Water in the United States in 2005

By Joan F. Kenny, Nancy L. Barber, Susan S. Hutson, Kristin S. Linsey, John K. Lovelace, and Molly A. Maupin

Abstract

Estimates of water use in the United States indicate that about 410 billion gallons per day (Bgal/d) were withdrawn in 2005 for all categories summarized in this report. This total is slightly less than the estimate for 2000, and about 5 percent less than total withdrawals in the peak year of 1980. Freshwater withdrawals in 2005 were 349 Bgal/d, or 85 percent of the total freshwater and saline-water withdrawals. Fresh groundwater withdrawals of 79.6 Bgal/day in 2005 were about 5 percent less than in 2000, and fresh surface-water withdrawals of 270 Bgal/day were about the same as in 2000. Withdrawals for thermoelectric-power generation and irrigation, the two largest uses of water, have stabilized or decreased since 1980. Withdrawals for public-supply and domestic uses have increased steadily since estimates began.

Thermoelectric-power generation water withdrawals were an estimated 201 Bgal/d in 2005, about 3 percent more than in 2000. In 2005, thermoelectric freshwater withdrawals accounted for 41 percent of all freshwater withdrawals. Nearly all of the water withdrawn for thermoelectric power was surface water used for once-through cooling at power plants. Twenty-nine percent of thermoelectric-power withdrawals were saline water from oceans and brackish coastal water bodies.

Withdrawals for irrigation in 2005 were 128 Bgal/d, about 8 percent less than in 2000 and approximately equal to estimates of irrigation water use in 1970. In 2005, irrigation withdrawals accounted for 37 percent of all freshwater withdrawals and 62 percent of all freshwater withdrawals excluding thermoelectric withdrawals. Irrigated acreage increased from 25 million acres in 1950 to 58 million acres in 1980, then remained fairly constant before increasing in 2000 and 2005 to more than 60 million acres. The number of acres irrigated using sprinkler and microirrigation systems has continued to increase and in 2005 accounted for 56 percent of the total irrigated acreage.

Water withdrawals for public supply were 44.2 Bgal/d in 2005, which is 2 percent more than in 2000, although the population increased by more than 5 percent during that time. Public supply accounted for 13 percent of all freshwater withdrawals in 2005 and 21 percent of all freshwater withdrawals excluding thermoelectric withdrawals. The percentage of the U.S. population obtaining drinking water from public suppliers has increased steadily from 62 percent in 1950 to 86 percent in 2005. Most of the population providing their own household water obtained their supplies from groundwater sources.

Self-supplied industrial water withdrawals continued to decline in 2005, as they have since their peak in 1970. Self-supplied industrial withdrawals were an estimated 18.2 Bgal/d in 2005, a 30-percent decrease from 1985. An estimated 4.02 Bgal/d were withdrawn for mining in 2005, which is 11 percent less than in 2000, and 18 percent less than in 1990. Withdrawals for mining were only 58 percent freshwater.

Livestock water use was estimated to be 2.14 Bgal/d in 2005, which is the smallest estimate since 1975, possibly due to the use of standardized coefficients for estimation of animal water needs. Water use for aquaculture was an estimated 8.78 Bgal/d in 2005, nearly four times the amount estimated in 1985. Part of this increase is due to the inclusion of more facilities in the estimates in 2005, and the use of standardized coefficients for estimating aquaculture use from other data.

Fresh surface water was the source for a majority of the public-supply, irrigation, aquaculture, thermoelectric, and industrial withdrawals. Nearly 30 percent of all fresh surface-water withdrawals in 2005 occurred in five States. In California, Idaho, and Colorado, most of the fresh surface-water withdrawals were for irrigation. In Texas and Illinois, most of the fresh surface-water withdrawals were for thermoelectric power generation.

About 67 percent of fresh groundwater withdrawals in 2005 were for irrigation, and 18 percent were for public supply. More than half of fresh groundwater withdrawals in the United States in 2005 occurred in six States. In California, Texas, Nebraska, Arkansas, and Idaho, most of the fresh groundwater withdrawals were for irrigation. In Florida, 52 percent of all fresh groundwater withdrawals were for public supply, and 34 percent were for irrigation.

Introduction

This report, "Estimated use of water in the United States in 2005," is the twelfth in a series of reports that has been compiled and published by the U.S. Geological Survey (USGS) every 5 years since 1950. These reports include estimates of water withdrawals by State, source of water, and category of use. Data from 2005 and earlier years can be used to indicate changes in water use over time, among different geographic areas, and from different sources. Water-use information complements the study of surface-water and groundwater availability, and is essential to understanding how future water demands will be met while maintaining adequate water quality and quantities for human and ecosystem needs.

Water supplies and their uses are affected by factors such as demographics, economic trends, legal decisions, and climatic fluctuations. From 1950 to 2005 the population of the United States doubled, and also shifted from rural to urban areas. Southern and Western States have experienced the greatest increases in population, with concurrent expansion of public water supplies. In response to increased demands and limits on supplies, communities have sought additional water sources or instituted water-conservation measures.

Irrigation practices and crop types also have changed with time, technology, and the economy. In some geographic areas, increased costs and reduced water availability have led to the use of more efficient irrigation practices and a reduction in irrigation water use. In other areas, increases in both water use and irrigated acreage have occurred because of water availability, demand for certain crops, and the desire to improve crop yield by using irrigation to supplement rainfall.

Changes in technology and economic conditions have affected industrial and thermoelectric power water uses and spurred interest in water reuse and reclamation. In response to regulation of the quality and temperature of discharged water, withdrawals for some thermoelectric and industrial facilities have decreased. Cooling water is essential for producing most of the thermoelectric power generated in the United States, and increased electric energy usage has resulted in additional demands for water. Limitations on water supplies have led to the use of less water-intensive cooling technologies for producing thermoelectric power in newer plants.

Climatic fluctuations have a prominent effect on water withdrawals, particularly those for irrigation, thermoelectric power generation, and public supply. Periodic droughts have drawn attention to the limits of local and regional water supplies. However, the effects of climatic conditions in any particular year cannot be associated readily with the aggregate data presented in these reports. The effects of temperature and precipitation extremes often are difficult to isolate from other factors that affect water use. Also, because of the nature of reporting programs, water-use estimates for some categories of use may be based on ancillary data from several different years.

Purpose and Scope

This report presents water-use estimates by source and by State for eight categories of water use for 2005. Sources include surface water and groundwater, both fresh and saline. Categories include public supply, domestic, irrigation, livestock, aquaculture, industrial, mining, and thermoelectric power. All withdrawals for the public-supply, domestic, irrigation, and livestock categories are shown as freshwater, although in some areas water is treated to reduce salinity for these uses. Both fresh and saline withdrawals are shown for industrial, mining, and thermoelectric-power generation uses. Geographic areas include the 50 States, the District of Columbia, Puerto Rico, and the U.S. Virgin Islands, which are hereafter referred to as "States" for brevity.

The USGS series of 5-year national water-use estimates serves as one of the few sources of information about regional and national trends in water withdrawals. Earlier reports (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) are available on the Internet at *http://water.usgs.gov/watuse/*. County-level data for all published categories of use for the years 1985, 1990, 1995, 2000, and 2005 may be downloaded from this site.

Terminology

The terms and units used in this report are similar to those used in previous USGS water-use Circulars; terms are defined in the Glossary at the end of this report. Withdrawal estimates for each category represent the total amount of water removed from the water source, regardless of how much of that total is consumptively used. In most cases, some fraction of the total withdrawal will be returned to the same or a different water source after use and is available for other withdrawals. Because of the uncertainty of estimating consumptive use and return flows on a category and State basis, estimates of consumptive use are not provided in this report. Saline water is defined as water containing dissolved solids of 1,000 milligrams per liter or more. Estimates of wastewater reuse were compiled by some States for the industrial, thermoelectric, and irrigation categories, but were not shown in the tables because of the small volumes of water compared to the totals.

Annual water-use data are expressed in this report in terms of million gallons per day (abbreviated as Mgal/d) and thousand acre-feet per year. The term billion gallons per day (abbreviated as Bgal/d) is used in the Abstract and Trends sections to more simply express large numbers for total uses. Units of millions or billions of gallons per day do not represent actual daily rates, but rather are used to express total amounts as an average daily rate for 1 year. For example, irrigation water may be applied only during parts of the year and at variable rates; therefore, the actual rate of application at any given time during the growing season is different from the average daily rate based on 365 days in a year.

The water-use data in this report are rounded to three significant figures. All values are rounded independently, so the sums of individual rounded numbers may not equal the totals. Percentage changes discussed in the text are calculated from the unrounded data and are expressed as integers. All population data are rounded to three significant figures.

Changes for the 2005 Report

For 2005, the reported categories of water use are the same as for 2000, but every category includes data from every State. Estimates for the livestock, aquaculture, and mining categories, which were optional for some States in 2000, are reported for all States, some of which chose to use national datasets generated using methods described by Lovelace (2009a, b, c). Deliveries from public supply for domestic use, last reported for 1995, were compiled for 2005, but public-supply deliveries for commercial, industrial, and thermoelectric-power generation use were not. The amount of power generated by thermoelectric power plants, which was not reported for 2000, has been included for 2005.

Changes that were made to the presentation of livestock, aquaculture, and thermoelectric-power generation data in 2000 were continued for 2005. Livestock and aquaculture remain separate categories, with aquaculture including withdrawals for both fish farms, formerly reported with the animal-specialties category, and fish hatcheries, formerly reported with commercial use. Thermoelectric-power generation water use remains subdivided by cooling type (thermoelectric withdrawals by once-through and recirculating cooling types were first presented for 2000).

The Trends section of this report includes national totals for withdrawals by category and source of water from 1950 to 2005. These totals may have changed for some categories and years due to corrections or revisions to individual State data. Because of these changes, some of the percentage changes in this report may be slightly different from calculations made using data previously published in Hutson and others (2004). In addition, industrial and mining water withdrawals (formerly termed "other industrial" uses to distinguish them from thermoelectric-power water uses) are shown as separate categories. Estimates of livestock, aquaculture, and mining water uses for the States that did not report those uses in 2000 are included in category totals for this report so that national totals could be provided for all categories for that year.

As in the 2000 report, water-use estimates were not compiled on the basis of hydrologic unit (watershed) for 2005. Also, no data are presented for the commercial category. Instream use for hydroelectric-power generation was not compiled for 2005. Some of these additional water data may have been collected by individual States, but are not compiled as a national dataset or included in this report.

Sources of Data and Methods of Analysis

The data presented in this report were compiled from various sources, depending on the category and the data available for each State. USGS personnel in each State determined the best sources of information available, compiled or estimated the data, and prepared documentation of the sources and methods used to determine water use. Values calculated using different sources and methods have varying levels of precision, and therefore some estimates are more reliable than others. Because the largest users and the most prominent categories of use within each State have the greatest effect on the totals, obtaining reliable estimates for these large users and categories was the primary focus of the compilation effort.

Sources of information include national datasets, State agencies, individual questionnaires, and local contacts. National datasets available to each State included the U.S. Environmental Protection Agency (USEPA) Safe Drinking Water Information System (SDWIS), U.S. Census Bureau population estimates, U.S. Department of Agriculture (USDA) Farm and Ranch Irrigation Survey, USDA Census of Agriculture, USDA National Agricultural Statistics Service (NASS) crop and livestock estimates, and U.S. Department of Energy (USDOE) Energy Information Administration (EIA) facility reports. Datasets and sources of information used to produce the national estimates for the livestock, aquaculture, and mining categories included the USDA NASS, county extension agents, USGS Minerals Information Team, USDOE EIA, and U.S. Bureau of Mines. Sources of information are discussed in greater detail in the individual category sections of this report.

Many of these data, such as those from NASS and EIA, are collected annually. Other data are provided for years other than 2005, but are used to develop the 2005 estimates in some States because they are the most complete data available. For example, the USDA Census of Agriculture is produced in years ending in "2" and "7," and the USDA Farm and Ranch Irrigation Survey is produced in years ending in "3" and "8." For several States, the 2005 water-use estimates were based on 2004 information from State water-use reporting programs.

Guidelines for preparing the 2005 water-use estimates were developed and distributed to water-use personnel in each USGS Water Science Center. These guidelines have been published as USGS Techniques and Methods Book 4, Chapter E1, "Guidelines for preparation of State water-use estimates for 2005" (Hutson, 2007) which is available on the Internet at *http://pubs.usgs.gov/tm/2007/tm4e1/*. Reports published by individual States as part of the National Water-Use Information Program, as well as a list of contact personnel in each USGS Water Science Center, also are available on the Internet at *http://water.usgs.gov/watuse/*.

Acknowledgments

This national compilation of water use would not be possible without the assistance and data provided by the many State and local agencies that manage water resources, operate data-collection programs, and administer regulations for use of water and other natural resources. The agencies and other organizations that provided assistance are listed for each State at the end of this report. The authors also gratefully acknowledge the USGS personnel in each State who compiled the data for this report.

Total Water Use — 410,000 million gallons per day

Total water withdrawals in the United States for 2005 were estimated for eight categories of use: public supply, domestic, irrigation, livestock, aquaculture, industrial, mining, and thermoelectric-power generation (fig. 1). Thermoelectric power was the largest category of water use, followed by irrigation and public supply. The remaining categories of self-supplied industrial, aquaculture, mining, self-supplied domestic, and livestock water uses together were less than 10 percent of total water withdrawals estimated in this report.

Total State populations and withdrawals by source for 2005 are listed in table 1. Total freshwater and saline-water withdrawals were estimated to be 410,000 Mgal/d, or 460,000 thousand acre-feet per year. Freshwater withdrawals of 349,000 Mgal/d made up 85 percent of the total, and the remaining 61,000 Mgal/d (15 percent) were saline water. Most saline-water withdrawals were seawater and brackish coastal water used to cool thermoelectric power plants. Total surface-water withdrawals were estimated to be 328,000 Mgal/d, or 80 percent of the total. About 82 percent of surface water withdrawn was freshwater. Total groundwater withdrawals were estimated to be 82,600 Mgal/d, of which 96 percent was freshwater.

Total withdrawals by category and State are listed in table 2*A* in million gallons per day and in table 2*B* in thousand acre-feet per year. In 2005, nearly one-half the total withdrawals (201,000 Mgal/d) were for thermoelectric-power generation. Withdrawals for thermoelectric-power generation represented 41 percent of all freshwater, 61 percent of all surface water, and 95 percent of all saline-water withdrawals in 2005. Withdrawals for irrigation of crops and other lands totaled 128,000 Mgal/d and were the second-largest category of water use. Irrigation withdrawals represented 31 percent of all water withdrawals, and 37 percent of all freshwater withdrawals.

More than one-fourth of the total water used in the United States in 2005 was withdrawn in California, Texas, Idaho, and Florida. California accounted for 11 percent of all withdrawals in the United States in 2005. Nearly three-fourths of the freshwater withdrawn in California was for irrigation, and 98 percent of saline water withdrawn was for thermoelectric-power generation. Withdrawals in Texas accounted for about 7 percent of the national total and were primarily for thermoelectric power and irrigation. Thermoelectric power accounted for 41 percent of freshwater withdrawals and 60 percent of saline withdrawals in Texas. Irrigation accounted for 33 percent of the freshwater withdrawals in Texas in 2005. Water withdrawals in Idaho were primarily for irrigation (85 percent) and aquaculture (13 percent). Almost two-thirds of the total withdrawals in Florida were saline water for thermoelectric power. Of Florida's freshwater withdrawals, 45 percent were for irrigation and 37 percent were for public supply.

Water withdrawals by category and State are listed for surface water in tables 3*A* and *B* and for groundwater in tables 4*A* and *B*. In 2005, more surface water than groundwater was withdrawn for all categories except self-supplied domestic, livestock, and mining. Of the 270,000 Mgal/d fresh surface-water withdrawals, more than one-half were for thermoelectric power, and more than one-fourth were for irrigation. The largest surface-water withdrawals were in California, where irrigation was the largest use of fresh surface water. Large quantities of fresh surface water were withdrawn in 2005 for thermoelectric power in Illinois, Texas, and Michigan. The largest saline surface-water withdrawals were for thermoelectric-power generation in California and Florida.

Nearly two-thirds of the fresh groundwater withdrawals in 2005 were for irrigation, and more than one-half of the groundwater for irrigation was withdrawn in just four States: California, Nebraska, Arkansas, and Texas. Irrigation was the largest use of fresh groundwater in 25 States. Nationwide, groundwater withdrawals for irrigation were about 3.5 times larger than groundwater withdrawals for public supply. More than 96 percent of all groundwater withdrawals in 2005 were freshwater. The largest withdrawals of saline groundwater occurred in Hawaii for thermoelectric-power generation and in Texas for mining.

The geographic distribution of total, surface-water, and groundwater withdrawals is shown in figure 2. The geographic distribution of freshwater and saline-water withdrawals by State is shown in figure 3.

The total withdrawals for a State are, in part, a function of the size of the State—for example, a large State would have more irrigable land area and larger irrigation withdrawals than a small State if other factors such as climate, soils, and available water supply are the same. Figure 4 shows intensity of freshwater withdrawals by State in gallons per day per square mile, adjusting for the land area of the State. Some smaller and medium-sized States in the Eastern United States had a greater intensity of freshwater withdrawals than some Western and Southern States with the largest withdrawals, such as California, Texas, Colorado, and Nebraska. In Idaho, both freshwater withdrawals and intensity were high.

Public supply, 11 percent

Nancy L. Barber, USGS

Water tower, DeKalb County, Georgia

Irrigation, 31 percent

USDA NRCS

Microirrigation in an orchard, California

Aquaculture, 2 percent

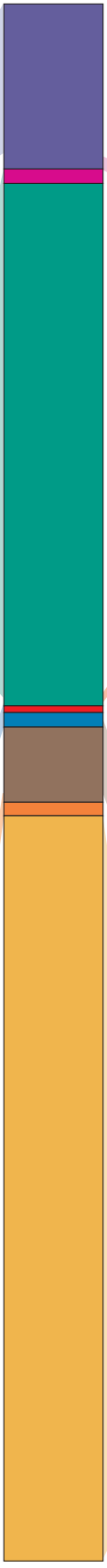
Peggy Greb, USDA ARS

Catfish ready for harvest

Mining, 1 percent

Nancy L. Barber, USGS

Dragline bucket in kaolin mine, Wilkinson County, Georgia



Domestic, 1 percent

Nancy L. Barber, USGS

Kitchen faucet

Livestock, less than 1 percent

Tim McCabe, USDA NRCS

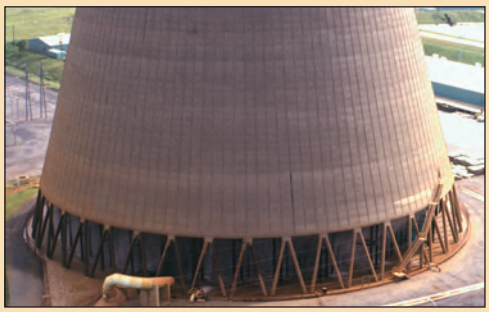
Dairy cows, central Maryland

Industrial, 4 percent

Used with permission

Chemical manufacturing plant

Thermoelectric power, 49 percent



Nancy L. Barber, USGS

Base of cooling tower, Bartow County, Georgia

Figure 1. Total water withdrawals by category, 2005.

Table 1. Total water withdrawals by source and State, 2005.

[Values may not sum to totals because of independent rounding]

State	Population (in thousands)	Withdrawals (in million gallons per day)									Withdrawals (in thousand acre-feet per year)		
		By source and type						Total			Total		
		Groundwater			Surface water								
		Fresh	Saline	Total	Fresh	Saline	Total	Fresh	Saline	Total	Fresh	Saline	Total
Alabama	4,560	491	0	491	9,470	0	9,470	9,960	0	9,960	11,200	0	11,200
Alaska	664	482	114	597	393	65.0	458	876	180	1,060	981	201	1,180
Arizona	5,940	3,040	2.61	3,050	3,200	0	3,200	6,240	2.61	6,240	7,000	2.93	7,000
Arkansas	2,780	7,510	0	7,510	3,920	0	3,920	11,400	0	11,400	12,800	0	12,800
California	36,100	10,700	255	11,000	22,200	12,600	34,800	32,900	12,900	45,700	36,800	14,400	51,300
Colorado	4,670	2,510	14.6	2,520	11,100	.39	11,100	13,600	15.0	13,600	15,300	16.8	15,300
Connecticut	3,510	154	0	154	700	2,900	3,600	854	2,900	3,760	957	3,260	4,210
Delaware	844	127	0	127	507	383	890	635	383	1,020	711	429	1,140
District of Columbia	582	0	0	0	9.70	0	9.70	9.70	0	9.70	10.9	0	10.9
Florida	17,900	4,200	3.26	4,200	2,620	11,500	14,100	6,820	11,500	18,300	7,650	12,900	20,500
Georgia	9,070	1,160	0	1,160	4,220	59.5	4,280	5,380	59.5	5,440	6,030	66.7	6,100
Hawaii	1,280	357	1,450	1,800	90.0	0	90.0	447	1,450	1,890	501	1,620	2,120
Idaho	1,430	4,360	0	4,360	15,200	0	15,200	19,500	0	19,500	21,900	0	21,900
Illinois	12,800	1,180	25.5	1,210	14,000	0	14,000	15,200	25.5	15,200	17,000	28.6	17,000
Indiana	6,270	707	0	707	8,630	0	8,630	9,340	0	9,340	10,500	0	10,500
Iowa	2,970	683	0	683	2,680	0	2,680	3,370	0	3,370	3,770	0	3,770
Kansas	2,740	2,950	0	2,950	840	0	840	3,790	0	3,790	4,240	0	4,240
Kentucky	4,170	157	0	157	4,170	0	4,170	4,330	0	4,330	4,850	0	4,850
Louisiana	4,520	1,620	151	1,780	9,820	0	9,820	11,400	151	11,600	12,800	170	13,000
Maine	1,320	99.2	0	99.2	366	139	505	466	139	605	522	156	678
Maryland	5,600	242	0	242	1,110	6,140	7,250	1,350	6,140	7,490	1,510	6,890	8,400
Massachusetts	6,400	318	0	318	937	2,340	3,270	1,260	2,340	3,590	1,410	2,620	4,030
Michigan	10,100	836	.94	837	10,800	0	10,800	11,700	.94	11,700	13,100	1.05	13,100
Minnesota	5,130	863	0	863	3,180	0	3,180	4,040	0	4,040	4,530	0	4,530
Mississippi	2,920	2,190	0	2,190	654	82.6	736	2,850	82.6	2,930	3,190	92.6	3,280
Missouri	5,800	1,750	0	1,750	7,050	0	7,050	8,790	0	8,790	9,860	0	9,860
Montana	936	283	5.12	288	9,830	0	9,830	10,100	5.12	10,100	11,300	5.74	11,300
Nebraska	1,760	7,710	.09	7,710	4,890	0	4,890	12,600	.09	12,600	14,100	.10	14,100
Nevada	2,410	981	0	981	1,400	0	1,400	2,380	0	2,380	2,670	0	2,670
New Hampshire	1,310	93.8	0	93.8	345	885	1,230	439	885	1,320	492	992	1,480
New Jersey	8,720	592	.01	592	1,340	5,460	6,800	1,930	5,460	7,390	2,160	6,120	8,280
New Mexico	1,930	1,680	0	1,680	1,650	0	1,650	3,330	0	3,330	3,740	0	3,740
New York	19,300	867	.42	867	9,420	4,890	14,300	10,300	4,890	15,200	11,500	5,480	17,000
North Carolina	8,680	700	0	700	10,600	1,550	12,200	11,300	1,550	12,900	12,700	1,740	14,400
North Dakota	637	142	0	142	1,200	0	1,200	1,340	0	1,340	1,500	0	1,500
Ohio	11,500	946	0	946	10,500	0	10,500	11,500	0	11,500	12,900	0	12,900
Oklahoma	3,540	565	190	755	973	0	973	1,540	190	1,730	1,720	213	1,940
Oregon	3,640	2,140	0	2,140	5,080	0	5,080	7,220	0	7,220	8,090	0	8,090
Pennsylvania	12,400	591	0	591	8,880	.75	8,880	9,470	.75	9,470	10,600	.84	10,600
Rhode Island	1,080	29.4	0	29.4	111	264	376	141	264	405	158	296	454
South Carolina	4,260	378	0	378	7,470	.01	7,470	7,850	.01	7,850	8,790	.01	8,790
South Dakota	776	271	0	271	230	0	230	500	0	500	561	0	561
Tennessee	5,960	489	0	489	10,300	0	10,300	10,800	0	10,800	12,100	0	12,100
Texas	22,900	8,020	548	8,570	15,600	2,580	18,200	23,600	3,130	26,700	26,500	3,510	30,000
Utah	2,550	882	73.0	955	3,940	221	4,160	4,820	293	5,120	5,410	329	5,730
Vermont	623	42.3	0	42.3	480	0	480	523	0	523	586	0	586
Virginia	7,570	339	10.6	349	6,740	3,530	10,300	7,080	3,540	10,600	7,940	3,960	11,900
Washington	6,290	1,410	0	1,410	4,190	33.2	4,230	5,600	33.2	5,640	6,280	37.3	6,320
West Virginia	1,820	141	.51	141	4,670	0	4,670	4,810	.51	4,810	5,390	.57	5,390
Wisconsin	5,540	975	0	975	7,620	0	7,620	8,600	0	8,600	9,640	0	9,640
Wyoming	509	531	177	708	3,880	0	3,880	4,410	177	4,590	4,950	199	5,150
Puerto Rico	3,910	147	.34	147	576	2,290	2,860	722	2,290	3,010	810	2,570	3,370
U.S. Virgin Islands	109	1.18	0	1.18	10.2	129	139	11.4	129	140	12.8	145	157
TOTAL	301,000	79,600	3,020	82,600	270,000	58,000	328,000	349,000	61,000	410,000	392,000	68,400	460,000

Table 2*A*. Total water withdrawals by water-use category, 2005, in million gallons per day.

[Values may not sum to totals because of independent rounding]

State	Public supply	Domestic	Irrigation	Livestock	Aquaculture	Industrial		Mining		Thermoelectric power		Total		
		Fresh	Fresh	Fresh	Fresh	Fresh	Saline	Fresh	Saline	Fresh	Saline	Fresh	Saline	Total
Alabama	802	39.1	161	28.1	74.9	550	0	27.8	0	8,270	0	9,960	0	9,960
Alaska	75.8	14.1	1.05	.30	720	8.16	4.10	22.2	175	33.6	0	876	180	1,060
Arizona	1,170	27.2	4,810	12.6	11.5	22.4	0	101	2.61	89.9	0	6,240	2.61	6,240
Arkansas	404	17.8	8,530	38.8	256	178	0	1.29	0	2,000	0	11,400	0	11,400
California	6,990	486	24,400	197	646	72.2	23.4	53.1	255	49.6	12,600	32,900	12,900	45,700
Colorado	864	34.4	12,300	33.1	88.0	142	0	6.44	15.0	123	0	13,600	15.0	13,600
Connecticut	480	63.1	22.5	1.25	8.57	67.6	38.5	3.40	0	207	2,870	854	2,900	3,760
Delaware	96.2	6.43	65.1	1.64	.10	41.4	0	1.55	.01	422	383	635	383	1,020
District of Columbia	0	0	0	0	0	0	0	0	0	9.70	0	9.70	0	9.70
Florida	2,540	190	3,070	17.8	9.19	243	1.19	195	0	558	11,500	6,820	11,500	18,300
Georgia	1,180	120	752	28.4	38.4	532	22.6	49.4	0	2,680	36.9	5,380	59.5	5,440
Hawaii	261	12.2	97.8	2.07	4.84	29.2	1.73	1.86	0	37.8	1,450	447	1,450	1,890
Idaho	246	86.6	16,600	44.1	2,490	63.2	0	24.2	0	1.10	0	19,500	0	19,500
Illinois	1,700	101	504	37.9	9.44	364	0	86.7	25.5	12,400	0	15,200	25.5	15,200
Indiana	676	124	151	38.7	1.18	2,200	0	100	0	6,050	0	9,340	0	9,340
Iowa	398	34.6	33.3	116	16.4	190	0	47.4	0	2,530	0	3,370	0	3,370
Kansas	403	14.9	2,740	108	5.15	41.9	0	14.8	0	459	0	3,790	0	3,790
Kentucky	558	34.8	18.9	45.9	20.4	186	0	36.6	0	3,430	0	4,330	0	4,330
Louisiana	719	44.0	992	7.97	271	3,110	0	26.9	151	6,280	0	11,400	151	11,600
Maine	95.9	34.1	3.92	2.77	53.1	170	17.8	6.76	0	99.5	121	466	139	605
Maryland	681	74.3	49.8	9.16	23.1	59.7	191	13.2	0	438	5,950	1,350	6,140	7,490
Massachusetts	793	40.5	145	1.86	44.4	112	0	10.7	0	107	2,340	1,260	2,340	3,590
Michigan	1,140	251	308	19.6	65.3	629	0	94.6	.94	9,150	0	11,700	.94	11,700
Minnesota	537	77.8	244	60.4	113	139	0	426	0	2,450	0	4,040	0	4,040
Mississippi	369	56.4	1,560	18.9	279	197	0	11.9	0	355	82.6	2,850	82.6	2,930
Missouri	831	59.5	1,370	76.1	156	80.9	0	34.7	0	6,180	0	8,790	0	8,790
Montana	142	23.5	9,670	39.0	42.0	67.0	0	35.4	5.12	89.9	0	10,100	5.12	10,100
Nebraska	330	52.1	8,460	108	82.7	11.3	0	10.3	.09	3,550	0	12,600	.09	12,600
Nevada	676	37.4	1,500	8.51	15.3	5.90	0	99.1	0	36.8	0	2,380	0	2,380
New Hampshire	99.8	41.6	4.52	1.19	17.7	41.5	0	3.76	0	229	885	439	885	1,320
New Jersey	958	79.5	95.1	1.14	9.15	86.0	0	38.3	0	663	5,460	1,930	5,460	7,390
New Mexico	286	32.0	2,810	50.7	20.2	13.2	0	58.7	0	55.9	0	3,330	0	3,330
New York	2,530	140	51.1	29.8	63.1	301	0	32.9	.84	7,140	4,880	10,300	4,890	15,200
North Carolina	921	161	292	126	1,020	394	0	46.1	0	8,350	1,550	11,300	1,550	12,900
North Dakota	67.1	8.90	151	22.6	6.21	14.7	0	5.66	0	1,060	0	1,340	0	1,340
Ohio	1,430	149	42.6	24.1	9.47	703	0	174	0	8,930	0	11,500	0	11,500
Oklahoma	646	25.1	495	162	19.1	24.1	0	2.68	190	164	0	1,540	190	1,730
Oregon	530	77.7	5,710	17.8	685	172	0	16.0	0	8.45	0	7,220	0	7,220
Pennsylvania	1,420	152	24.3	61.8	524	770	0	95.7	0	6,430	.75	9,470	.75	9,470
Rhode Island	120	6.10	5.49	.19	5.78	.50	0	1.71	0	1.44	264	141	264	405
South Carolina	647	127	91.6	11.3	1.31	419	0	9.06	0	6,540	0	7,850	.01	7,850
South Dakota	100	7.67	292	47.7	33.2	4.41	0	10.5	0	4.69	0	500	0	500
Tennessee	914	36.7	55.4	29.7	59.5	783	0	21.7	0	8,940	0	10,800	0	10,800
Texas	4,270	257	7,800	258	14.5	1,250	716	91.0	548	9,680	1,860	23,600	3,130	26,700
Utah	607	13.9	4,000	17.8	87.7	35.4	127	5.14	162	58.0	4.18	4,820	293	5,120
Vermont	45.9	13.9	3.13	8.20	18.2	7.95	0	3.79	0	421	0	523	0	523
Virginia	982	126	47.9	29.8	444	527	8.52	29.8	0	4,920	3,510	7,080	3,540	10,600
Washington	990	86.0	3,520	30.7	38.0	454	33.2	26.6	0	456	0	5,600	33.2	5,640
West Virginia	189	33.5	.02	4.99	52.7	966	0	14.2	.51	3,550	0	4,810	.51	4,810
Wisconsin	552	87.3	402	72.8	81.7	471	0	32.5	0	6,900	0	8,600	0	8,600
Wyoming	96.3	6.32	3,990	16.2	23.3	6.04	0	51.8	177	223	0	4,410	177	4,590
Puerto Rico	652	2.11	45.2	7.79	.50	9.41	0	1.98	.34	2.81	2,290	722	2,290	3,010
U.S. Virgin Islands	5.92	1.95	0	.07	0	3.29	0	0	.02	.18	129	11.4	129	140
TOTAL	44,200	3,830	128,000	2,140	8,780	17,000	1,190	2,310	1,710	143,000	58,100	349,000	61,000	410,000

Table 2*B*. Total water withdrawals by water-use category, 2005, in thousand acre-feet per year.

[Values may not sum to totals because of independent rounding]

State	Public supply	Domestic	Irrigation	Livestock	Aquaculture	Industrial		Mining		Thermoelectric power		Total		
		Fresh	Fresh	Fresh	Fresh	Fresh	Saline	Fresh	Saline	Fresh	Saline	Fresh	Saline	Total
Alabama	899	43.9	181	31.5	84.0	617	0	31.2	0	9,280	0	11,200	0	11,200
Alaska	85.0	15.8	1.18	.34	808	9.15	4.60	24.9	197	37.6	0	981	201	1,180
Arizona	1,310	30.5	5,390	14.1	12.9	25.2	0	113	2.93	101	0	7,000	2.93	7,000
Arkansas	453	20.0	9,570	43.6	288	200	0	1.45	0	2,240	0	12,800	0	12,800
California	7,830	545	27,300	220	724	81.0	26.3	59.6	286	55.6	14,100	36,800	14,400	51,300
Colorado	969	38.6	13,800	37.1	98.6	160	0	7.22	16.8	138	0	15,300	16.8	15,300
Connecticut	538	70.7	25.2	1.40	9.61	75.7	43.1	3.81	0	232	3,210	957	3,260	4,210
Delaware	108	7.21	73.0	1.84	.11	46.4	0	1.74	.01	473	429	711	429	1,140
District of Columbia	0	0	0	0	0	0	0	0	0	10.9	0	10.9	0	10.9
Florida	2,850	213	3,440	19.9	10.3	272	1.33	218	0	626	12,900	7,650	12,900	20,500
Georgia	1,320	134	843	31.9	43.1	596	25.3	55.4	0	3,010	41.4	6,030	66.7	6,100
Hawaii	292	13.7	110	2.32	5.43	32.8	1.94	2.09	0	42.3	1,620	501	1,620	2,120
Idaho	276	97.0	18,600	49.4	2,800	70.9	0	27.1	0	1.23	0	21,900	0	21,900
Illinois	1,910	114	565	42.5	10.6	408	0	97.2	28.6	13,800	0	17,000	28.6	17,000
Indiana	758	139	170	43.4	1.32	2,470	0	112	0	6,780	0	10,500	0	10,500
Iowa	446	38.7	37.4	130	18.4	212	0	53.1	0	2,840	0	3,770	0	3,770
Kansas	451	16.7	3,070	121	5.77	46.9	0	16.5	0	514	0	4,240	0	4,240
Kentucky	625	39.0	21.2	51.5	22.8	209	0	41.0	0	3,840	0	4,850	0	4,850
Louisiana	806	49.4	1,110	8.93	304	3,480	0	30.2	170	7,040	0	12,800	170	13,000
Maine	107	38.2	4.39	3.11	59.6	190	20.0	7.58	0	112	136	522	156	678
Maryland	764	83.3	55.8	10.3	25.9	66.9	214	14.8	0	491	6,670	1,510	6,890	8,400
Massachusetts	889	45.4	163	2.09	49.8	126	0	12.0	0	120	2,620	1,410	2,620	4,030
Michigan	1,280	281	345	22.0	73.2	705	0	106	1.05	10,300	0	13,100	1.05	13,100
Minnesota	602	87.2	274	67.7	126	155	0	477	0	2,740	0	4,530	0	4,530
Mississippi	414	63.2	1,750	21.2	312	221	0	13.3	0	398	92.6	3,190	92.6	3,280
Missouri	932	66.7	1,540	85.3	175	90.7	0	38.9	0	6,930	0	9,860	0	9,860
Montana	159	26.3	10,800	43.8	47.1	75.2	0	39.7	5.74	101	0	11,300	5.74	11,300
Nebraska	370	58.4	9,480	121	92.8	12.7	0	11.5	.10	3,980	0	14,100	.10	14,100
Nevada	758	41.9	1,680	9.54	17.2	6.61	0	111	0	41.3	0	2,670	0	2,670
New Hampshire	112	46.7	5.07	1.33	19.8	46.6	0	4.21	0	257	992	492	992	1,480
New Jersey	1,070	89.1	107	1.28	10.3	96.4	0	42.9	0	743	6,120	2,160	6,120	8,280
New Mexico	321	35.9	3,160	56.8	22.6	14.8	0	65.8	0	62.7	0	3,740	0	3,740
New York	2,840	157	57.2	33.4	70.7	337	0	36.9	.94	8,010	5,480	11,500	5,480	17,000
North Carolina	1,030	180	327	141	1,140	442	0	51.7	0	9,350	1,740	12,700	1,740	14,400
North Dakota	75.2	9.98	169	25.3	6.96	16.5	0	6.34	0	1,190	0	1,500	0	1,500
Ohio	1,610	167	47.7	27.0	10.6	788	0	195	0	10,000	0	12,900	0	12,900
Oklahoma	724	28.1	555	181	21.4	27.0	0	3.00	213	184	0	1,720	213	1,940
Oregon	594	87.1	6,400	20.0	767	193	0	17.9	0	9.47	0	8,090	0	8,090
Pennsylvania	1,590	171	27.3	69.3	587	863	0	107	0	7,200	.84	10,600	.84	10,600
Rhode Island	134	6.84	6.15	.21	6.48	.56	0	1.92	0	1.61	296	158	296	454
South Carolina	725	143	103	12.7	1.47	469	0	10.2	0	7,330	0	8,790	.01	8,790
South Dakota	113	8.60	327	53.5	37.2	4.94	0	11.7	0	5.26	0	561	0	561
Tennessee	1,020	41.1	62.1	33.3	66.7	878	0	24.3	0	10,000	0	12,100	0	12,100
Texas	4,790	288	8,740	289	16.2	1,400	803	102	614	10,900	2,090	26,500	3,510	30,000
Utah	681	15.6	4,480	19.9	98.3	39.7	143	5.76	181	65.1	4.69	5,410	329	5,730
Vermont	51.4	15.6	3.51	9.19	20.4	8.91	0	4.25	0	472	0	586	0	586
Virginia	1,100	141	53.7	33.4	498	591	9.55	33.3	0	5,510	3,930	7,940	3,960	11,900
Washington	1,110	96.4	3,950	34.5	42.6	509	37.2	29.8	0	511	0	6,280	37.3	6,320
West Virginia	212	37.6	.02	5.59	59.1	1,080	0	15.9	.57	3,980	0	5,390	.57	5,390
Wisconsin	619	97.9	450	81.7	91.6	528	0	36.5	0	7,730	0	9,640	0	9,640
Wyoming	108	7.08	4,470	18.2	26.1	6.77	0	58.0	199	250	0	4,950	199	5,150
Puerto Rico	731	2.37	50.6	8.73	.56	10.5	0	2.22	.38	3.15	2,560	810	2,570	3,370
U.S. Virgin Islands	6.64	2.19	0	.08	0	3.69	0	0	.02	.20	145	12.8	145	157
TOTAL	49,600	4,290	144,000	2,390	9,840	19,000	1,330	2,590	1,920	160,000	65,200	392,000	68,400	460,000

Table 3*A*. Surface-water withdrawals by water-use category, 2005, in million gallons per day.

[Values may not sum to totals because of independent rounding]

State	Public supply	Domestic	Irrigation	Livestock	Aquaculture	Industrial		Mining		Thermoelectric power		Total		
		Fresh	Fresh	Fresh	Fresh	Fresh	Saline	Fresh	Saline	Fresh	Saline	Fresh	Saline	Total
Alabama	524	0	87.0	15.7	34.4	523	0	8.26	0	8,270	0	9,470	0	9,470
Alaska	49.9	.68	.02	.17	285	4.02	4.10	22.2	60.9	31.4	0	393	65.0	458
Arizona	602	0	2,540	1.67	2.25	0	0	9.05	0	39.4	0	3,200	0	3,200
Arkansas	266	0	1,510	23.3	10.6	113	0	1.05	0	2,000	0	3,920	0	3,920
California	5,710	57.2	15,700	109	459	9.90	23.4	18.6	.29	39.7	12,600	22,200	12,600	34,800
Colorado	762	0	10,000	11.0	71.2	139	0	1.24	.39	117	0	11,100	.39	11,100
Connecticut	404	0	21.8	0	3.68	60.6	38.5	2.73	0	207	2,870	700	2,900	3,600
Delaware	45.0	0	9.77	.13	0	29.7	0	.75	.01	422	383	507	383	890
District of Columbia	0	0	0	0	0	0	0	0	0	9.70	0	9.70	0	9.70
Florida	339	0	1,620	.90	.16	62.5	1.19	56.9	0	541	11,500	2,620	11,500	14,100
Georgia	926	0	265	26.3	33.4	291	22.6	.47	0	2,680	36.9	4,220	59.5	4,280
Hawaii	11.4	0	74.2	1.32	2.61	0	0	.44	0	0	0	90.0	0	90.0
Idaho	26.7	0	12,700	8.34	2,390	22.1	0	22.0	0	0	0	15,200	0	15,200
Illinois	1,300	0	24.5	0	3.86	236	0	71.2	0	12,300	0	14,000	0	14,000
Indiana	320	0	54.0	13.1	.67	2,110	0	95.5	0	6,040	0	8,630	0	8,630
Iowa	86.0	0	1.69	28.9	4.84	12.3	0	44.2	0	2,510	0	2,680	0	2,680
Kansas	242	0	114	23.8	3.22	6.34	0	4.64	0	445	0	840	0	840
Kentucky	489	12.6	18.0	43.6	19.4	138	0	28.7	0	3,420	0	4,170	0	4,170
Louisiana	365	0	308	3.81	102	2,840	0	20.8	0	6,180	0	9,820	0	9,820
Maine	68.5	0	2.77	.70	29.3	161	17.8	5.26	0	99.0	121	366	139	505
Maryland	585	0	15.0	2.95	17.5	45.5	191	4.17	0	436	5,950	1,110	6,140	7,250
Massachusetts	590	0	98.0	.66	37.3	96.7	0	7.77	0	107	2,340	937	2,340	3,270
Michigan	883	0	110	1.89	62.4	540	0	81.4	0	9,140	0	10,800	0	10,800
Minnesota	165	0	28.4	0	50.8	73.0	0	418	0	2,440	0	3,180	0	3,180
Mississippi	39.5	0	131	11.3	33.7	120	0	.61	0	317	82.6	654	82.6	736
Missouri	588	0	38.9	56.8	148	43.6	0	11.8	0	6,160	0	7,050	0	7,050
Montana	74.8	1.06	9,530	27.4	39.6	29.6	0	34.2	0	89.6	0	9,830	0	9,830
Nebraska	94.2	0	1,150	20.1	74.1	.01	0	10.2	0	3,540	0	4,890	0	4,890
Nevada	541	0	828	0	.67	5.20	0	0	0	21.0	0	1,400	0	1,400
New Hampshire	62.6	.09	4.07	.30	10.7	35.9	0	3.74	0	228	885	345	885	1,230
New Jersey	548	0	51.9	0	0	39.8	0	37.4	0	662	5,460	1,340	5,460	6,800
New Mexico	37.3	0	1,550	3.05	18.5	1.72	0	1.29	0	45.5	0	1,650	0	1,650
New York	2,030	0	30.8	10.4	47.1	140	0	25.9	.42	7,140	4,880	9,420	4,890	14,300
North Carolina	765	0	214	32.3	1,010	223	0	11.0	0	8,340	1,550	10,600	1,550	12,200
North Dakota	35.2	0	73.0	9.01	6.21	9.70	0	.40	0	1,060	0	1,200	0	1,200
Ohio	947	3.00	24.9	16.4	5.89	554	0	61.7	0	8,910	0	10,500	0	10,500
Oklahoma	532	0	134	107	18.9	16.0	0	1.67	0	163	0	973	0	973
Oregon	449	8.22	3,780	14.6	660	164	0	2.09	0	7.57	0	5,080	0	5,080
Pennsylvania	1,210	0	16.0	7.97	512	704	0	10.8	0	6,420	.75	8,880	.75	8,880
Rhode Island	103	0	0	.01	5.47	0	0	1.12	0	1.44	264	111	264	376
South Carolina	496	0	43.4	6.65	.62	386	0	.50	0	6,530	0	7,470	.01	7,470
South Dakota	34.6	0	143	28.5	14.0	.10	0	5.93	0	3.97	0	230	0	230
Tennessee	581	0	22.0	14.2	44.7	738	0	11.4	0	8,940	0	10,300	0	10,300
Texas	3,070	0	1,680	95.9	9.06	1,060	716	64.2	0	9,620	1,860	15,600	2,580	18,200
Utah	259	2.11	3,610	9.59	.18	14.7	92.4	1.41	128	44.6	0	3,940	221	4,160
Vermont	32.0	.17	2.83	2.05	12.2	6.14	0	3.55	0	421	0	480	0	480
Virginia	898	0	33.2	22.8	438	421	8.52	27.3	0	4,910	3,510	6,740	3,530	10,300
Washington	451	.02	2,890	9.82	31.0	346	33.2	4.14	0	456	0	4,190	33.2	4,230
West Virginia	152	.66	.01	3.38	42.8	911	0	9.44	0	3,550	0	4,670	0	4,670
Wisconsin	247	0	15.2	7.27	43.2	400	0	14.9	0	6,890	0	7,620	0	7,620
Wyoming	46.5	0	3,570	10.1	21.1	1.92	0	13.5	0	221	0	3,880	0	3,880
Puerto Rico	556	0	15.2	2.08	.49	0	0	.22	0	1.42	2,290	576	2,290	2,860
U.S. Virgin Islands	5.04	1.95	0	.03	0	3.03	0	0	.02	.18	129	10.2	129	139
TOTAL	29,600	87.7	74,900	846	6,870	13,900	1,150	1,300	190	142,000	56,700	270,000	58,000	328,000

Table 3*B*. Surface-water withdrawals by water-use category, 2005, in thousand acre-feet per year.

[Values may not sum to totals because of independent rounding]

State	Public supply	Domestic	Irrigation	Livestock	Aquaculture	Industrial		Mining		Thermoelectric power		Total		
		Fresh	Fresh	Fresh	Fresh	Fresh	Saline	Fresh	Saline	Fresh	Saline	Fresh	Saline	Total
Alabama	588	0	97.5	17.6	38.5	586	0	9.26	0	9,280	0	10,600	0	10,600
Alaska	55.9	.76	.02	.19	319	4.51	4.60	24.9	68.3	35.2	0	441	72.9	514
Arizona	674	0	2,850	1.87	2.52	0	0	10.1	0	44.2	0	3,590	0	3,590
Arkansas	299	0	1,690	26.1	11.9	126	0	1.18	0	2,240	0	4,400	0	4,400
California	6,400	64.1	17,700	122	515	11.1	26.3	20.9	.33	44.5	14,100	24,800	14,100	39,000
Colorado	855	0	11,200	12.3	79.8	156	0	1.39	.44	131	0	12,400	.44	12,400
Connecticut	453	0	24.4	0	4.13	67.9	43.1	3.06	0	232	3,210	785	3,260	4,040
Delaware	50.4	0	11.0	.15	0	33.3	0	.84	.01	473	429	569	429	998
District of Columbia	0	0	0	0	0	0	0	0	0	10.9	0	10.9	0	10.9
Florida	380	0	1,820	1.01	.18	70.0	1.33	63.8	0	607	12,900	2,940	12,900	15,800
Georgia	1,040	0	297	29.5	37.5	327	25.3	.53	0	3,000	41.4	4,730	66.7	4,800
Hawaii	12.8	0	83.2	1.48	2.93	0	0	.49	0	0	0	101	0	101
Idaho	29.9	0	14,200	9.35	2,680	24.8	0	24.7	0	0	0	17,000	0	17,000
Illinois	1,450	0	27.5	0	4.33	264	0	79.8	0	13,800	0	15,700	0	15,700
Indiana	359	0	60.5	14.7	.75	2,370	0	107	0	6,770	0	9,680	0	9,680
Iowa	96.4	0	1.89	32.4	5.43	13.8	0	49.5	0	2,810	0	3,010	0	3,010
Kansas	272	0	128	26.7	3.61	7.11	0	5.20	0	499	0	942	0	942
Kentucky	548	14.1	20.1	48.9	21.7	155	0	32.2	0	3,840	0	4,680	0	4,680
Louisiana	410	0	345	4.27	114	3,190	0	23.3	0	6,930	0	11,000	0	11,000
Maine	76.8	0	3.11	.79	32.9	180	20.0	5.90	0	111	136	411	156	567
Maryland	656	0	16.8	3.31	19.6	51.0	214	4.67	0	489	6,670	1,240	6,890	8,130
Massachusetts	661	0	110	.74	41.8	108	0	8.71	0	120	2,620	1,050	2,620	3,670
Michigan	989	0	124	2.12	69.9	605	0	91.2	0	10,300	0	12,100	0	12,100
Minnesota	185	0	31.8	0	57.0	81.9	0	468	0	2,740	0	3,560	0	3,560
Mississippi	44.2	0	147	12.7	37.8	135	0	.68	0	356	92.6	733	92.6	825
Missouri	659	0	43.6	63.7	166	48.9	0	13.2	0	6,910	0	7,900	0	7,900
Montana	83.9	1.19	10,700	30.7	44.4	33.2	0	38.3	0	100	0	11,000	0	11,000
Nebraska	106	0	1,290	22.5	83.1	.01	0	11.4	0	3,970	0	5,480	0	5,480
Nevada	607	0	928	0	.75	5.83	0	0	0	23.5	0	1,570	0	1,570
New Hampshire	70.2	.10	4.56	.34	12.0	40.2	0	4.19	0	256	992	387	992	1,380
New Jersey	614	0	58.2	0	0	44.6	0	41.9	0	742	6,120	1,500	6,120	7,620
New Mexico	41.8	0	1,730	3.42	20.7	1.93	0	1.45	0	51.0	0	1,860	0	1,860
New York	2,270	0	34.5	11.7	52.8	157	0	29.1	.47	8,010	5,480	10,600	5,480	16,000
North Carolina	858	0	240	36.2	1,130	250	0	12.4	0	9,350	1,740	11,900	1,740	13,600
North Dakota	39.4	0	81.8	10.1	6.96	10.9	0	.45	0	1,190	0	1,340	0	1,340
Ohio	1,060	3.36	27.9	18.4	6.60	621	0	69.1	0	9,990	0	11,800	0	11,800
Oklahoma	597	0	150	120	21.2	18.0	0	1.87	0	183	0	1,090	0	1,090
Oregon	504	9.21	4,230	16.3	740	183	0	2.34	0	8.49	0	5,700	0	5,700
Pennsylvania	1,350	0	18.0	8.93	574	789	0	12.2	0	7,200	.84	9,950	.84	9,960
Rhode Island	116	0	0	.01	6.13	0	0	1.26	0	1.61	296	125	296	421
South Carolina	556	0	48.7	7.45	.70	433	0	.56	0	7,320	0	8,370	.01	8,370
South Dakota	38.8	0	160	31.9	15.8	.11	0	6.65	0	4.45	0	258	0	258
Tennessee	652	0	24.7	15.9	50.1	827	0	12.7	0	10,000	0	11,600	0	11,600
Texas	3,440	0	1,890	108	10.2	1,190	803	71.9	0	10,800	2,090	17,500	2,890	20,400
Utah	291	2.37	4,040	10.8	.20	16.5	104	1.58	144	50.1	0	4,420	247	4,660
Vermont	35.9	.19	3.17	2.30	13.7	6.88	0	3.98	0	472	0	538	0	538
Virginia	1,010	0	37.2	25.5	491	472	9.55	30.6	0	5,510	3,930	7,560	3,950	11,500
Washington	505	.02	3,240	11.0	34.7	388	37.2	4.64	0	511	0	4,700	37.3	4,740
West Virginia	170	.74	.01	3.79	48.0	1,020	0	10.6	0	3,980	0	5,240	0	5,240
Wisconsin	277	0	17.1	8.15	48.5	448	0	16.7	0	7,730	0	8,540	0	8,540
Wyoming	52.1	0	4,000	11.3	23.6	2.15	0	15.1	0	248	0	4,350	0	4,350
Puerto Rico	624	0	17.0	2.33	.55	0	0	.25	0	1.59	2,560	645	2,560	3,210
U.S. Virgin Islands	5.65	2.19	0	.03	0	3.40	0	0	.02	.20	145	11.5	145	156
TOTAL	33,200	98.3	84,000	948	7,710	15,600	1,290	1,450	213	159,000	63,500	302,000	65,000	367,000

Table 4*A*. Groundwater withdrawals by water-use category, 2005, in million gallons per day.

[Values may not sum to totals because of independent rounding]

State	Public supply	Domestic	Irrigation	Livestock	Aquaculture	Industrial		Mining		Thermoelectric power		Total		
		Fresh	Fresh	Fresh	Fresh	Fresh	Saline	Fresh	Saline	Fresh	Saline	Fresh	Saline	Total
Alabama	277	39.1	74.2	12.4	40.5	27.6	0	19.6	0	0.22	0	491	0	491
Alaska	25.9	13.4	1.03	.13	436	4.14	0	0	114	2.15	0	482	114	597
Arizona	567	27.2	2,260	10.9	9.25	22.4	0	91.6	2.61	50.5	0	3,040	2.61	3,050
Arkansas	138	17.8	7,020	15.5	246	65.8	0	.24	0	.93	0	7,510	0	7,510
California	1,280	429	8,620	88.1	186	62.3	0	34.5	255	9.84	0	10,700	255	11,000
Colorado	102	34.4	2,320	22.1	16.8	3.61	0	5.20	14.6	6.50	0	2,510	14.6	2,520
Connecticut	76.1	63.1	.74	1.25	4.89	7.02	0	.67	0	.08	0	154	0	154
Delaware	51.2	6.43	55.3	1.51	.10	11.6	0	.80	0	.32	0	127	0	127
District of Columbia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Florida	2,200	190	1,450	16.9	9.03	181	0	138	0	16.9	3.26	4,200	3.26	4,200
Georgia	254	120	486	2.15	4.98	240	0	48.9	0	3.76	0	1,160	0	1,160
Hawaii	249	12.2	23.6	.75	2.23	29.2	1.73	1.42	0	37.8	1,450	357	1,450	1,800
Idaho	220	86.6	3,870	35.8	102	41.1	0	2.16	0	1.10	0	4,360	0	4,360
Illinois	406	101	479	37.9	5.58	128	0	15.5	25.5	7.20	0	1,180	25.5	1,210
Indiana	356	124	97.4	25.6	.51	86.9	0	4.70	0	12.6	0	707	0	707
Iowa	312	34.6	31.6	87.2	11.6	177	0	3.23	0	25.5	0	683	0	683
Kansas	160	14.9	2,620	84.3	1.93	35.5	0	10.1	0	13.4	0	2,950	0	2,950
Kentucky	69.0	22.2	.93	2.31	.99	48.1	0	7.89	0	5.14	0	157	0	157
Louisiana	354	44.0	684	4.16	169	265	0	6.11	151	97.4	0	1,620	151	1,780
Maine	27.4	34.1	1.15	2.07	23.8	8.61	0	1.50	0	.53	0	99.2	0	99.2
Maryland	95.9	74.3	34.8	6.21	5.63	14.2	0	9.05	0	1.77	0	242	0	242
Massachusetts	203	40.5	47.1	1.20	7.13	15.6	0	2.96	0	0	0	318	0	318
Michigan	260	251	198	17.7	2.95	89.1	0	13.2	.94	4.07	0	836	.94	837
Minnesota	372	77.8	216	60.4	61.8	65.5	0	8.05	0	2.41	0	863	0	863
Mississippi	330	56.4	1,430	7.56	245	76.9	0	11.3	0	37.3	0	2,190	0	2,190
Missouri	243	59.5	1,340	19.2	7.75	37.4	0	22.9	0	21.0	0	1,750	0	1,750
Montana	67.3	22.4	140	11.6	2.38	37.4	0	1.20	5.12	.25	0	283	5.12	288
Nebraska	236	52.1	7,310	88.2	8.63	11.3	0	.08	.09	7.86	0	7,710	.09	7,710
Nevada	135	37.4	670	8.51	14.7	.70	0	99.1	0	15.9	0	981	0	981
New Hampshire	37.2	41.6	.45	.89	7.01	5.65	0	.02	0	.99	0	93.8	0	93.8
New Jersey	410	79.5	43.2	1.14	9.15	46.2	0	.91	0	1.59	.01	592	.01	592
New Mexico	249	32.0	1,270	47.6	1.69	11.5	0	57.4	0	10.4	0	1,680	0	1,680
New York	503	140	20.3	19.4	16.0	161	0	6.94	.42	0	0	867	.42	867
North Carolina	156	161	77.4	93.7	6.83	171	0	35.0	0	.14	0	700	0	700
North Dakota	31.9	8.90	77.8	13.6	0	5.00	0	5.26	0	0	0	142	0	142
Ohio	488	146	17.7	7.71	3.58	149	0	112	0	22.5	0	946	0	946
Oklahoma	114	25.1	361	54.7	.20	8.04	0	1.01	190	1.25	0	565	190	755
Oregon	80.9	69.5	1,930	3.22	24.8	8.95	0	13.9	0	.88	0	2,140	0	2,140
Pennsylvania	210	152	8.29	53.8	11.8	66.1	0	84.9	0	4.39	0	591	0	591
Rhode Island	16.2	6.10	5.49	.18	.31	.50	0	.59	0	0	0	29.4	0	29.4
South Carolina	151	127	48.1	4.67	.69	32.4	0	8.56	0	5.58	0	378	0	378
South Dakota	65.9	7.67	149	19.2	19.1	4.31	0	4.55	0	.72	0	271	0	271
Tennessee	332	36.7	33.4	15.5	14.8	45.6	0	10.4	0	0	0	489	0	489
Texas	1,210	257	6,120	162	5.41	187	0	26.8	548	55.8	0	8,020	548	8,570
Utah	348	11.8	389	8.18	87.5	20.6	35.1	3.73	33.7	13.4	4.18	882	73.0	955
Vermont	13.8	13.7	.30	6.15	5.97	1.81	0	.24	0	.26	0	42.3	0	42.3
Virginia	83.8	126	14.7	7.04	6.27	106	0	2.47	0	3.07	0	339	10.6	349
Washington	539	86.0	629	20.9	7.03	107	0	22.4	0	0	0	1,410	0	1,410
West Virginia	37.2	32.8	.01	1.61	9.92	54.4	0	4.71	.51	.20	0	141	.51	141
Wisconsin	305	87.3	387	65.6	38.5	70.9	0	17.6	0	3.37	0	975	0	975
Wyoming	49.8	6.32	422	6.12	2.23	4.12	0	38.3	177	1.32	0	531	177	708
Puerto Rico	96.2	2.11	30.0	5.71	.01	9.41	0	1.76	.34	1.39	0	147	.34	147
U.S. Virgin Islands	.88	0	0	.04	0	.26	0	0	0	0	0	1.18	0	1.18
TOTAL	14,600	3,740	53,500	1,290	1,910	3,070	36.8	1,020	1,520	510	1,450	79,600	3,020	82,600

Table 4*B*. Groundwater withdrawals by water-use category, 2005, in thousand acre-feet per year.

[Values may not sum to totals because of independent rounding]

State	Public supply	Domestic	Irrigation	Livestock	Aquaculture	Industrial		Mining		Thermoelectric power		Total		
		Fresh	Fresh	Fresh	Fresh	Fresh	Saline	Fresh	Saline	Fresh	Saline	Fresh	Saline	Total
Alabama	311	43.9	83.2	13.9	45.4	31.0	0	21.9	0	0.25	0	550	0	550
Alaska	29.0	15.0	1.15	.15	488	4.64	0	0	128	2.41	0	541	128	669
Arizona	636	30.5	2,540	12.2	10.4	25.2	0	103	2.93	56.6	0	3,410	2.93	3,420
Arkansas	154	20.0	7,870	17.4	276	73.7	0	.27	0	1.04	0	8,420	0	8,420
California	1,430	480	9,660	98.8	209	69.9	0	38.7	285	11.0	0	12,000	285	12,300
Colorado	114	38.6	2,600	24.8	18.9	4.05	0	5.83	16.4	7.29	0	2,810	16.4	2,830
Connecticut	85.3	70.7	.83	1.40	5.48	7.87	0	.75	0	.09	0	172	0	172
Delaware	57.4	7.21	62.0	1.69	.11	13.0	0	.90	0	.36	0	143	0	143
District of Columbia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Florida	2,470	213	1,620	18.9	10.1	202	0	154	0	19.0	3.65	4,710	3.65	4,710
Georgia	285	134	545	2.41	5.58	269	0	54.9	0	4.21	0	1,300	0	1,300
Hawaii	280	13.7	26.5	.84	2.50	32.8	1.94	1.59	0	42.3	1,620	400	1,620	2,020
Idaho	246	97.0	4,340	40.1	114	46.1	0	2.42	0	1.23	0	4,890	0	4,890
Illinois	455	114	537	42.5	6.26	143	0	17.4	28.6	8.07	0	1,320	28.6	1,350
Indiana	399	139	109	28.7	.57	97.4	0	5.27	0	14.2	0	793	0	793
Iowa	350	38.7	35.5	97.8	13.0	199	0	3.62	0	28.6	0	766	0	766
Kansas	180	16.7	2,940	94.5	2.16	39.8	0	11.3	0	15.0	0	3,300	0	3,300
Kentucky	77.4	24.9	1.04	2.59	1.11	53.9	0	8.84	0	5.76	0	176	0	176
Louisiana	396	49.4	767	4.66	190	297	0	6.85	170	109	0	1,820	170	1,990
Maine	30.7	38.2	1.29	2.32	26.7	9.65	0	1.68	0	.59	0	111	0	111
Maryland	108	83.3	39.0	6.96	6.31	15.9	0	10.1	0	1.98	0	271	0	271
Massachusetts	228	45.4	52.8	1.35	7.99	17.5	0	3.32	0	0	0	356	0	356
Michigan	292	281	222	19.8	3.31	99.9	0	14.8	1.05	4.56	0	937	1.05	938
Minnesota	417	87.2	242	67.7	69.3	73.5	0	9.02	0	2.70	0	968	0	968
Mississippi	370	63.2	1,600	8.47	274	86.2	0	12.6	0	41.8	0	2,460	0	2,460
Missouri	273	66.7	1,500	21.6	8.69	41.9	0	25.6	0	23.5	0	1,960	0	1,960
Montana	75.4	25.1	157	13.1	2.67	41.9	0	1.35	5.74	.28	0	317	5.74	323
Nebraska	264	58.4	8,190	98.9	9.67	12.7	0	.09	.10	8.81	0	8,650	.10	8,650
Nevada	151	41.9	751	9.54	16.4	.79	0	111	0	17.8	0	1,100	0	1,100
New Hampshire	41.7	46.6	.50	1.00	7.86	6.33	0	.02	0	1.11	0	105	0	105
New Jersey	460	89.1	48.4	1.28	10.3	51.8	0	1.02	0	1.78	.01	664	.01	664
New Mexico	279	35.9	1,420	53.4	1.89	12.9	0	64.3	0	11.7	0	1,880	0	1,880
New York	564	157	22.8	21.7	18.0	181	0	7.78	.47	0	0	972	.47	972
North Carolina	174	180	86.8	105	7.66	191	0	39.3	0	.16	0	785	0	785
North Dakota	35.7	9.98	87.3	15.2	0	5.60	0	5.90	0	0	0	160	0	160
Ohio	547	164	19.8	8.64	4.01	167	0	126	0	25.2	0	1,060	0	1,060
Oklahoma	127	28.1	405	61.3	.22	9.01	0	1.13	213	1.40	0	634	213	847
Oregon	90.7	77.9	2,170	3.61	27.8	10.0	0	15.6	0	.99	0	2,390	0	2,390
Pennsylvania	235	171	9.29	60.3	13.2	74.1	0	95.2	0	4.92	0	662	0	662
Rhode Island	18.1	6.84	6.15	.20	.35	.56	0	.66	0	0	0	32.9	0	32.9
South Carolina	169	143	54.0	5.24	.77	36.3	0	9.60	0	6.26	0	424	0	424
South Dakota	73.9	8.60	167	21.6	21.4	4.83	0	5.10	0	.81	0	303	0	303
Tennessee	373	41.1	37.5	17.3	16.6	51.2	0	11.6	0	0	0	548	0	548
Texas	1,350	288	6,860	182	6.06	210	0	30.0	614	62.5	0	8,990	614	9,600
Utah	390	13.2	436	9.17	98.1	23.1	39.3	4.18	37.8	15.0	4.69	989	81.8	1,070
Vermont	15.5	15.4	.34	6.89	6.69	2.03	0	.27	0	.29	0	47.4	0	47.4
Virginia	94.0	141	16.5	7.89	7.03	119	0	2.77	0	3.44	0	380	11.8	391
Washington	605	96.4	705	23.5	7.88	120	0	25.1	0	0	0	1,580	0	1,580
West Virginia	41.7	36.8	.01	1.80	11.1	60.9	0	5.28	.57	.22	0	158	.57	158
Wisconsin	342	97.9	433	73.5	43.1	79.5	0	19.7	0	3.78	0	1,090	0	1,090
Wyoming	55.8	7.08	474	6.86	2.50	4.62	0	42.9	199	1.48	0	595	199	793
Puerto Rico	108	2.37	33.6	6.40	.01	10.5	0	1.97	.38	1.56	0	164	.38	165
U.S. Virgin Islands	.99	0	0	.05	0	.29	0	0	0	0	0	1.32	0	1.32
TOTAL	16,400	4,190	60,000	1,450	2,140	3,440	41.2	1,140	1,700	571	1,630	89,300	3,380	92,600

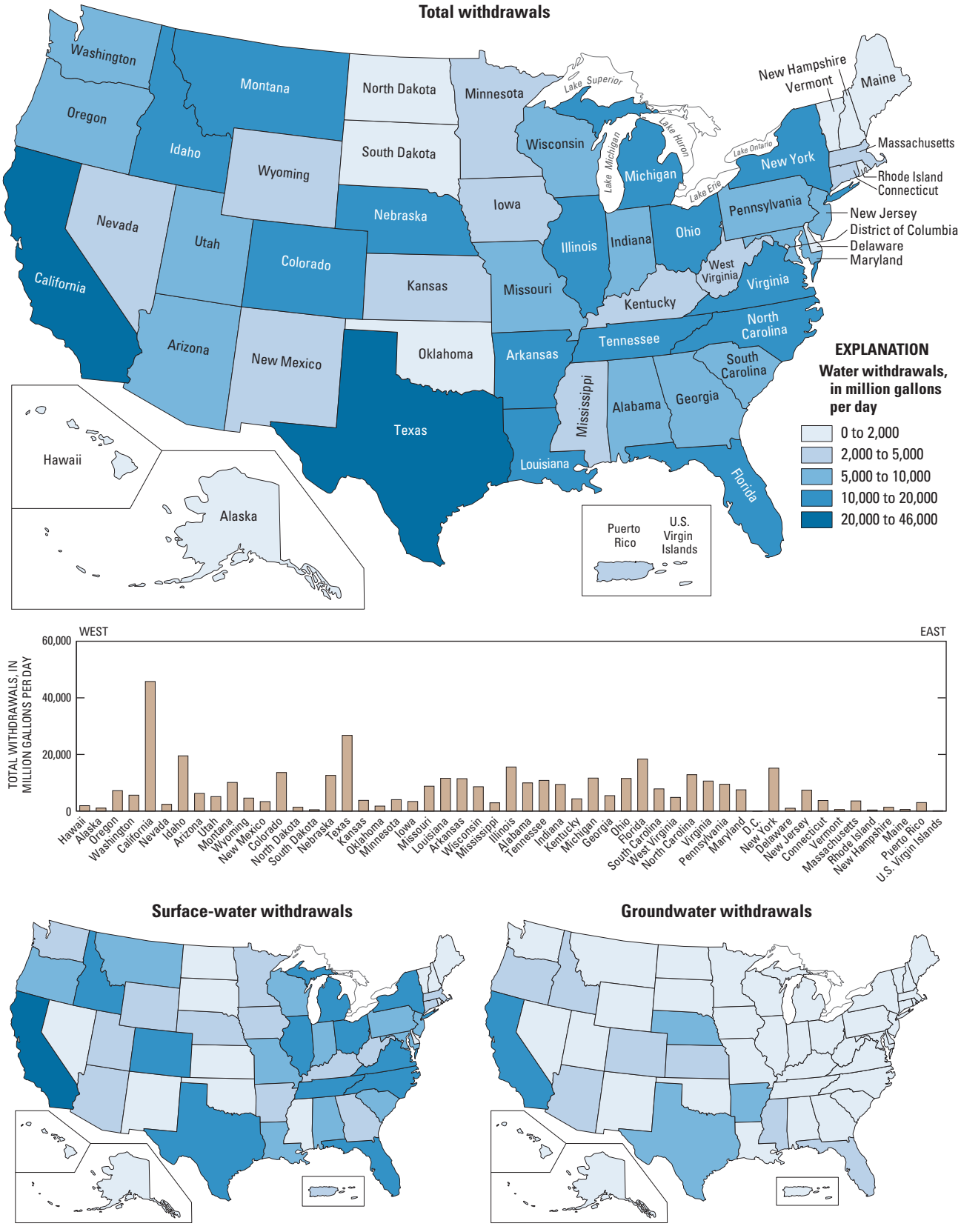


Figure 2. Total, surface-water, and groundwater withdrawals, 2005.

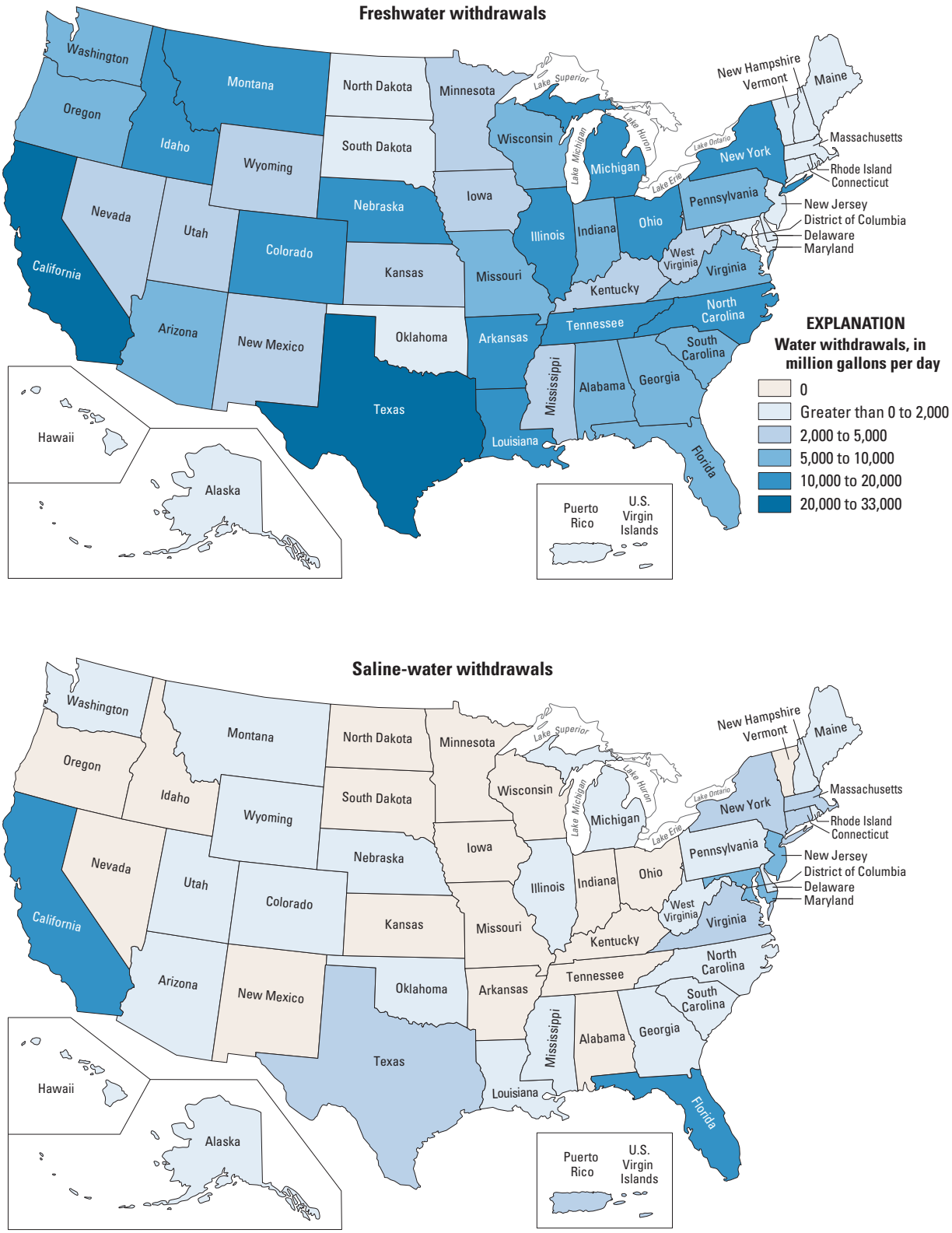


Figure 3. Freshwater and saline-water withdrawals, 2005.

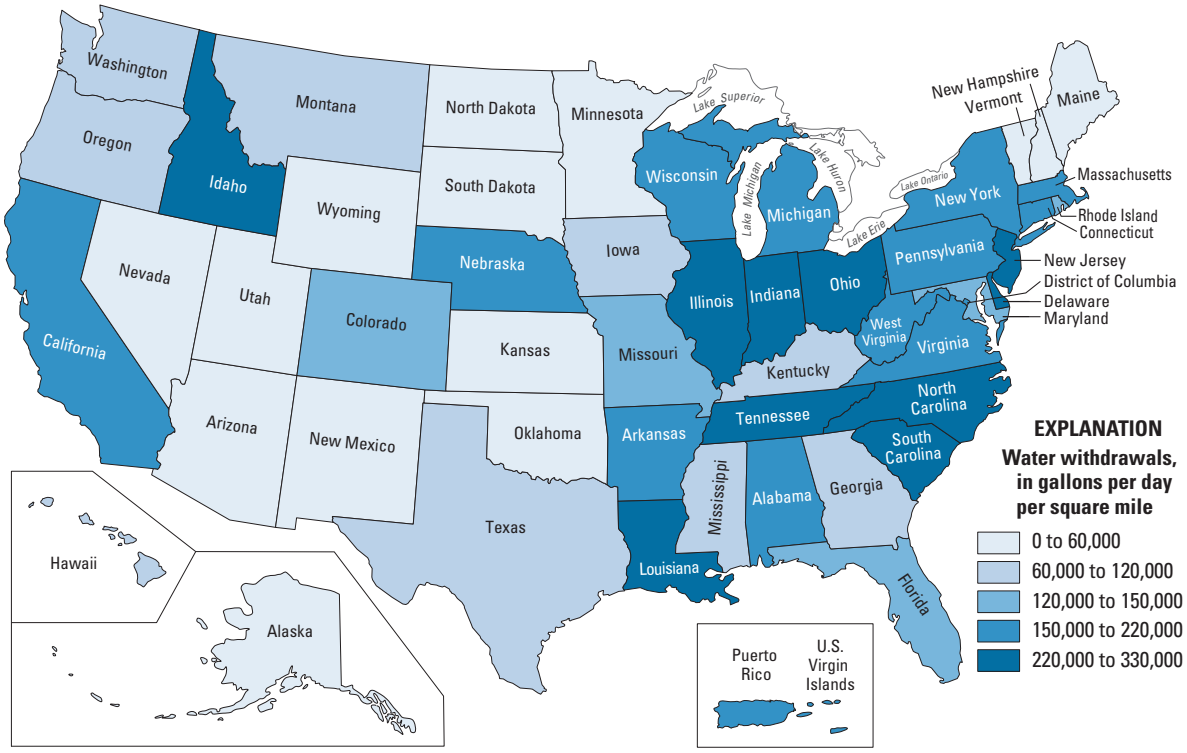


Figure 4. Intensity of freshwater withdrawals, 2005.

Plant Scherer in Georgia is one of the largest coal-fired thermoelectric power plants in the United States. Photo courtesy of Georgia Power, a Southern Company.

Public Supply — 44,200 million gallons per day

Public supply refers to water withdrawn by public and private water suppliers that provide water to at least 25 people or have a minimum of 15 connections. Public-supply water is delivered to users for domestic, commercial, and industrial purposes, and also is used for public services and system losses.

Approximately 44,200 Mgal/d (table 5), or 49,600 thousand acre-feet per year (table 2*B*), of water were withdrawn for public supply in 2005. This amount is 2 percent more than the estimated amount of water withdrawn for public supply in 2000. Public supply represents about 13 percent of total freshwater withdrawals, and 21 percent of all withdrawals, not including thermoelectric power. Some public-supply water sources are desalinated seawater or brackish groundwater that has been treated to reduce dissolved solids. These saline water sources currently represent a relatively small proportion of total public-supply water withdrawals in the United States and, thus, are not identified separately in table 5.

An estimated 258 million people relied on public water supplies for their household use. This number represents about 86 percent of the total U.S. population. States with the largest populations (California, Texas, New York, and Florida) withdrew the largest amounts of water for public supply (fig. 5). Two-thirds of water withdrawn for public supply in 2005 was from surface sources, such as lakes and streams; the other third was from groundwater. A total of 38 States (including the District of Columbia, which obtains its water from Maryland) relied on surface water for more than half their public supplies, whereas only 15 States obtained more than half their public water supplies from groundwater. California, Texas, New York, Illinois, and Pennsylvania each withdrew more than 1,000 Mgal/d of surface water for public supply in 2005, and 45 percent of the total surface-water withdrawals for public supply occurred in these five States. Three States—Florida, California, and Texas—each withdrew more than 1,000 Mgal/d of groundwater for public supply in 2005 and together accounted for 32 percent of total groundwater withdrawals for this category.

Of the total public-supply water, most is delivered to customers for domestic, commercial, and industrial needs. Part of the total, often unbilled, is used for public services, such as pools, parks, firefighting, water and wastewater treatment, and municipal buildings. A certain amount of public-supply water is unaccounted for because of leaks, flushing, tower maintenance, and other system losses. Estimates of domestic deliveries, which represent indoor and outdoor water uses at occupied residences, are given in table 5. Domestic deliveries averaged 58 percent of total public-supply use, but this percentage varies from State to State. Estimates for commercial and industrial deliveries, public use, and system losses were not available for all States and, therefore, are included in table 5 as an aggregate number.

Methods varied by State for estimating public-supply withdrawals, source of water, population served, and domestic deliveries. Common sources of information about withdrawals by source included data collected from water suppliers by State water regulatory agencies or surveys. Population served estimates were derived using various sources, including reports from State agencies, the USEPA SDWIS database, Census data, and information on service connections from public suppliers. Domestic deliveries for each State were estimated by various methods including surveys of public-supply sales information, calculations using coefficients for per capita use along with population served, and development of average percentages of deliveries to various customer categories.

Chattahoochee Water Treatment Plant, City of Atlanta, Georgia. Photo by Nancy L. Barber, USGS.

Table 5. Public-supply water withdrawals, 2005.

[Values may not sum to totals because of independent rounding; Mgal/d, million gallons per day; n/a, not applicable]

State	Population (in thousands)			Withdrawals (in Mgal/d)			Public-supply deliveries		
	Total	Served by public supply		By source		Total	Domestic use (in Mgal/d)	Domestic use (in percent)	All other uses and system losses (in Mgal/d)
		Population	Population (in percent)	Ground-water	Surface water				
Alabama	4,560	4,040	89	277	524	802	326	41	476
Alaska	664	429	65	25.9	49.9	75.8	46.8	62	29.0
Arizona	5,940	5,720	96	567	602	1,170	802	69	367
Arkansas	2,780	2,580	93	138	266	404	254	63	150
California	36,100	33,400	93	1,280	5,710	6,990	3,980	57	3,000
Colorado	4,670	4,370	94	102	762	864	530	61	335
Connecticut	3,510	2,670	76	76.1	404	480	200	42	280
Delaware	844	763	90	51.2	45.0	96.2	44.6	46	51.6
District of Columbia	582	582	100	0	0	0	82.7	n/a	–82.7
Florida	17,900	16,100	90	2,200	339	2,540	1,530	60	1,010
Georgia	9,070	7,470	82	254	926	1,180	727	62	452
Hawaii	1,280	1,200	94	249	11.4	261	198	76	62.6
Idaho	1,430	1,010	70	220	26.7	246	181	73	65.6
Illinois	12,800	11,600	91	406	1,300	1,700	1,050	62	654
Indiana	6,270	4,650	74	356	320	676	353	52	323
Iowa	2,970	2,440	82	312	86.0	398	158	40	240
Kansas	2,740	2,600	95	160	242	403	209	52	194
Kentucky	4,170	3,480	83	69.0	489	558	243	44	314
Louisiana	4,520	3,970	88	354	365	719	485	67	234
Maine	1,320	746	56	27.4	68.5	95.9	37.8	39	58.0
Maryland	5,600	4,670	83	95.9	585	681	536	79	146
Massachusetts	6,400	5,870	92	203	590	793	487	61	306
Michigan	10,100	7,210	71	260	883	1,140	559	49	584
Minnesota	5,130	4,020	78	372	165	537	273	51	264
Mississippi	2,920	2,370	81	330	39.5	369	284	77	85.6
Missouri	5,800	4,950	85	243	588	831	452	54	379
Montana	936	635	68	67.3	74.8	142	81.0	57	61.1
Nebraska	1,760	1,450	82	236	94.2	330	185	56	145
Nevada	2,410	2,230	92	135	541	676	421	62	255
New Hampshire	1,310	755	58	37.2	62.6	99.8	56.6	57	43.2
New Jersey	8,720	7,760	89	410	548	958	525	55	432
New Mexico	1,930	1,550	80	249	37.3	286	175	61	111
New York	19,300	17,400	90	503	2,030	2,530	1,720	68	807
North Carolina	8,680	6,390	74	156	765	921	444	48	477
North Dakota	637	532	84	31.9	35.2	67.1	48.8	73	18.3
Ohio	11,500	9,470	83	488	947	1,430	643	45	792
Oklahoma	3,540	3,250	92	114	532	646	276	43	370
Oregon	3,640	2,930	81	80.9	449	530	363	68	167
Pennsylvania	12,400	9,890	80	210	1,210	1,420	552	39	865
Rhode Island	1,080	990	92	16.2	103	120	79.3	66	40.3
South Carolina	4,260	2,980	70	151	496	647	298	46	349
South Dakota	776	666	86	65.9	34.6	100	65.6	65	34.8
Tennessee	5,960	5,450	91	332	581	914	443	48	471
Texas	22,900	20,600	90	1,210	3,070	4,270	2,870	67	1,400
Utah	2,550	2,480	97	348	259	607	460	76	148
Vermont	623	438	70	13.8	32.0	45.9	25.8	56	20.0
Virginia	7,570	5,890	78	83.8	898	982	442	45	540
Washington	6,290	5,380	86	539	451	990	562	57	428
West Virginia	1,820	1,400	77	37.2	152	189	149	79	39.4
Wisconsin	5,540	3,870	70	305	247	552	229	41	324
Wyoming	509	425	83	49.8	46.5	96.3	71.0	74	25.2
Puerto Rico	3,910	3,880	99	96.2	556	652	347	53	306
U.S. Virgin Islands	109	73.0	67	.88	5.04	5.92	5.33	90	.59
TOTAL	301,000	258,000	86	14,600	29,600	44,200	25,600	58	18,600

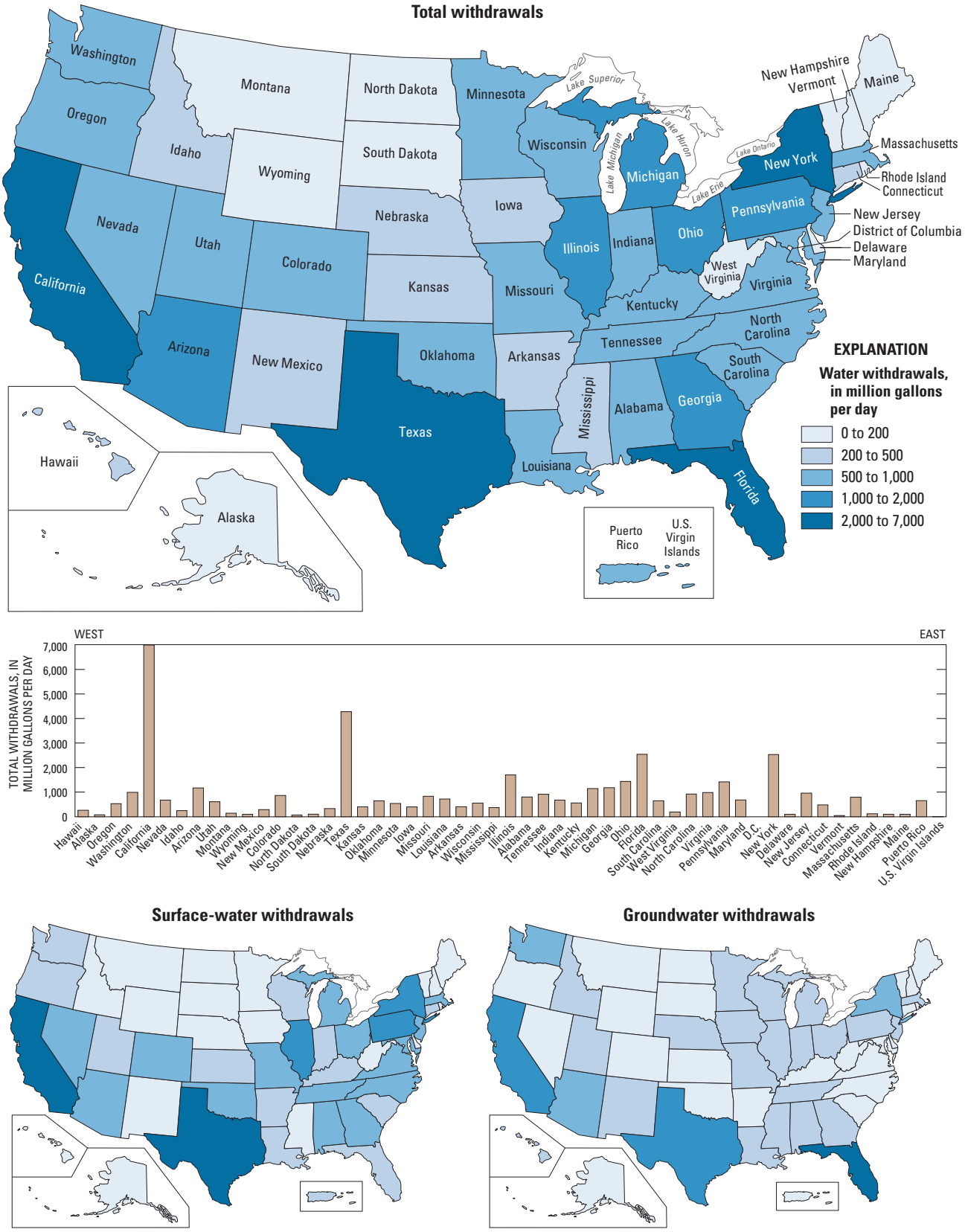


Figure 5. Public-supply withdrawals by source and State, 2005.

Domestic

3,830 million gallons per day

Domestic water use includes indoor and outdoor uses at residences. Common indoor water uses are drinking, food preparation, washing clothes and dishes, and flushing toilets. Common outdoor uses are watering lawns and gardens and washing cars. Domestic water is either self-supplied or provided by public suppliers. Self-supplied domestic water use is usually withdrawn from a private source, such as a well, or captured as rainwater in a cistern. Domestic deliveries are provided to homes by public suppliers. Table 6 lists the estimated self-supplied and public-supplied population in each State, along with the amounts used by each segment of the population for domestic needs and the respective per capita use in gallons per day. Domestic self-supplied withdrawals anddeliveries also are combined in table 6 to show the entire estimated amount of domestic use in 2005 and the weighted per capita use in gallons per day calculated for all domestic use.

An estimated 42.9 million people in the United States, or 14 percent of the population, supplied their own water for domestic use in 2005. These self-supplied withdrawals totaled 3,830 Mgal/day, or about 1 percent of estimated withdrawals for all uses in 2005. Nearly all (98 percent) of these self-supplied withdrawals were from fresh groundwater. Domestic self-supplied water use was calculated using an estimate of the population that was not served by public supply and a coefficient for daily per capita use. For some States, these coefficients were county averages derived from observed residential water use and population estimates in nearby areas served by public suppliers. Other States used the same coefficient for all counties, often one used by State regulatory or planning agencies. Per capita self-supplied domestic usage ranged from 50 gallons per day (gal/d) in Kentucky to 206 gal/d in Nevada, and generally was lowest in the Northern and Eastern States and largest in the mountain and Western States. Outdoor watering in the drier climates causes domestic per capita use to increase. The national average in 2005 was 89 gal/d for self-supplied domestic use. In comparison, the national average per capita use for self-supplied domestic water use was 80 gal/d in 1995 and 83 gal/d in 2000.

Domestic water use includes drinking water, bathing, and watering the lawn. Photos by Nancy L. Barber.

The majority of people in the United States used water provided by public suppliers in 2005. These domestic deliveries totaled 25,600 Mgal/d. The most common method for estimating the quantity of water delivered by public water suppliers for domestic use was to use sales information from reports or surveys of public suppliers. Although complete surveys were uncommon, sample data could be used to develop coefficients for estimating the deliveries for all public suppliers. Typical coefficients used include percentage of the total withdrawals that were for domestic use, and per capita use derived from residential sales and the estimated population served.

Per capita water use for domestic deliveries ranged from 51 gal/d in Maine to 189 gal/d in Nevada. The national average was 99 gal/d for public-supplied domestic water use. This per capita usage is similar to the rate of 101 gal/d observed in 1995, the last year for which domestic delivery information was compiled for all States.

Combined domestic self-supplied withdrawals and public-supplied deliveries totaled 29,400 Mgal/d in 2005, and the weighted average per capita usage was 98 gal/d. The geographic distribution of total domestic water use, self-supplied withdrawals, and domestic deliveries by State is shown in figure 6*A*. States with the largest domestic use (public supplied and self supplied) and the largest domestic deliveries from public supply were those with the largest populations: California, Texas, New York, Florida, and Illinois. California, Texas, and Michigan had the largest self-supplied withdrawals.

Self-supplied domestic population in each State, in thousands of people and as a percentage of total State population, is shown in figure 6*B*. Self-supplied domestic populations were largest in Michigan, California, Pennsylvania, North Carolina, and Texas. States with the largest percentages of their population that were self-supplied were Maine, New Hampshire, Alaska, and the U.S. Virgin Islands.

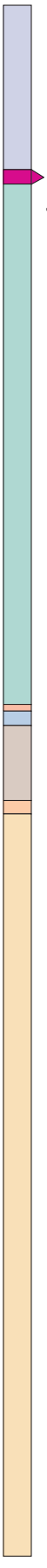


Table 6. Domestic water withdrawals and deliveries, 2005.

[Values may not sum to totals because of independent rounding; Mgal/d, million gallons per day; gal/d, gallons per day; n/a, not applicable]

State	Self supplied						Public supply			Total use		
	Self-supplied population (in thousands)	Percent of total population	Withdrawals (in Mgal/d)			Self-supplied per capita use (in gal/d)	Population served (in thousands)	Water deliveries (in Mgal/d)	Public-supply per capita use (in gal/d)	Total population (in thousands)	Water use (withdrawals and deliveries, in Mgal/d)	Total domestic per capita use (in gal/d)
			By source									
			Ground-water	Surface water	Total							
Alabama	521	11	39.1	0	39.1	75	4,040	326	81	4,560	365	80
Alaska	235	35	13.4	.68	14.1	60	429	46.8	109	664	60.9	92
Arizona	218	4	27.2	0	27.2	125	5,720	802	140	5,940	830	140
Arkansas	200	7	17.8	0	17.8	89	2,580	254	99	2,780	272	98
California	2,710	7	429	57.2	486	179	33,400	3,980	119	36,100	4,470	124
Colorado	299	6	34.4	0	34.4	115	4,370	530	121	4,670	564	121
Connecticut	841	24	63.1	0	63.1	75	2,670	200	75	3,510	263	75
Delaware	80.4	10	6.43	0	6.43	80	763	44.6	58	844	51.1	61
District of Columbia	0	0	0	0	0	n/a	582	82.7	142	582	82.7	142
Florida	1,790	10	190	0	190	106	16,100	1,530	95	17,900	1,720	96
Georgia	1,600	18	120	0	120	75	7,470	727	97	9,070	847	93
Hawaii	74.0	6	12.2	0	12.2	165	1,200	198	165	1,280	210	165
Idaho	424	30	86.6	0	86.6	204	1,010	181	180	1,430	267	187
Illinois	1,130	9	101	0	101	90	11,600	1,050	90	12,800	1,150	90
Indiana	1,630	26	124	0	124	76	4,650	353	76	6,270	477	76
Iowa	531	18	34.6	0	34.6	65	2,440	158	65	2,970	193	65
Kansas	149	5	14.9	0	14.9	100	2,600	209	80	2,740	223	81
Kentucky	696	17	22.2	12.6	34.8	50	3,480	243	70	4,170	278	67
Louisiana	551	12	44.0	0	44.0	80	3,970	485	122	4,520	529	117
Maine	575	44	34.1	0	34.1	59	746	37.8	51	1,320	71.9	54
Maryland	929	17	74.3	0	74.3	80	4,670	536	115	5,600	610	109
Massachusetts	527	8	40.5	0	40.5	77	5,870	487	83	6,400	528	82
Michigan	2,910	29	251	0	251	86	7,210	559	77	10,100	810	80
Minnesota	1,110	22	77.8	0	77.8	70	4,020	273	68	5,130	351	68
Mississippi	555	19	56.4	0	56.4	102	2,370	284	120	2,920	340	116
Missouri	850	15	59.5	0	59.5	70	4,950	452	91	5,800	512	88
Montana	301	32	22.4	1.06	23.5	78	635	81.0	128	936	104	112
Nebraska	313	18	52.1	0	52.1	167	1,450	185	128	1,760	237	135
Nevada	182	8	37.4	0	37.4	206	2,230	421	189	2,410	459	190
New Hampshire	555	42	41.6	.09	41.6	75	755	56.6	75	1,310	98.2	75
New Jersey	961	11	79.5	0	79.5	83	7,760	525	68	8,720	605	69
New Mexico	377	20	32.0	0	32.0	85	1,550	175	113	1,930	207	107
New York	1,870	10	140	0	140	75	17,400	1,720	99	19,300	1,860	97
North Carolina	2,300	26	161	0	161	70	6,390	444	69	8,680	604	70
North Dakota	105	16	8.90	0	8.90	85	532	48.8	92	637	57.7	91
Ohio	1,990	17	146	3.00	149	75	9,470	643	68	11,500	792	69
Oklahoma	295	8	25.1	0	25.1	85	3,250	276	85	3,540	301	85
Oregon	707	19	69.5	8.22	77.7	110	2,930	363	124	3,640	441	121
Pennsylvania	2,540	20	152	0	152	60	9,890	552	56	12,400	704	57
Rhode Island	85.9	8	6.10	0	6.10	71	990	79.3	80	1,080	85.4	79
South Carolina	1,270	30	127	0	127	100	2,980	298	100	4,260	426	100
South Dakota	110	14	7.67	0	7.67	70	666	65.6	99	776	73.3	94
Tennessee	509	9	36.7	0	36.7	72	5,450	443	81	5,960	479	80
Texas	2,230	10	257	0	257	115	20,600	2,870	139	22,900	3,130	137
Utah	68.5	3	11.8	2.11	13.9	203	2,480	460	186	2,550	474	186
Vermont	185	30	13.7	.17	13.9	75	438	25.8	59	623	39.8	64
Virginia	1,680	22	126	0	126	75	5,890	442	75	7,570	568	75
Washington	904	14	86.0	.02	86.0	95	5,380	562	104	6,290	648	103
West Virginia	420	23	32.8	.66	33.5	80	1,400	149	107	1,820	183	101
Wisconsin	1,670	30	87.3	0	87.3	52	3,870	229	59	5,540	316	57
Wyoming	84.4	17	6.32	0	6.32	75	425	71.0	167	509	77.4	152
Puerto Rico	30.7	1	2.11	0	2.11	69	3,880	347	89	3,910	349	89
U.S. Virgin Islands	35.7	33	0	1.95	1.95	55	73.0	5.33	73	109	7.28	67
TOTAL	42,900	14	3,740	87.7	3,830	89	258,000	25,600	99	301,000	29,400	98

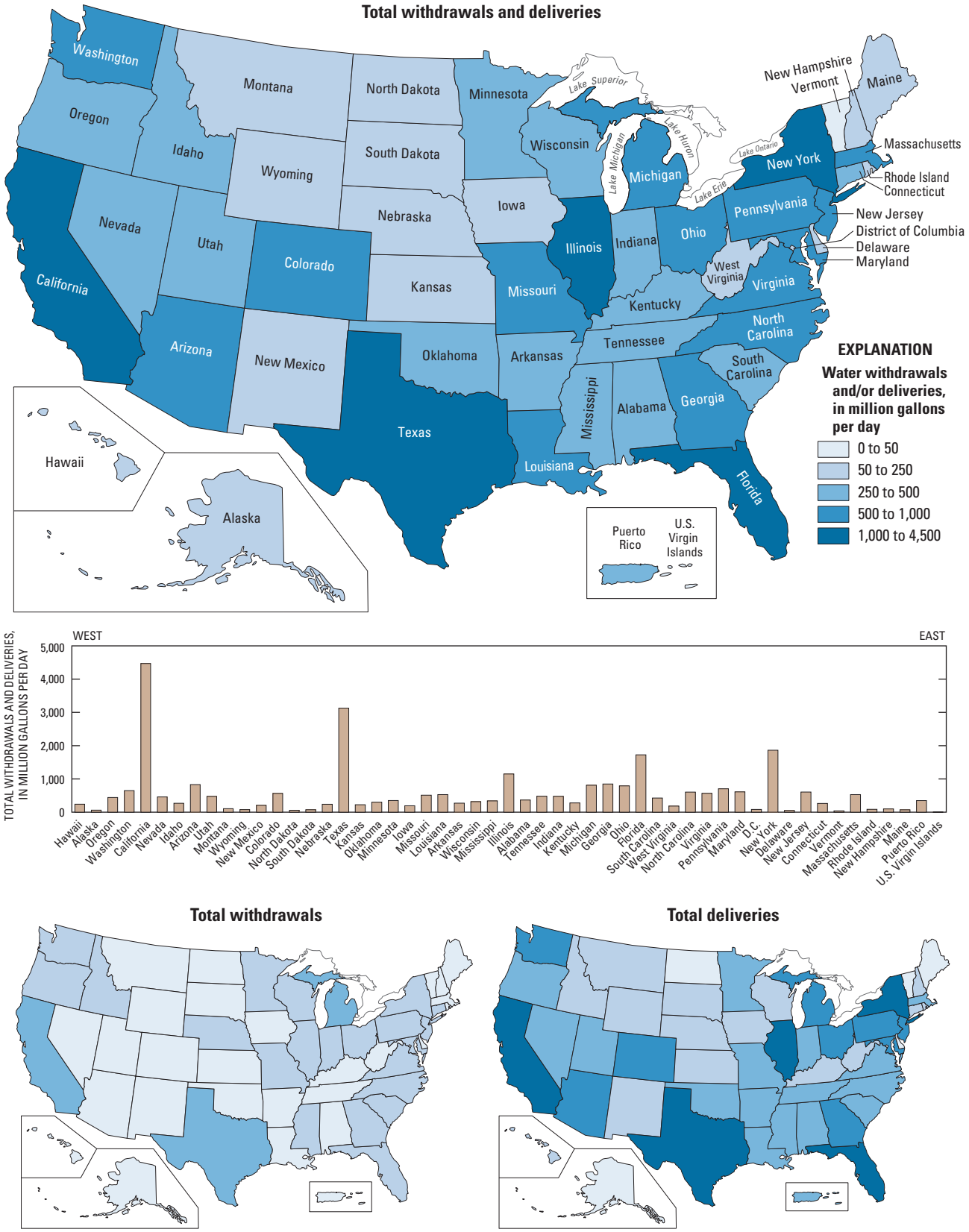


Figure 6*A*. Domestic withdrawals and deliveries by State, 2005.

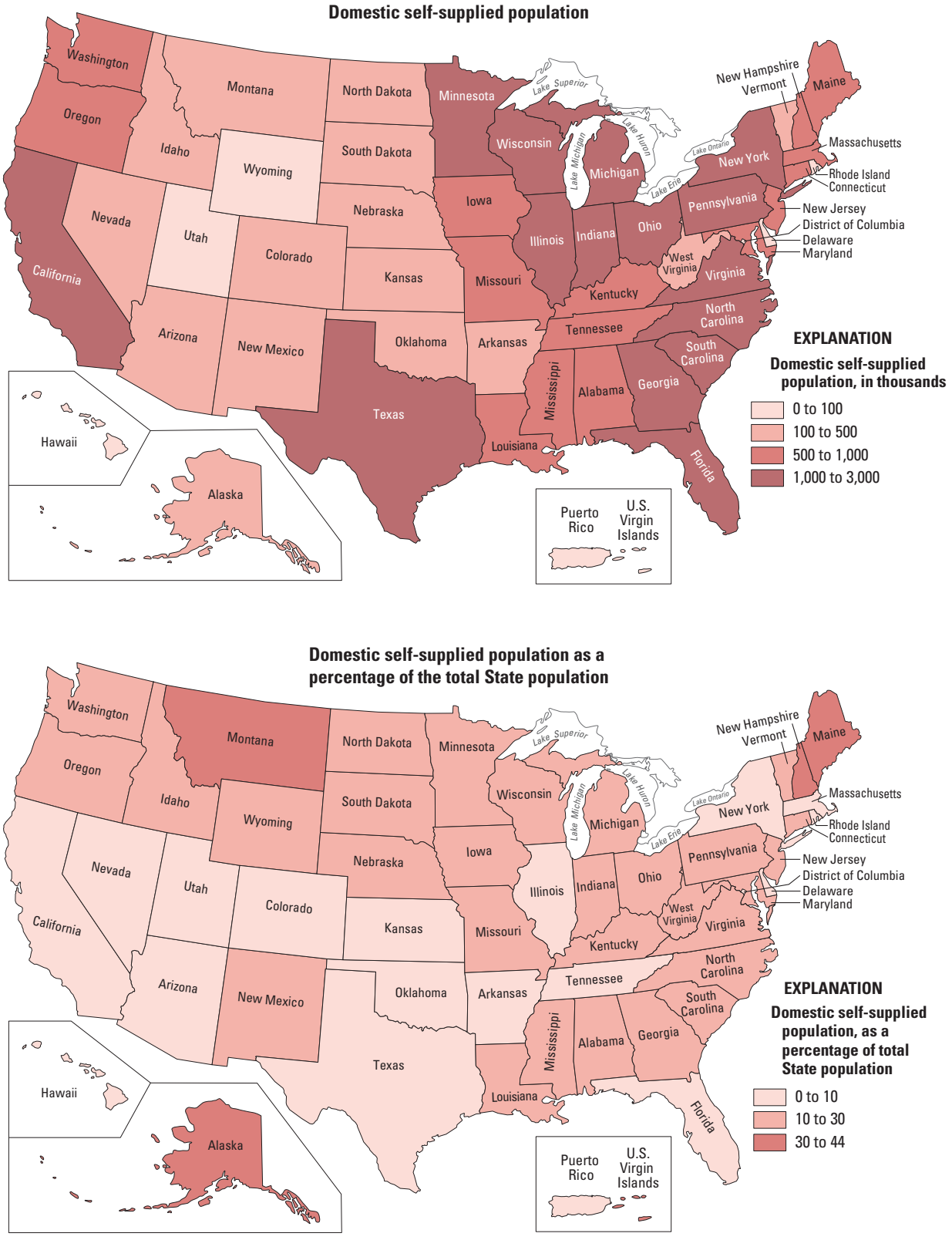


Figure 6*B*. Self-supplied domestic population and percentage of total population by State, 2005.

Irrigation

128,000 million gallons per day

Irrigation water use includes water that is applied by an irrigation system to sustain plant growth in all agricultural and horticultural practices. Irrigation also includes water that is applied for pre-irrigation, frost protection, application of chemicals, weed control, field preparation, crop cooling, harvesting, dust suppression, leaching salts from the root zone, and water lost in conveyance. Irrigation of golf courses, parks, nurseries, turf farms, cemeteries, and other self-supplied landscape-watering uses also are included. Irrigation water use includes self-supplied withdrawals and deliveries from irrigation companies, irrigation districts, cooperatives, or governmental entities. All irrigation withdrawals were considered freshwater. Irrigated acres were reported by three types of irrigation methods: sprinkler, microirrigation, and surface (flood) systems.

Irrigation withdrawals and irrigated acres by irrigation system are listed by State in table 7. For 2005, total irrigation withdrawals were about 128,000 Mgal/d, or 144,000 thousand acre-feet per year. Irrigation withdrawals were 37 percent of total freshwater withdrawals and 62 percent of total freshwater withdrawals for all categories excluding thermoelectric power. Surface water accounted for 58 percent of the total irrigation withdrawals. About 61.1 million acres were irrigated in 2005.

About 26.6 million acres were irrigated with surface (flood) systems, 4.05 million acres with microirrigation systems, and 30.5 million acres with sprinkler systems. The national average application rate was 2.35 acre-feet per acre.

The geographic distribution of total, surface-water, and groundwater withdrawals for irrigation is shown in figure 7. The majority of withdrawals (85 percent) and irrigated acres (74 percent) were in the 17 conterminous Western States. The 17 Western States are located in areas where average annual precipitation typically is less than 20 inches and is insufficient to support crops without supplemental water. Surface water was the primary source of water in the arid West and the Mountain States. California, Idaho, Colorado, and Montana combined accounted for 49 percent of the total irrigation withdrawals and 64 percent of surface-water irrigation withdrawals. Nearly 90 percent of the groundwater used for irrigation was withdrawn in 13 States, and each of these States withdrew more than 1,000 Mgal/d (1,120 thousand acre-feet per year) of groundwater for irrigation in 2005. Among these 13 States, groundwater was the primary source for irrigation in Nebraska, Arkansas, Texas, Kansas, Mississippi, and Missouri.

Total irrigation withdrawals in both Eastern and Western States were smaller in 2005 than in 2000, but because the West accounts for such a large majority of the total, changes in those States have a greater effect on the total. Groundwater withdrawals increased slightly in the East, and surface-water withdrawals declined in both the East and West. Total irrigated acres decreased in the West by 4 percent and increased in the East by 5 percent. In the West, acres irrigated by surface irrigation methods declined by 16 percent, and acres irrigated by sprinkler methods increased by 9 percent. Irrigated acres in the East increased for all type of systems; the largest percentage increase was in microirrigation systems.

Total irrigation withdrawals of 128,000 Mgal/d for 2005 were almost 8 percent less than the estimated 139,000 Mgal/d withdrawn during 2000. Surface-water withdrawals of 74,900 Mgal/d in 2005 were 9 percent less than in 2000, when an estimated 82,400 Mgal/d were withdrawn. Groundwater withdrawals of 53,500 Mgal/d in 2005 were about 5 percent less than the 56,600 mgal/d withdrawn in 2000. Total irrigated acres in 2005 were 2 percent less than 2000. Acres irrigated with surface (flood) irrigation systems declined by 10 percent, from 29.7 million acres in 2000 to 26.6 million acres in 2005. Acres irrigated with sprinkler irrigation systems increased almost 7 percent, from 28.5 million acres in 2000 to 30.5 million acres in 2005.

Five States—California, Nebraska, Texas, Arkansas, and Idaho—accounted for 52 percent of total irrigated acreage. Nebraska, Texas, and California accounted for 41 percent of the irrigated acreage using sprinkler and microirrigation systems. California alone accounted for 65 percent of the irrigated acreage with microirrigation systems. Sprinkler and microirrigation systems combined were associated with more than 56 percent of total irrigated acreage.

Generally, application rates were greatest in the arid West and Mountain States where surface water was the predominant source of water used for irrigation, and surface (flood) application was the predominant method of irrigation. Massachusetts is the exception with the highest application rate in the United States (6.9 acre-feet per acre), likely due to water-management practices in the many cranberry bogs in that State. In Arizona and Idaho, application rates exceeded 5 acre-feet per acre. Many States that typically use large quantities of water for irrigation, such as California, Montana, Florida, Kansas, and Nevada, showed declines in application rates in 2005 compared to 2000.

Sources of data for irrigation withdrawals and irrigated acres included State and Federal crop reporting programs. Withdrawals also were estimated using information on irrigated crop acreages along with specific crop water-consumption coefficients or irrigation-system application rates. Estimation methods ideally included adjustments for climatic variables, system efficiencies, conveyance losses, and other irrigation practices such as pre-irrigation. Other methods of estimating irrigation withdrawals included extrapolation of sample data on crop water-application rates or power-consumption coefficients.

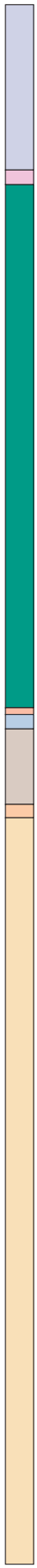


Table 7. Irrigation water withdrawals, 2005.

[Values may not sum to totals because of independent rounding]

State	Irrigated land (in thousand acres)				Withdrawals (in million gallons per day)			Withdrawals (in thousand acre-feet per year)			Application rate (in acre-feet per acre)
	By type of irrigation			Total	By source		Total	By source		Total	
	Sprinkler	Micro-irrigation	Surface		Ground-water	Surface water		Ground-water	Surface water		
Alabama	132	3.25	0.17	136	74.2	87.0	161	83.2	97.5	181	1.33
Alaska	2.40	0	.07	2.47	1.03	.02	1.05	1.15	.02	1.18	.48
Arizona	213	21.0	716	949	2,260	2,540	4,810	2,540	2,850	5,390	5.68
Arkansas	482	84.8	4,300	4,870	7,020	1,510	8,530	7,870	1,690	9,570	1.96
California	1,460	2,650	4,940	9,050	8,620	15,700	24,400	9,660	17,700	27,300	3.02
Colorado	1,150	3.16	1,880	3,030	2,320	10,000	12,300	2,600	11,200	13,800	4.56
Connecticut	24.2	1.82	0	26.1	.74	21.8	22.5	.83	24.4	25.2	.97
Delaware	95.9	1.23	0	97.1	55.3	9.77	65.1	62.0	11.0	73.0	.75
District of Columbia	.32	0	0	.32	0	0	0	0	0	0	0
Florida	447	668	752	1,870	1,450	1,620	3,070	1,620	1,820	3,440	1.84
Georgia	1,420	92.9	0	1,510	486	265	752	545	297	843	.56
Hawaii	16.9	102	0	119	23.6	74.2	97.8	26.5	83.2	110	.92
Idaho	2,310	4.57	1,220	3,530	3,870	12,700	16,600	4,340	14,200	18,600	5.26
Illinois	460	0	0	460	479	24.5	504	537	27.5	565	1.23
Indiana	313	0	0	313	97.4	54.0	151	109	60.5	170	.54
Iowa	123	0	0	123	31.6	1.69	33.3	35.5	1.89	37.4	.30
Kansas	2,780	13.0	330	3,120	2,620	114	2,740	2,940	128	3,070	.98
Kentucky	34.5	2.18	1.44	38.1	.93	18.0	18.9	1.04	20.1	21.2	.56
Louisiana	99.3	0	956	1,060	684	308	992	767	345	1,110	1.05
Maine	29.9	.03	.91	30.9	1.15	2.77	3.92	1.29	3.11	4.39	.14
Maryland	75.2	5.28	0	80.5	34.8	15.0	49.8	39.0	16.8	55.8	.69
Massachusetts	21.7	1.89	0	23.6	47.1	98.0	145	52.8	110	163	6.90
Michigan	449	16.2	1.28	467	198	110	308	222	124	345	.74
Minnesota	448	0	19.4	467	216	28.4	244	242	31.8	274	.59
Mississippi	399	0	1,130	1,530	1,430	131	1,560	1,600	147	1,750	1.14
Missouri	514	1.15	762	1,280	1,340	38.9	1,370	1,500	43.6	1,540	1.21
Montana	919	.64	1,350	2,270	140	9,530	9,670	157	10,700	10,800	4.77
Nebraska	5,870	.76	2,480	8,350	7,310	1,150	8,460	8,190	1,290	9,480	1.14
Nevada	255	.18	320	575	670	828	1,500	751	928	1,680	2.92
New Hampshire	5.49	0	0	5.49	.45	4.07	4.52	.50	4.56	5.07	.92
New Jersey	109	13.7	2.71	125	43.2	51.9	95.1	48.4	58.2	107	.85
New Mexico	408	19.1	441	868	1,270	1,550	2,810	1,420	1,730	3,160	3.64
New York	81.2	24.2	0	105	20.3	30.8	51.1	22.8	34.5	57.2	.54
North Carolina	275	7.01	0	282	77.4	214	292	86.8	240	327	1.16
North Dakota	214	0	45.5	259	77.8	73.0	151	87.3	81.8	169	.65
Ohio	70.4	0	0	70.4	17.7	24.9	42.6	19.8	27.9	47.7	.68
Oklahoma	384	1.91	86.9	472	361	134	495	405	150	555	1.17
Oregon	1,010	7.85	949	1,970	1,930	3,780	5,710	2,170	4,230	6,400	3.25
Pennsylvania	67.1	16.9	0	84.1	8.29	16.0	24.3	9.29	18.0	27.3	.32
Rhode Island	6.94	0	.70	7.64	5.49	0	5.49	6.15	0	6.15	.81
South Carolina	182	20.7	5.84	208	48.1	43.4	91.6	54.0	48.7	103	.49
South Dakota	298	0	124	422	149	143	292	167	160	327	.78
Tennessee	49.9	7.31	5.69	62.9	33.4	22.0	55.4	37.5	24.7	62.1	.99
Texas	4,060	74.7	2,070	6,210	6,120	1,680	7,800	6,860	1,890	8,740	1.41
Utah	574	1.45	631	1,210	389	3,610	4,000	436	4,040	4,480	3.71
Vermont	4.56	0	0	4.56	.30	2.83	3.13	.34	3.17	3.51	.77
Virginia	111	19.6	0	131	14.7	33.2	47.9	16.5	37.2	53.7	.41
Washington	1,470	102	268	1,840	629	2,890	3,520	705	3,240	3,950	2.14
West Virginia	2.32	0	.99	3.31	.01	.01	.02	.01	.01	.02	.01
Wisconsin	373	0	12.8	386	387	15.2	402	433	17.1	450	1.17
Wyoming	180	4.03	818	1,000	422	3,570	3,990	474	4,000	4,470	4.47
Puerto Rico	0	54.5	0	54.5	30.0	15.2	45.2	33.6	17.0	50.6	.93
U.S. Virgin Islands	0	0	0	0	0	0	0	0	0	0	0
TOTAL	30,500	4,050	26,600	61,100	53,500	74,900	128,000	60,000	84,000	144,000	2.35

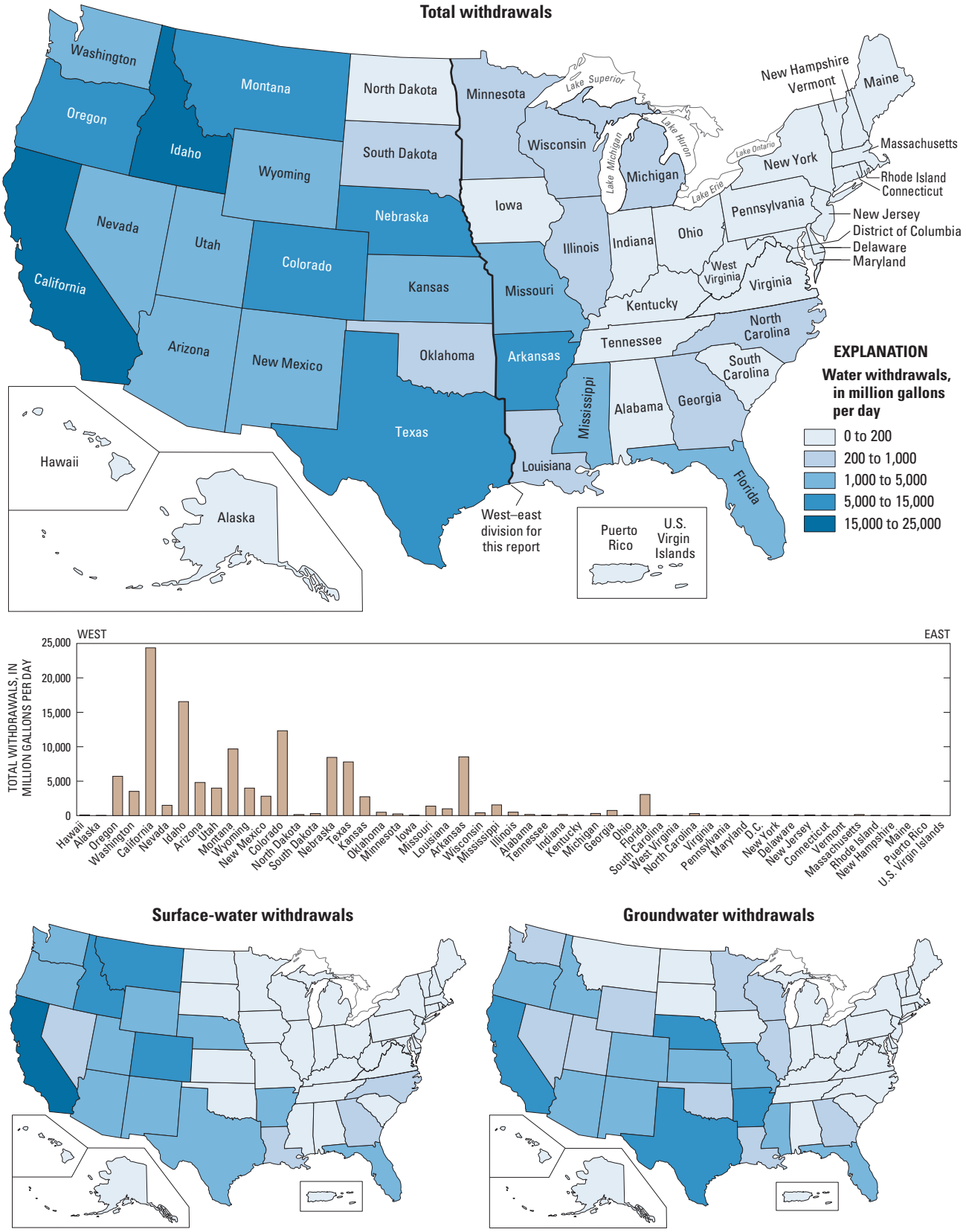
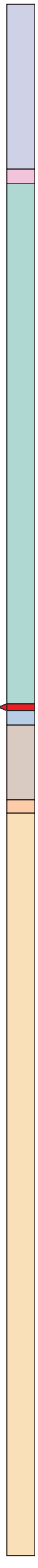


Figure 7. Irrigation withdrawals by source and State, 2005.



Livestock

2,140 million gallons per day

Livestock water use is water associated with livestock watering, feedlots, dairy operations, and other on-farm needs. Livestock includes dairy cows and heifers, beef cattle and calves, sheep and lambs, goats, hogs and pigs, horses, and poultry. Other livestock water uses include cooling of facilities for the animals and animal products such as milk, dairy sanitation and wash down of facilities, animal waste-disposal systems, and incidental water losses. All withdrawals were considered freshwater and self-supplied. The livestock category excludes on-farm domestic use, lawn and garden watering, and irrigation water use.

Livestock withdrawals for 2005 are listed by State in table 8. During 2005, withdrawals were an estimated 2,140 Mgal/d, or 2,390 thousand acre-feet per year (table 2*B*). Livestock withdrawals were less than 1 percent of total freshwater withdrawals and 1 percent of total freshwater withdrawals excluding thermoelectric power. Groundwater was the source for 60 percent of total livestock withdrawals. Estimated total livestock withdrawals for 2005 were 8 percent less than in 2000. This comparison is based on total livestock withdrawals for 2000 that included estimates for all States. Livestock water use data for the States that did not provide data for the 2000 report (Hutson and others, 2004) were estimated as the average of 1995 and 2005 data. The revised estimate of total livestock use for 2000 was 2,330 Mgal/d, of which 1,300 Mgal/d (56 percent) was groundwater and 1,030 Mgal/d was surface water.

The geographic distribution of total, surface-water, and groundwater livestock withdrawals is shown in figure 8. Texas, California, Oklahoma, and North Carolina each used more than 125 Mgal/d for livestock and accounted for 35 percent of total livestock withdrawals in 2005. Texas, North Carolina, Nebraska, California, Iowa, and Kansas each used more than 80 Mgal/d of groundwater for livestock and accounted for 47 percent of groundwater withdrawals for this use. California, Oklahoma, and Texas each used more than 95 Mgal/d of surface water for livestock and accounted for 37 percent of surface-water withdrawals for this use.

Few State agencies require livestock operations to report water withdrawals; therefore, most estimates of livestock withdrawals were derived using animal population data and water-use coefficients, in gallons per head per day for each animal type. Animal population data generally are available from State agricultural agencies and the NASS. Coefficients vary by State and, for many States, were provided by agricultural extension agents or water-permitting agencies. Coefficients may reflect facility maintenance needs and effects of climate on animal watering.

Many of the 2005 withdrawals for livestock were estimated according to methods described by Lovelace (2009b), using livestock population data compiled for the NASS 2002 Census of Agriculture and water-use coefficients. In some States, such as California, these withdrawal estimates were substantially different than estimates from previous years, in part because different water-use coefficients were used.

(Above) Holstein dairy cattle, Washington County, Virginia. Photo by Jeff Vanuga, USDA NRCS. (Right) Hogs being fed in Iowa hoglot. Photo by Lynn Betts, USDA NRCS. (Far right) Breeder chickens, Cleburne County, Alabama. Photo by Michael J. Harper, Alabama Office of Water Resources.

Table 8. Livestock water withdrawals, 2005.

[Values may not sum to totals because of independent rounding]

State	Withdrawals (in million gallons per day)		
	By source		Total
	Groundwater	Surface water	
Alabama	12.4	15.7	28.1
Alaska	.13	.17	.30
Arizona	10.9	1.67	12.6
Arkansas	15.5	23.3	38.8
California	88.1	109	197
Colorado	22.1	11.0	33.1
Connecticut	1.25	0	1.25
Delaware	1.51	.13	1.64
District of Columbia	0	0	0
Florida	16.9	.90	17.8
Georgia	2.15	26.3	28.4
Hawaii	.75	1.32	2.07
Idaho	35.8	8.34	44.1
Illinois	37.9	0	37.9
Indiana	25.6	13.1	38.7
Iowa	87.2	28.9	116
Kansas	84.3	23.8	108
Kentucky	2.31	43.6	45.9
Louisiana	4.16	3.81	7.97
Maine	2.07	.70	2.77
Maryland	6.21	2.95	9.16
Massachusetts	1.20	.66	1.86
Michigan	17.7	1.89	19.6
Minnesota	60.4	0	60.4
Mississippi	7.56	11.3	18.9
Missouri	19.2	56.8	76.1
Montana	11.6	27.4	39.0
Nebraska	88.2	20.1	108
Nevada	8.51	0	8.51
New Hampshire	.89	.30	1.19
New Jersey	1.14	0	1.14
New Mexico	47.6	3.05	50.7
New York	19.4	10.4	29.8
North Carolina	93.7	32.3	126
North Dakota	13.6	9.01	22.6
Ohio	7.71	16.4	24.1
Oklahoma	54.7	107	162
Oregon	3.22	14.6	17.8
Pennsylvania	53.8	7.97	61.8
Rhode Island	.18	.01	.19
South Carolina	4.67	6.65	11.3
South Dakota	19.2	28.5	47.7
Tennessee	15.5	14.2	29.7
Texas	162	95.9	258
Utah	8.18	9.59	17.8
Vermont	6.15	2.05	8.20
Virginia	7.04	22.8	29.8
Washington	20.9	9.82	30.7
West Virginia	1.61	3.38	4.99
Wisconsin	65.6	7.27	72.8
Wyoming	6.12	10.1	16.2
Puerto Rico	5.71	2.08	7.79
U.S. Virgin Islands	.04	.03	.07
TOTAL	1,290	846	2,140

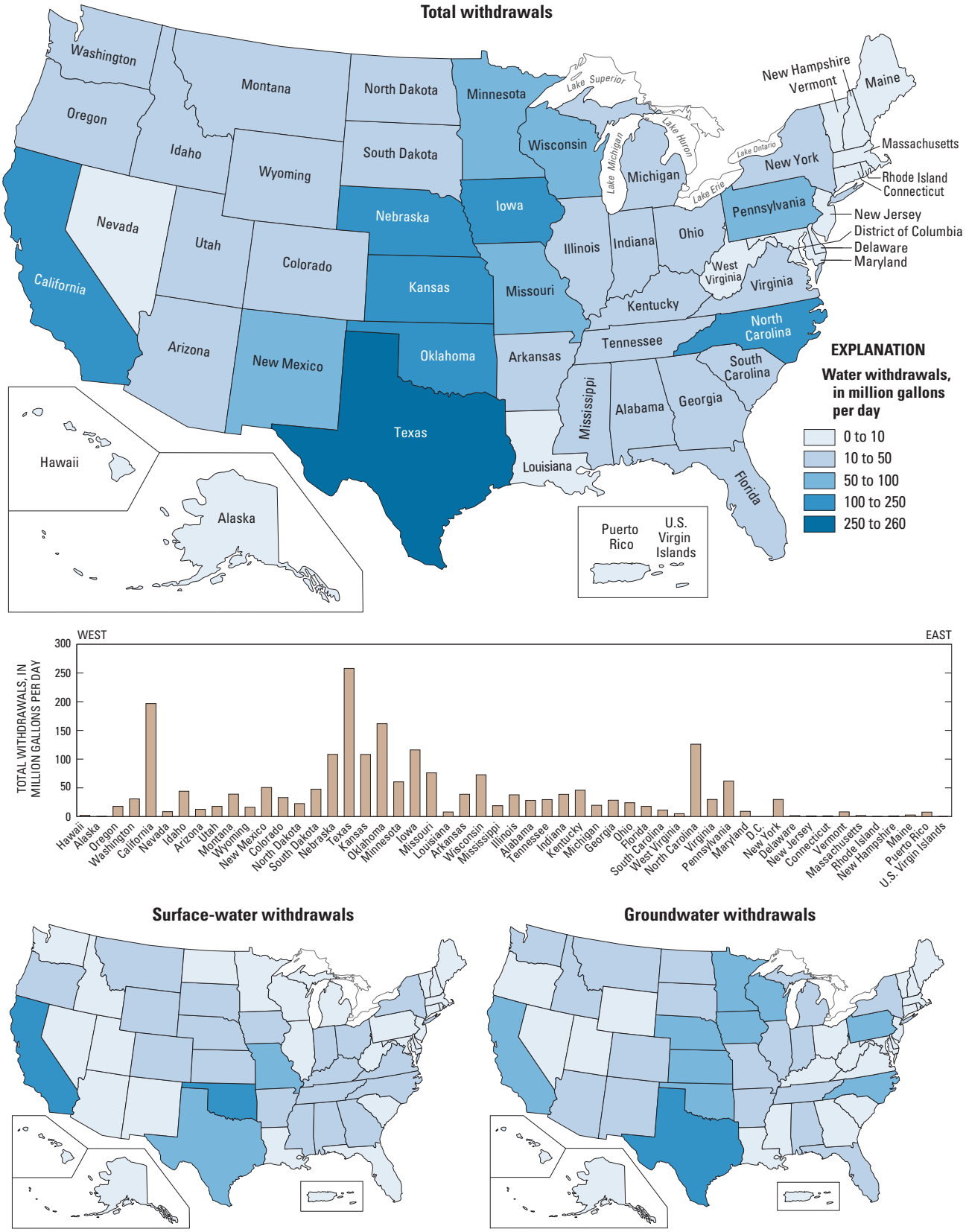


Figure 8. Livestock withdrawals by source and State, 2005.

Aquaculture

8,780 million gallons per day

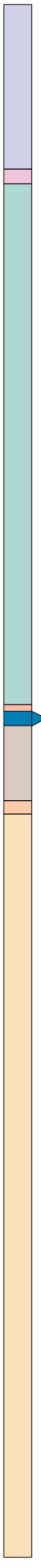
Aquaculture water use is water associated with raising organisms that live in water—such as finfish and shellfish—for food, restoration, conservation, or sport. Aquaculture production occurs under controlled feeding, sanitation, and harvesting procedures primarily in ponds, flowthrough raceways, and, to a lesser extent, cages, net pens, and closed-recirculation tanks. All withdrawals were considered self-supplied. Only freshwater withdrawals were compiled as part of the total.

Freshwater withdrawals for aquaculture during 2005 are listed by State in table 9. During 2005, the estimated rate of freshwater withdrawn for aquaculture was 8,780 Mgal/d, or 9,840 thousand acre-feet per year (table 2B). Surface water was the source for about 78 percent of the withdrawals for this category. Much of the surface water was used for flowthrough raceways and was returned to the source after use. Aquaculture withdrawals were 2 percent of total water withdrawals and 4 percent of total withdrawals for all categories excluding thermoelectric power. Aquaculture withdrawals for 2000 were revised to include estimates for States that did not provide data for that year (Hutson and others, 2004). Missing data were estimated as the average of 1995 and 2005 aquaculture estimates. The revised estimate of total aquaculture use for 2000 was 5,410 Mgal/d, of which 1,470 Mgal/d was groundwater and 3,940 Mgal/d was surface water. Estimated aquaculture withdrawals in 2005 were 62 percent larger than estimates for 2000; however, this apparent increase may be the result of the difference in estimation methods used rather than an actual increase in withdrawals.

The geographic distribution of total, surface-water, and groundwater withdrawals for aquaculture is shown in figure 9. Idaho and North Carolina used the most water for aquaculture, about 40 percent of the total and about 50 percent of the surface-water withdrawals for aquaculture. The States of Alaska, Arkansas, Mississippi, California, Louisiana, and Idaho together accounted for 73 percent of the groundwater withdrawals for aquaculture.

Several sources of information were used to estimate 2005 aquaculture withdrawals. Some estimates of aquaculture withdrawals were derived from State permits that reported water withdrawals or return flows for aquaculture facilities. The USEPA Permit Compliance System database also was a source of return-flow data that were used to estimate water withdrawals. State regulatory agencies, State offices of the NASS, and Cooperative Extension Service offices also provided information used to estimate aquaculture withdrawals in some States.

Many of the 2005 withdrawals for aquaculture were estimated according to methods described by Lovelace (2009a), using aquaculture data compiled for the NASS 2005 Census of Aquaculture with standardized water-use coefficients and water-replacement rates. The data included statistics for various aquacultured species and aquaculture ponds, raceways, tanks, egg incubators, pens, and cages at commercial and noncommercial aquaculture operations. In some States, such as North Carolina, these withdrawal estimates were substantially larger than estimates from previous years, in part because more aquaculture operations were included in the 2005 estimates.



(Right) Trout fingerlings in hatchery on Pyramid Lake Indian Reservation, Washoe County, Nevada. Photo by Ron Nichols, USDA NRCS. (Next page) Mosaic of catfish ponds in Arkansas. Photo by Roger Bright, USDA ARS.

Table 9. Aquaculture water withdrawals, 2005.

[Values may not sum to totals because of independent rounding]

State	Withdrawals (in million gallons per day)		
	By source		Total
	Groundwater	Surface water	
Alabama	40.5	34.4	74.9
Alaska	436	285	720
Arizona	9.25	2.25	11.5
Arkansas	246	10.6	256
California	186	459	646
Colorado	16.8	71.2	88.0
Connecticut	4.89	3.68	8.57
Delaware	.10	0	.10
District of Columbia	0	0	0
Florida	9.03	.16	9.19
Georgia	4.98	33.4	38.4
Hawaii	2.23	2.61	4.84
Idaho	102	2,390	2,490
Illinois	5.58	3.86	9.44
Indiana	.51	.67	1.18
Iowa	11.6	4.84	16.4
Kansas	1.93	3.22	5.15
Kentucky	.99	19.4	20.4
Louisiana	169	102	271
Maine	23.8	29.3	53.1
Maryland	5.63	17.5	23.1
Massachusetts	7.13	37.3	44.4
Michigan	2.95	62.4	65.3
Minnesota	61.8	50.8	113
Mississippi	245	33.7	279
Missouri	7.75	148	156
Montana	2.38	39.6	42.0
Nebraska	8.63	74.1	82.7
Nevada	14.7	.67	15.3
New Hampshire	7.01	10.7	17.7
New Jersey	9.15	0	9.15
New Mexico	1.69	18.5	20.2
New York	16.0	47.1	63.1
North Carolina	6.83	1,010	1,020
North Dakota	0	6.21	6.21
Ohio	3.58	5.89	9.47
Oklahoma	.20	18.9	19.1
Oregon	24.8	660	685
Pennsylvania	11.8	512	524
Rhode Island	.31	5.47	5.78
South Carolina	.69	.62	1.31
South Dakota	19.1	14.0	33.2
Tennessee	14.8	44.7	59.5
Texas	5.41	9.06	14.5
Utah	87.5	.18	87.7
Vermont	5.97	12.2	18.2
Virginia	6.27	438	444
Washington	7.03	31.0	38.0
West Virginia	9.92	42.8	52.7
Wisconsin	38.5	43.2	81.7
Wyoming	2.23	21.1	23.3
Puerto Rico	.01	.49	.50
U.S. Virgin Islands	0	0	0
TOTAL	1,910	6,870	8,780

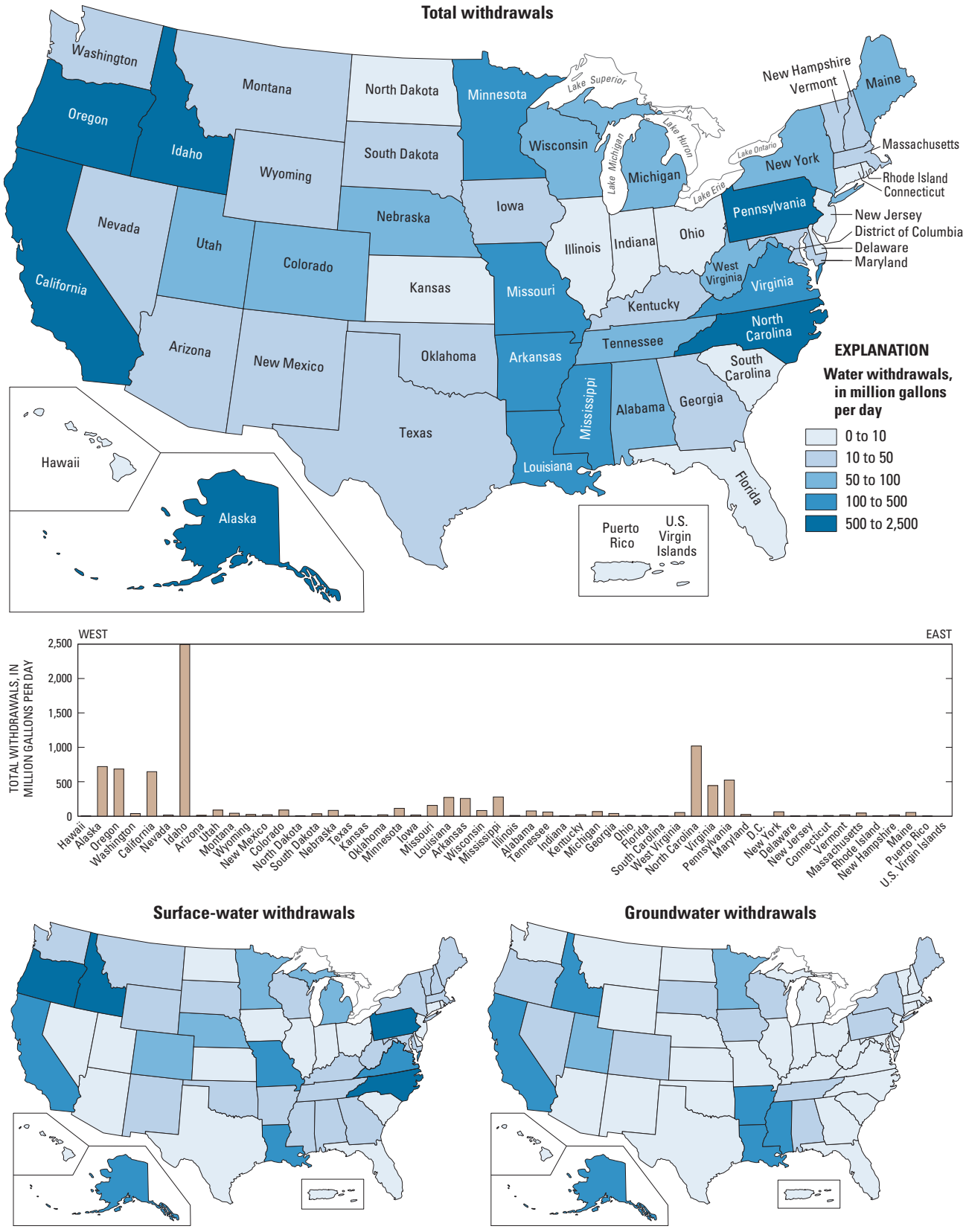


Figure 9. Aquaculture withdrawals by source and State, 2005.

Industrial — 18,200 million gallons per day

Industrial water use includes water used for such purposes as fabricating, processing, washing, diluting, cooling, or transporting a product; incorporating water into a product; or for sanitation needs within the manufacturing facility. Some industries that use large amounts of water produce such commodities as food, paper, chemicals, refined petroleum, or primary metals. Water for industrial use may be delivered from a public supplier or be self-supplied. In this report, industrial use refers to self-supplied industrial withdrawals only. Withdrawals were reported as freshwater or saline water. As in the 2000 report, public-supply deliveries to industrial users and consumptive use were not reported for 2005.

Industrial withdrawals are listed by State in table 10. For 2005, withdrawals were an estimated 18,200 Mgal/d, or 20,400 thousand acre-feet per year (table 2*B*). Industrial withdrawals were about 4 percent of total withdrawals and about 9 percent of total withdrawals for all categories excluding thermoelectric power. Surface water was the source for 83 percent of total industrial withdrawals, and 92 percent of the surface-water withdrawals for industrial use was freshwater. Nearly all (99 percent) of the groundwater withdrawals for industrial use also were freshwater. For 2005, total industrial withdrawals were 8 percent less than during 2000.

The geographic distribution of total, total surface-water, and total groundwater withdrawals for industrial use is shown in figure 10. Louisiana, Indiana, and Texas accounted for 40 percent of total industrial withdrawals and 43 percent of the total fresh surface-water withdrawals. Texas accounted for 62 percent of the saline surface-water withdrawals for industry, mostly from areas along the Gulf coast. The largest fresh groundwater withdrawals were in Louisiana and Georgia, which together accounted for 16 percent of the total fresh groundwater withdrawals for industrial use. Most of the saline groundwater used for industry was from counties in the vicinity of the Great Salt Lake in Utah.

Sources of data for industrial water use included individual facilities and State or Federal permit programs that require reporting of industrial withdrawals or return flows. Industrial withdrawals also were estimated using employment numbers classified by industry group and per employee water-use coefficients.

4 percent

Large capacity well at a paper mill, St. Marys, Georgia. Photo by Alan M. Cressler, USGS.

Table 10. Industrial self-supplied water withdrawals, 2005.

[Values may not sum to totals because of independent rounding]

State	Withdrawals (in million gallons per day)								
	By source and type						Total		
	Groundwater			Surface water					
	Fresh	Saline	Total	Fresh	Saline	Total	Fresh	Saline	Total
Alabama	27.6	0	27.6	523	0	523	550	0	550
Alaska	4.14	0	4.14	4.02	4.10	8.12	8.16	4.10	12.3
Arizona	22.4	0	22.4	0	0	0	22.4	0	22.4
Arkansas	65.8	0	65.8	113	0	113	178	0	178
California	62.3	0	62.3	9.90	23.4	33.3	72.2	23.4	95.7
Colorado	3.61	0	3.61	139	0	139	142	0	142
Connecticut	7.02	0	7.02	60.6	38.5	99.0	67.6	38.5	106
Delaware	11.6	0	11.6	29.7	0	29.7	41.4	0	41.4
District of Columbia	0	0	0	0	0	0	0	0	0
Florida	181	0	181	62.5	1.19	63.6	243	1.19	244
Georgia	240	0	240	291	22.6	314	532	22.6	554
Hawaii	29.2	1.73	31.0	0	0	0	29.2	1.73	31.0
Idaho	41.1	0	41.1	22.1	0	22.1	63.2	0	63.2
Illinois	128	0	128	236	0	236	364	0	364
Indiana	86.9	0	86.9	2,110	0	2,110	2,200	0	2,200
Iowa	177	0	177	12.3	0	12.3	190	0	190
Kansas	35.5	0	35.5	6.34	0	6.34	41.9	0	41.9
Kentucky	48.1	0	48.1	138	0	138	186	0	186
Louisiana	265	0	265	2,840	0	2,840	3,110	0	3,110
Maine	8.61	0	8.61	161	17.8	179	170	17.8	187
Maryland	14.2	0	14.2	45.5	191	237	59.7	191	251
Massachusetts	15.6	0	15.6	96.7	0	96.7	112	0	112
Michigan	89.1	0	89.1	540	0	540	629	0	629
Minnesota	65.5	0	65.5	73.0	0	73.0	139	0	139
Mississippi	76.9	0	76.9	120	0	120	197	0	197
Missouri	37.4	0	37.4	43.6	0	43.6	80.9	0	80.9
Montana	37.4	0	37.4	29.6	0	29.6	67.0	0	67.0
Nebraska	11.3	0	11.3	.01	0	.01	11.3	0	11.3
Nevada	.70	0	.70	5.20	0	5.20	5.90	0	5.90
New Hampshire	5.65	0	5.65	35.9	0	35.9	41.5	0	41.5
New Jersey	46.2	0	46.2	39.8	0	39.8	86.0	0	86.0
New Mexico	11.5	0	11.5	1.72	0	1.72	13.2	0	13.2
New York	161	0	161	140	0	140	301	0	301
North Carolina	171	0	171	223	0	223	394	0	394
North Dakota	5.00	0	5.00	9.70	0	9.70	14.7	0	14.7
Ohio	149	0	149	554	0	554	703	0	703
Oklahoma	8.04	0	8.04	16.0	0	16.0	24.1	0	24.1
Oregon	8.95	0	8.95	164	0	164	172	0	172
Pennsylvania	66.1	0	66.1	704	0	704	770	0	770
Rhode Island	.50	0	.50	0	0	0	.50	0	.50
South Carolina	32.4	0	32.4	386	0	386	419	0	419
South Dakota	4.31	0	4.31	.10	0	.10	4.41	0	4.41
Tennessee	45.6	0	45.6	738	0	738	783	0	783
Texas	187	0	187	1,060	716	1,780	1,250	716	1,960
Utah	20.6	35.1	55.7	14.7	92.4	107	35.4	127	163
Vermont	1.81	0	1.81	6.14	0	6.14	7.95	0	7.95
Virginia	106	0	106	421	8.52	430	527	8.52	536
Washington	107	0	107	346	33.2	379	454	33.2	487
West Virginia	54.4	0	54.4	911	0	911	966	0	966
Wisconsin	70.9	0	70.9	400	0	400	471	0	471
Wyoming	4.12	0	4.12	1.92	0	1.92	6.04	0	6.04
Puerto Rico	9.41	0	9.41	0	0	0	9.41	0	9.41
U.S. Virgin Islands	.26	0	.26	3.03	0	3.03	3.29	0	3.29
TOTAL	3,070	36.8	3,110	13,900	1,150	15,000	17,000	1,190	18,200

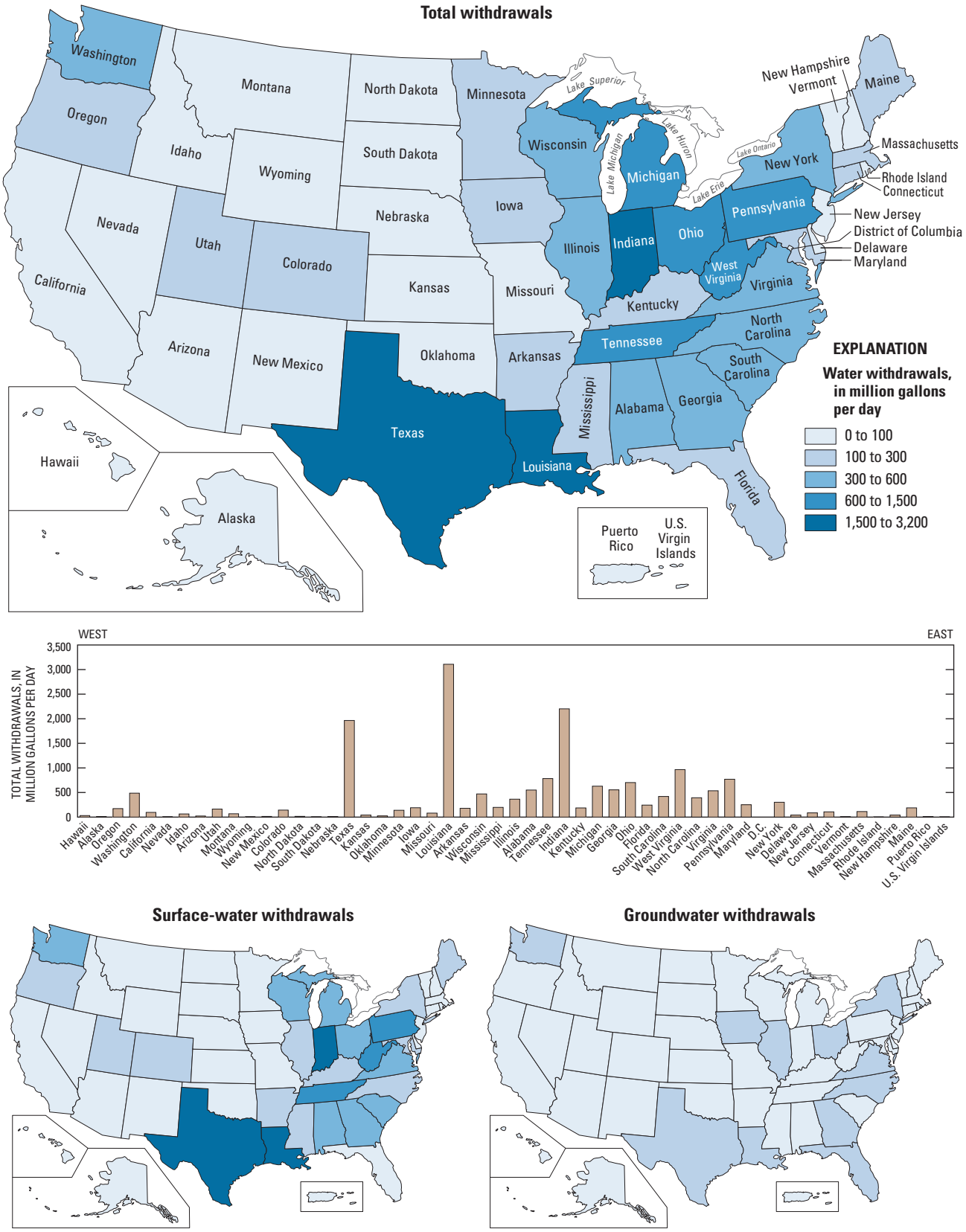


Figure 10. Industrial withdrawals by source and State, 2005.

Mining

4,020 million gallons per day

Mining water use is water used for the extraction of minerals that may be in the form of solids, such as coal, iron, sand, and gravel; liquids, such as crude petroleum; and gases, such as natural gas. The category includes quarrying, milling (crushing, screening, washing, and flotation of mined materials), re-injecting extracted water for secondary oil recovery, and other operations associated with mining activities. All mining withdrawals were considered self-supplied. Water withdrawals were reported as freshwater or saline water. Dewatering was not reported as a mining withdrawal unless the water was used beneficially, such as dampening roads for dust control.

Mining withdrawals during 2005 are listed by State in table 11. During 2005, an estimated 4,020 Mgal/d, or 4,510 thousand acre-feet per year (table 2*B*), were withdrawn. Mining withdrawals were about 1 percent of total withdrawals and about 2 percent of total withdrawals for all categories excluding thermoelectric power. Groundwater was the source for 63 percent of total withdrawals for mining. Sixty percent of the groundwater withdrawals for mining were saline. Most of the surface-water withdrawals (87 percent) were freshwater. Saline groundwater withdrawals and fresh surface-water withdrawals together represented 70 percent of the total withdrawals for mining.

Dredge in limerock quarry, Miami–Dade County, Florida. Photo by Richard L. Marella, USGS.

Mining withdrawals for 2000 were revised to include estimates for States that did not provide data for that year (Hutson and others, 2004). Missing data were estimated as the average of 1995 and 2005 mining estimates. The revised estimate of total mining use for 2000 was 4,500 Mgal/d, of which 2,700 Mgal/d was groundwater and 1,800 Mgal/d was surface water.

Total mining withdrawals in 2005 were 11 percent smaller than in 2000. Groundwater withdrawals were 6 percent smaller, and surface-water withdrawals were 18 percent smaller. Freshwater mining withdrawals of 2,310 Mgal/d in 2005 were almost 20 percent smaller than the 2,870 Mgal/d estimated for 2000. Saline-water mining withdrawals of 1,710 Mgal/d in 2005 were almost 5 percent larger than the 1,630 Mgal/d estimated for 2000.

About 52 percent (1,390 Mgal/d) of groundwater mining withdrawals were considered saline in 2000; in 2005 about 60 percent (1,520 Mgal/d) of groundwater mining withdrawals were considered saline. Estimated surface-water mining withdrawals that were considered saline decreased from 238 Mgal/d in 2000 to 190 Mgal/d in 2005, but in both years saline surface water represented 13 percent of the total surface water used for mining.

The geographic distribution of total, total freshwater, and total saline-water withdrawals for mining water use is shown in figure 11. Texas, Minnesota, and California accounted for 34 percent of the total withdrawals for mining. Sand and gravel operations in Indiana and iron ore mining in Michigan and Minnesota accounted for the largest fresh surface-water withdrawals. Mineral salt extraction from the Great Salt Lake in Utah accounted for the largest saline surface-water withdrawals for mining in the United States. Florida, Ohio, Nevada, Arizona, and Pennsylvania accounted for 52 percent of fresh groundwater withdrawals. Gas and oil operations in Texas, California, Oklahoma, Wyoming, and Louisiana were responsible for the large saline groundwater withdrawals in those States, because saline water is a byproduct of mining operations.

Sources of data used to estimate water use for mining included surveys of mining operations and State and Federal agencies that collect water withdrawal, discharge, or mineral production data for mining operations. Many of the 2005 withdrawals for mining were estimated using mineral production data and water-use coefficients in gallons per weight or volume of minerals produced. Production data for nonfuel minerals, including metals and nonmetallic minerals, were obtained from the USGS Minerals Information Team. Production or water-injection data for fuel minerals, including coal, petroleum, and natural gas, were obtained from the Energy Information Administration and various State agencies. In some States, these withdrawal estimates were substantially different from estimates from previous years because of the estimation techniques used. Additional information on these data sources and estimation methods is given in the report "Methods for estimating water withdrawals for mining in the United States, 2005" (Lovelace, 2009c).

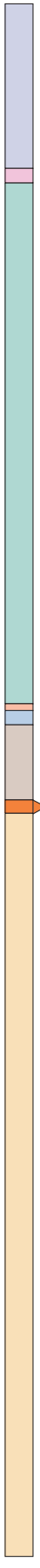


Table 11. Mining water withdrawals, 2005.

[Values may not sum to totals because of independent rounding]

State	Withdrawals (in million gallons per day)								
	By source and type						Total		
	Groundwater			Surface water					
	Fresh	Saline	Total	Fresh	Saline	Total	Fresh	Saline	Total
Alabama	19.6	0	19.6	8.26	0	8.26	27.8	0	27.8
Alaska	0	114	114	22.2	60.9	83.1	22.2	175	198
Arizona	91.6	2.61	94.2	9.05	0	9.05	101	2.61	103
Arkansas	.24	0	.24	1.05	0	1.05	1.29	0	1.29
California	34.5	255	289	18.6	.29	18.9	53.1	255	308
Colorado	5.20	14.6	19.8	1.24	.39	1.63	6.44	15.0	21.4
Connecticut	.67	0	.67	2.73	0	2.73	3.40	0	3.40
Delaware	.80	0	.80	.75	.01	.76	1.55	.01	1.56
District of Columbia	0	0	0	0	0	0	0	0	0
Florida	138	0	138	56.9	0	56.9	195	0	195
Georgia	48.9	0	48.9	.47	0	.47	49.4	0	49.4
Hawaii	1.42	0	1.42	.44	0	.44	1.86	0	1.86
Idaho	2.16	0	2.16	22.0	0	22.0	24.2	0	24.2
Illinois	15.5	25.5	41.0	71.2	0	71.2	86.7	25.5	112
Indiana	4.70	0	4.70	95.5	0	95.5	100	0	100
Iowa	3.23	0	3.23	44.2	0	44.2	47.4	0	47.4
Kansas	10.1	0	10.1	4.64	0	4.64	14.8	0	14.8
Kentucky	7.89	0	7.89	28.7	0	28.7	36.6	0	36.6
Louisiana	6.11	151	157	20.8	0	20.8	26.9	151	178
Maine	1.50	0	1.50	5.26	0	5.26	6.76	0	6.76
Maryland	9.05	0	9.05	4.17	0	4.17	13.2	0	13.2
Massachusetts	2.96	0	2.96	7.77	0	7.77	10.7	0	10.7
Michigan	13.2	.94	14.1	81.4	0	81.4	94.6	.94	95.5
Minnesota	8.05	0	8.05	418	0	418	426	0	426
Mississippi	11.3	0	11.3	.61	0	.61	11.9	0	11.9
Missouri	22.9	0	22.9	11.8	0	11.8	34.7	0	34.7
Montana	1.20	5.12	6.32	34.2	0	34.2	35.4	5.12	40.5
Nebraska	.08	.09	.17	10.2	0	10.2	10.3	.09	10.4
Nevada	99.1	0	99.1	0	0	0	99.1	0	99.1
New Hampshire	.02	0	.02	3.74	0	3.74	3.76	0	3.76
New Jersey	.91	0	.91	37.4	0	37.4	38.3	0	38.3
New Mexico	57.4	0	57.4	1.29	0	1.29	58.7	0	58.7
New York	6.94	.42	7.36	25.9	.42	26.4	32.9	.84	33.7
North Carolina	35.0	0	35.0	11.0	0	11.0	46.1	0	46.1
North Dakota	5.26	0	5.26	.40	0	.40	5.66	0	5.66
Ohio	112	0	112	61.7	0	61.7	174	0	174
Oklahoma	1.01	190	191	1.67	0	1.67	2.68	190	193
Oregon	13.9	0	13.9	2.09	0	2.09	16.0	0	16.0
Pennsylvania	84.9	0	84.9	10.8	0	10.8	95.7	0	95.7
Rhode Island	.59	0	.59	1.12	0	1.12	1.71	0	1.71
South Carolina	8.56	0	8.56	.50	0	.50	9.06	0	9.06
South Dakota	4.55	0	4.55	5.93	0	5.93	10.5	0	10.5
Tennessee	10.4	0	10.4	11.4	0	11.4	21.7	0	21.7
Texas	26.8	548	575	64.2	0	64.2	91.0	548	639
Utah	3.73	33.7	37.4	1.41	128	130	5.14	162	167
Vermont	.24	0	.24	3.55	0	3.55	3.79	0	3.79
Virginia	2.47	0	2.47	27.3	0	27.3	29.8	0	29.8
Washington	22.4	0	22.4	4.14	0	4.14	26.6	0	26.6
West Virginia	4.71	.51	5.22	9.44	0	9.44	14.2	.51	14.7
Wisconsin	17.6	0	17.6	14.9	0	14.9	32.5	0	32.5
Wyoming	38.3	177	216	13.5	0	13.5	51.8	177	229
Puerto Rico	1.76	.34	2.10	.22	0	.22	1.98	.34	2.32
U.S. Virgin Islands	0	0	0	0	.02	.02	0	.02	.02
TOTAL	1,020	1,520	2,540	1,300	190	1,490	2,310	1,710	4,020

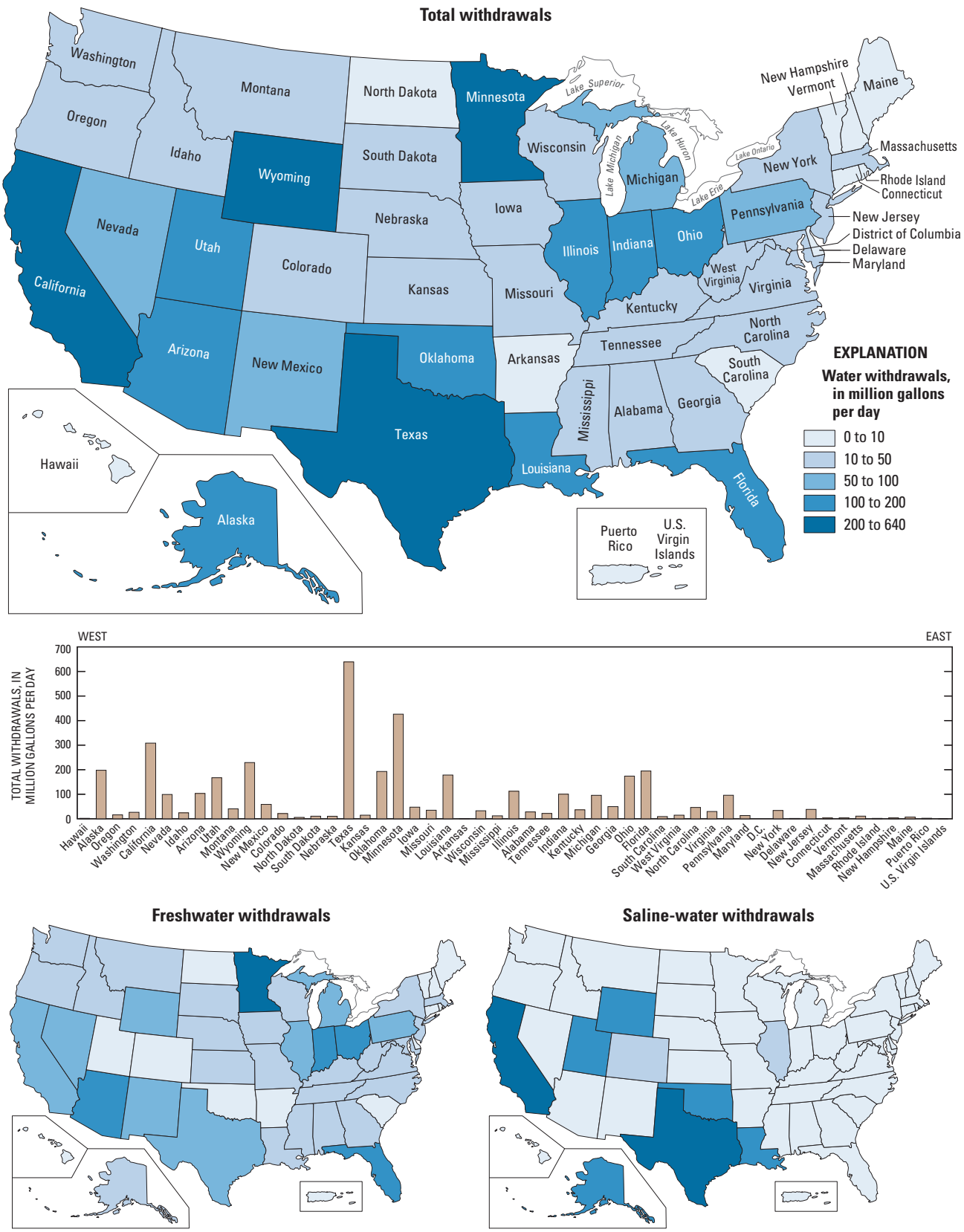
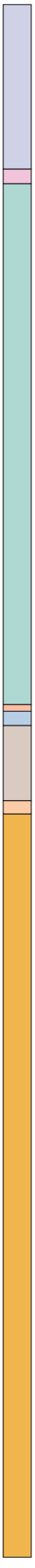


Figure 11. Mining withdrawals by water quality and State, 2005.



Thermoelectric Power — 201,000 million gallons per day

Water for thermoelectric power is used in generating electricity with steam-driven turbine generators. Thermoelectric-power water withdrawals were compiled by cooling-system type rather than by fuel type as had been done in compilations previous to 2000. Cooling-system type is the primary determinant for the amount of consumptive use relative to withdrawals. Once-through (also known as open-loop) cooling refers to cooling systems in which water is withdrawn from a source, circulated through heat exchangers, and then returned to a surface-water body. Large amounts of water are needed for once-through cooling, but consumptive use is a small percentage of the total withdrawn (Solley and others, 1998). Recirculation (also known as closed-loop) cooling refers to cooling systems in which water is withdrawn from a source, circulated through heat exchangers, cooled using ponds or towers, and then recirculated. Subsequent water withdrawals for a recirculation system are used to replace water lost to evaporation, blowdown, drift, and leakage. Smaller amounts of water are withdrawn for recirculation cooling than for once-through cooling, but the consumptive use is a larger percentage of the amount withdrawn. Thermoelectric-power withdrawals were reported as freshwater or saline water. For 2005, public-supply deliveries to thermoelectric plants were not reported.

Thermoelectric-power withdrawals and net power generation are listed by State in table 12. The total quantity of water withdrawn for thermoelectric power for 2005 was an estimated 201,000 Mgal/d or 225,000 thousand acre-feet per year (table 2B). Surface water was the source for 99 percent of total thermoelectric-power withdrawals, and 28 percent of the surface water was saline. Saline surface-water withdrawals accounted for 93 percent of total saline withdrawals for all categories. Thermoelectric-power withdrawals accounted for 49 percent of total water use, 41 percent of total freshwater withdrawals, and 53 percent of fresh surface-water withdrawals for all categories. Estimates of total withdrawals for thermoelectric-power generation were about 3 percent larger for 2005 than for 2000; however, freshwater withdrawals increased by 7 percent, whereas saline withdrawals decreased 4 percent. Net power generation associated with self-supplied thermoelectric-power water withdrawals amounted to 3,190,000 gigawatt-hours in 2005. On average, about 23 gallons of water were used to produce 1 kilowatt-hour of energy.

The geographic distribution of total, total freshwater, and total saline-water withdrawals for thermoelectric power is shown in figure 12. The largest total thermoelectric withdrawals were in California, where nearly all the water used for cooling purposes was saline. Illinois, Texas, Michigan, and Tennessee together accounted for 28 percent of freshwater withdrawals for thermoelectric power. California and Florida accounted for 41 percent of saline withdrawals for thermoelectric power. Hawaii accounted for nearly all of the saline groundwater used for thermoelectric power in 2005. Saline groundwater withdrawals for this category were not included in the tables for 2000, but the withdrawals have been restored to the national totals for 2005. Prior to 2000, saline thermoelectric withdrawals for Hawaii were classified as surface water.

The Eastern States (see division line in figure 12) accounted for 84 percent of total thermoelectric withdrawals. This pattern of withdrawals exists partly because the power-production infrastructure in these areas was established along major rivers, the Great Lakes, and the coast in order to meet electricity demand. Most of these withdrawals are associated with once-through thermoelectric power plants. In contrast, many Western States use hydroelectric-power generation to supply a substantial part of the demand for electricity. More than one-half of the 246,000 gigawatt-hours of hydroelectric power produced by public utilities in 2005 was in Washington, Oregon, and California (U.S. Department of Energy, 2009). Almost all of the energy produced in Idaho was from hydroelectric generation. Hydroelectric-power generation, an instream use, is not included in this report.

Thermoelectric-power withdrawals are listed by cooling-system type and by State in table 13. Power plants equipped with once-through cooling systems accounted for 92 percent of water withdrawals for thermoelectric power, and plants equipped with recirculating systems withdrew the remaining 8 percent of the water. Cooling technologies that require less water allow for the production of thermoelectric power in areas where water is scarce or strictly managed. Such water-scarce States as Nevada, New Mexico, and Utah used recirculating cooling systems rather than the more water-intensive once-through cooling systems. During 2005, about 81 percent of the generating units using recirculating cooling systems reported consumptive-use rates of 50 percent or greater (U.S. Department of Energy, 2006a and 2006b).

Reclaimed wastewater is a source of water for thermoelectric-power generation, especially in States with arid climates or otherwise limited water resources. Arizona, California, Florida, and Texas are among the States that use significant quantities of reclaimed wastewater for thermoelectric-power generation (Veil, 2007). In Arizona, about 59 Mgal/d of reclaimed wastewater was associated with thermoelectric-power generation. Reclaimed wastewater is not included in the thermoelectric-power data tables or national totals for this report.

Sources of data for thermoelectric-power water use included individual facilities, State permitting or regulatory agencies, and the USDOE EIA. Generally, relatively complete files on water withdrawals and power generation were maintained by these entities.

Table 12. Thermoelectric-power water withdrawals, 2005.

[Values may not sum to totals because of independent rounding]

State	Withdrawals (in million gallons per day)									Power generated (in million kilowatt hours)
	By source and type						Total			
	Groundwater			Surface water						
	Fresh	Saline	Total	Fresh	Saline	Total	Fresh	Saline	Total	
Alabama	0.22	0	0.22	8,270	0	8,270	8,270	0	8,270	114,000
Alaska	2.15	0	2.15	31.4	0	31.4	33.6	0	33.6	1,530
Arizona	50.5	0	50.5	39.4	0	39.4	89.9	0	89.9	82,500
Arkansas	.93	0	.93	2,000	0	2,000	2,000	0	2,000	41,300
California	9.84	0	9.84	39.7	12,600	12,600	49.6	12,600	12,600	56,200
Colorado	6.50	0	6.50	117	0	117	123	0	123	38,200
Connecticut	.08	0	.08	207	2,870	3,070	207	2,870	3,070	23,600
Delaware	.32	0	.32	422	383	804	422	383	805	6,250
District of Columbia	0	0	0	9.70	0	9.70	9.70	0	9.70	166
Florida	16.9	3.26	20.2	541	11,500	12,000	558	11,500	12,000	186,000
Georgia	3.76	0	3.76	2,680	36.9	2,720	2,680	36.9	2,720	122,000
Hawaii	37.8	1,450	1,480	0	0	0	37.8	1,450	1,480	7,300
Idaho	1.10	0	1.10	0	0	0	1.10	0	1.10	462
Illinois	7.20	0	7.20	12,300	0	12,300	12,400	0	12,400	188,000
Indiana	12.6	0	12.6	6,040	0	6,040	6,050	0	6,050	120,000
Iowa	25.5	0	25.5	2,510	0	2,510	2,530	0	2,530	38,500
Kansas	13.4	0	13.4	445	0	445	459	0	459	45,100
Kentucky	5.14	0	5.14	3,420	0	3,420	3,430	0	3,430	92,600
Louisiana	97.4	0	97.4	6,180	0	6,180	6,280	0	6,280	61,900
Maine	.53	0	.53	99.0	121	220	99.5	121	221	6,360
Maryland	1.77	0	1.77	436	5,950	6,390	438	5,950	6,390	34,000
Massachusetts	0	0	0	107	2,340	2,440	107	2,340	2,440	23,800
Michigan	4.07	0	4.07	9,140	0	9,140	9,150	0	9,150	117,000
Minnesota	2.41	0	2.41	2,440	0	2,440	2,450	0	2,450	45,500
Mississippi	37.3	0	37.3	317	82.6	400	355	82.6	437	32,800
Missouri	21.0	0	21.0	6,160	0	6,160	6,180	0	6,180	89,600
Montana	.25	0	.25	89.6	0	89.6	89.9	0	89.9	18,400
Nebraska	7.86	0	7.86	3,540	0	3,540	3,550	0	3,550	30,400
Nevada	15.9	0	15.9	21.0	0	21.0	36.8	0	36.8	22,400
New Hampshire	.99	0	.99	228	885	1,110	229	885	1,110	15,500
New Jersey	1.59	.01	1.60	662	5,460	6,120	663	5,460	6,120	47,000
New Mexico	10.4	0	10.4	45.5	0	45.5	55.9	0	55.9	33,600
New York	0	0	0	7,140	4,880	12,000	7,140	4,880	12,000	93,600
North Carolina	.14	0	.14	8,340	1,550	9,890	8,350	1,550	9,890	115,000
North Dakota	0	0	0	1,060	0	1,060	1,060	0	1,060	30,200
Ohio	22.5	0	22.5	8,910	0	8,910	8,930	0	8,930	147,000
Oklahoma	1.25	0	1.25	163	0	163	164	0	164	48,700
Oregon	.88	0	.88	7.57	0	7.57	8.45	0	8.45	8,410
Pennsylvania	4.39	0	4.39	6,420	.75	6,420	6,430	.75	6,430	202,000
Rhode Island	0	0	0	1.44	264	266	1.44	264	266	55,300
South Carolina	5.58	0	5.58	6,530	0	6,530	6,540	0	6,540	90,500
South Dakota	.72	0	.72	3.97	0	3.97	4.69	0	4.69	3,270
Tennessee	0	0	0	8,940	0	8,940	8,940	0	8,940	80,400
Texas	55.8	0	55.8	9,620	1,860	11,500	9,680	1,860	11,500	222,000
Utah	13.4	4.18	17.6	44.6	0	44.6	58.0	4.18	62.2	38,200
Vermont	.26	0	.26	421	0	421	421	0	421	4,710
Virginia	3.07	0	3.07	4,910	3,510	8,420	4,920	3,510	8,420	78,500
Washington	0	0	0	456	0	456	456	0	456	19,800
West Virginia	.20	0	.20	3,550	0	3,550	3,550	0	3,550	86,800
Wisconsin	3.37	0	3.37	6,890	0	6,890	6,900	0	6,900	56,600
Wyoming	1.32	0	1.32	221	0	221	223	0	223	46,300
Puerto Rico	1.39	0	1.39	1.42	2,290	2,290	2.81	2,290	2,290	21,300
U.S. Virgin Islands	0	0	0	.18	129	129	.18	129	129	921
TOTAL	510	1,450	1,960	142,000	56,700	199,000	143,000	58,100	201,000	3,190,000

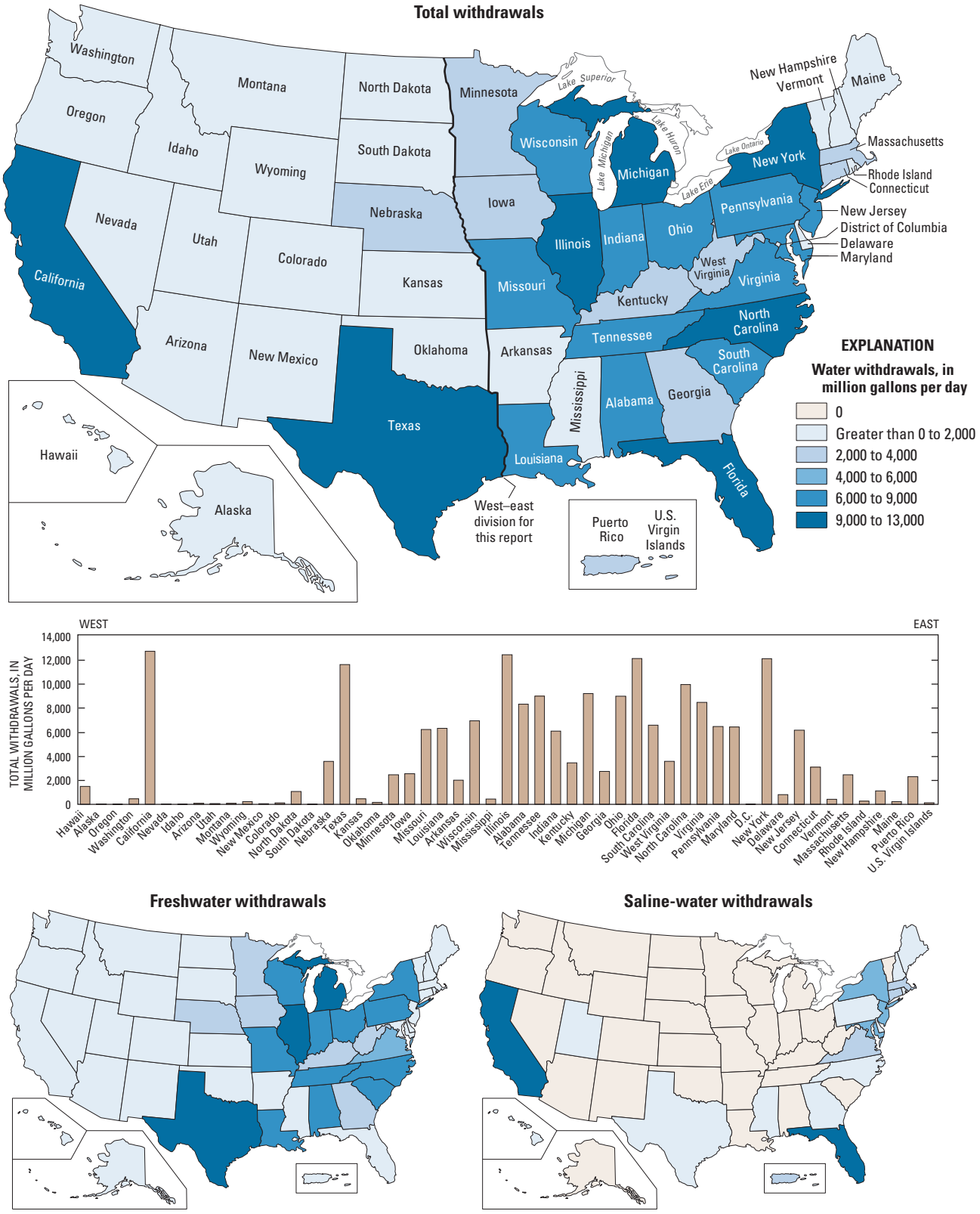


Figure 12. Thermoelectric-power withdrawals by water quality and State, 2005.

Table 13. Thermoelectric-power water withdrawals by cooling type, 2005.

[Values may not sum to totals because of independent rounding. All values are in million gallons per day]

State	Withdrawals for once-through cooling					Withdrawals for recirculation cooling				
	By source and type				Total	By source and type				Total
	Groundwater		Surface water			Groundwater		Surface water		
	Fresh	Saline	Fresh	Saline		Fresh	Saline	Fresh	Saline	
Alabama	0.05	0	8,100	0	8,100	0.17	0	178	0	178
Alaska	0	0	31.4	0	31.4	2.15	0	0	0	2.15
Arizona	5.13	0	0	0	5.13	45.3	0	39.4	0	84.8
Arkansas	.43	0	1,580	0	1,580	.50	0	420	0	420
California	0	0	0	12,600	12,600	9.84	0	39.7	0	49.6
Colorado	.01	0	71.2	0	71.2	6.49	0	45.5	0	52.0
Connecticut	0	0	196	2,870	3,060	.08	0	10.9	0	11.0
Delaware	0	0	417	374	791	.32	0	4.74	8.40	13.5
District of Columbia	0	0	0	0	0	0	0	9.70	0	9.70
Florida	2.15	3.26	492	11,300	11,800	14.8	0	49.1	140	204
Georgia	2.67	0	2,270	36.9	2,310	1.09	0	411	0	412
Hawaii	25.3	1,450	0	0	1,470	12.5	0	0	0	12.5
Idaho	0	0	0	0	0	1.10	0	0	0	1.10
Illinois	.66	0	11,800	0	11,800	6.54	0	594	0	601
Indiana	4.27	0	5,360	0	5,360	8.36	0	675	0	683
Iowa	13.6	0	2,490	0	2,500	11.9	0	18.8	0	30.7
Kansas	.17	0	412	0	412	13.2	0	33.1	0	46.4
Kentucky	0	0	757	0	757	5.14	0	2,670	0	2,670
Louisiana	0	0	4,510	0	4,510	97.4	0	1,670	0	1,760
Maine	0	0	97.3	121	219	.53	0	1.69	0	2.22
Maryland	1.77	0	429	5,940	6,370	0	0	7.63	14.8	22.4
Massachusetts	0	0	107	2,340	2,440	0	0	0	.45	.45
Michigan	4.07	0	9,140	0	9,150	0	0	0	0	0
Minnesota	1.60	0	1,540	0	1,540	.81	0	906	0	907
Mississippi	1.87	0	315	82.6	400	35.4	0	2.17	0	37.6
Missouri	3.29	0	6,140	0	6,140	17.7	0	23.0	0	40.8
Montana	0	0	61.1	0	61.1	.25	0	28.5	0	28.8
Nebraska	1.67	0	3,540	0	3,540	6.19	0	.01	0	6.20
Nevada	0	0	0	0	0	15.9	0	21.0	0	36.8
New Hampshire	.33	0	227	885	1,110	.66	0	.94	0	1.60
New Jersey	1.26	0	662	5,190	5,850	.33	.01	0	273	273
New Mexico	0	0	0	0	0	10.4	0	45.5	0	55.9
New York	0	0	7,140	4,880	12,000	0	0	0	0	0
North Carolina	0	0	6,690	1,550	8,230	.14	0	1,660	0	1,660
North Dakota	0	0	1,040	0	1,040	0	0	26.5	0	26.5
Ohio	16.7	0	8,550	0	8,570	5.81	0	360	0	366
Oklahoma	0	0	27.5	0	27.5	1.25	0	135	0	137
Oregon	0	0	0	0	0	.88	0	7.57	0	8.45
Pennsylvania	.40	0	4,100	.75	4,100	3.99	0	2,320	0	2,330
Rhode Island	0	0	0	264	264	0	0	1.44	0	1.44
South Carolina	.03	0	5,660	0	5,660	5.55	0	878	0	883
South Dakota	0	0	0	0	0	.72	0	3.97	0	4.69
Tennessee	0	0	8,750	0	8,750	0	0	188	0	188
Texas	0	0	8,180	1,830	10,000	55.8	0	1,450	35.2	1,540
Utah	0	0	0	0	0	13.4	4.18	44.6	0	62.2
Vermont	0	0	421	0	421	.26	0	.28	0	.54
Virginia	1.51	0	4,720	3,510	8,220	1.56	0	197	0	199
Washington	0	0	425	0	425	0	0	30.2	0	30.2
West Virginia	0	0	3,410	0	3,410	.20	0	145	0	145
Wisconsin	0	0	6,890	0	6,890	3.37	0	0	0	3.37
Wyoming	0	0	162	0	162	1.32	0	59.6	0	60.9
Puerto Rico	1.39	0	1.42	2,290	2,290	0	0	0	0	0
U.S. Virgin Islands	0	0	.18	129	129	0	0	0	0	0
TOTAL	90.3	1,450	127,000	56,200	185,000	419	4.19	15,400	472	16,300

Trends in Water Use, 1950–2005

The USGS has conducted water-use compilations every 5 years since 1950. A summary of population growth and withdrawal estimates by category and source of water is given in table 14 for each 5-year period from 1950 through 2005. These trends are shown graphically for freshwater uses in figure 13 and total uses in figure 14.

Some categories of water use have been presented differently over the 55-year span of these compilations. To the extent possible, individual category withdrawals are shown in table 14. For example, self-supplied domestic and livestock withdrawals are shown separately for each year, although theses uses were combined as "rural" for the 1950 and 1955 compilations. The industrial water-use category included withdrawals for commercial, mining, and aquaculture uses until these uses were estimated separately beginning in 1985. Water use at fish hatcheries was reported as commercial use in 1990 and 1995, but is included in the aquaculture category for 2000 and 2005. Estimates of commercial withdrawals were not compiled nationally for 2000 or 2005.

Corrections and additions to previously published data are included in table 14 and in some cases have resulted in different national totals. The largest of these changes is reflected in the thermoelectric and saline groundwater withdrawals for 2000, because of the exclusion of 1.2 Bgal/d of saline groundwater for once-through cooling in Hawaii that year. Revisions to Alabama thermoelectric withdrawals in 1995 added another 1.2 Bgal/d of fresh surface water to the total for 1995. Revisions to irrigation estimates for several States resulted in a slight increase in total irrigation use and total fresh surface-water use, and a slight decrease in fresh groundwater use. Withdrawals for livestock, aquaculture, and mining uses in 2000 were estimated for those States that did not compile data for those categories for that year, so that a national total could be provided for these categories from 1985 through 2005. Unreported uses for these categories in 2000 were estimated as the average of the 1995 and 2005 estimates. The percentage change in withdrawals for each category and source from 2000 to 2005 (table 14) was calculated from the revised data.

The historic Chicago water tower housed a standpipe for the city water system from 1869–1911 and survived the Great Chicago Fire of 1871. It now serves as a tourist information center. Photo by Nancy L. Barber, USGS.

Total withdrawals in 2000 and 2005 were at their largest since 1975 and 1980, when water use was considered to have peaked. The increase in total water use between 1950 and 1980 primarily was related to the increasingly large amounts of water withdrawn for irrigation and thermoelectric-power generation. The largest increases in total withdrawals between the 5-year intervals occurred before 1980.

Thermoelectric power has been the category with the largest water withdrawals since 1965, and for 2005 made up 49 percent of total withdrawals. The largest total and fresh and saline surface-water withdrawals were during 1980. Withdrawals by thermoelectric-power plants increased from 40 Bgal/d in 1950 to 210 Bgal/d in 1980, declined to 187 Bgal/d in 1985, and have since increased to 201 Bgal/d in 2005.

Thermoelectric-power water withdrawals have been affected by limited water availability in some areas of the United States, and also by sections of the Clean Water Act (Amendments to the 1972 Federal Water Pollution Control Act) that regulate cooling system thermal discharges and mandate the use of best available technology for minimizing environmental effects of cooling water intakes (Michelletti and Burns, 2002). Consequently, since the 1970s, power plants have increasingly been built with or converted to using wet recirculating cooling systems (using cooling towers or cooling ponds) or dry recirculating (air-cooled) systems instead of using once-through cooling systems. Recent energy industry data indicate that about 43 percent of the generating capacity in the United States is

Table 14. Trends in estimated water use in the United States, 1950–2005.

[Data for 2000 and earlier from Hutson and others (2004). Water-use data are in billion gallons per day (thousand million gallons per day) and are rounded to two significant figures for 1950–80, and to three significant figures for 1985–2005; percentage change is calculated from unrounded numbers. Geographic extent: 1950, 48 States and District of Columbia, and Hawaii; 1955, 48 States and District of Columbia; 1960 and 1975–2005, 50 States and District of Columbia, Puerto Rico, and U.S. Virgin Islands; 1965–1970, 50 States and District of Columbia, and Puerto Rico; —, not available]

	Year												Percent change 2000–2005
	1950	1955	1960	1965	1970	1975	1980	1985	1990	1995	2000	2005	
Population, in millions	150.7	164.0	179.3	193.8	205.9	216.4	229.6	242.4	252.3	267.1	285.3	300.7	+5
Total withdrawals	180	240	270	310	370	420	[1]430	[1]397	[1]404	[1]399	[1]413	410	–1
Public supply	14	17	21	24	27	29	[1]33	[1]36.4	[1]38.8	40.2	43.2	44.2	+2
Rural domestic and livestock													
Self-supplied domestic	2.1	2.1	2.0	2.3	2.6	2.8	3.4	3.32	3.39	3.39	[1]3.58	3.83	+7
Livestock	1.5	1.5	1.6	1.7	1.9	2.1	2.2	2.23	2.25	2.28	[2]2.38	2.14	–10
Irrigation	89	110	110	120	130	140	150	[1]135	[1]134	[1]130	[1]139	128	–8
Thermoelectric power	40	72	100	130	170	200	210	187	[1]194	190	195	201	+3
Other													
Self-supplied industrial	37	39	38	46	47	45	45	[1]25.9	22.6	22.4	19.7	18.2	–8
Mining	[3]	[3]	[3]	[3]	[3]	[3]	[3]	3.44	4.93	3.72	[2]4.50	4.02	–11
Commercial	[3]	[3]	[3]	[3]	[3]	[3]	[3]	1.23	2.39	2.89	[4]	[4]	—
Aquaculture	[3]	[3]	[3]	[3]	[3]	[3]	[3]	2.24	[5]2.25	[5]3.22	[2]5.77	8.78	+52
Source of water													
Ground													
Fresh	34	47	50	60	68	82	83	[1]73.4	[1]79.6	76.4	[1]84.3	79.6	–5
Saline	[4]	.6	.4	.5	1.0	1.0	.93	[1].66	1.22	1.11	[1]2.67	3.02	+13
Surface													
Fresh	140	180	190	210	250	260	[1]280	[1]263	[1]255	[1]261	[1]265	270	+2
Saline	10	18	31	43	53	69	71	59.6	68.2	59.7	61.0	58.0	–5

[1] Revised data values.

[2] Partial totals from 2000 have been expanded to include all States.

[3] Included in self-supplied industrial.

[4] Data not available.

[5] In 1990 and 1995, some aquaculture use was included in the commercial category.

associated with once-through cooling, 42 percent with wet recirculating cooling towers, 14 percent with wet recirculating cooling ponds, and less than 1 percent with dry recirculating systems (Feeley and others, 2008). Records of cooling systems in fossil fuel plants from 1996 to 2004 and a smaller number of nuclear plants from 1996 to 2000 indicate that average use rates for once-through systems ranged between 50 gallons per kilowatt hour (gal/kWh) and 65 gal/kWh; for recirculating-cooling systems with cooling towers, between 1.0 gal/kWh to 2.0 gal/kWh; and for recirculating-cooling systems with ponds or canals, between 14 gal/kWh to 24 gal/kWh. However, consumptive use ranged from a small percentage of total withdrawals at once-through power plants to approximately 70 percent of water withdrawn at recirculation systems with cooling towers (Dziegielewski and others, 2006).

Use of recirculation water for cooling reduces the intake water requirement at a power plant, resulting in reduced water withdrawals. The increasing influence over time of using technologies that require less water can be observed in the USGS water-use historical record. The trend showing the increase, decline, and subsequent gradual increase of water withdrawals for thermoelectric power generation from 1950 to 2005 (table 14) occurred as the net power generated increased steadily during the same period (U.S. Department of Energy, 2007). The ratio of total water withdrawals to energy produced, in gallons per kilowatt hour, can be calculated using the USGS estimate of thermoelectric water use with the USDOE EIA records of historic net power production. This ratio decreased from an average of 63 gal/kWh during 1950 to 23 gal/kWh during 2005.

Irrigation is the second largest category of water use, after thermoelectric. In 1950, irrigation withdrawals of about 89 Bgal/d accounted for about one-half of all water use and 64 percent of use excluding thermoelectric. By the peak year of 1980, irrigation withdrawals totaled 150 Bgal/d and represented 35 percent of total use and 68 percent of the total excluding thermoelectric. Estimated irrigation water use has decreased in each 5-year compilation year since 1980, except for the year 2000, which was an extremely dry year throughout much of the country. Irrigation withdrawals of 128 Bgal/d in 2005 were 15 percent smaller than in 1980 and represented 31 percent of total use and 61 percent of the total excluding thermoelectric.

Surface water historically has been the source for most of the irrigation in the United States. During 1950, 77 percent of all irrigation was from surface water, primarily in the Western States. By 1980, the quantity of groundwater used for irrigation had nearly doubled because of expansion of irrigation in areas of the central United States, and groundwater accounted for 40 percent of total irrigation withdrawals. In 2005, 42 percent of irrigation withdrawals were from groundwater.

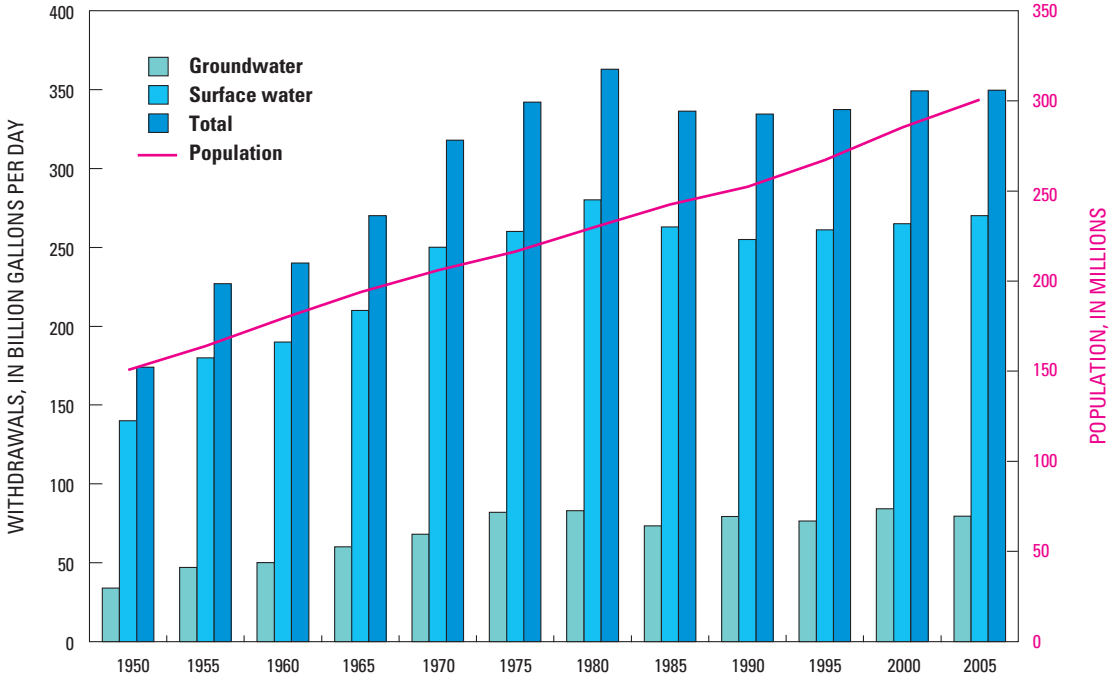


Figure 13. Trends in population and freshwater withdrawals by source, 1950–2005.

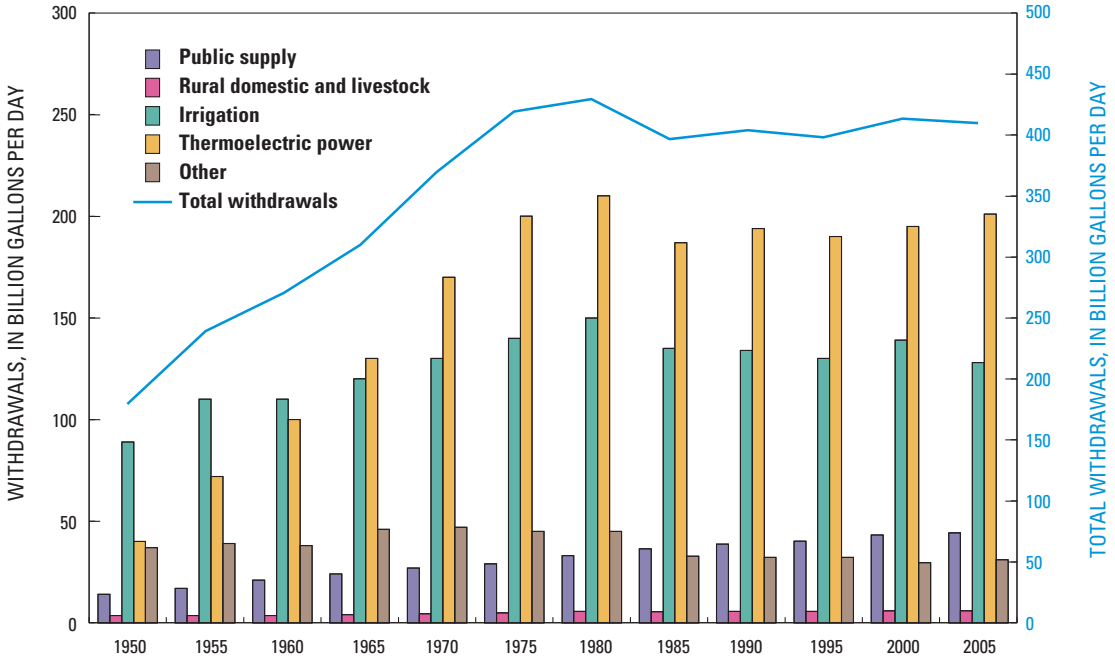


Figure 14. Trends in total water withdrawals by water-use category, 1950–2005.

The total number of acres irrigated continued to increase from 1950 to 2000, even as withdrawals remained static or decreased. In 2005, the total number of acres irrigated was 2 percent less than in 2000, but still more than 60 million acres. Between 1985 and 2005, the number of acres irrigated by sprinkler systems steadily increased from 22 million to more than 30 million acres. Presently, acres irrigated with sprinkler types of systems represent 50 percent of total acres irrigated. The use of microirrigation systems increased from less than 3 percent of the total acres irrigated in 1995 to almost 7 percent in 2005. Acres irrigated with flood systems decreased by 24 percent from 1985 to 2005, from 35 to 26.6 million acres. The average application rate for irrigation water has declined steadily from 3.55 acre-feet per acre in 1950 to 2.35 acre-feet per acre in 2005. This decline is attributed to greater use of sprinkler systems rather than flood systems and corresponding decreases in conveyance losses due to the more efficient application of water.

Estimated withdrawals for public supply have increased continually since 1950, along with the population served by public supply. Public-supply withdrawals were 14 Bgal/d in 1950, when 62 percent of the population was served by public water suppliers, and 44.2 Bgal/d in 2005, when 86 percent of the population was served by public water suppliers. Public-supply withdrawals in 2005 were about 11 percent of total withdrawals and 21 percent of all freshwater uses excluding thermoelectric power generation, generally consistent with the percentages since 1990. The percentage of groundwater used for public supply increased from 26 percent in 1950 to 33 percent in 2005. In 1980, estimates indicated that 36 percent of public-supply withdrawals were from groundwater; however, that peak percentage was the result of counting public-supply water in southern California as groundwater because surface water brought through aqueducts was stored in an aquifer before being pumped for municipal use.

Estimated withdrawals for self-supplied domestic use increased by 82 percent between 1950 and 2005. The self-supplied population was 57.5 million people in 1950, or 38 percent of the total population, and domestic withdrawals were 2.1 Bgal/d. In 2005, the self-supplied population was 42.9 million people, and the domestic withdrawals were 3.83 Bgal/d. These data indicate an increase in per capita use from less than 40 to almost 90 gallons per day. Beginning with the 1985 estimates and continuing through 2005, with the exception of 2000, domestic deliveries from public supply were estimated. Average per capita use for the domestic population obtaining household water from public supply was 105 gallons per day in 1985 and 1990, 101 in 1995, and 99 for 2005. Estimates of the combined domestic per capita use for both self-supplied and public-supplied populations have not changed appreciably in 20 years, ranging from 100 gallons per day in 1985 to 98 gallons per day in 2005.

Changes in the industrial category may be compared for 1985 through 2005, which are the years the industrial category was compiled separately from commercial, mining, and aquaculture. Self-supplied industrial use decreased almost 8 percent between 2000 and 2005, continuing the decline shown each year since 1985. Total industrial withdrawals decreased by almost 30 percent over this entire period, from 25.9 Bgal/d during 1985 to 18.2 Bgal/d during 2005. Groundwater provided 15 percent of the total industrial withdrawals during 1985; 18 percent of the total during 1990, 1995, and 2000; and 17 percent during 2005. Almost all of the groundwater withdrawn for industrial uses was freshwater. The percentage of industrial surface water that was freshwater increased from 84 percent during 1985 to 92 percent during 2005.

Changes in the economic profile of the United States and in environmental legislation have occurred as industrial water withdrawals have declined. Although overall U.S. employment increased 25 percent between 1990 and 2005, manufacturing employment declined almost 19 percent during the same period. Employment in several major water-using industries showed even larger declines: primary metal manufacturing employment declined 31 percent, employment in the paper manufacturing and petroleum and coal products manufacturing industries each declined 26 percent, and employment in the chemical manufacturing industry declined 12 percent (U.S. Department of Commerce, 2009). Stricter water-quality standards for water discharges, mandated by the Clean Water Act, may have encouraged conservation, greater efficiency, and shifts to technologies that use less water.

Estimates of livestock, aquaculture, and mining water uses were included with other categories prior to the 1985 estimates. Livestock water use initially was included with rural domestic, but since 1960 has been estimated as a separate category. During this time, water use for raising livestock has increased but is still one of the smaller individual categories of use at about 2 Bgal/d. Aquaculture water use was included with either the industrial, commercial, or animal specialties categories until 2000, when it was estimated separately in recognition of the growth of this industry. The apparent increase in aquaculture water use since 1985 is partly due to the increase in farm-raised fish and fishery stock, and partly due to an increase in the types of operations inventoried for the estimates. Mining water use was included with industrial use until 1985, and since then the estimates of water use for mining have varied little, averaging 4.13 Bgal/d.

Total water withdrawals more than doubled between 1950 and 2005. During this time period, the proportion of the total by source remained approximately 80 percent surface water and 20 percent groundwater. Most of the groundwater withdrawn has been freshwater; less than 1 percent of total withdrawals has been from saline groundwater. Fresh surface water accounted for about 78 percent of total withdrawals in 1950 and about 66 percent in 2005; since 1980, saline surface-water withdrawals have been about 15 percent of total withdrawals. The increase in saline withdrawals primarily was related to greater use of brackish or saline surface water for thermoelectric-power generation in coastal areas.

References Cited

Dziegielewski, Ben, Bik, Thomas, Alqalawi, Usama, Mubako, Stanley, Eidem, Nathan, and Bloom, Shauna, 2006, Water use benchmarks for thermoelectric power generation: Carbondale, Illinois, Project completion report, Research report of the Department of Geography and Environmental Resources, Southern Illinois University, accessed March 12, 2009, at *http://www.geog.siu.edu/geography_info/research/documents/ThermoReport.pdf*.

Feeley, T.J., III, Skone, T.J., Stiegel, G.J., Jr., McNemar, Andrea, Nemeth, Michael, Schimmoller, Brian, Murphy, J.T., and Manfredo, Lynn, 2008, Water—A critical resource in the thermoelectric power industry: Energy, v. 33, p. 1–11.

Hutson, S.S., compiler, 2007, Guidelines for preparation of State water-use estimates for 2005: U.S. Geological Survey Techniques and Methods Book 4, Chap. E1, 28 p. (Also available at *http://pubs.usgs.gov/tm/2007/tm4e1*.)

Hutson, S.S., Barber, N.L., Kenny, J.F., Linsey, K.S., Lumia, D.S., and Maupin, M.A., 2004, Estimated use of water in the United States in 2000: U.S. Geological Survey Circular 1268, 46 p.

Lovelace, J.K., 2009a, Methods for estimating water withdrawals for aquaculture in the United States, 2005: U.S. Geological Survey Scientific Investigations Report 2009–5042, 13 p.

Lovelace, J.K., 2009b, Method for estimating water withdrawals for livestock in the United States, 2005: U.S. Geological Survey Scientific Investigations Report 2009–5041, 7 p.

Lovelace, J.K., 2009c, Methods for estimating water witdrawals for mining in the United States, 2005: U.S. Geological Survey Scientific Investigations Report 2009–5053, 7 p.

MacKichan, K.A., 1951, Estimated use of water in the United States, 1950: U.S. Geological Survey Circular 115, 13 p.

MacKichan, K.A., 1957, Estimated use of water in the United States, 1955: U.S. Geological Survey Circular 398, 18 p.

MacKichan, K.A., and Kammerer, J.C., 1961, Estimated use of water in the United States, 1960: U.S. Geological Survey Circular 456, 26 p.

Micheletti, W.C., and Burns, J.M., 2002, Emerging issues and needs in power plant cooling systems, in Proceedings of the Workshop on Electric Utilities and Water: Emerging issues and R&D needs: Pittsburgh, Pennsylvania, July 23–24, 2002, accessed May 20, 2009, at *http://www.netl.doe.gov/publications/proceedings/02/EUW/Micheletti_JMB.PDF*.

Murray, C.R., 1968, Estimated use of water in the United States, 1965: U.S. Geological Survey Circular 556, 53 p.

Murray, C.R., and Reeves, E.B., 1972, Estimated use of water in the United States, 1970: U.S. Geological Survey Circular 676, 37 p.

Murray, C.R., and Reeves, E.B., 1977, Estimated use of water in the United States in 1975: U.S. Geological Survey Circular 765, 39 p.

Solley, W.B., Chase, E.B., and Mann, W.B., IV, 1983, Estimated use of water in the United States in 1980: U.S. Geological Survey Circular 1001, 56 p.

Solley, W.B., Merk, C.F., and Pierce, R.R., 1988, Estimated use of water in the United States in 1985: U.S. Geological Survey Circular 1004, 82 p.

Solley, W.B., Pierce, R.R., and Perlman, H.A., 1993, Estimated use of water in the United States in 1990: U.S. Geological Survey Circular 1081, 76 p.

Solley, W.B., Pierce, R.R., and Perlman, H.A., 1998, Estimated use of water in the United States in 1995: U.S. Geological Survey Circular 1200, 71 p.

U.S. Department of Commerce, 2009, Table SA25–Employment by industry (NAICS Series 1990-2007): Bureau of Economic Analysis, Regional Economic Accounts, accessed February 24, 2009, at *http://www.bea.gov/regional/spi/default.cfm?satable=SA25N&series=NAICS*.

U.S. Department of Energy, 2006a, Steam-electric plant operation and design report, Form EIA-767: Energy Information Administration, accessed March 9, 2009, at *http://www.eia.doe.gov/cneaf/electricity/forms/eia767/eia767.pdf*.

U.S. Department of Energy, 2006b, Power plant report, Form EIA-906: Energy Information Administration, accessed March 9, 2009, at *http://www.eia.doe.gov/cneaf/electricity/page/eia906_920.html*.

U.S. Department of Energy, 2007, Annual energy review 2006: Energy Information Administration, DOE/EIA-0384(2006), accessed March 12, 2009, at *http://tonto.eia.doe.gov/FTPROOT/multifuel/038406.pdf*.

U.S. Department of Energy, 2009, State electricity profiles: Energy Information Administration, DOE/EIA-0348(01)/2, accessed March 3, 2009, at *http://www.eia.doe.gov/cneaf/electricity/st_profiles/e_profiles_sum.html*.

Veil, J.A., 2007, Use of reclaimed water for power plant cooling: Argonne, Illinois, Argonne National Laboratory, Environmental Science Division, ANL/EVS/R-07/3, 60 p.

Glossary

The following terms are referenced in the text or are part of the water-use Circular series.

animal-specialties water use water use associated with the production of fish in captivity, except for fish hatcheries, and the raising of horses and such fur-bearing animals as rabbits and pets. Animal-specialties water-use estimates were included in the 1990 and 1995 water-use Circulars, but were combined with the livestock categories or aquaculture categories beginning in 2000. *See also* aquaculture water use, fish-farm water use, livestock water use, and rural water use.

aquaculture water use water use associated with the farming of organisms that live in water (such as finfish and shellfish) and offstream water use associated with fish hatcheries. *See also* fish-farm water use, fish-hatchery water use, animal-specialties water use, and livestock water use.

closed-loop cooling system *see* recirculation cooling system.

commercial water use water for motels, hotels, restaurants, office buildings, other commercial facilities, military and nonmilitary institutions, and (for 1990 and 1995) offstream fish hatcheries. Water may be obtained from a public-supply system or may be self-supplied. Commercial water-use estimates were included in some previous water-use Circulars but were omitted beginning in 2000. *See also* fish-hatchery water use, public-supply water use, public-supply deliveries, and self-supplied water use.

consumptive use the part of water withdrawn that is evaporated, transpired, incorporated into products or crops, consumed by humans or livestock, or otherwise removed from the immediate water environment. Consumptive-use estimates were included in some previous water-use Circulars but were omitted beginning in 2000. Also referred to as water consumed.

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 groundwater source and be available for further use. Conveyance-loss estimates were included in some previous water-use Circulars but were omitted beginning in 2000. *See also* irrigation water use.

cooling system an equipment system that provides water for cooling purposes, such as to condensers at power plants or at factories. May include water intakes, outlets, cooling towers, ponds, canals, pumps, and pipes. *See also* cooling-system type, industrial water use, and thermoelectric-power water use.

cooling-system type defined as either once-through or recirculation cooling system. *See also* industrial water use, once-through cooling system, recirculation cooling system, and thermoelectric-power water use.

domestic water use water used for indoor household purposes such as drinking, food preparation, bathing, washing clothes and dishes, flushing toilets, and outdoor purposes such as watering lawns and gardens. Domestic water use includes water provided to households by a public water supply (domestic deliveries) and self-supplied water. *See also* public-supply deliveries, public-supply water use, rural water use, and self-supplied water use.

fish-farm water use water used for the production of finfish and shellfish under controlled feeding, sanitation, and harvesting procedures for commercial purposes. Water use by fish farms is classified in the aquaculture category. *See also* animal-specialties water use, aquaculture water use, and fish-hatchery water use.

fish-hatchery water use water used for raising fish for later release and in association with the operation of fish hatcheries or fishing preserves. Fish-hatchery water use has been included in the aquaculture category since 2000. *See also* aquaculture water use, commercial water use, and fish-farm water use.

freshwater water that contains less than 1,000 milligrams per liter (mg/L) of dissolved solids. Generally, water with more than 500 mg/L of dissolved solids is undesirable for drinking and many industrial uses. *See also* saline water.

industrial water use water used for fabrication, processing, washing, and cooling. Includes industries such as chemical and allied products, food, paper and allied products, petroleum refining, wood products, and steel. Term used in previous water-use Circulars to describe the combined public-supply deliveries to industrial users and self-supplied industrial withdrawals. For 2000 and 2005, industrial water use refers only to self-supplied industrial withdrawals. *See also* cooling system, cooling-system type, mining water use, public-supply deliveries, public-supply water use, and self-supplied water use.

instream use water that is used, but not withdrawn, from a surface-water source for such purposes as hydroelectric-power generation, navigation, water-quality improvement, fish propagation, and recreation. Instream water-use estimates for hydroelectric power were included in some previous water-use Circulars but were omitted for 2000 and 2005.

irrigation district a cooperative, self-governing public corporation set up as a subdivision of the State government, with definite geographic boundaries, organized, and having taxing power to obtain and distribute water for irrigation of lands within the district. Created under the authority of a State legislature with the consent of a designated fraction of the landowners or citizens. *See also* irrigation water use.

irrigation water use water that is applied by an irrigation system to assist crop and pasture growth, or to maintain vegetation on recreational lands such as parks and golf courses. Irrigation includes water that is applied for pre-irrigation, frost protection, chemical application, weed control, field preparation, crop cooling, harvesting, dust suppression, leaching of salts from the root zone, and conveyance losses. *See also* conveyance loss, microirrigation system, sprinkler irrigation system, and surface irrigation system.

livestock water use water used for livestock watering, feedlots, dairy operations, and other on-farm needs. Types of livestock include dairy cows and heifers, beef cattle and calves, sheep and lambs, goats, hogs and pigs, horses and poultry. *See also* animal-specialties water use, aquaculture water use, and rural water use.

microirrigation system an irrigation system that wets only a discrete portion of the soil surface in the vicinity of the plant by means of applicators (such as orifices, emitters, porous tubing, or perforated pipe) and operated under low pressure. The applicators may be placed on or below the surface of the ground or suspended from supports. *See also* irrigation water use, sprinkler irrigation system, and surface irrigation system.

mining water use water used for the extraction of naturally occurring minerals including solids (such as coal, sand, gravel, and other ores), liquids (such as crude petroleum), and gases (such as natural gas). Also includes uses associated with quarrying, milling, and other preparations customarily done at the mine site or as part of a mining activity. Does not include water associated with dewatering of the aquifer that is not put to beneficial use. Also does not include water used in processing, such as smelting, refining petroleum, or slurry pipeline operations. These processing uses are included in industrial water use. *See also* industrial water use and self-supplied water use.

offstream use water withdrawn or diverted from a groundwater or surface-water source for aquaculture, commercial, domestic self-supply, industrial, irrigation, livestock, mining, public supply, thermoelectric power, and other uses. *See also* entries for each of these categories of use.

once-through cooling system also known as open-loop cooling system. Cooling system in which the water is withdrawn from a source, circulated through the heat exchangers, and then returned to a body of water at a higher temperature. *See also* cooling system, cooling-system type, industrial water use, and thermoelectric-power water use.

public-supply deliveries amount of water delivered from a public supplier to users for domestic, commercial, industrial, thermoelectric-power, or public-use purposes. Estimates of deliveries for each purpose were provided for 1995 and earlier years, but not for 2000. For 2005, only domestic deliveries were estimated nationally. *See also* commercial water use, domestic water use, industrial water use, public-supply water use, public water use, and thermoelectric-power use.

public-supply water use water withdrawn by public and private water suppliers that furnish water to at least 25 people or have a minimum of 15 connections. Public suppliers provide water for a variety of uses, such as domestic, commercial, industrial, thermoelectric-power, and public water use. *See also* commercial water use, domestic water use, industrial water use, public-supply deliveries, public water use, and thermoelectric-power water use.

public water use water supplied from a public supplier and used for such purposes as firefighting, street washing, flushing of water lines, and maintaining municipal parks and swimming pools. Generally, public-use water is not billed by the public supplier. *See also* public-supply deliveries and public-supply water use.

recirculation cooling system also known as closed-loop cooling system. Water is withdrawn from a source, circulated through heat exchangers, cooled, and then re-used in the same process. Recirculation cooling systems may use induced draft cooling towers, forced draft cooling towers, cooling ponds, or canals. *See also* cooling system, cooling-system type, industrial water use, and thermoelectric-power water use.

reclaimed wastewater wastewater-treatment plant effluent that has been diverted for beneficial uses such as irrigation, industry, or thermoelectric cooling instead of being released to a natural waterway or aquifer. *See also* water use.

return flow water that reaches a groundwater or surface-water source after release from the point of use and thus becomes available for further use. Term used in previous water-use Circulars. *See also* water use.

rural water use water used in suburban or farm areas for domestic and livestock needs. The water generally is self-supplied, and includes domestic use, drinking water for livestock, and other uses such as dairy sanitation, cleaning, and waste disposal. Term used in previous water-use Circulars. *See also* animal-specialties water use, domestic water use, livestock water use, and self-supplied water use.

saline water water that contains 1,000 mg/L or more of dissolved solids. *See also* freshwater.

self-supplied water use water withdrawn from a groundwater or surface-water source by a user rather than being obtained from a public supply.

sprinkler irrigation system an irrigation system in which water is applied by means of perforated pipes or nozzles operated under pressure so as to form a spray pattern. *See also* irrigation water use, microirrigation system, and surface irrigation system.

standard industrial classification (SIC) codes four-digit codes established by the Office of Management and Budget, published in 1987, and used in the classification of establishments by type of activity in which they are engaged.

surface irrigation system irrigation by means of flood, furrow, or gravity. Flood irrigation is the application of irrigation water in which the entire soil surface is covered by ponded water. Furrow is a partial surface-flooding method of irrigation normally used with clean-tilled crops in which water is applied in furrows or rows of sufficient capacity to contain the design irrigation stream. Gravity is an irrigation method in which water is not pumped, but flows in ditches or pipes and is distributed by gravity. *See also* irrigation water use, microirrigation system, and sprinkler irrigation system.

thermoelectric-power water use water used in the process of generating electricity with steam-driven turbine generators. Term used in previous water-use Circulars to describe the combined public-supply deliveries to thermoelectric-power plants and self-supplied thermoelectric-power withdrawals. For 2000 and 2005, thermoelectric-power water use refers only to self-supplied thermoelectric-power withdrawals. *See also* cooling system, cooling-system type, public-supply water use, and self-supplied water use.

wastewater-treatment return flow term used in previous water-use Circulars to describe water returned to the hydrologic system by wastewater-treatment facilities. *See also* water use.

water use In a restrictive sense, the term refers to water that is withdrawn for a specific purpose, such as for public supply, domestic use, irrigation, thermoelectric-power cooling, or industrial processing. In previous water-use Circulars, water use for the domestic, commercial, industrial, and thermoelectric categories included both self-supplied withdrawals and deliveries from public supply. More broadly, water use pertains to the interaction of humans 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.

watt-hour (Wh) an electrical energy unit of measure equal to 1 watt of power supplied to, or taken from, an electric circuit steadily for 1 hour.

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

Center pivot irrigation system, Burke County, Georgia. Photo by Alan M. Cressler, USGS.

Cooperating Agencies and Organizations

The following State, regional, and local organizations provided assistance and data as part of the water-use compilation. In addition, State and regional offices of the U.S. Army Corps of Engineers, U.S. Bureau of Reclamation, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, USDA National Agricultural Statistics Service, USDA Natural Resources Conservation Service, and other Federal agencies provided assistance and data for various States.

Alabama

Alabama Department of Economic and Community Development, Office of Water Resources, Water Management Branch

Alabama Department of Environmental Management, Drinking Water Branch

Alabama Rural Water Association

Geological Survey of Alabama

Tennessee Valley Authority

Alaska

Alaska Department of Commerce, Community and Economic Development

Alaska Department of Environmental Conservation, Public Health Service

Alaska Department of Fish and Game

Alaska Department of Natural Resources, Division of Agriculture

Alaska Division of Geology and Geophysical Surveys

Alaska Division of Land and Water Management

Alaska Division of Mining Land and Water

Alaska Oil and Gas Conservation Commission

University of Alaska, Cooperative Extension Service

Arizona

Arizona Department of Water Resources

Arizona Corporation Commission

Arkansas

Arkansas Natural Resources Commission

California

California Department of Water, Division of Planning and Local Assistance

California Energy Commission

Colorado

Colorado Department of Health and Environment

Colorado Department of Natural Resources

Colorado Division of Water Resources Office of State Engineer

Colorado Geological Survey

Colorado Oil and Gas Conservation Commission

Rocky Mountain Golf Course Superintendents Association

Connecticut

State of Connecticut Department of Environmental Protection

Delaware

Delaware Department of Natural Resources and Environmental Control

Florida

Florida Department of Environmental Protection

Northwest Florida Water Management District

South Florida Water Management District

Southwest Florida Water Management District

St. Johns River Water Management District

Suwannee River Water Management District

Georgia

Georgia Environmental Protection Division, Watershed Protection Branch

Georgia Power Company

University of Georgia, Cooperative Extension Service

Hawaii

Hawaii Commission on Water Resource Management

Idaho

Idaho Department of Agriculture, Agricultural Statistics Service

Idaho Department of Fish and Game

Idaho Department of Water Resources

Idaho Division of Environmental Quality

Idaho State Geological Survey

University of Idaho, Aquaculture Research Institute

University of Idaho, Research and Extension Center at Kimberly

Illinois

Illinois State Water Survey, Illinois Water Inventory Program

Indiana

Indiana Department of Natural Resources, Division of Water

Iowa

Iowa Department of Natural Resources, Water Supply Engineering Section

Kansas

Kansas Department of Agriculture, Division of Water Resources

Kansas Water Office

Kentucky

Kentucky Energy and Environment Cabinet, Division of Water

Louisiana

Capitol Area Ground Water Conservation Committee
Louisiana Cooperative Extension Service
Louisiana Department of Environmental Quality
Louisiana Department of Health and Hospitals
Louisiana Department of Transportation and Development
Louisiana Office of Conservation,
Injection and Mining Division
Louisiana State University Agricultural Center

Maine

Maine Department of Agriculture
Maine Department of Environmental Protection
Maine Department of Health and Human Services
Maine Public Utilities Commission

Maryland

Maryland Department of the Environment

Massachusetts

Massachusetts Department of Environmental Protection

Michigan

Michigan Department of Environmental Quality,
Water Use Program

Minnesota

Minnesota Department of Natural Resources

Mississippi

Mississippi Agriculture and Forestry Extension Service
Mississippi Department of Environmental Quality,
Office of Land and Water Resources
Mississippi State Department of Health
Yazoo Mississippi Delta Joint Management District

Missouri

Missouri Department of Natural Resources

Montana

Montana Agricultural Statistical Service
Montana Department of Natural Resources and Conservation

Nebraska

Nebraska Department of Natural Resources

Nevada

Carson City Water Division
Nevada Agricultural Statistics Service
Nevada Bureau of Mines and Geology
Nevada Department of Wildlife
Nevada Division of Water Resources
Pershing County Water Conservation District
Southern Nevada Water Authority
State of Nevada Demographer
Truckee Carson Irrigation District
Truckee Meadows Water Authority
University of Nevada, Reno,
Department of Animal Biotechnology

New Hampshire

New Hampshire Department of Environmental Services

New Jersey

New Jersey Department of Environmental Protection

New Mexico

New Mexico Office of the State Engineer,
Water Conservation Bureau

New York

New York City Department of Environmental Protection
New York State Department of Environmental Conservation
New York State Department of Health

North Carolina

Carolinas Golf Course Superintendents Association
Duke Energy Company
North Carolina Department of Environment and Natural
Resources, Division of Water Resources
North Carolina Department of Agriculture and Consumer
Services, Agribusiness and Aquaculture
North Carolina State University, College of Agriculture
and Life Sciences, Cooperative Extension
North Carolina State University, College of Agriculture
and Life Sciences, Department of Crop Science
Progress Energy Company

North Dakota

North Dakota Agricultural Statistics Service
North Dakota Industrial Commission, Oil and Gas Division
North Dakota State Data Center,North Dakota State University
North Dakota State Department of Health
North Dakota State Water Commission

Ohio

Ohio Department of Natural Resources

Oklahoma

City of Tulsa, Department of Public Works
City of Oklahoma City, Water & Wastewater Utilities
Grand River Dam Authority
Oklahoma Agricultural Statistics Service
Oklahoma Corporation Commission
Oklahoma Climatological Survey
Oklahoma Department of Commerce
Oklahoma Department of Environmental Quality
Oklahoma Municipal Power Authority
Oklahoma Pork Council
Oklahoma Water Resources Board
Southwest Power Administration

Oregon

Oregon Agricultural Statistic Service
Oregon Department of Energy
Oregon Department of Fish and Wildlife
Oregon Department of Geology and Mineral Industries
Oregon Health Division, Drinking Water Program
Oregon Water Resources Department

Pennsylvania

Delaware River Basin Commission
Pennsylvania Department of Environmental Protection

Puerto Rico

Puerto Rico Aqueduct and Sewer Authority
Puerto Rico Department of Health
Puerto Rico Department of Natural and Environmental Resources
Puerto Rico Electric and Power Authority
Puerto Rico Land Authority

Rhode Island

Rhode Island Department of Environmental Management, Office of Water Resources
Rhode Island Division of Planning
Rhode Island Economic Development Corporation
Rhode Island Water Resources Board

South Carolina

Duke Energy Corporation
South Carolina Department of Health and Environmental Control

South Dakota

South Dakota Department of Agriculture
South Dakota Department of Environment and Natural Resources

Tennessee

Memphis Light, Gas, and Water
Tennessee Department of Environment and Conservation, Division of Water Supply

Texas

Texas Bureau Of Economic Geology
Texas Commission on Environmental Quality, Surface Water Rights Division
Texas Railroad Commission
Texas Water Development Board. Water Use and Projections Section

U.S. Virgin Islands

U.S. Virgin Islands Energy Office, Department of Planning and Natural Resources
U.S. Virgin Islands Water and Power Authority

Utah

Utah Department of Agriculture
Utah Department of Natural Resources, Division of Oil, Gas, and Mining
Utah Department of Natural Resources, Division of Water Resources
Utah Department of Natural Resources, Division of Water Rights
Utah Department of Natural Resources, Division of Wildlife Resources
Utah Governor's Office of Planning and Budget

Vermont

Vermont Agency of Natural Resources, Department of Environmental Conservation

Virginia

Virginia Department of Environmental Quality, Water Supply Planning Program
Virginia Department of Health, Office of Drinking Water

Washington

Washington State Department of Ecology
Washington State Department of Health

West Virginia

West Virginia Department of Environmental Protection, Division of Water And Waste Management
West Virginia Department of Health and Human Resources, Bureau for Public Health
West Virginia Geological and Economic Survey

Wisconsin

Minnesota Department of Natural Resources
O.J. Noer Turf Grass Research & Education Facility
Public Service Commission of Wisconsin, Water and Energy Divisions
Southeastern Wisconsin Regional Planning Commission
University of Wisconsin–Extension, Agriculture and Natural Resources
University of Wisconsin–Extension, Geologic and Natural History Survey
Wisconsin Department of Agriculture, Trade and Consumer Protection
Wisconsin Department of Natural Resources

Wyoming

Wyoming Agricultural Statistics Service
Wyoming Department of Employment
Wyoming Oil and Gas Conservation Commission
Wyoming Water Development Commission

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