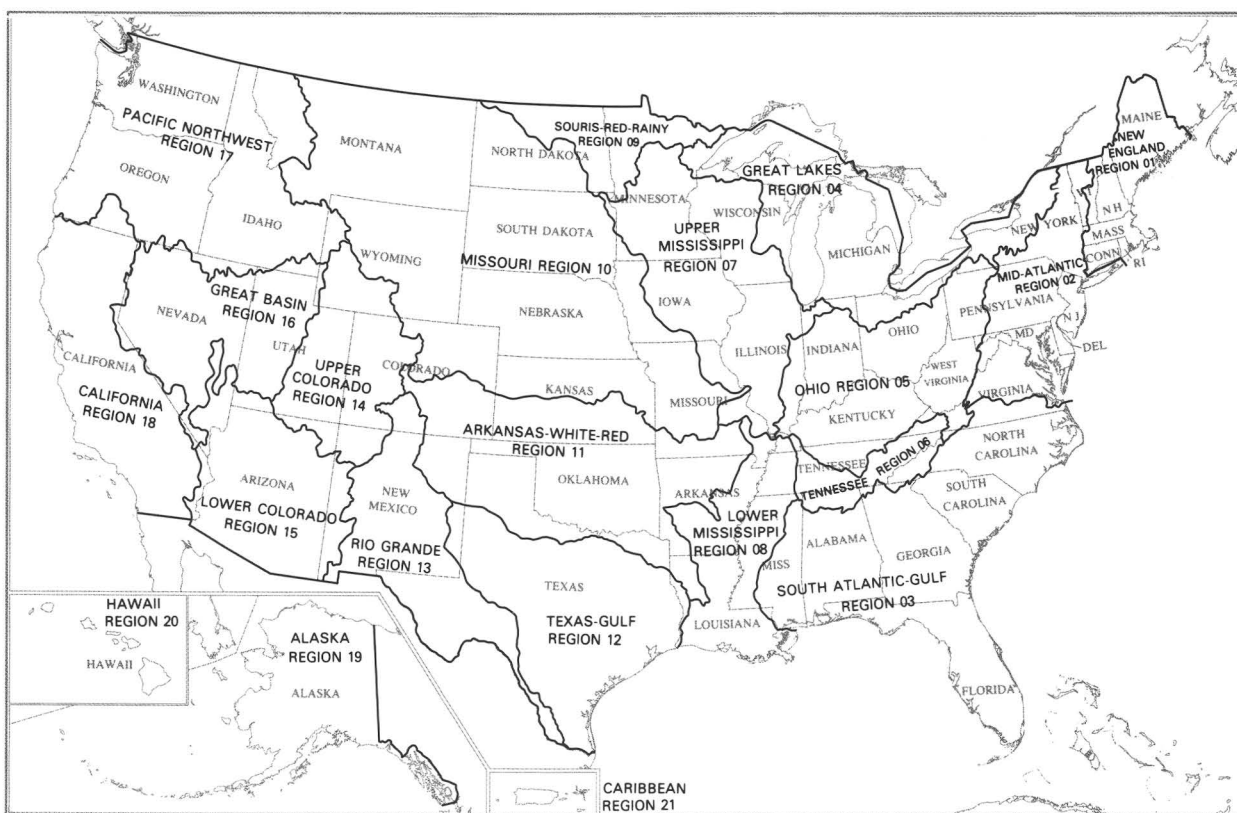


# ESTIMATED USE OF WATER IN THE UNITED STATES IN 1 . 9 . 8 . 5

U.S. Geological Survey Circular 1004



Water-resources regions of the United States as established by the U.S. Water Resources Council in 1970. This map shows the relationship of the regions to the States. (See glossary in this report for definitions of water-resources region.)

#### ABOUT THE COVER

Comparison of water withdrawals, by States, 1985.

Total withdrawals of surface and ground water in the United States were 399,000 million gallons per day during 1985. See table 24 for each State total.

# ESTIMATED USE OF WATER IN THE UNITED STATES IN 1985

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By Wayne B. Solley, Charles F. Merk,  
and Robert R. Pierce

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U.S. GEOLOGICAL SURVEY CIRCULAR 1004

DEPARTMENT OF THE INTERIOR  
MANUEL LUJAN, Jr., Secretary  
  
U.S. GEOLOGICAL SURVEY  
Dallas L. Peck, Director



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# GLOSSARY

Water-use terminology is continuing to expand in this series of water-use circulars prepared at 5-year intervals. The term “water use” as initially used in 1950 in the U.S. Geological Survey’s water-use circulars meant withdrawals of water; in the report for 1960, the term was redefined to include consumptive use of water as well as withdrawals. With the beginning of the Survey’s National Water-Use Information Program (see page 3) the term was again redefined to include return flow and offstream and instream uses.

## TERMS USED IN THIS REPORT

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

**aquaculture**—farming of organisms that live in water, such as fish, shellfish, and algae.

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

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

**consumptive use**—that 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. Also referred to as water consumed and water depletion.

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

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

**delivery/release**—the amount of water delivered to the point of use and the amount released after use; the difference between these amounts is usually the same as the consumptive use. *See also* consumptive use.

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

**evaporation**—process by which water is changed from the liquid into the vapor state. *See also* evapotranspiration and transpiration.

**evapotranspiration**—a collective term that includes water discharged to the atmosphere as a

result of evaporation from the soil and surface-water bodies and by plant transpiration. *See also* evaporation and transpiration.

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

**gigawatt-hour (GWh)**—one billion watt-hours.

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

**hydroelectric power water use**—the use of water in the generation of electricity at plants where the turbine generators are driven by falling water; an instream use.

**in-channel use**—*see* instream use.

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

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

**irrigation district**—in the United States, 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.

**irrigation return flow**—part of irrigation water that is not consumed by evapotranspiration and that migrates to an aquifer or surface-water body.

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

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

**million gallons per day (Mgal/d)**—a rate of flow of water.

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

**nonwithdrawal use**—*see* instream use.

**off-channel use**—*see* offstream use.

**offstream use**—water withdrawn or diverted from a ground- or surface-water source for public-water supply, industry, irrigation, livestock, thermoelectric power generation, and other uses. Sometimes called off-channel use or withdrawal use.

**per-capita use**—the average amount of water used per person during a standard time period, generally per day.

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

**public-supply deliveries**—water provided for multiple users through a public-supply distribution system.

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

**reclaimed sewage**—wastewater treatment-plant effluent that has been diverted or intercepted for use before it reaches a natural waterway or aquifer.

**recycled water**—water that is used more than one time before it passes back into the natural hydrologic system.

**residential water use**—*see* domestic water use.

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

**reuse**—*see* recycled water.

**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, evaporation from stock-watering ponds, and cleaning and waste disposal. *See also* domestic water use, livestock water use, and self-supplied water.

**saline water**—water that contains more than 1,000 milligrams per liter of dissolved solids.

**self-supplied industrial use**—*see* industrial water use and self-supplied water.

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

**sewage**—wastewater carried off by sewers and drains.

**sewage treatment**—the processing of wastewater for the removal or reduction of contained solids or other undesirable constituents.

**sewage-treatment return flow**—water returned to the hydrologic system by sewage-treatment facilities.

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

**surface water**—an open body of water, such as a stream or a lake.

**thermoelectric power**—electrical power generated using fossil-fuel (coal, oil, or natural gas), geothermal, or nuclear energy.

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

**transpiration**—process by which water that is absorbed by plants, usually through the roots, is evaporated into the atmosphere from the plant surface. *See also* evaporation and evapotranspiration.

**wastewater**—water that carries wastes from homes, businesses, and industries.

**water consumed**—*see* consumptive use.

**water transfer**—artificial conveyance of water from one area to another.

**water-resources region**—designated natural drainage basin or hydrologic area that contains either the drainage area of a major river or the combined drainage areas of two or more rivers; of 21 regions, 18 are in the conterminous United States, and one each are in Alaska, Hawaii, and the Caribbean. (*See* map on inside of front cover.)

**water-resources subregion**—the 21 designated water-resources regions of the United States are subdivided into 222 subregions. Each subregion includes that area drained by a river system, a reach of a river and its tributaries in that reach, a closed basin(s), or a group of streams forming a coastal drainage system.

**water use**—*see* offstream use and instream use.

**watthour (Wh)**—an electrical energy unit of measure equal to one watt of power supplied to, or taken from, an electrical circuit steadily for one hour.

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

## CONVERSION FACTORS

For those readers who may prefer to use units other than those used in this report, the conversion factors are listed below:

Multiply	By	To Obtain
<b>Area</b>		
acre	43,560	square foot (ft <sup>2</sup> )
	4,047	square meter (m <sup>2</sup> )
	0.001562	square mile (mi <sup>2</sup> )
<b>Flow</b>		
million gallons per day (Mgal/d)	1.121	thousand acre-feet per year
	0.001547	thousand cubic feet per second
	0.6944	thousand gallons per minute
	0.003785	million cubic meters per day
thousand acre-feet per year	0.8921	million gallons per day
	0.001380	thousand cubic feet per second
	0.6195	thousand gallons per minute
	0.003377	million cubic meters per day
gigawatthour (GWh)	1,000	megawatthour
	1,000,000	kilowatthour

Some water relations in inch-pound units are listed below:

(Approximations)		
1 gallon	=	8.34 pounds
1 million gallons	=	3.07 acre-feet
1 cubic foot	=	62.4 pounds
	=	7.48 gallons
1 acre-foot (acre-ft)	=	325,851 gallons
	=	43,560 cubic feet
1 cubic mile	=	1.1 trillion gallons
	=	3,379,200 acre feet
1 inch of rain	=	17.4 million gallons per square mile
	=	27,200 gallons per acre
	=	100 tons per acre



# ESTIMATED USE OF WATER IN THE UNITED STATES IN 1985

By Wayne B. Solley, Charles F. Merk,  
and Robert R. Pierce

## ABSTRACT

Water withdrawals in the United States during 1985 were estimated to average 399,000 million gallons per day (Mgal/d) of freshwater and saline water for offstream uses—10 percent less than the 1980 estimate. Average per-capita use for all offstream uses was 1,650 gallons per day (gal/d) of freshwater and saline water combined and 1,400 gal/d of freshwater alone.

Offstream water-use categories are classified in this report as public supply, domestic, commercial, irrigation, livestock, industrial, mining, and thermoelectric power. During 1985, public-supply withdrawals were estimated to be 36,500 Mgal/d, and self-supplied withdrawals were estimated as follows: domestic, 3,320 Mgal/d; commercial, 1,230 Mgal/d; irrigation, 137,000 Mgal/d; livestock, 4,470 Mgal/d; industrial, 25,800 Mgal/d; mining, 3,440 Mgal/d; and thermoelectric power, 187,000 Mgal/d.

Water use for hydroelectric power generation, the only instream use compiled in this report, was estimated to be 3,050,000 Mgal/d during 1985, or 7 percent less than during 1980. This is in contrast to an increasing trend that persisted from 1950 to 1980.

Estimates of withdrawals by source indicate that, during 1985, total surface-water withdrawals were 325,000 Mgal/d, or 10 percent less than during 1980, and total ground-water withdrawals were 74,000 Mgal/d, or 12 percent less than during 1980. Total saline-water withdrawals during 1985 were 60,300 Mgal/d, or 16 percent less than during 1980; most was saline surface water. Reclaimed sewage averaged about 579 Mgal/d during 1985, or 22 percent more than during 1980.

Total freshwater consumptive use was estimated to be 92,300 Mgal/d during 1985, or 9 percent less than during 1980. Consumptive use by irrigation accounted for the largest part of consumptive use during 1985 and was estimated to be 73,800 Mgal/d.

A comparison of total withdrawals (fresh and saline) by State indicates that 37 States and Puerto Rico had less water withdrawn for offstream uses during 1985 than during 1980. California accounted for the most water withdrawn for offstream use, 49,700 Mgal/d, more than double the water withdrawn in either Texas or Idaho, the next largest users. A similar comparison by water-resources regions indicates that the California and the South Atlantic-Gulf regions accounted for nearly one-quarter of the total water withdrawn in the United States. Total withdrawals for offstream use in the eastern water-resources regions, which include the Mississippi and Souris Rivers, accounted for 53 percent of the Nation's total withdrawals, compared to 55 percent during 1980. Freshwater consumptive use in the East was about 11 percent of the freshwater withdrawn in the East and accounted for only 21 percent of the Nation's total freshwater consumptive use. By comparison, freshwater consumptive use in the West was about 41 percent of the freshwater withdrawn in the West.

The 1985 estimates of total water withdrawals and consumptive use were less than the 1980 estimates; this apparently further confirms a general trend indicated by a slackening in the rate of increase of total withdrawals from 1970 to 1975 and again from 1975 to 1980. Public-supply withdrawals during 1985 were 7 percent more than during 1980, self-supplied domestic withdrawals were 4 percent less, irrigation withdrawals were 6 percent less, livestock withdrawals were 108 percent more, and thermoelectric power withdrawals were 13 percent less. The combined total for self-supplied industrial, commercial, and mining withdrawals (excluding thermoelectric power) was 30,500 Mgal/d during 1985, or 33 percent less than withdrawals listed for "other" industries during 1980, which also included commercial and mining uses.

# INTRODUCTION

## PURPOSE AND SCOPE

The purpose of this report is to present consistent and current water-use estimates by State and water-resources region for the entire United States, Puerto Rico, the Virgin Islands, and the District of Columbia. Estimates of water withdrawn from surface- and ground-water sources for offstream use, of consumptive use, and of instream use during 1985 are presented in this report. The U.S. Geological Survey has compiled similar national estimates every 5 years since 1950 (MacKichan, 1951, 1957; MacKichan and Kammerer, 1961; Murray, 1968; Murray and Reeves, 1972, 1977; and Solley and others, 1983). Quantitative assessments derived from this series of reports can be used to appraise present use and to plan for future uses of the Nation's water resources.

"Offstream use" involves water being diverted or withdrawn from a surface- or ground-water source and conveyed to the place of use. "Consumptive use" refers to that part of the water withdrawn that is evaporated, transpired, incorporated into products and crops, consumed by humans or livestock, or otherwise removed from the immediate water supply. "Instream use" refers to all uses taking place within the river channel itself.

In the "Offstream Use" section of this report, eight categories of offstream water use are discussed—public supply, domestic, commercial, irrigation, livestock, industrial, mining, and thermoelectric power. In the "Instream Use" section, only hydroelectric power is discussed. Detailed information for other instream uses, such as navigation, recreation, and evaporation, is beyond the scope of this report. Information on sewage-treatment facilities is given in the "Miscellaneous Use" section, and a list is provided that shows the States for which information for other instream and miscellaneous uses is available.

Presentation of many of the water-use categories used in this report is more detailed than the presentation of categories used in previous U.S. Geological Survey water-use circulars in this series. An explanation of how the categories in this report relate to previous water-use circulars is given in the terminology section so that the reader can aggregate or disaggregate the information to obtain comparable figures for the different years. Although some categories of water use are different, the organization and the presentation of the data are similar to those of the 1980 water-use circular. For each category of water use, a discussion of the 1985 withdrawal and consumptive-use estimates and a comparison of those estimates with corresponding 1980 estimates are given. The text is supplemented with illustrations and tables showing data for each State, Puerto Rico, the Virgin Islands, and the District of Columbia and for each of the 21 water-resources regions (see map on inside of front cover). At the end of the report is a summary section of 1985 water use by categories and source of water and a section on trends in water use for the period 1950–85.



## NATIONAL WATER-USE INFORMATION PROGRAM

Numerous reports on the subject of water use have been published in the past 35 years. Generally, these reports either pertain to a specific category of use or cover a particular geographical area for which data on the various categories of water use are given. Although the U.S. Geological Survey has published national estimates of water use in the United States at 5-year intervals since 1950, these estimates were derived from a variety of sources and ranged widely in accuracy.

In 1977, the Congress of the United States recognized the need for uniform, current, and reliable information on water use and directed the U.S. Geological Survey to establish a National Water-Use Information Program to complement the Survey's data on the availability and quality of the Nation's water resources. Thus, the National Water-Use Information Program became part of the U.S. Geological Survey's Federal-State Cooperative Program (Mann and others, 1982). As of 1988, 49 States and Puerto Rico are participating in the program at various levels of involvement.

As stated by Viessman and DeMoncada (1980, p. 1), "There are many inconsistencies in the ways in which data are reported. The major State and Federal agencies involved in reporting current water-use patterns and in projecting future water use are not always in agreement on definitions of terms, units of measurement, or methods of estimating water use. This makes it difficult, at times, to reconcile State and Federal figures and efficiently use the information that is available." The National Water-Use Information Program is designed to overcome these problems and to be the source for accurate, consistent, timely, and accessible water-use information. The goals of the program are to collect and compile reliable site-specific and aggregated water-use information, to develop and refine computerized water-use information systems at State and national levels, to devise new methods and techniques to improve the collection and the analysis of water-use information, and to disseminate the information in ways that adapt to the needs of a variety of users. The National Water-Use Information Program has supported water-use projects at the State level to identify and compile water-use estimates. More detailed, consistent, and timely water-use information is available in a computerized format, and about 150 State water-use reports have been published. These reports are referenced in the selected water-use bibliography at the end of this circular.

Analyses of field data and evaluations of existing water-use data were more comprehensive and more detailed in the compilation of data for this report than for previous water-use circulars in this series as a result of financial support from the National Water-Use Information Program. As the State water-use information programs are developed and refined, the timeliness and accuracy of water-use data at the State and the national levels will continue to improve.

## TERMINOLOGY

The terms and units used in this report are, on the whole, similar to those used in previous water-use circulars in this series. In this report, the term "Off-stream use" represents all water diverted or withdrawn from a surface- or ground-water source and conveyed to the place of use. Hydroelectric power generation is discussed specifically as an "Instream use," water use taking place within the stream channel. The terms "freshwater," "saline water," and "reclaimed sewage," as types of water used in various categories are defined in the glossary. Saline water is a factor only in the industrial, mining, and thermoelectric power categories. Surface and ground waters, as sources of water, and the categories of water use also are defined in the glossary. In this report, withdrawals refer to self-supplied withdrawals, and deliveries refer to public-supply deliveries.

The 5 categories of water use discussed in previous water-use circulars in this series have been subdivided and, in some instances, reclassified in this report into 12 categories that correspond to the water-use categories used in the National Water-Use Information Program. The table below is intended for use as a cross reference to the two sets of water-use categories.

Comparison of categories of water use as identified in the

National Water-Use Information Program	Water-use circular series (1950-80)				
	Public supply	Rural	Irrigation	Self- supplied industrial	Hydro- electric power
<b>As of 1985:</b>					
Public supply .....	X	...	...	...	...
Domestic .....	X	X	...	...	...
Commercial .....	X	...	...	X	...
Irrigation .....	...	...	X	...	...
Livestock .....	...	X	...	...	...
Industrial .....	X	...	...	X	...
Mining .....	...	...	...	X	...
Thermoelectric power					
Fossil fuel .....	...	...	...	X	...
Geothermal .....	...	...	...	X	...
Nuclear .....	...	...	...	X	...
Hydroelectric power ..	...	...	...	...	X
Sewage treatment ....	...	...	...	...	...
<b>Planned for future:</b>					
Aquaculture .....	...	...	...	...	...
Navigation .....	...	...	...	...	...
Preservation .....	...	...	...	...	...
Quality improvement .	...	...	...	...	...
Recreation .....	...	...	...	...	...
Reservoir evaporation .	...	...	...	...	...

In this table, each category as used in this report is listed in the left-hand column (above a list proposed for future inclusion), and an X or X's in the same line to the right indicates the corresponding category or categories as used in the previous circulars in this series; for example, if the reader looks at the category "Livestock" as used in this report and the National Water-Use Information Program, the X shows that "Rural use" was the category used in previous water-use circulars in this series. Conversely, if the reader looks at the category "Rural use" as used in previous water-use circulars, the X's show that "Domestic" and "Livestock" are the categories used in this report and in the National Water-Use Information Program.

A more detailed explanation of the 12 water-use categories used in this report and their relation to the categories used in previous water-use circulars in this series is presented so that the user of the reports can aggregate or disaggregate the information to obtain comparable results.

**Public supply** is equivalent to the public-supply category in previous water-use circulars. In this report, deliveries from public suppliers to the various water users are shown in more detail than in previous circulars.

**Domestic use** is a separate category in this report and includes self-supplied withdrawals and public-supply deliveries. In previous water-use circulars, self-supplied domestic withdrawals were shown under the rural-use category, and public-supply deliveries were included under the public-supply category as water delivered for domestic and public uses.

**Commercial use** is a separate category in this report and includes self-supplied withdrawals and public-supply deliveries. In previous water-use circulars, self-supplied commercial withdrawals were included under "other" industries in the self-supplied industrial category, and public-supply deliveries to commercial facilities were included under the public-supply category as water delivered for industrial and commercial uses.

**Irrigation** in this report is equivalent to the irrigation category used in previous water-use circulars in this series.

**Livestock use** is a separate category in this report and is equivalent to the "Livestock use" listed under the rural-use category in previous water-use circulars.

**Industrial use** is a separate category in this report and includes self-supplied withdrawals and public-supply deliveries. Self-supplied industrial in this report is similar to "other" industries in previous water-use circulars, except that it does not include commercial and mining water use.

**Mining use** is a separate category in this report. In previous water-use circulars, mining was included under "other" industries in the self-supplied industrial category.

**Thermoelectric power** is a separate category in this report and includes self-supplied withdrawals and public-supply deliveries. Thermoelectric power also is subdivided by energy source—fossil fuel, geothermal, and nuclear. In previous water-use circulars, thermoelectric power was included in the self-supplied industrial category and was not subdivided by energy source.

**Hydroelectric power** in this report is equivalent to the hydroelectric power category used in previous water-use circulars and is listed under instream use.

**Sewage treatment** is a new category in this series of water-use circulars. Under this category, information is provided on the numbers of public and other wastewater treatment facilities and on discharges of treated wastewater from only the public facilities. A more detailed explanation of this new category is given on page 48.

## SOURCES OF DATA AND METHODS OF ANALYSIS

In cooperation with State and local agencies, the water-use estimates for 1985 were compiled by the U.S. Geological Survey's District Offices on the basis of information for 222 water-resources subregions. [For an explanation of subregions, see Seaber and others (1984).] Water-use estimates also were compiled for each county in the United States. These estimates were entered into a State water-use data base in each District Office and were submitted to the Survey's headquarters in Reston, Va. The information was aggregated by State (including Puerto Rico, the Virgin Islands, and the District of Columbia) and by the 21 water-resources regions for 12 categories of water use. Sources of information and accuracy of data vary and are discussed for each category of water use in subsequent parts of this report. Documentation is available from each District Office that identifies the sources of water-use information for that State and describes how the water-use estimates were determined for this report.

Numerical data in this report were derived from several sources, and each type of data and the rounding method used are explained below. The reader is cautioned that all numbers were rounded independently; thus, the sums of individual rounded numbers may not equal the totals. The percentage changes discussed in the text, however, were calculated from the unrounded "raw" numbers rather than from the rounded numbers described below.

Water-use numerical data are the average daily quantities used, as derived from annual totals. In previous water-use circulars in this series, the numerical data usually were rounded to two significant figures. Because more confidence is evidenced in the water-use estimates presented in this report, the numerical data herein generally are rounded to three significant figures above 100 and to two figures below 100. Most tables in this report show these data in million gallons per day. Selected tables also show per-capita-use data in gallons per day, rounded to three significant figures, and irrigation data in thousand acre-feet per year. A conversion table is given at the end of the glossary to assist those readers who may wish to convert the data to other units of measurement.

Population data, which are from the U.S. Bureau of the Census population estimates and projections (U.S. Bureau of the Census, 1986), generally are shown to the nearest thousand. Data on population served by public supply were compiled in cooperation with State and local agencies, and these data are rounded to three significant figures. The number of people served by self-supplied systems was determined by subtracting the number of people served by public supply from the total population.

## ACKNOWLEDGMENTS

The authors acknowledge the assistance provided by the many State and local agencies that cooperated with the U.S. Geological Survey and the many U.S. Geological Survey water-use project chiefs that participated in the collection and compilation of data for this report. Many of the States have published reports on water use as part of their participation in the National Water-Use Information Program, and a selected list of these publications is given in the end of this report.

The authors also acknowledge Joan M. Rubin, Willis G. Hester, David W. Stewart, Glenn A. Doonan, Howard A. Perlman, and Robin S. Sevin, who contributed to the graphics, design, and layout of this report.

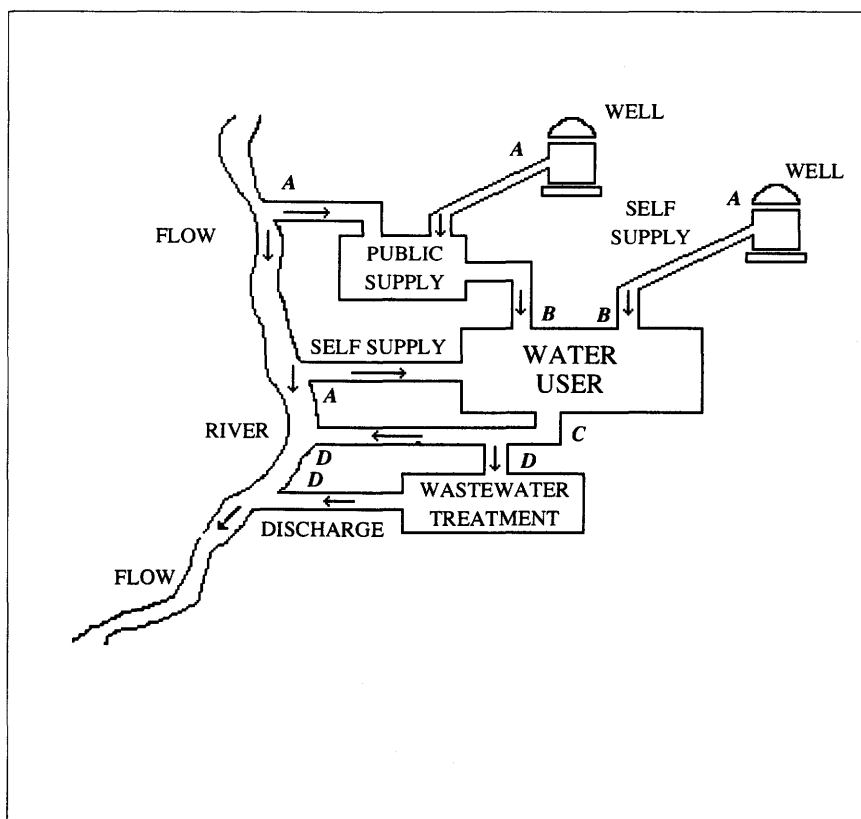
Special acknowledgment is given to Howard A. Perlman, Douglas D. Nebert, and Tyson M. Broad, who developed the software to store and retrieve the large quantity of data compiled for this report.

## WATER USE

Water use in this report is subdivided as offstream use, instream use, or miscellaneous use. The difference among these three types of use is explained below.

Offstream use is a water use that depends on water being diverted or withdrawn from a surface- or ground-water source and conveyed to the place of use. To determine the total quantity of water used (self-supplied withdrawals and public-supply deliveries), three subtypes of use are evaluated, as explained below and shown in the following sketch.

1. Withdrawal—The quantity of water diverted or withdrawn from a surface- or ground-water source (*A* in sketch).
2. Delivery/release—The quantity of water delivered at the point of use (*B*) (self supply or public supply) and the quantity released after use (*C*). The difference between these volumes, in some instances, will be the consumptive use, or the quantity of water that is not returned directly to any water source.
3. Return flow—The quantity of water that is discharged to a surface- or ground-water source (*D*) after release from the point of use and thus becomes available for further use.



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In this report, self-supply withdrawal, public-supply delivery (where applicable), and consumptive-use estimates are given for eight categories of off-stream use—public supply (water delivered to domestic, commercial, industrial, and thermoelectric power users), domestic, commercial, irrigation, livestock, industrial, mining, and thermoelectric power. Data on deliveries, releases, and return flows are not adequate for detailed discussions; however, generalized return-flow information is presented graphically for each category of use.

Each category of use characteristically has different effects on the usability or reuse potential of return flows. Reuse potential reflects the quality and the quantity of water available for subsequent use; for example, irrigation return flow may be contaminated by pesticides and fertilizers, and, because of the high consumptive use of water in irrigation, the mineral content of the return flow often is substantially greater than that of the water applied. Consequently, irrigation return flow frequently has little reuse potential. This is a significant contrast to the reuse potential of water discharged from thermoelectric plants, where the principal change in the water is an increase in temperature. The National Water-Use Information Program now is documenting some return flows, and future reports will include better estimates of consumptive use based on more complete return-flow information. Program plans also include obtaining information on water-quality changes associated with the various uses of water.

Instream use is a water use not dependent on diversion or withdrawal from surface- or ground-water sources and usually is classified as flow uses or onsite uses. Examples of instream uses, which depend on water running freely in a channel, are hydroelectric power generation, freshwater sweetening of saline estuaries, maintenance of minimum streamflow to support fish propagation, and the assimilation of wastewater.

Quantitative estimates for most instream uses are difficult to compile on a national scale. However, because such uses reflect the level of competition with offstream uses and affect the quality and the quantity of water resources for all uses, effective water-resources management requires that methods and procedures be devised to enable instream uses to be assessed quantitatively.

The only instream-use estimates compiled for this report are for hydroelectric power generation. Unlike other instream uses, the water used for hydroelectric power generation is a measurable quantity because the amount of water passed through the plant can be documented. Consumptive use in actual hydroelectric power generation (as opposed to evaporation from impoundments) generally is negligible and is not discussed further.

In this report, miscellaneous use refers to water involved in sewage treatment and utilized for purposes other than the above categories. Information is provided on the number of all types of wastewater-treatment facilities and on the estimates of releases from public facilities only. "Other Uses" that are compiled by some States are shown in the "Miscellaneous Use" section of this report.

## OFFSTREAM USE

### Public Supply

Public supply refers to water withdrawn by public and private water suppliers and delivered to multiple users for domestic, commercial, industrial, and thermoelectric power uses. In this report, public supply is equivalent to the "Public-supply" category in previous water-use circulars in this series, and includes water systems that furnish water to at least 25 people or that have a minimum of 15 hookups. The difference in the quantity of water withdrawn by public suppliers and the quantity of water delivered to all users includes losses in the collection and distribution systems, public use (water for firefighting, street washing, municipal parks, and swimming pools), and, in a few areas, water transferred between adjacent States or water-resources regions. These differences are shown in the chart below as "Public use and losses".

Data on population served and withdrawals usually are accurate because local and State agencies generally maintain relatively complete information. Deliveries from public suppliers to various users are more difficult to obtain.

The source (surface and ground waters) and distribution of deliveries for public supply are

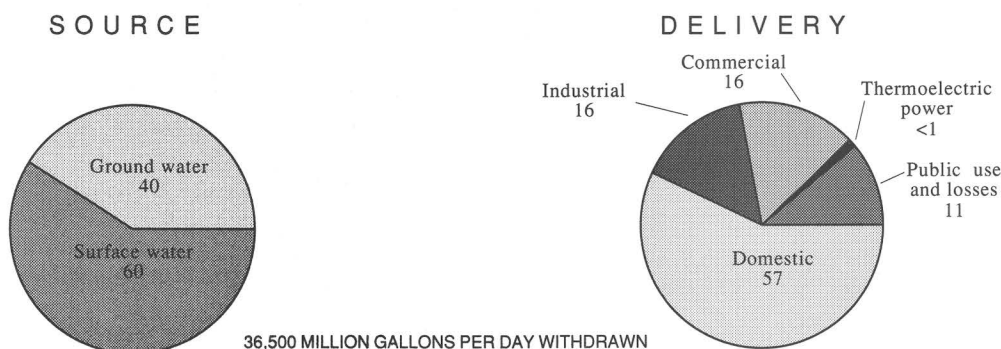
shown in the chart below. The distribution of total public-supply withdrawals and the estimates of public-supply use (withdrawals and deliveries) by water-resources region are shown in figure 1 and table 1, respectively. Similar information by State is shown in figure 2 and table 2.

The quantity of water withdrawn for public supply during 1985 was estimated to be 36,500 million gallons per day (Mgal/d) (see tables 1 and 2), or 7 percent more than during 1980. This is an average of 183 gallons per day (gal/d) for each person served. Public-supply withdrawals represent 9 percent of total withdrawals for all offstream categories. Public suppliers served about 200 million people during 1985 (a 7-percent increase over 1980), or about 82 percent of the total population.

Surface water was the source for 60 percent of public-supply withdrawals. Ground water was the source for 40 percent of withdrawals, compared to 34 percent in 1980. Public-supply deliveries were distributed to users as follows: domestic, 57 percent; industrial, 16 percent; commercial, 16 percent; and thermoelectric power, less than 1 percent. The remaining 11 percent of withdrawals represented public use and

losses in the distribution system. Large positive values listed under "Public use and losses" in tables 1 and 2 may indicate, in addition to public use and losses, large exports of public-supply water to adjacent areas; negative values indicate large imports of public-supply water from adjacent areas to the extent that public-supply deliveries in a region or in a State exceed public-supply withdrawals. A few States reported zero public use and losses because they did not compile information on public use and losses.

Public-supply withdrawals in the California and Mid-Atlantic water-resources regions, two of the most populated regions, accounted for about 31 percent of total public-supply withdrawals. The withdrawals in California, Texas, and New York, the three most populous States (25 percent of the Nation's total population), also accounted for 31 percent of the nationwide total public-supply withdrawals. Surface water was the source for about three-fourths of the public-supply withdrawals in the north-eastern and the Great Lakes areas of the United States, about one-half of the withdrawals in the "sunbelt" area, and about one-quarter of the withdrawals in the California region.



PUBLIC-SUPPLY SOURCE AND DELIVERY, 1985, IN PERCENT



## TOTAL WITHDRAWALS

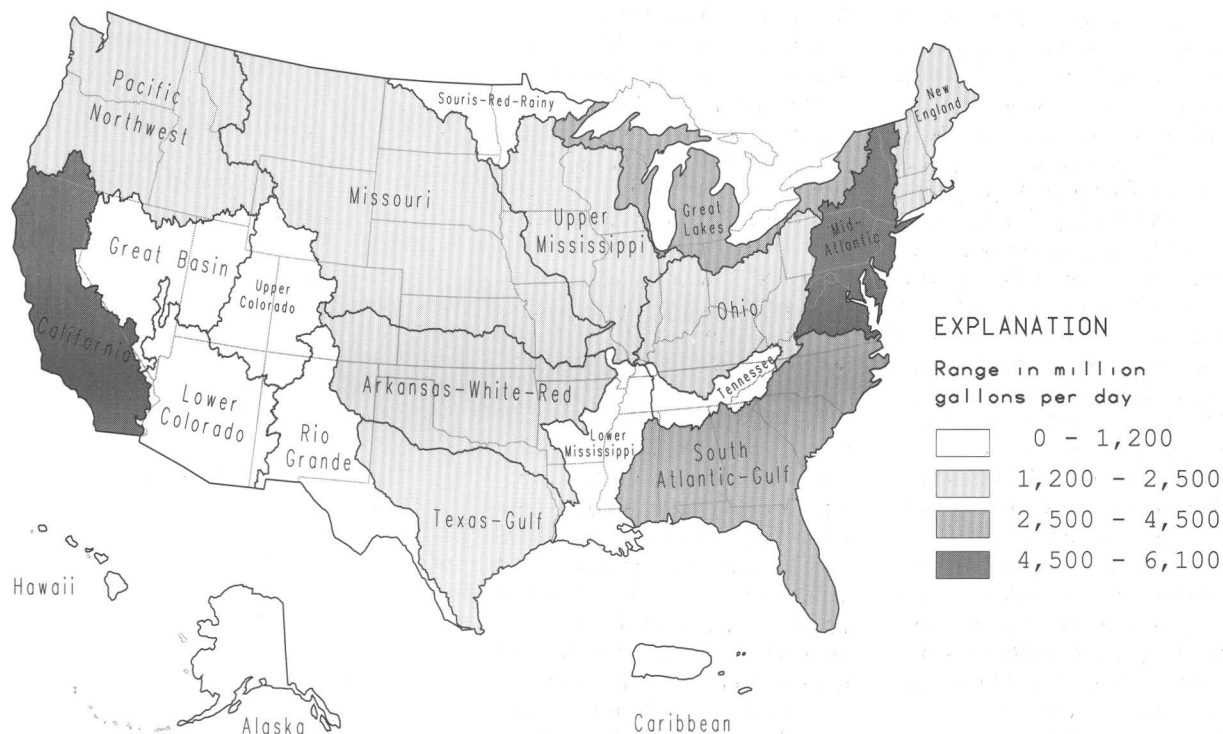


Figure 1. Public-supply freshwater withdrawals, by water-resources region, 1985.

Table 1.—Public-supply freshwater use, by water-resources region, 1985

[Figures may not add to totals because of independent rounding. Mgal/d = million gallons per day; gal/d = gallons per day]

REGION	POPULATION SERVED, in thousands			WATER WITHDRAWALS, in Mgal/d			WATER DELIVERIES, BY TYPE OF USE, in Mgal/d					PER CAPITA USE, in gal/d
	Source			Source			Domestic	Commer- cial	Indus- trial	Thermo- electric power	Public use and losses <sup>1</sup>	
	Ground water	Surface water	Total	Ground water	Surface water	Total						
New England.....	2750	7680	10400	323	1130	1450	819	351	183	5.5	95	139
Mid-Atlantic.....	9050	24500	33500	1240	4810	6040	2900	677	1370	1.2	1090	180
South Atlantic-Gulf..	14000	11200	25200	2200	2000	4210	2650	610	692	4.8	250	167
Great Lakes.....	2860	14800	17600	445	3640	4080	1440	679	710	.4	1250	232
Ohio.....	5060	10800	15900	718	1720	2440	1100	370	526	.1	445	154
Tennessee.....	750	2190	2940	97	372	469	249	105	89	.0	26	159
Upper Mississippi....	8280	7420	15700	1170	706	1880	1560	488	479	4.0	-654	119
Lower Mississippi....	4200	1760	5960	629	324	953	710	105	46	2.1	90	160
Souris-Red-Rainy....	240	226	466	30	35	64	40	11	3.9	.0	9.5	138
Missouri Basin.....	3770	4820	8590	606	974	1580	980	265	123	6.5	205	184
Arkansas-White-Red...	2280	4630	6920	367	1020	1380	640	179	321	27	216	200
Texas-Gulf.....	6060	7700	13800	1050	1410	2460	1970	96	195	8.6	195	179
Rio Grande.....	1320	425	1740	297	158	455	281	43	8.4	.0	122	261
Upper Colorado.....	166	346	512	39	88	127	88	14	1.7	.0	24	248
Lower Colorado.....	2140	1550	3690	458	371	829	583	131	81	2.4	32	225
Great Basin.....	1080	748	1830	323	207	529	400	66	19	.0	44	289
Pacific Northwest....	2550	3720	6270	623	994	1620	979	192	361	.0	84	258
California.....	16400	7980	24300	3730	1570	5300	3230	1220	497	31	323	218
Alaska.....	231	117	348	41	35	76	30	31	7.8	.3	7.6	217
Hawaii.....	1050	80	1130	172	31	204	132	51	6.4	.0	15	181
Caribbean.....	547	2430	2980	84	311	395	180	30	12	2.2	171	133
Total.....	84,800	115,000	200,000	14,600	21,900	36,500	21,000	5,710	5,730	96	4,040	183

<sup>1</sup> Includes transfers from adjacent areas.

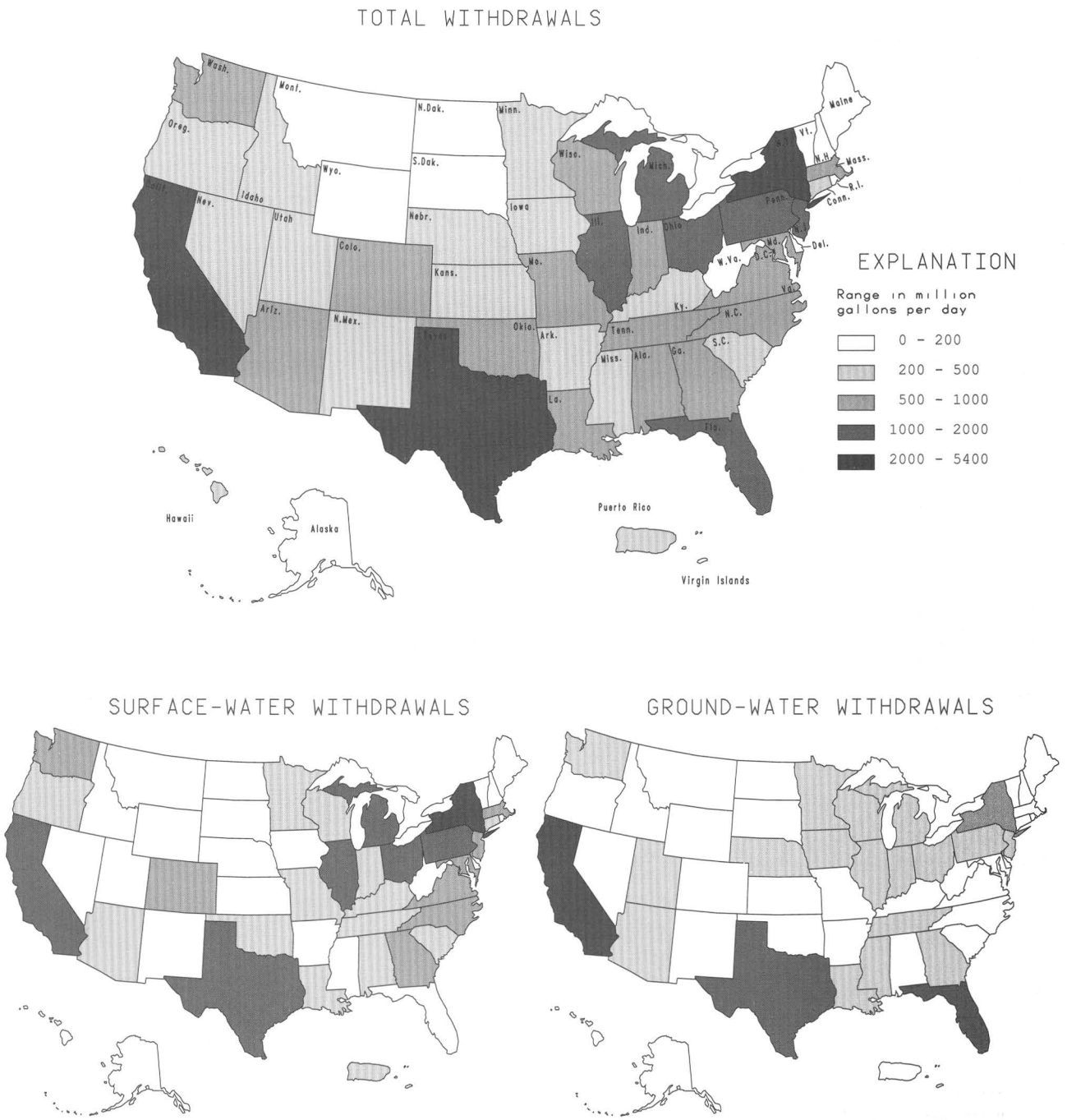


Figure 2. Public-supply freshwater withdrawals, by source and by State, 1985.

Table 2.—Public-supply freshwater use, by State, 1985

[Figures may not add to totals because of independent rounding. Mgal/d = million gallons per day; gal/d = gallons per day]

STATE	POPULATION SERVED, in thousands			WATER WITHDRAWALS, in Mgal/d			WATER DELIVERIES, BY TYPE OF USE, in Mgal/d					PER CAPITA USE, in gal/d
	Source			Source			Domestic	Commer- cial	Indus- trial	Thermo- electric power	Public use and losses <sup>1</sup>	
	Ground water	Surface water	Total	Ground water	Surface water	Total						
Alabama.....	1240	2270	3510	173	442	615	332	61	221	.0	.0	175
Alaska.....	231	117	348	41	35	76	30	31	7.8	.3	7.6	217
Arizona.....	1930	1160	3090	385	233	618	449	90	79	.0	.0	200
Arkansas.....	801	880	1680	101	156	257	170	87	.1	.3	.0	153
California.....	16300	8000	24300	3730	1570	5310	3240	1220	494	31	325	218
Colorado.....	447	2560	3010	86	651	737	456	112	18	13	138	245
Connecticut.....	518	2170	2680	66	296	362	178	49	62	1.3	72	135
Delaware.....	274	240	514	29	49	77	36	12	18	.6	11	151
D.C.....	.0	626	626	.0	218	218	174	44	.0	.0	.0	348
Florida.....	8680	1060	9740	1490	185	1680	1200	248	142	4.8	84	172
Georgia.....	1460	3200	4660	205	631	836	545	142	135	.0	14	179
Hawaii.....	1050	80	1130	172	31	204	132	51	6.4	.0	15	181
Idaho.....	611	92	704	185	27	212	200	6.1	6.7	.0	.0	302
Illinois.....	3850	5980	9830	467	1320	1780	850	471	255	.9	206	181
Indiana.....	1790	1880	3670	271	304	575	423	78	73	.0	.8	157
Iowa.....	1570	557	2130	259	92	350	289	4.2	41	1.6	14	164
Kansas.....	994	1000	2000	158	158	316	150	83	41	1.0	41	158
Kentucky.....	309	2460	2770	49	356	404	179	19	167	.0	40	146
Louisiana.....	1960	1940	3900	276	352	629	564	7.6	1.5	.0	55	161
Maine.....	216	613	829	24	84	108	96	1.7	11	.0	.2	130
Maryland.....	619	2950	3560	70	702	771	365	57	55	.0	294	216
Massachusetts.....	1610	3720	5330	181	586	767	415	276	69	4.2	3.1	144
Michigan.....	1400	5970	7370	222	1030	1250	630	339	247	.0	36	170
Minnesota.....	1850	848	2700	265	208	473	401	23	46	1.5	1.5	175
Mississippi.....	2070	189	2260	275	37	312	165	47	28	1.5	71	138
Missouri.....	1470	2670	4140	171	474	645	355	60	133	.3	97	156
Montana.....	228	386	614	62	96	158	90	29	1.2	.0	38	257
Nebraska.....	1170	159	1320	208	39	248	149	50	49	.0	.0	187
Nevada.....	303	579	882	94	193	288	189	54	6.3	2.4	36	326
New Hampshire.....	208	429	637	28	61	89	63	9.1	16	.0	.0	139
New Jersey.....	2850	3860	6710	406	641	1050	503	136	240	.6	167	156
New Mexico.....	857	147	1000	198	28	226	179	42	2.8	.0	2.8	225
New York.....	4170	11700	15900	535	2330	2860	1470	282	1010	.0	95	180
North Carolina.....	803	2650	3450	88	507	595	315	137	128	.0	17	172
North Dakota.....	256	256	512	30	39	69	40	14	2.3	.0	13	135
Ohio.....	2840	6060	8900	395	1020	1420	467	326	340	.3	283	159
Oklahoma.....	690	2140	2830	106	414	521	158	58	204	2.2	98	184
Oregon.....	418	1520	1940	83	332	416	246	45	53	.0	72	214
Pennsylvania.....	1320	6850	8170	258	1340	1600	539	186	246	.0	629	196
Rhode Island.....	152	732	884	15	101	116	59	15	20	.0	23	132
South Carolina.....	614	1910	2520	76	283	359	189	5.7	86	.0	79	142
South Dakota.....	431	117	548	65	16	80	61	14	5.4	.0	.0	147
Tennessee.....	1340	2320	3660	243	384	627	303	163	98	.6	63	172
Texas.....	6890	8510	15400	1230	1760	2990	2200	105	284	23	373	194
Utah.....	1020	553	1570	299	148	447	340	50	15	.0	43	285
Vermont.....	106	237	343	17	36	53	34	5.2	13	.0	.0	154
Virginia.....	598	3620	4210	75	504	579	337	70	57	.0	115	137
Washington.....	1480	2040	3530	339	616	955	516	133	306	.0	.0	271
West Virginia.....	363	947	1310	37	114	151	81	21	22	.0	27	115
Wisconsin.....	1700	1430	3130	275	301	575	169	98	153	.2	155	184
Wyoming.....	146	183	329	48	50	98	61	14	3.2	1.9	18	298
Puerto Rico.....	544	2390	2930	84	307	391	178	30	12	1.4	170	133
Virgin Islands.....	3.5	44	47	.2	4.3	4.5	2.1	.2	.0	.7	1.5	95
Total.....	84,800	115,000	200,000	14,600	21,900	36,500	21,000	5,710	5,730	96	4,040	183

<sup>1</sup> Includes transfers from adjacent areas.

## Domestic

Domestic water use includes water for normal household purposes, such as drinking, food preparation, bathing, washing clothes and dishes, flushing toilets, and watering lawns and gardens. In previous water-use circulars in this series, self-supplied domestic withdrawals were tabulated under the "Rural use" category, and public-supply deliveries for domestic purposes were included under the "Public supply" category as water delivered for domestic and public uses.

Public suppliers generally maintain reliable information about withdrawals and population served. Information on deliveries from public suppliers to various users was more difficult to obtain. The number of people served by their own water systems (self-supplied) was determined by subtracting the number of people served by public supplies from the total population as reported by the U.S. Bureau of the Census. The difference between these totals indicated that 42.5 million people, or 18 percent of the Nation's total population, were served by their own water systems in 1985 compared with 43.5 million people in

1980, a 2-percent decrease. Self-supplied domestic systems rarely are metered, and little firm data exist. Self-supplied domestic withdrawals were estimated using per-capita-use coefficients that ranged from 50 to 110 gallons per person per day. Consumptive-use estimates were based on coefficients, generally ranging from 0.1 to 0.5, multiplied by withdrawals and deliveries.

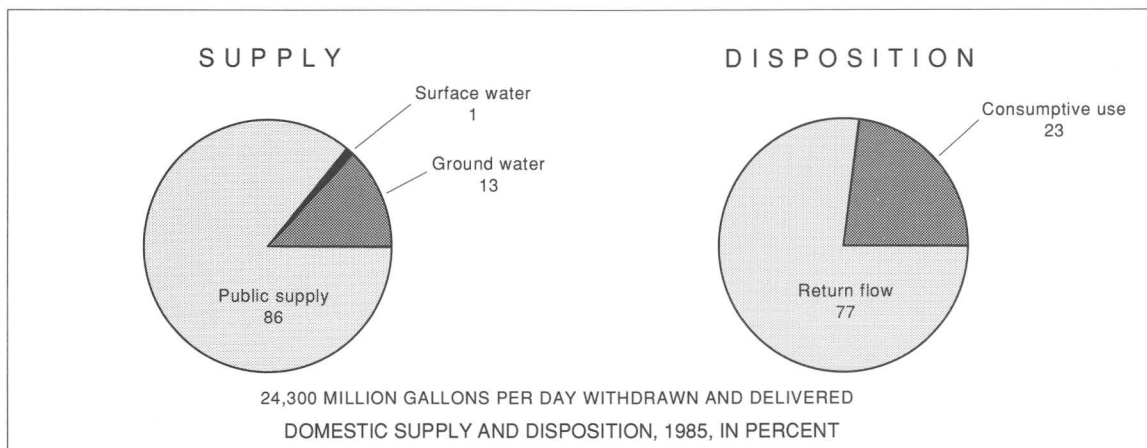
The supply (self-supplied withdrawals and public-supply deliveries) and disposition of water for domestic purposes are shown in the chart below. The distribution of total self-supplied domestic withdrawals and the estimates of domestic water use (withdrawals, deliveries, consumptive use) by water-resources region are shown in figure 3 and table 3, respectively. Similar information by State is shown in figure 4 and table 4.

The quantity of self-supplied water withdrawn for domestic purposes in 1985 was estimated to be 3,320 Mgal/d (see tables 3 and 4), or 4 percent less than in 1980. Domestic withdrawals represent 0.8 percent of total withdrawals for all offstream categories. Ground water was the source for about 98

percent of self-supplied domestic withdrawals; surface water was the source for the remaining 2 percent. Withdrawals for the population served by their own water systems averaged about 78 gal/d for each person, about the same as in 1980.

Public suppliers delivered about 21,000 Mgal/d of water to domestic users; this accounted for 57 percent of total public-supply deliveries. Public-supply domestic deliveries averaged 105 gal/d for each person served. The consumptive use of water for domestic purposes in 1985 was about 5,680 Mgal/d, or about 23 percent of self-supplied withdrawals and public-supply deliveries.

In 1985, the South Atlantic-Gulf water-resources region had the largest self-supplied withdrawals for domestic purposes, whereas the California region accounted for the largest total of domestic withdrawals and deliveries. (See figure 3.) Self-supplied domestic withdrawals were fairly evenly distributed among the States. Florida and New York were the major users, accounting for 8 percent and 6 percent, respectively. (See figure 4.)



## TOTAL WITHDRAWALS

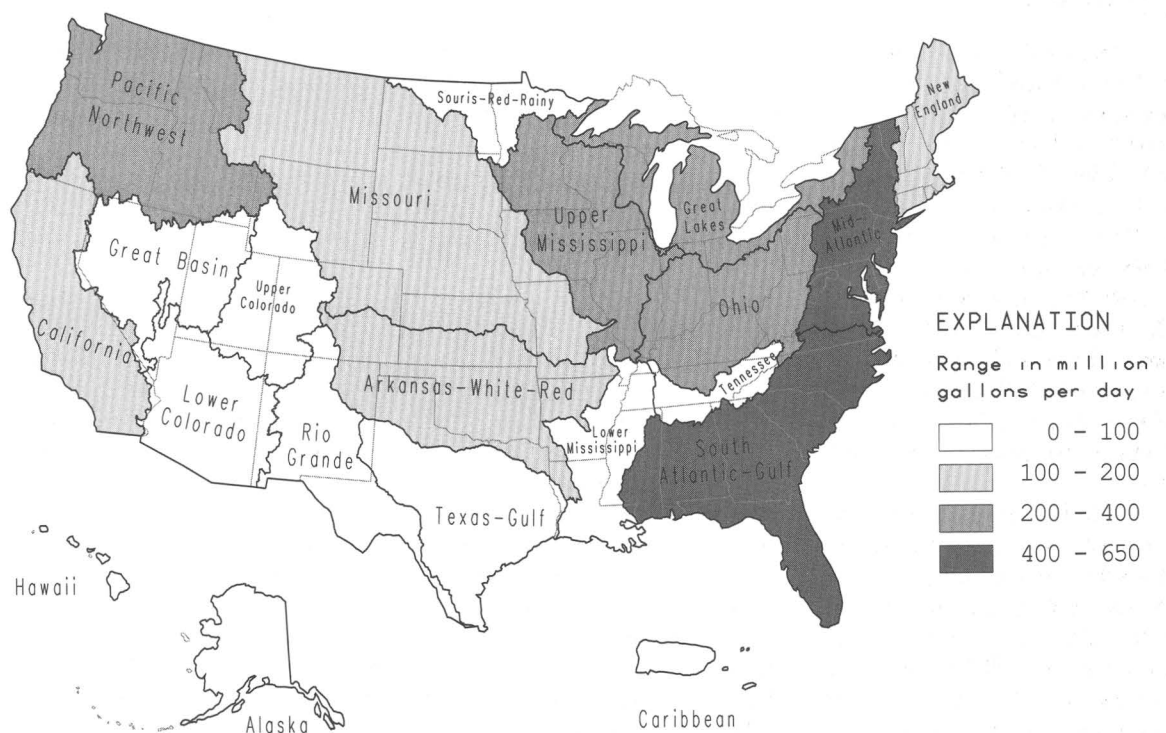


Figure 3. Domestic freshwater withdrawals, by water-resources region, 1985.

Table 3.—Domestic freshwater use, by water-resources region, 1985

[Figures may not add to totals because of independent rounding. Mgal/d = million gallons per day; gal/d = gallons per day]

REGION	Population, in thousands	SELF SUPPLIED			Per capita use, in gal/d	PUBLIC SUPPLY			TOTAL	
		Water withdrawals, in Mgal/d				Population served, in thousands	Water deliveries, in Mgal/d	Per capita use, in gal/d	Withdrawals and de- liveries, in Mgal/d	Consump- tive use, in Mgal/d
		Source		Total						
		Ground water	Surface water							
New England.....	1860	125	.0	125	67	10400	819	78	943	249
Mid-Atlantic.....	6380	447	.0	447	70	33500	2900	87	3350	420
South Atlantic-Gulf..	7240	643	.0	643	89	25200	2650	105	3290	700
Great Lakes.....	3700	286	.1	286	77	17600	1440	82	1730	213
Ohio.....	6000	366	4.7	371	62	15900	1100	69	1470	220
Tennessee.....	905	62	.0	62	68	2940	249	85	311	48
Upper Mississippi....	5220	383	.0	383	73	15700	1560	99	1940	409
Lower Mississippi....	1300	82	.0	82	64	5960	710	119	793	155
Souris-Red-Rainy....	254	22	.0	22	88	466	40	85	62	24
Missouri Basin.....	1650	128	2.5	131	79	8590	980	114	1110	404
Arkansas-White-Red...	1570	124	1.2	126	80	6920	640	93	766	246
Texas-Gulf.....	868	94	.0	94	108	13800	1970	143	2060	741
Rio Grande.....	349	36	.0	36	102	1740	281	161	317	135
Upper Colorado.....	126	8.5	.4	8.9	70	512	88	171	97	33
Lower Colorado.....	234	30	1.5	31	133	3690	583	158	614	340
Great Basin.....	148	17	2.0	19	126	1830	400	218	419	152
Pacific Northwest....	1960	245	23	268	137	6270	979	156	1250	193
California.....	2020	128	15	143	71	24300	3230	133	3380	879
Alaska.....	210	9.0	.7	9.7	46	348	30	85	39	7.9
Hawaii.....	23	11	.3	11	479	1130	132	117	143	71
Caribbean.....	514	9.8	10	20	39	2980	180	60	200	40
Total.....	42,500	3,250	62	3,320	78	200,000	21,000	105	24,300	5,680

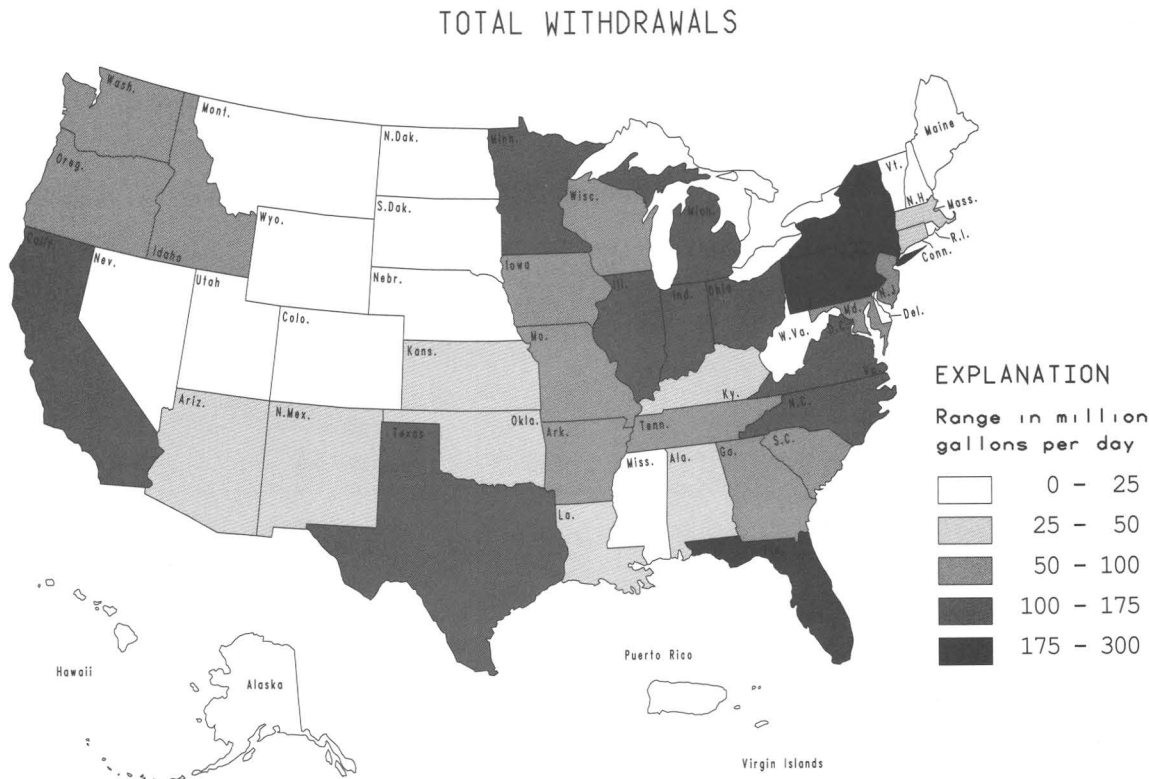


Figure 4. Domestic freshwater withdrawals, by State, 1985.

**Table 4.—Domestic freshwater use, by State 1985**

[Figures may not add to totals because of independent rounding. Mgal/d = million gallons per day; gal/d = gallons per day]

STATE	Population, in thousands	SELF SUPPLIED			Per capita use, in gal/d	PUBLIC SUPPLY			TOTAL	
		Water withdrawals, in Mgal/d		Total		Population served, in thousands	Water deliveries, in Mgal/d	Per capita use, in gal/d	Withdrawals and de- liveries, in Mgal/d	Consump- tive use, in Mgal/d
		Source								
		Ground water	Surface water							
Alabama.....	515	39	.0	39	75	3510	332	95	371	62
Alaska.....	210	9.0	.7	9.7	46	348	30	85	39	7.9
Arizona.....	189	26	1.4	27	142	3090	449	145	476	275
Arkansas.....	678	60	.0	60	89	1680	170	101	230	60
California.....	2010	125	15	140	70	24300	3240	133	3380	879
Colorado.....	222	17	.0	17	75	3010	456	152	473	145
Connecticut.....	515	39	.0	39	75	2680	178	66	217	59
Delaware.....	108	10	.0	10	96	514	36	70	46	4.6
D.C.....	.0	.0	.0	.0	.0	626	174	279	174	17
Florida.....	1590	259	.0	259	163	9740	1200	123	1460	304
Georgia.....	1310	99	.0	99	75	4660	545	117	643	116
Hawaii.....	23	11	.3	11	479	1130	132	117	143	71
Idaho.....	301	76	13	89	296	704	200	284	289	5.3
Illinois.....	1750	130	.0	130	74	9830	850	86	981	97
Indiana.....	1800	139	.0	139	77	3670	423	115	562	56
Iowa.....	751	65	.0	65	87	2130	289	136	354	144
Kansas.....	453	42	.0	42	93	2000	150	75	192	87
Kentucky.....	956	43	4.8	47	50	2770	179	65	226	60
Louisiana.....	576	46	.0	46	80	3900	564	145	610	122
Maine.....	329	19	.0	19	58	829	96	115	114	80
Maryland.....	827	63	.0	63	77	3560	365	102	428	43
Massachusetts.....	496	35	.0	35	71	5330	415	78	450	77
Michigan.....	1640	123	.1	123	75	7370	630	85	752	98
Minnesota.....	1490	131	.0	131	88	2700	401	148	532	172
Mississippi.....	355	16	.0	16	45	2260	165	73	181	36
Missouri.....	893	54	.0	54	60	4140	355	86	408	114
Montana.....	209	15	.8	16	78	614	90	147	106	50
Nebraska.....	281	24	.0	24	87	1320	149	112	173	87
Nevada.....	86	12	.6	12	141	882	189	215	201	102
New Hampshire.....	361	22	.0	22	60	637	63	99	85	17
New Jersey.....	851	64	.0	64	75	6710	503	75	567	103
New Mexico.....	414	38	.0	38	93	1000	179	178	218	106
New York.....	1890	191	.0	191	101	15900	1470	93	1660	166
North Carolina.....	2800	169	.0	169	60	3450	315	91	484	154
North Dakota.....	176	15	.0	15	83	512	40	77	54	18
Ohio.....	1850	139	.0	139	75	8900	467	53	606	91
Oklahoma.....	469	25	1.2	26	56	2830	158	56	185	55
Oregon.....	735	70	9.6	80	109	1940	246	127	326	89
Pennsylvania.....	3680	184	.0	184	50	8170	539	66	723	72
Rhode Island.....	84	5.6	.0	5.6	67	884	59	66	64	14
South Carolina.....	823	62	.0	62	75	2520	189	75	251	50
South Dakota.....	158	15	.9	16	103	548	61	110	77	19
Tennessee.....	1100	70	.0	70	64	3660	303	83	373	37
Texas.....	958	105	.0	105	110	15400	2200	143	2310	832
Utah.....	76	4.5	1.6	6.1	81	1570	340	217	346	119
Vermont.....	192	12	.0	12	60	343	34	100	46	9.1
Virginia.....	1490	112	.0	112	75	4210	337	80	448	90
Washington.....	856	98	.0	98	115	3530	516	146	614	82
West Virginia.....	626	21	.0	21	34	1310	81	62	102	29
Wisconsin.....	1680	84	.0	84	50	3130	169	54	253	25
Wyoming.....	180	12	1.3	13	75	329	61	185	74	30
Puerto Rico.....	458	9.1	9.1	18	40	2930	178	61	196	39
Virgin Islands.....	57	.6	1.0	1.6	29	47	2.1	44	3.7	.7
Total.....	42,500	3,250	62	3,320	78	200,000	21,000	105	24,300	5,680

## Commercial

Commercial water use includes water for motels, hotels, restaurants, office buildings, other commercial facilities, and civilian and military institutions. In previous water-use circulars in this series, self-supplied commercial withdrawals were included under the "other" industries in the self-supplied industrial category, and public-supply deliveries for commercial purposes were included under the "Public supply" category as water delivered for industrial and commercial uses.

Information on self-supplied commercial withdrawals sometimes is available through State agencies that permit withdrawals or require permits to operate potable water supplies. In many instances, withdrawal estimates were based on the population of the commercial facilities; that is, the number of students attending a university, inmates in a penal institution, workers in an office building, or the average daily

number of guests in a hotel. Information on deliveries from public suppliers to various users was more difficult to obtain. Consumptive-use estimates were based on coefficients, generally ranging from 0.05 to 0.30, multiplied by withdrawals and deliveries.

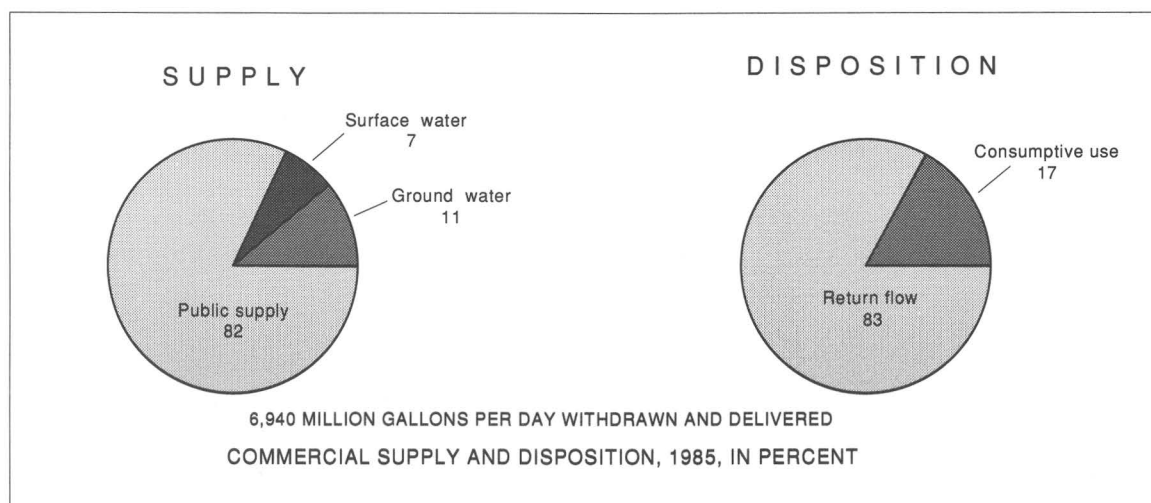
The supply (self-supplied withdrawals and public-supply deliveries) and disposition of water for commercial purposes are shown in the chart below. The distribution of total self-supplied commercial withdrawals and the estimates of commercial water use (withdrawals, deliveries, consumptive use) by water-resources region are shown in figure 5 and table 5, respectively. Similar information by State is shown in figure 6 and table 6.

The quantity of self-supplied water withdrawn for commercial purposes during 1985 was estimated to be 1,230 Mgal/d. (See tables 5 and 6.) Commercial withdrawals represent 0.3 percent of total with-

drawals for all offstream categories. Ground water was the source for about 61 percent of all self-supplied commercial withdrawals, and surface water was the source for the remaining 39 percent.

Public suppliers delivered about 5,710 Mgal/d of water to commercial users during 1985, or more than four times the quantity of self-supplied commercial withdrawals; this accounted for about 16 percent of total public-supply deliveries. The consumptive use of water for commercial purposes during 1985 was about 1,190 Mgal/d, or 17 percent of self-supplied withdrawals and public-supply deliveries.

The eastern water-resources regions accounted for more than 60 percent of total commercial withdrawals and deliveries, and the California region accounted for another 18 percent of the total. Massachusetts reported the largest self-supplied commercial withdrawals in the United States.





## TOTAL WITHDRAWALS

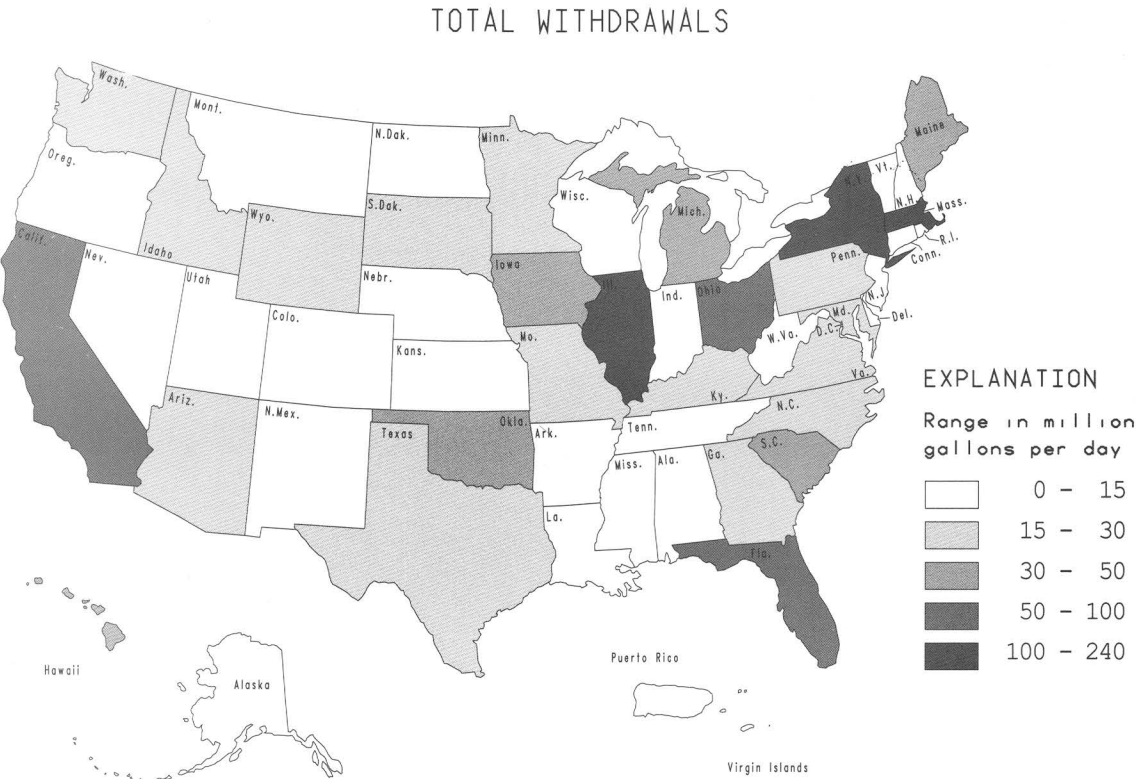


Figure 5. Commercial freshwater withdrawals, by water-resources region, 1985.

Table 5.—Commercial freshwater use, by water-resources region, 1985

[Figures may not add to totals because of independent rounding. All values in million gallons per day]

REGION	SELF-SUPPLIED WITHDRAWALS		Total	PUBLIC-SUPPLY DELIVERIES	TOTAL	
	Source				Withdrawals and deliveries	Consumptive use
	Ground water	Surface water				
New England.....	86	198	284	351	635	143
Mid-Atlantic.....	128	49	177	677	854	102
South Atlantic-Gulf..	111	46	157	610	767	145
Great Lakes.....	26	71	97	679	776	73
Ohio.....	57	12	69	370	439	33
Tennessee.....	3.0	.1	3.1	105	108	10
Upper Mississippi....	76	64	140	488	628	76
Lower Mississippi....	8.0	.6	8.6	105	113	11
Souris-Red-Rainy....	.0	.0	.0	11	11	1.0
Missouri Basin.....	44	16	60	265	325	63
Arkansas-White-Red...	38	8.3	46	179	226	25
Texas-Gulf.....	11	7.3	18	96	114	6.9
Rio Grande.....	8.8	.3	9.1	43	52	23
Upper Colorado.....	5.3	1.2	6.6	14	21	3.1
Lower Colorado.....	23	.5	23	131	154	63
Great Basin.....	2.7	.9	3.6	66	70	11
Pacific Northwest....	38	.4	38	192	230	34
California.....	47	5.6	53	1220	1270	330
Alaska.....	.4	.0	.4	31	31	4.6
Hawaii.....	33	.0	33	51	83	31
Caribbean.....	.5	.4	.9	30	31	6.1
Total.....	746	481	1,230	5,710	6,940	1,190



**Figure 6.** Commercial freshwater withdrawals, by State, 1985.

**Table 6.—Commercial freshwater use, by State, 1985**

[Figures may not add to totals because of independent rounding. All values in million gallons per day]

STATE	SELF-SUPPLIED WITHDRAWALS			PUBLIC-SUPPLY DELIVERIES	TOTAL	
	Source		Total		Withdrawals and deliveries	Consumptive use
	Ground water	Surface water				
Alabama.....	3.2	.0	3.2	61	65	14
Alaska.....	.4	.0	.4	31	31	4.6
Arizona.....	17	.1	17	90	107	54
Arkansas.....	6.0	1.9	8.0	87	95	5.6
California.....	47	5.7	53	1220	1270	331
Colorado.....	8.1	.3	8.4	112	120	21
Connecticut.....	8.6	.0	8.6	49	58	15
Delaware.....	2.0	.0	2.0	12	14	1.4
D.C.....	.0	.0	.0	44	44	4.4
Florida.....	55	1.0	56	248	305	84
Georgia.....	24	4.6	28	142	171	31
Hawaii.....	33	.0	33	51	83	31
Idaho.....	16	.0	16	6.1	22	.0
Illinois.....	33	74	107	471	577	64
Indiana.....	1.0	.1	1.1	78	79	5.5
Iowa.....	29	9.0	38	4.2	42	5.5
Kansas.....	.0	.0	.0	83	83	25
Kentucky.....	5.1	11	16	19	35	1.3
Louisiana.....	.2	.0	.2	7.6	7.8	1.5
Maine.....	10	28	38	1.7	40	13
Maryland.....	19	6.3	25	57	82	8.1
Massachusetts.....	67	171	238	276	514	112
Michigan.....	8.0	26	34	339	374	27
Minnesota.....	24	1.8	26	23	49	11
Mississippi.....	4.1	.0	4.1	47	51	8.2
Missouri.....	17	.0	17	60	78	5.4
Montana.....	.0	.0	.0	29	29	11
Nebraska.....	.3	.0	.3	50	51	13
Nevada.....	7.0	.4	7.4	54	61	12
New Hampshire.....	.0	.0	.0	9.1	9.1	1.8
New Jersey.....	14	1.1	15	136	151	7.5
New Mexico.....	7.3	.0	7.3	42	49	25
New York.....	65	66	130	282	413	40
North Carolina.....	15	7.9	23	137	160	5.0
North Dakota.....	.1	.0	.1	14	15	2.4
Ohio.....	51	.4	51	326	377	19
Oklahoma.....	25	6.9	32	58	90	6.3
Oregon.....	1.5	.1	1.6	45	46	9.3
Pennsylvania.....	27	.0	27	186	214	46
Rhode Island.....	.0	.0	.0	15	15	.6
South Carolina.....	8.5	32	41	5.7	47	7.1
South Dakota.....	12	5.2	17	14	32	3.2
Tennessee.....	4.9	.0	4.9	163	168	15
Texas.....	17	7.7	25	105	130	6.5
Utah.....	.4	.0	.4	50	50	6.6
Vermont.....	.0	.0	.0	5.2	5.2	1.0
Virginia.....	18	3.8	22	70	92	12
Washington.....	20	.3	20	133	153	21
West Virginia.....	.3	.5	.8	21	22	2.4
Wisconsin.....	3.8	.0	3.8	98	102	27
Wyoming.....	9.9	7.1	17	14	31	3.4
Puerto Rico.....	.0	.0	.0	30	30	5.9
Virgin Islands.....	.5	.4	.9	.2	1.1	.2
Total.....	746	481	1,230	5,710	6,940	1,190

## Irrigation

Irrigation of crops developed concurrently with the settlement of the arid West, where, during most years, natural precipitation was insufficient to raise many crops. In the humid Eastern States, as well, irrigation has been used to supplement natural precipitation to increase the number of plantings per year or crop yields and to reduce the risk of crop failures during drought periods.

Irrigation water use in this report includes all water artificially applied to farm and horticultural crops as well as water used to irrigate public and private golf courses. Water withdrawn for irrigation can be self supplied or supplied by irrigation companies or districts.

Information about the number of acres irrigated and the quantity of water withdrawn was obtained from the following sources: State agencies responsible for permitting or allocating the withdrawal of water, the U.S. Soil Conservation Service, county irrigation specialists, county extension agents, individual farmers, agricultural research stations, and the U.S. Bureau of the Census, Agricultural Census, and Farm and Ranch Survey. Total irrigated acreages are reported in two classes—total acres sprayed (includes center pivot, traveling gun, trickle, drip) and total acres flooded (includes flooding, furrow, ditch).

Methods of estimating withdrawals for irrigation varied greatly. In some instances, they were based on theoretical estimates of water required to raise a given crop in that area. In other

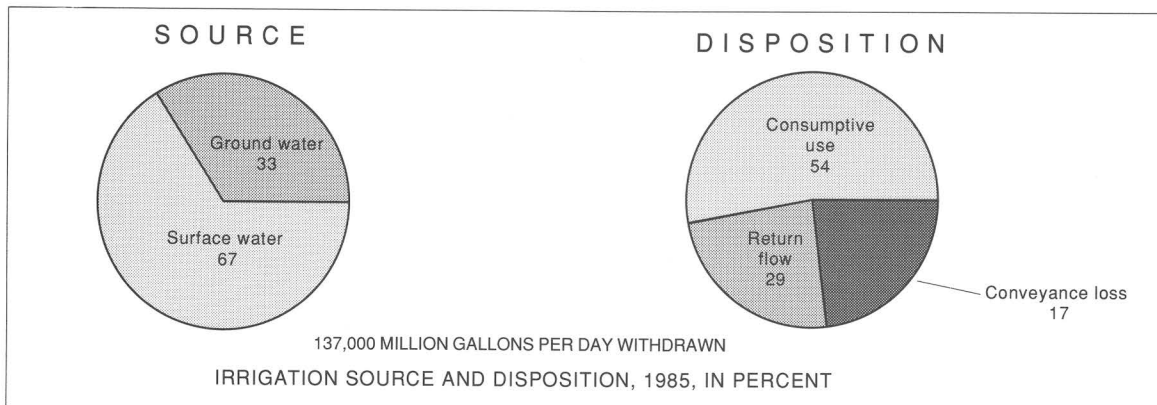
instances, accurate records of water-application rates were available. Fairly accurate estimates of water withdrawn for irrigation can be made if the acreage irrigated, water-application rates, and conveyance losses are known. It usually is difficult to obtain reliable estimates for consumptive use and for conveyance loss. Thus, some of the estimates of consumptive use and conveyance loss may be only rough approximations of actual conditions. In most States, estimated consumptive use was based on coefficients, ranging from 0.8 to 1.0, multiplied by withdrawals. In a few States, consumptive use was calculated as the difference between reported withdrawals and reported return flows.

The source (surface and ground waters) and disposition of water for irrigation are shown in the chart below. The distribution of total irrigation withdrawals and the estimates of irrigation use (withdrawals, conveyance loss, consumptive use) by water-resources region are shown in figure 7 and table 7, respectively. Similar information by State is shown in figure 8 and table 8.

The quantity of water withdrawn for irrigation during 1985 was estimated to be 154 million acre-ft, or 137,000 Mgal/d. (See tables 7 and 8.) Irrigation withdrawals represent 34 percent of total nationwide withdrawals for all offstream categories. Surface water was the source for about 67 percent of irrigation withdrawals, and, except for a small fraction of 1 percent that was reclaimed sewage,

ground water furnished the remainder. Irrigation withdrawals during 1985 were 6 percent less than during 1980, and the acreage irrigated during 1985 was 1 percent less than during 1980. (Ground-water withdrawals for irrigation during 1980 were revised from 67 million to 62 million acre-ft (60,000–55,000 Mgal/d), as a result of a revision of irrigation withdrawals in California based on a more reliable source of information.) Surface-water withdrawals for irrigation during 1985 were about 1 percent more than during 1980, and ground-water withdrawals for irrigation during 1985 were about 17 percent less than during 1980. Of the 154 million acre-ft withdrawn for irrigation, 54 percent was consumptive use, 17 percent was lost in conveyance, and 29 percent was return flow to surface- or ground-water supplies.

Irrigation water use is by far the largest water use in the West. The nine western water-resources regions (regions 10–18), led by the California region, accounted for 91 percent of the total water withdrawn for irrigation during 1980 and 1985. In the eastern regions, most of the water withdrawn for irrigation was in the South Atlantic–Gulf and Lower Mississippi regions, which together had about 1,800 Mgal/d less water withdrawn during 1985 than during 1980. California and Idaho were by far the largest users of irrigation water and, together, accounted for 37 percent of the national total.



## TOTAL WITHDRAWALS

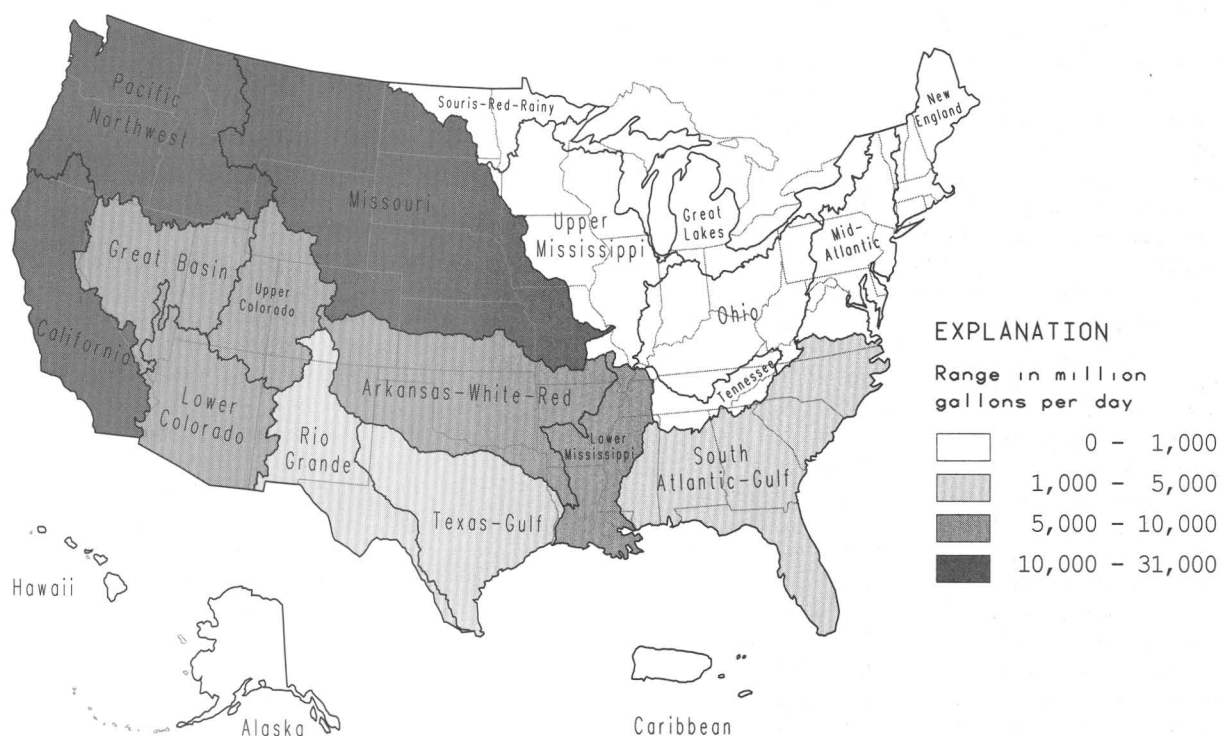


Figure 7. Irrigation freshwater withdrawals, by water-resources region, 1985.

Table 7.—Irrigation water use, by water-resources region, 1985

[Figures may not add to totals because of independent rounding]

IRRIGATED LAND BY TYPE, in thousand acres	THOUSAND ACRE-Feet PER YEAR							MILLION GALLONS PER DAY						
			Withdrawals, by source		Total	Reclaimed sewage	Convey- ance losses	Consump- tive use, fresh- water	Withdrawals, by source		Total	Reclaimed sewage	Convey- ance losses	Consump- tive use, fresh- water
	Spray	Flood	Ground	Surface					Ground	Surface				
New England.....	69	1.8	5.2	23	28	.0	.0	28	4.6	21	25	.0	.0	25
Mid-Atlantic.....	310	3.3	112	166	278	1.4	1.9	256	100	148	248	1.3	1.7	229
South Atlantic-Gulf..	2380	1110	2180	1890	4070	88	68	3020	1950	1690	3630	79	61	2700
Great Lakes.....	481	.2	133	152	285	23	.0	307	118	136	254	21	.0	274
Ohio.....	110	.4	22	23	45	.0	.4	42	19	21	40	.0	.3	38
Tennessee.....	23	.0	1.5	10	12	.1	.0	8.6	1.3	8.9	10	.1	.0	7.7
Upper Mississippi....	902	26	328	73	401	4.7	13	387	293	65	358	4.2	12	345
Lower Mississippi....	642	3000	4950	1560	6510	.0	528	4930	4410	1390	5810	.0	471	4400
Souris-Red-Rainy....	113	33	43	41	84	.6	9.3	71	38	36	75	.6	8.3	63
Missouri Basin.....	5230	8560	9160	18100	27200	3.9	9870	13000	8170	16100	24300	3.5	8810	11600
Arkansas-White-Red...	1800	3980	7690	2220	9910	3.4	1010	8110	6860	1980	8840	3.1	898	7230
Texas-Gulf.....	1650	2890	4040	1510	5550	38	763	4920	3600	1340	4950	34	681	4390
Rio Grande.....	199	1150	1400	4180	5570	2.4	682	2210	1250	3730	4970	2.1	608	1970
Upper Colorado.....	112	1340	38	8010	8040	.1	1220	2490	34	7140	7170	.0	1090	2220
Lower Colorado.....	484	990	2910	4080	6990	42	1400	4050	2590	3640	6240	37	1240	3610
Great Basin.....	534	1370	1310	6950	8260	21	1470	3770	1170	6200	7370	18	1310	3370
Pacific Northwest....	5130	2610	4900	29600	34500	5.1	8260	13400	4370	26400	30800	4.6	7370	12000
California.....	2070	7680	11600	23000	34600	252	1060	21600	10300	20500	30800	224	942	19200
Alaska.....	.4	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Hawaii.....	.6	263	377	639	1020	1.6	102	23	336	570	906	1.4	91	21
Caribbean.....	8.8	29	56	120	176	.0	18	114	50	107	157	.0	16	102
Total.....	22,200	35,000	51,200	102,000	154,000	487	26,500	82,700	45,700	91,300	137,000	434	23,600	73,800

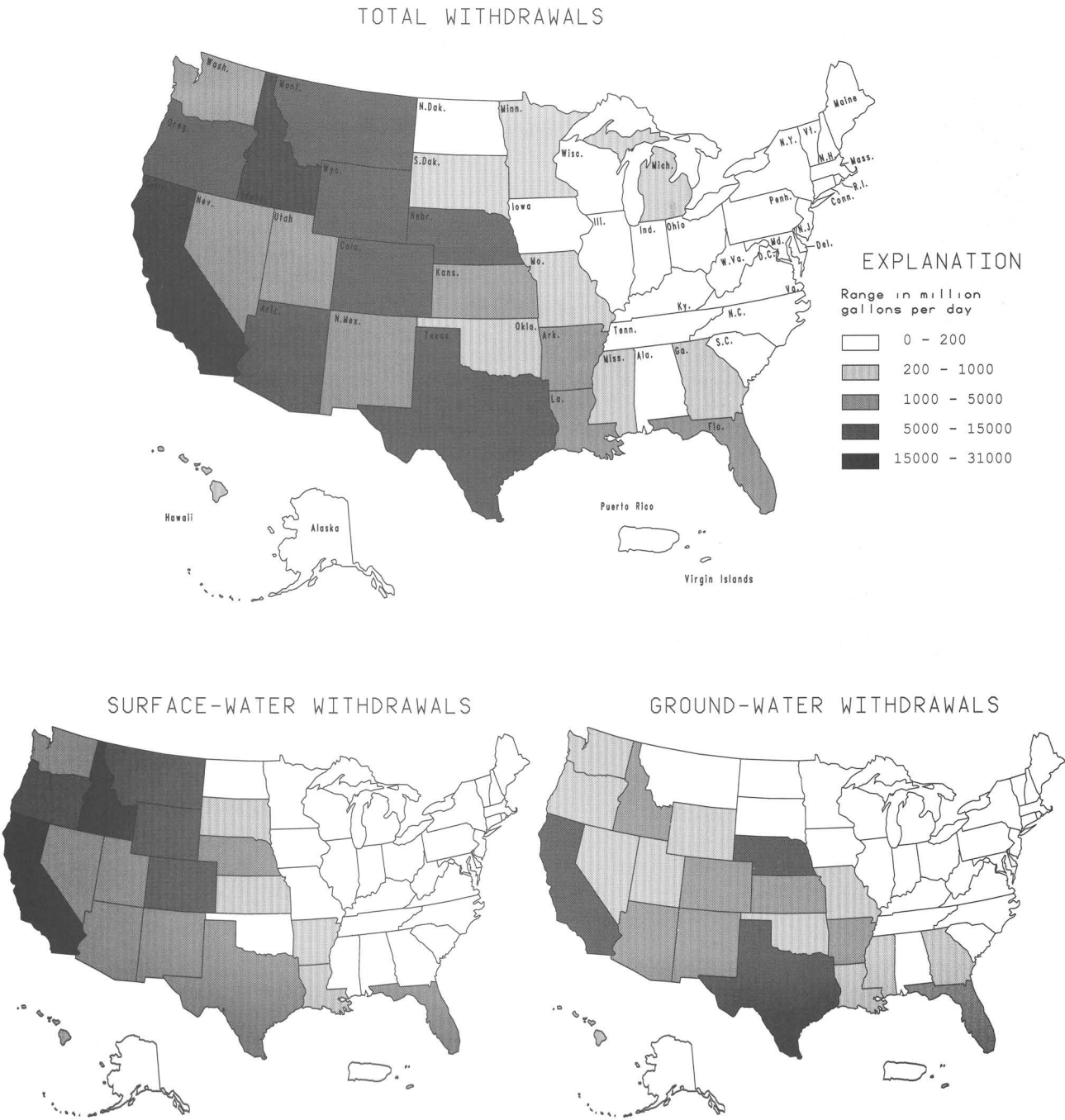


Figure 8. Irrigation freshwater withdrawals, by source and by State, 1985.

**Table 8.—Irrigation water use, by State, 1985**  
 [Figures may not add to totals because of independent rounding]

STATE	IRRIGATED LAND BY TYPE, in thousand acres		THOUSAND ACRE-FEET PER YEAR						MILLION GALLONS PER DAY					
			Withdrawals, by source		Total	Reclaimed sewage	Convey- ance losses	Consump- tive use, fresh- water	Withdrawals, by source		Total	Reclaimed sewage	Convey- ance losses	Consump- tive use, fresh- water
			Freshwater						Freshwater					
	Spray	Flood	Ground	Surface	Ground	Surface	Ground	Surface						
Alabama.....	162	.0	20	57	77	.0	.0	58	18	51	69	.0	.0	51
Alaska.....	.4	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Arizona.....	465	852	2800	3390	6180	32	1320	3550	2500	3020	5520	29	1180	3170
Arkansas.....	182	1840	3740	607	4340	.0	308	3200	3330	541	3870	.0	275	2850
California.....	2000	7580	11600	22700	34400	263	1040	21700	10400	20300	30600	235	929	19300
Colorado.....	675	2680	2390	11500	13900	5.5	3220	5120	2130	10300	12400	4.9	2880	4570
Connecticut.....	6.7	.0	.2	2.9	3.0	.0	.0	3.0	.2	2.6	2.7	.0	.0	2.7
Delaware.....	61	.0	21	8.9	30	.0	.0	30	19	8.0	27	.0	.0	27
D.C.....	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Florida.....	804	1110	1780	1490	3270	57	64	2250	1590	1320	2910	51	57	2010
Georgia.....	1100	.0	346	162	508	31	.0	508	308	145	453	28	.0	453
Hawaii.....	.6	263	377	639	1020	1.6	102	23	336	570	906	1.4	91	21
Idaho.....	2770	1330	3710	19400	23100	.0	7210	5810	3310	17300	20600	.0	6430	5180
Illinois.....	256	.0	80	.0	80	.0	.0	80	71	.0	71	.0	.0	71
Indiana.....	155	.0	40	12	52	.0	.0	52	36	11	47	.0	.0	47
Iowa.....	139	39	59	17	76	.0	.0	76	53	15	67	.0	.0	67
Kansas.....	1180	1770	5020	291	5310	.0	321	4990	4470	260	4730	.0	287	4450
Kentucky.....	21	.4	.3	8.3	8.6	.0	.4	8.2	.3	7.4	7.7	.0	.3	7.3
Louisiana.....	170	707	795	868	1660	.0	164	1660	709	775	1480	.0	146	1480
Maine.....	6.3	.0	.2	2.0	2.1	.0	.0	2.1	.2	1.7	1.9	.0	.0	1.9
Maryland.....	57	.0	22	16	39	.0	.0	39	20	15	34	.0	.0	34
Massachusetts...	45	1.8	4.4	14	18	.0	.0	18	3.9	12	16	.0	.0	16
Michigan.....	325	.0	102	134	236	23	.0	259	91	119	210	21	.0	231
Minnesota.....	416	31	147	87	234	5.4	21	213	131	78	209	4.8	19	190
Mississippi.....	258	484	813	180	993	.0	103	439	725	161	886	.0	92	392
Missouri.....	172	326	318	25	343	.0	.0	248	283	23	306	.0	.0	221
Montana.....	662	1640	90	9220	9310	.0	4780	1980	80	8220	8300	.0	4270	1760
Nebraska.....	3330	4150	5800	2340	8140	.0	2930	5220	5180	2090	7270	.0	2610	4650
Nevada.....	156	687	840	2910	3750	12	821	1940	750	2600	3350	11	732	1730
New Hampshire...	1.3	.0	.0	.6	.6	.0	.0	.6	.0	.6	.6	.0	.0	.6
New Jersey.....	89	3.3	41	107	148	.0	.0	133	37	95	132	.0	.0	119
New Mexico.....	367	577	1310	1850	3160	.0	.0	1430	1170	1650	2820	.0	.0	1270
New York.....	59	.0	22	20	42	.0	.0	42	20	18	38	.0	.0	38
North Carolina..	222	.0	11	137	148	.0	.0	141	9.8	123	132	.0	.0	126
North Dakota....	125	79	72	101	173	.0	9.4	139	64	90	154	.0	8.4	124
Ohio.....	32	.0	8.1	10	19	.0	.0	17	7.3	9.4	17	.0	.0	15
Oklahoma.....	280	168	426	73	499	.0	3.7	490	380	65	445	.0	3.3	437
Oregon.....	1130	911	528	5870	6400	5.2	865	2750	471	5240	5710	4.6	772	2450
Pennsylvania....	18	.0	1.7	10	12	.0	.0	12	1.5	9.2	11	.0	.0	11
Rhode Island....	8.5	.0	.4	3.5	3.9	.0	.0	3.9	.3	3.1	3.4	.0	.0	3.4
South Carolina..	58	.0	24	14	38	.0	.0	38	21	13	34	.0	.0	34
South Dakota....	324	73	127	389	516	.0	135	313	113	347	460	.0	120	279
Tennessee.....	29	.0	2.7	7.4	10	.2	.0	5.9	2.4	6.6	8.9	.1	.0	5.3
Texas.....	1920	4830	6070	3020	9100	43	837	7530	5420	2700	8120	38	747	6720
Utah.....	174	937	431	3590	4020	6.5	341	2170	384	3200	3590	5.8	305	1940
Vermont.....	1.2	.0	.0	.6	.6	.0	.0	.6	.0	.5	.5	.0	.0	.5
Virginia.....	84	.0	7.3	51	58	1.6	5.8	38	6.5	46	52	1.5	5.2	34
Washington.....	1270	350	706	4840	5540	.0	44	4980	629	4310	4940	.0	39	4440
West Virginia...	4.1	.0	.3	3.9	4.2	.0	.0	4.2	.3	3.4	3.7	.0	.0	3.7
Wisconsin.....	249	.0	92	2.3	94	.0	.0	94	82	2.0	84	.0	.0	84
Wyoming.....	211	1600	336	6000	6340	.0	1800	2870	300	5360	5660	.0	1610	2560
Puerto Rico.....	8.8	29	56	120	176	.0	18	114	50	107	157	.0	16	102
Virgin Islands..	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Total.....	22,200	35,000	51,200	102,000	154,000	487	26,500	82,700	45,700	91,300	137,000	434	23,600	73,800

# Livestock

Livestock water use includes water for stock watering, feed lots, dairy operations, fish farming, and other on-farm needs. Livestock use in this report is equivalent to the livestock category listed under “Rural use” in previous water-use circulars in this series. Livestock use is sometimes classified as agriculture nonirrigation use.

The quantity of surface water and ground water withdrawn for use by livestock was estimated from the numbers of livestock and poultry in a county or hydrologic unit. The livestock and poultry numbers are available by county in most States from the Crop and Livestock Reporting Service. The number of animals in each hydrologic unit was estimated from the county data, and the number of each type of animal was multiplied by a value of average water use per head to obtain the amount of water required. The water used for fish farming includes the quantity of water required to maintain pond elevations at acceptable levels. Uncer-

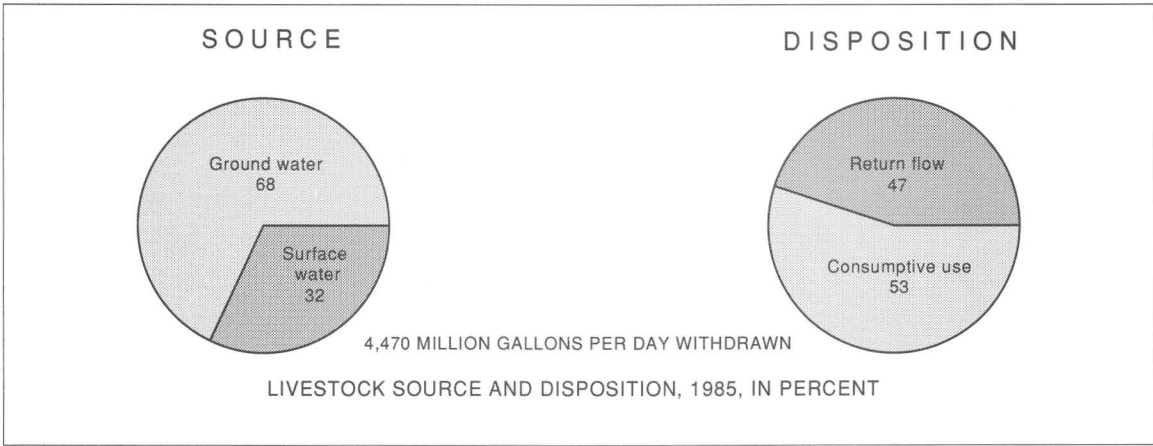
tainties in the livestock water-use estimates include difficulties in determining the sources of water (surface or ground water) and great variations in available estimates of the consumptive use for livestock. Consumptive-use estimates generally were based on coefficients, ranging from 0.1 to 1.0, multiplied by withdrawals.

The source (surface and ground waters) and disposition of water for livestock are shown in the chart below. The distribution of total livestock withdrawals and the estimates of livestock use (withdrawals and consumptive use) by water-resources region are shown in figure 9 and table 9, respectively. Similar information by State is shown in figure 10 and table 10.

The quantity of water withdrawn for livestock purposes during 1985 was estimated to be 4,470 Mgal/d (see tables 9 and 10), or twice that withdrawn in 1980. Livestock withdrawals represent 1 percent of total withdrawals for all offstream categories. The large

increase in livestock use was attributed to an increase in fish farming in several States, including Arkansas, Idaho, and Mississippi, and to the fact that some States reported fish farming under the industrial category in previous water-use circulars in this series. Surface water was the source for about 32 percent of withdrawals for livestock use, and ground water was the source for the remaining 68 percent. The consumptive use of water for livestock during 1985 was about 2,370 Mgal/d, or 53 percent of total withdrawals for livestock use.

The Pacific Northwest water-resources region had the most water withdrawn for livestock and accounted for about 25 percent of the Nation’s total livestock use. Arkansas, Idaho, and Mississippi accounted for about 42 percent of the Nation’s total livestock use, largely because of increases in fish farming. The remainder of the withdrawals were fairly evenly distributed among the other States.





## TOTAL WITHDRAWALS

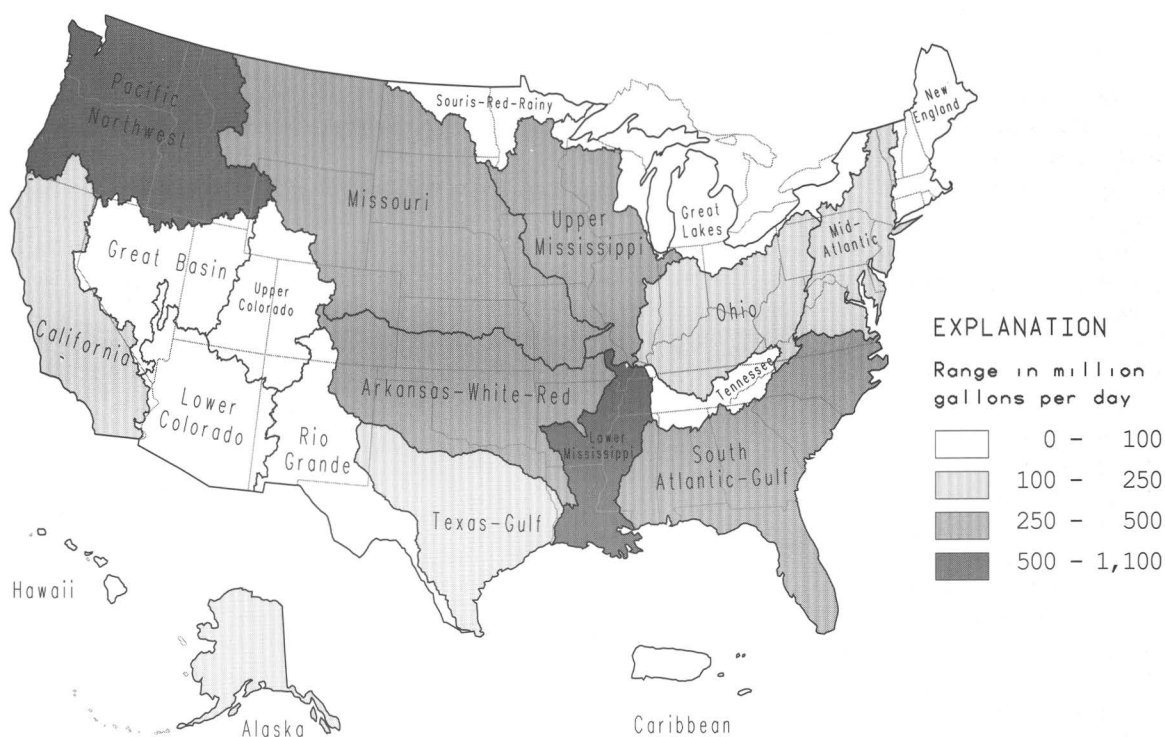


Figure 9. Livestock freshwater withdrawals, by water-resources region, 1985.

Table 9.—Livestock freshwater use, by water-resources region, 1985

[Figures may not add to totals because of independent rounding.  
All values in million gallons per day]

REGION	WITHDRAWALS			CONSUMPTIVE USE
	By source		Total	
	Ground water	Surface water		
New England.....	13	31	44	30
Mid-Atlantic.....	106	36	142	85
South Atlantic-Gulf..	199	78	277	227
Great Lakes.....	64	14	78	69
Ohio.....	98	87	184	155
Tennessee.....	35	24	59	28
Upper Mississippi....	257	43	300	279
Lower Mississippi....	634	257	892	348
Souris-Red-Rainy....	8.8	3.8	13	13
Missouri Basin.....	222	151	373	364
Arkansas-White-Red...	110	145	255	199
Texas-Gulf.....	63	113	176	176
Rio Grande.....	16	24	40	39
Upper Colorado.....	3.9	35	39	13
Lower Colorado.....	26	43	69	14
Great Basin.....	48	21	69	16
Pacific Northwest....	1060	32	1090	150
California.....	41	160	201	156
Alaska.....	10	146	156	.2
Hawaii.....	.7	3.1	3.8	2.2
Caribbean.....	8.6	.0	8.7	8.7
Total.....	3,020	1,450	4,470	2,370

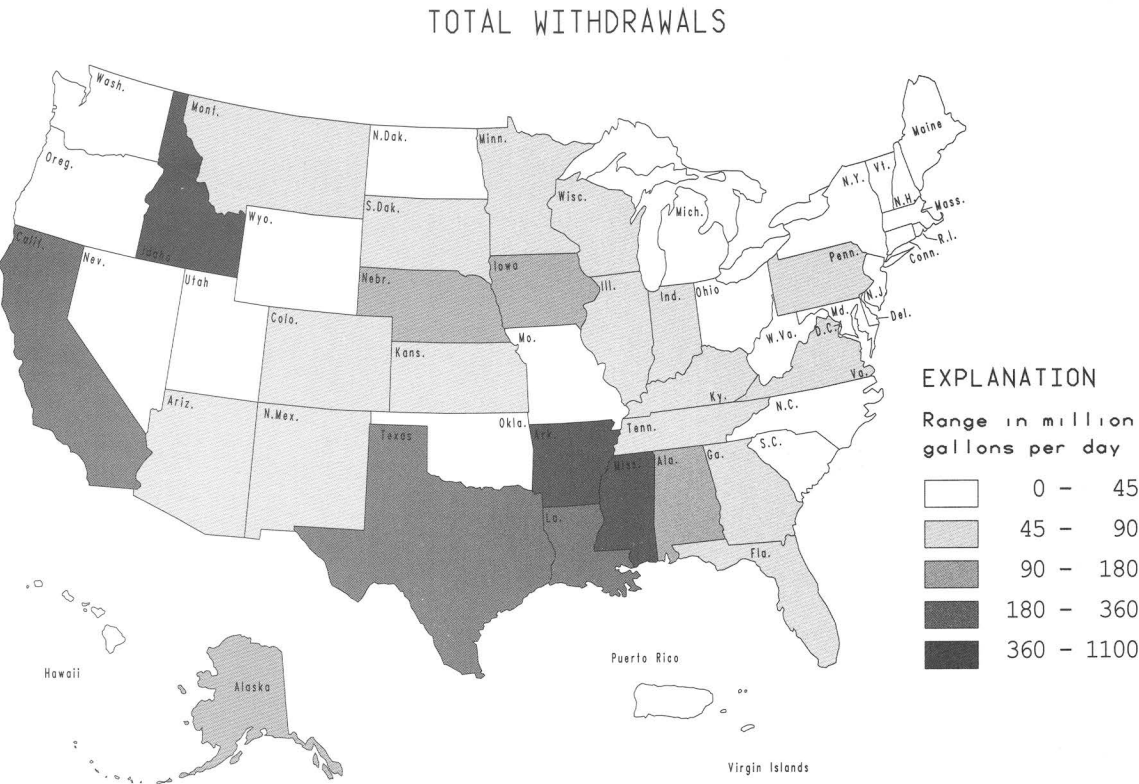


Figure 10. Livestock freshwater withdrawals, by State, 1985.

**Table 10.—Livestock freshwater use, by State, 1985**

[Figures may not add to totals because of independent rounding.  
All values in million gallons per day]

STATE	WITHDRAWALS			CONSUMPTIVE USE
	By source		Total	
	Ground water	Surface water		
Alabama.....	67	29	96	58
Alaska.....	10	146	156	.2
Arizona.....	25	36	61	9.8
Arkansas.....	242	198	440	242
California.....	41	159	199	155
Colorado.....	16	45	61	31
Connecticut.....	6.4	2.0	8.4	1.8
Delaware.....	1.9	.0	1.9	1.9
D.C.....	.0	.0	.0	.0
Florida.....	58	8.1	66	66
Georgia.....	25	22	47	47
Hawaii.....	.7	3.1	3.8	2.2
Idaho.....	1040	.0	1040	102
Illinois.....	57	.0	57	49
Indiana.....	48	.0	48	41
Iowa.....	135	37	172	172
Kansas.....	42	26	68	68
Kentucky.....	2.5	48	50	50
Louisiana.....	75	127	203	92
Maine.....	3.0	26	29	25
Maryland.....	13	9.8	23	11
Massachusetts.....	.4	.9	1.3	1.3
Michigan.....	19	5.4	25	22
Minnesota.....	53	9.5	63	63
Mississippi.....	373	12	385	85
Missouri.....	10	30	41	41
Montana.....	16	34	50	50
Nebraska.....	101	19	120	116
Nevada.....	5.9	20	26	6.6
New Hampshire.....	.6	.7	1.2	.2
New Jersey.....	3.1	.0	3.1	3.1
New Mexico.....	11	39	50	49
New York.....	12	7.3	20	18
North Carolina.....	29	5.1	34	34
North Dakota.....	13	8.9	22	22
Ohio.....	25	16	41	41
Oklahoma.....	2.0	2.6	4.6	4.6
Oregon.....	3.8	21	25	25
Pennsylvania.....	62	8.4	70	61
Rhode Island.....	1.5	.8	2.3	2.0
South Carolina.....	5.2	5.0	10	10
South Dakota.....	19	28	47	47
Tennessee.....	32	34	65	28
Texas.....	111	150	261	261
Utah.....	31	7.2	38	6.9
Vermont.....	3.8	1.7	5.6	1.1
Virginia.....	29	25	53	5.4
Washington.....	21	8.8	30	25
West Virginia.....	16	9.6	26	22
Wisconsin.....	87	3.1	90	73
Wyoming.....	3.2	13	16	16
Puerto Rico.....	8.6	.0	8.6	8.6
Virgin Islands.....	.0	.0	.0	.0
Total.....	3,020	1,450	4,470	2,370

## Industrial

Industrial water use includes water for such industrial purposes as processing, washing, and cooling. Major water-using industries include, but are not limited to, steel, chemical and allied products, paper and allied products, and petroleum refining. Industrial use is classified as a separate category in this report and includes self-supplied withdrawals and public-supply deliveries. In previous water-use circulars in this series, self-supplied industrial use included all self-supplied industrial uses (thermoelectric power and "other" industries, which included commercial and mining uses). In this report, thermoelectric power, commercial, and mining uses are classified as separate water-use categories; self-supplied industrial use is similar to "other" self-supplied industries used in previous circulars, except that industrial use in this report does not include commercial and mining water uses.

Many States have developed State regulatory permit programs that require reporting of actual

industrial withdrawals. Improved estimates are more likely for 1985 than for previous years because of the present availability of more comprehensive inventories and more complete water-use records. Information on deliveries from public suppliers to various users was more difficult to obtain. Consumptive-use estimates generally were based on coefficients, ranging from 0.07 to 0.72, depending on the type of industry, multiplied by withdrawals and deliveries.

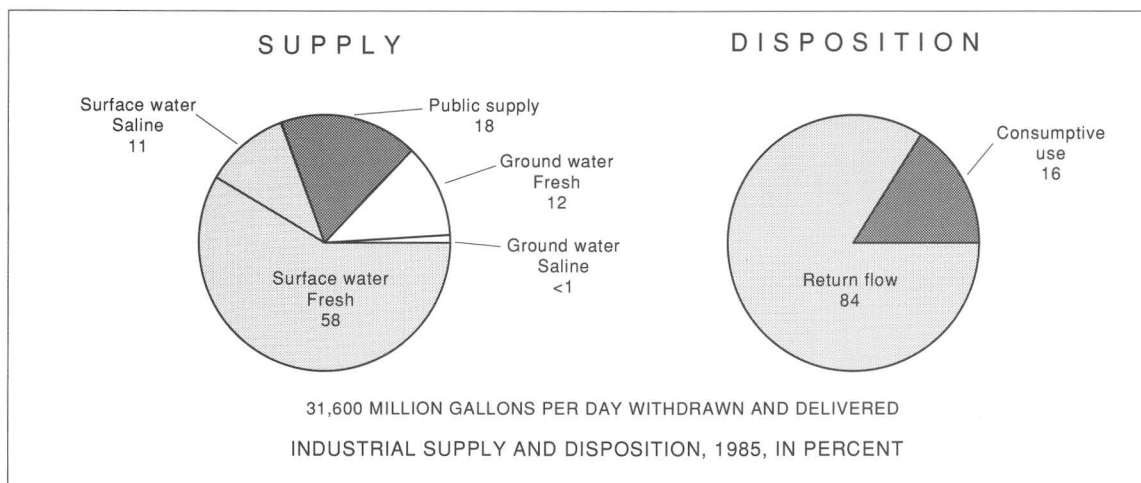
The supply (self-supplied fresh and saline withdrawals and public-supply deliveries) and disposition of water for industrial purposes are shown in the chart below. The distribution of total self-supplied industrial withdrawals and the estimates of industrial water use (withdrawals, deliveries, consumptive use) by water-resources region are shown in figure 11 and table 11, respectively. Similar information by State is shown in figure 12 and table 12.

The quantity of self-supplied water (fresh and saline) withdrawn

for industrial purposes during 1985 was estimated to be 25,800 Mgal/d, of which 3,500 Mgal/d was saline. (See tables 11 and 12.) Industrial withdrawals represent about 6 percent of total withdrawals for all offstream categories. Surface water was the source for about 85 percent of self-supplied industrial withdrawals; ground water, 15 percent; and reclaimed sewage, only a fraction of 1 percent.

Indiana, Texas, Louisiana, and Pennsylvania reported the largest withdrawals for industries. (See figure 12). Maryland and Texas reported the largest quantities of reclaimed sewage used by industries.

Public supplies delivered about 5,730 Mgal/d of freshwater to industries; this accounted for 16 percent of public-supply deliveries. The consumptive use of freshwater and saline water for industrial purposes during 1985 was about 5,160 Mgal/d, or 16 percent of total withdrawals and deliveries.



## TOTAL WITHDRAWALS

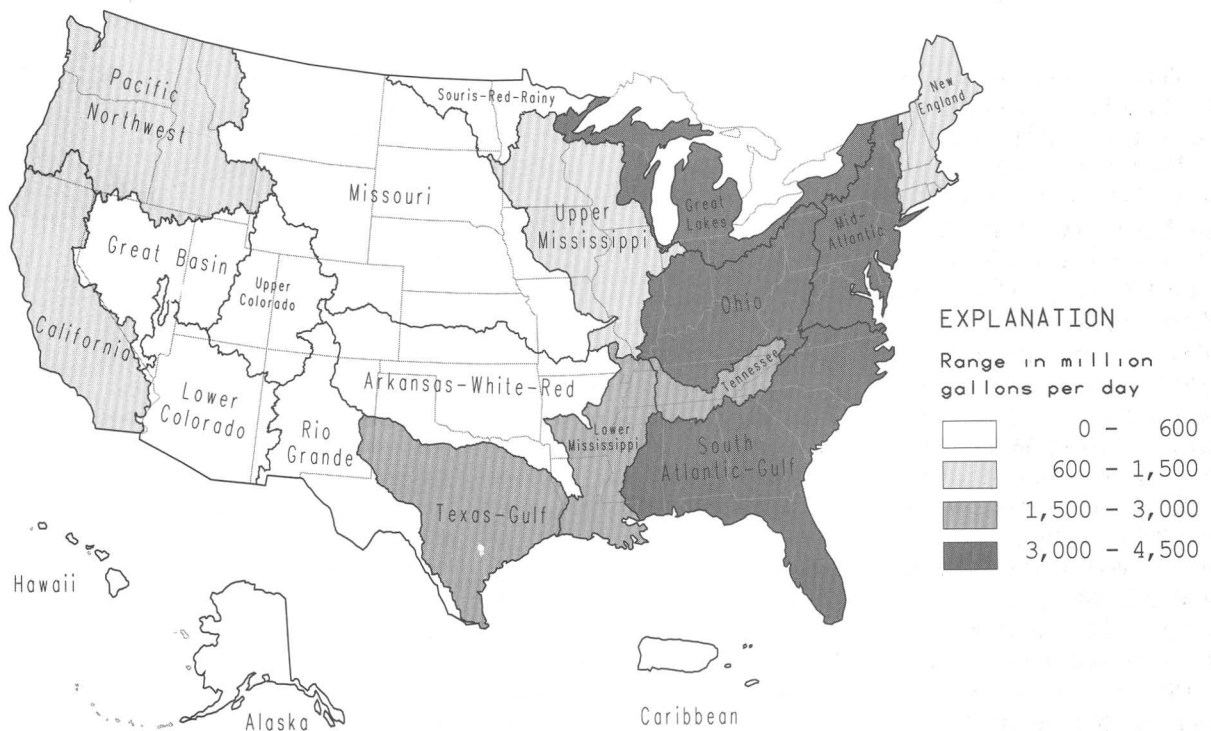


Figure 11. Industrial water withdrawals, by water-resources region, 1985.

Table 11.—Industrial water use, by water-resources region, 1985

[Figures may not add to totals because of independent rounding. All values in million gallons per day]

REGION	SELF SUPPLIED WITHDRAWALS							RECLAIMED SEWAGE	PUBLIC- SUPPLY DELIV- ERIES	TOTAL			
	By source and type						Total			With- drawals and deliveries	Consumptive use		
	Ground water		Surface water										
	Fresh	Saline	Fresh	Saline	Fresh	Saline							
New England.....	88	.0	597	120	685	120	805	.0	183	868	193	6.4	199
Mid-Atlantic.....	526	.4	1960	1550	2480	1550	4030	81	1370	3850	396	98	495
South Atlantic-Gulf..	890	.0	2430	69	3320	69	3390	.0	692	4010	672	2.3	674
Great Lakes.....	203	3.7	4210	.0	4410	3.7	4410	.0	710	5120	380	.2	380
Ohio.....	271	.0	2920	.0	3190	.0	3190	.0	526	3720	550	.0	550
Tennessee.....	33	.0	1730	.0	1760	.0	1760	.0	89	1850	229	.0	229
Upper Mississippi....	320	.0	554	.0	874	.0	874	.0	479	1350	325	.0	325
Lower Mississippi....	437	5.3	1860	.0	2300	5.3	2300	.0	46	2340	201	.0	201
Souris-Red-Rainy.....	1.4	.0	45	.0	46	.0	46	.0	3.9	50	4.1	.0	4.1
Missouri Basin.....	115	.0	86	.0	201	.0	201	.0	123	324	79	.0	79
Arkansas-White-Red...	104	.0	389	.0	493	.0	493	2.3	321	813	145	.0	145
Texas-Gulf.....	159	.4	689	1430	849	1430	2280	53	195	1040	453	824	1280
Rio Grande.....	6.3	.0	1.1	.0	7.4	.0	7.4	.0	8.4	16	8.2	.0	8.2
Upper Colorado.....	1.5	.0	6.1	.0	7.6	.0	7.6	.0	1.7	9.3	3.4	.0	3.4
Lower Colorado.....	45	8.3	8.1	.0	53	8.3	62	5.0	81	135	81	8.3	89
Great Basin.....	21	.0	3.5	.0	25	.0	25	.2	19	44	18	.0	18
Pacific Northwest....	337	.0	717	37	1050	37	1090	.6	361	1420	140	5.0	145
California.....	328	7.9	105	254	433	262	695	2.6	497	930	301	11	312
Alaska.....	7.7	.0	106	.0	114	.0	114	.0	7.8	121	11	.0	11
Hawaii.....	16	.0	4.8	.0	20	.0	20	.0	6.4	27	6.3	.0	6.3
Caribbean.....	19	.2	.0	14	19	14	33	.0	12	31	6.2	2.0	8.2
Total.....	3,930	26	18,400	3,480	22,300	3,500	25,800	144	5,730	28,100	4,200	957	5,160

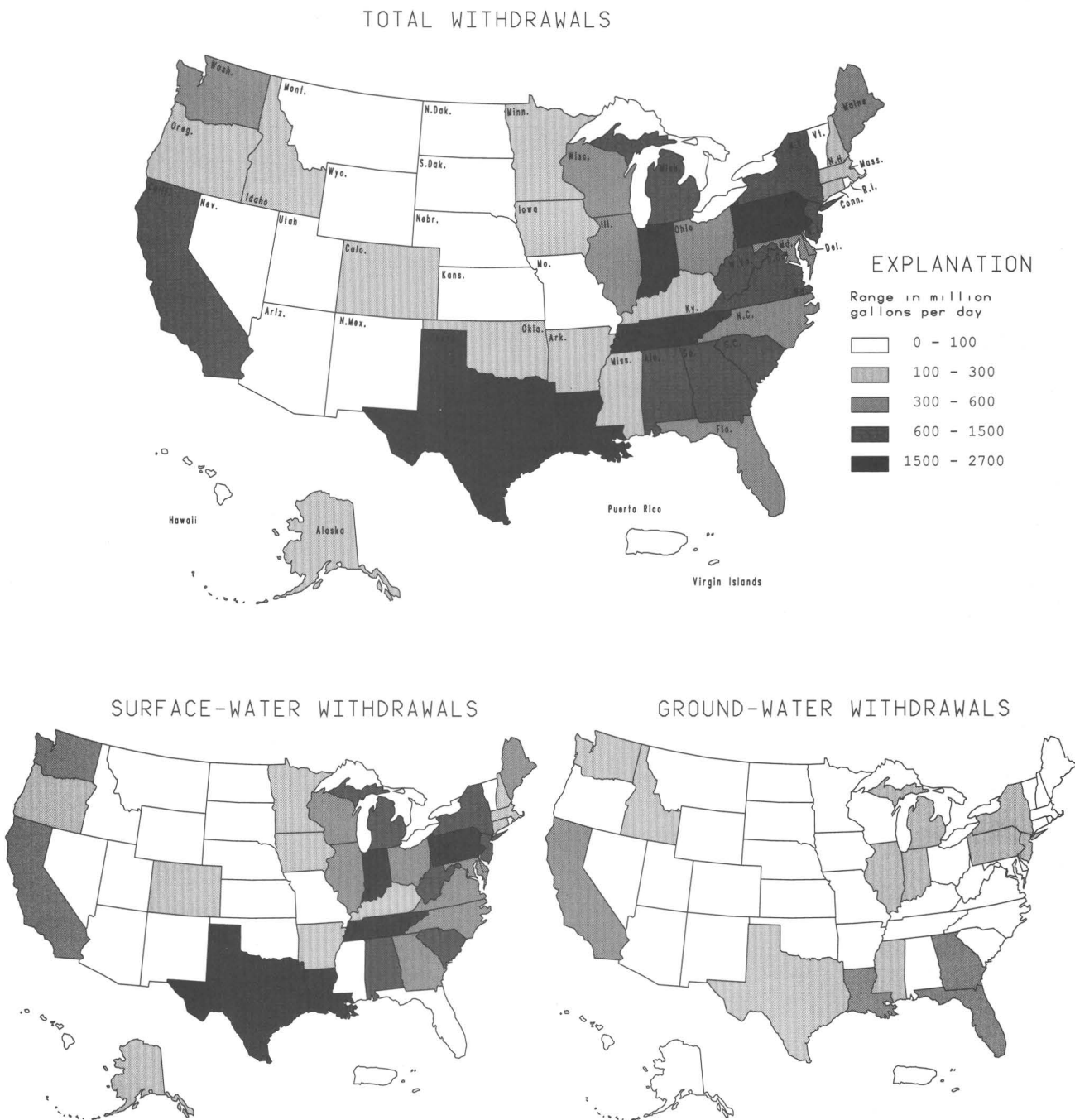


Figure 12. Industrial withdrawals, by source and by State, 1985.

Table 12.—Industrial water use, by State, 1985

[Figures may not add to totals because of independent rounding. All values in million gallons per day]

STATE	SELF-SUPPLIED WITHDRAWALS							RECLAIMED SEWAGE	TOTAL				
	By source and type						PUBLIC- SUPPLY DELIV- ERIES		With- drawals and deliveries	Consumptive use			
	Ground water		Surface water		Total					Fresh	Saline	Total	
	Fresh	Saline	Fresh	Saline	Fresh	Saline							
Alabama.....	34	.0	804	.0	838	.0	838	.0	221	1060	233	.0	233
Alaska.....	7.7	.0	106	.0	114	.0	114	.0	7.8	121	11	.0	11
Arizona.....	44	8.3	.7	.0	45	8.3	53	4.9	79	124	78	8.3	87
Arkansas.....	64	.0	108	.0	172	.0	172	.0	.1	172	21	.0	21
California.....	326	7.9	105	254	431	262	693	2.9	494	925	301	11	312
Colorado.....	7.4	.0	113	.0	120	.0	120	.0	18	138	28	.0	28
Connecticut.....	18	.0	59	68	77	68	145	.0	62	139	13	1.4	14
Delaware.....	16	.0	3.1	391	19	391	410	.0	18	36	3.6	3.9	7.5
D.C.....	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Florida.....	340	.0	54	27	394	27	421	.0	142	537	144	.2	145
Georgia.....	323	.0	283	31	606	31	637	.0	135	740	74	.5	74
Hawaii.....	16	.0	4.8	.0	20	.0	20	.0	6.4	27	6.3	.0	6.3
Idaho.....	172	.0	26	.0	199	.0	199	.0	6.7	205	5.4	.0	5.4
Illinois.....	150	.0	385	.0	535	.0	535	.0	255	790	273	.0	273
Indiana.....	109	.0	2550	.0	2660	.0	2660	.0	73	2730	228	.0	228
Iowa.....	71	.0	126	.0	197	.0	197	.0	41	239	31	.0	31
Kansas.....	70	.0	11	.0	81	.0	81	.0	41	122	40	.0	40
Kentucky.....	66	.0	175	.0	241	.0	241	.0	167	408	17	.0	17
Louisiana.....	297	5.3	1790	.0	2090	5.3	2090	.0	1.5	2090	189	.0	189
Maine.....	8.3	.0	207	30	215	30	246	.0	11	226	83	4.6	88
Maryland.....	20	.0	54	275	74	275	350	81	55	130	32	69	101
Massachusetts.....	26	.0	103	22	129	22	151	.0	69	198	44	.4	44
Michigan.....	121	3.7	1200	.0	1320	3.7	1330	.0	247	1570	123	.2	124
Minnesota.....	76	.0	108	.0	184	.0	184	.0	46	231	70	.0	70
Mississippi.....	131	.0	96	5.7	227	5.7	233	.0	28	255	44	1.0	45
Missouri.....	37	.0	52	.0	88	.0	88	.0	133	221	30	.0	30
Montana.....	29	.0	27	.0	56	.0	56	.0	1.2	57	8.8	.0	8.8
Nebraska.....	41	.0	7.2	.0	48	.0	48	.0	49	97	34	.0	34
Nevada.....	2.3	.0	7.8	.0	10	.0	10	.0	6.3	16	3.2	.0	3.2
New Hampshire....	33	.0	204	.2	238	.2	238	.0	16	254	51	.0	51
New Jersey.....	129	.1	127	801	256	801	1060	.0	240	496	37	16	53
New Mexico.....	.4	.0	.4	.0	.8	.0	.8	.0	2.8	3.6	2.1	.0	2.1
New York.....	272	.0	760	.0	1030	.0	1030	.0	1010	2050	205	.0	205
North Carolina...	43	.0	371	6.0	414	6.0	420	.0	128	542	55	.5	56
North Dakota.....	2.2	.0	6.8	.0	8.9	.0	8.9	.0	2.3	11	9.2	.0	9.2
Ohio.....	11	.0	451	.0	462	.0	462	.0	340	802	156	.0	156
Oklahoma.....	22	.0	84	.0	106	.0	106	.0	204	310	21	.0	21
Oregon.....	29	.0	263	.0	293	.0	293	.6	53	346	22	.0	22
Pennsylvania.....	149	.0	1910	.0	2060	.0	2060	.0	246	2300	186	.0	186
Rhode Island.....	3.9	.0	13	.2	17	.2	17	.0	20	37	2.6	.0	2.6
South Carolina...	38	.0	1090	.0	1130	.0	1130	.0	86	1210	183	.0	183
South Dakota.....	7.8	.0	.9	.0	8.7	.0	8.7	.0	5.4	14	1.8	.0	1.8
Tennessee.....	89	.0	1510	.0	1600	.0	1600	.0	98	1700	187	.0	187
Texas.....	149	.4	834	1430	983	1430	2420	55	284	1270	507	824	1330
Utah.....	20	.0	7.5	.0	28	.0	28	.0	15	43	19	.0	19
Vermont.....	4.0	.0	50	.0	54	.0	54	.0	13	67	13	.0	13
Virginia.....	99	.2	477	81	576	81	657	.0	57	633	71	9.7	80
Washington.....	108	.0	411	37	519	37	556	.0	306	825	107	5.0	112
West Virginia....	33	.0	853	.0	886	.0	886	.0	22	909	133	.0	133
Wisconsin.....	38	.0	424	.0	461	.0	461	.0	153	614	58	.0	58
Wyoming.....	7.8	.0	3.6	.0	11	.0	11	.0	3.2	15	2.0	.0	2.0
Puerto Rico.....	18	.0	.0	.0	18	.0	18	.0	12	31	6.1	.0	6.1
Virgin Islands...	.0	.2	.0	14	.0	14	14	.0	.0	.0	.0	2.0	2.1
Total.....	3,930	26	18,400	3,480	22,300	3,500	25,800	144	5,730	28,100	4,200	957	5,160

## Mining

Mining water use includes water for the extraction of naturally occurring materials (including petroleum), dewatering, milling, and other preparations that are a part of mining activities. Mining use is a separate category in this report; all water is self supplied. In previous water-use circulars in this series, mining use was included under "other" industries in the self-supplied industrial category. As with other industries, saline water is significant.

Water used in mining is difficult to categorize and estimate. Except for some washing and milling, water used at mining sites tends to be an impediment to or a byproduct of the extraction process. Unless water is needed for the mining operation, little attention is paid to quantities withdrawn—in dewatering, for example. Estimates for mining withdrawals were obtained from State agencies that regulate discharges or by estimating a coefficient for the relation between the

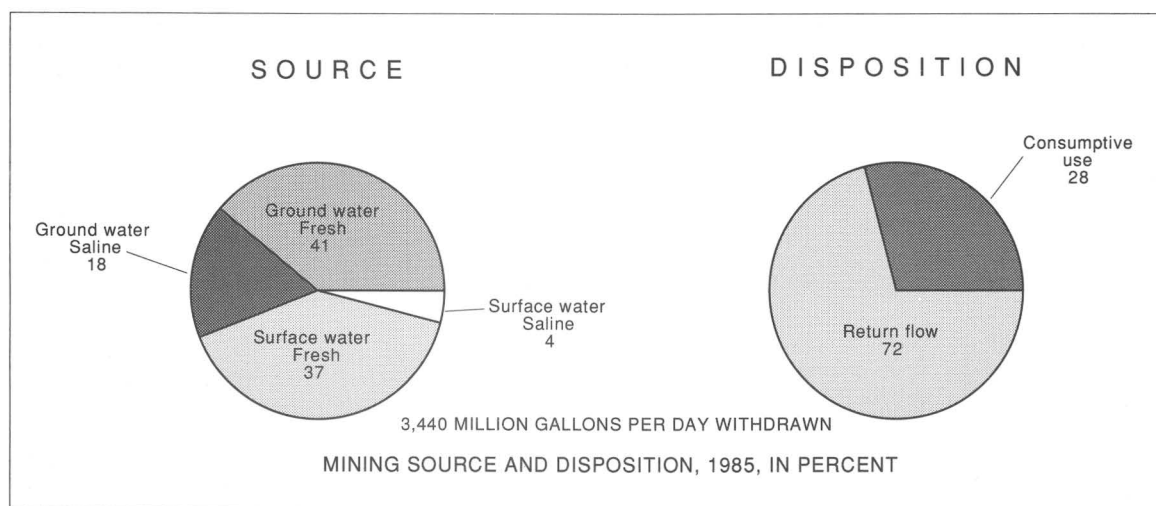
quantity of water withdrawn and the quantity of material extracted or processed. Consumptive-use estimates were based on coefficients, ranging from 0.1 to 1.0, depending on the type of mining activity, multiplied by withdrawals.

The source (surface and ground waters) and disposition of water for mining purposes are shown in the chart below. The distribution of total mining withdrawals and the estimates of mining use (withdrawals and consumptive use) by water-resources region are shown in figure 13 and table 13, respectively. Similar information by State is shown in figure 14 and table 14.

With these uncertainties, the quantity of water (fresh and saline) withdrawn for mining use during 1985 was estimated to be 3,440 Mgal/d. (See tables 13 and 14.) Mining withdrawals represent 0.9 percent of total withdrawals for all offstream categories. Surface water was the source for about 41

percent of withdrawals for mining use, and ground water was the source for the remaining 59 percent. Saline water accounted for about 22 percent of total withdrawals for mining use. The consumptive use of freshwater and saline water for mining during 1985 was about 975 Mgal/d, or 28 percent of withdrawals.

The most water for mining use during 1985 was withdrawn in the California water-resources region, followed closely by the Ohio, the South Atlantic–Gulf, and the Missouri Basin regions. (See figure 13.) California and Texas had the most water withdrawn for mining use and accounted for about 24 percent of the Nation's total withdrawals for mining use. (See figure 14.) Saline ground water was the major source of withdrawals for mining use in California and Texas because saline ground water is a byproduct of the petroleum extraction process.





## TOTAL WITHDRAWALS

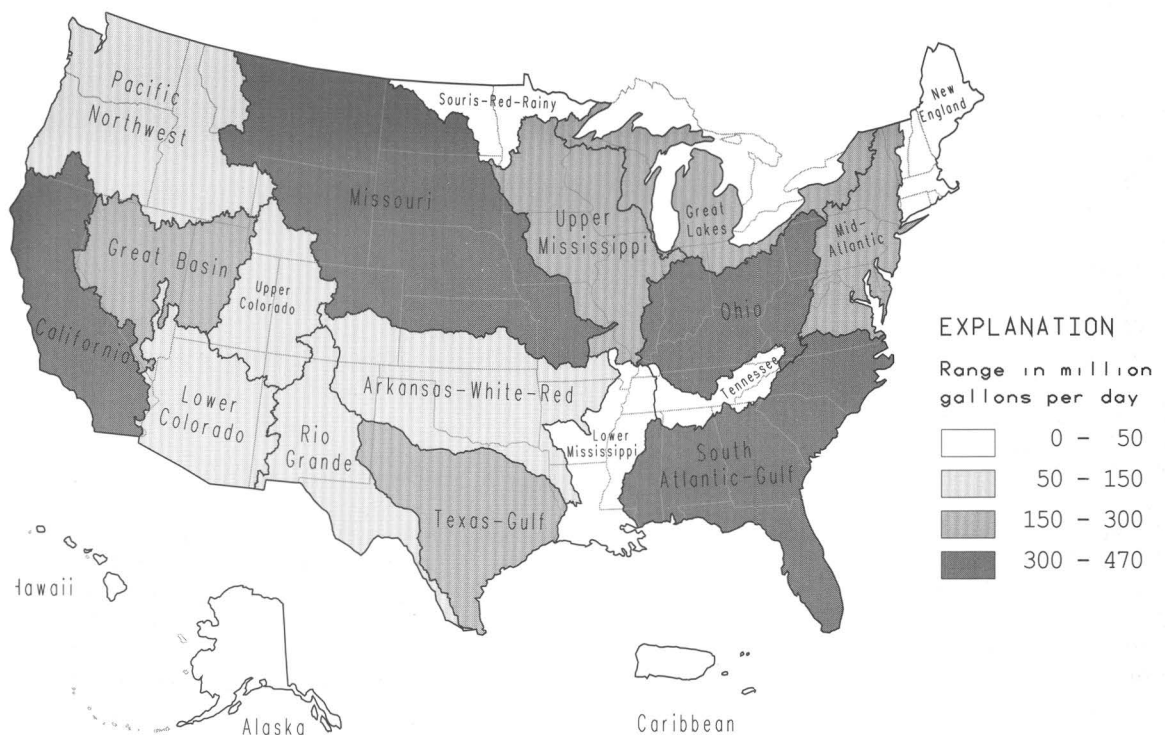


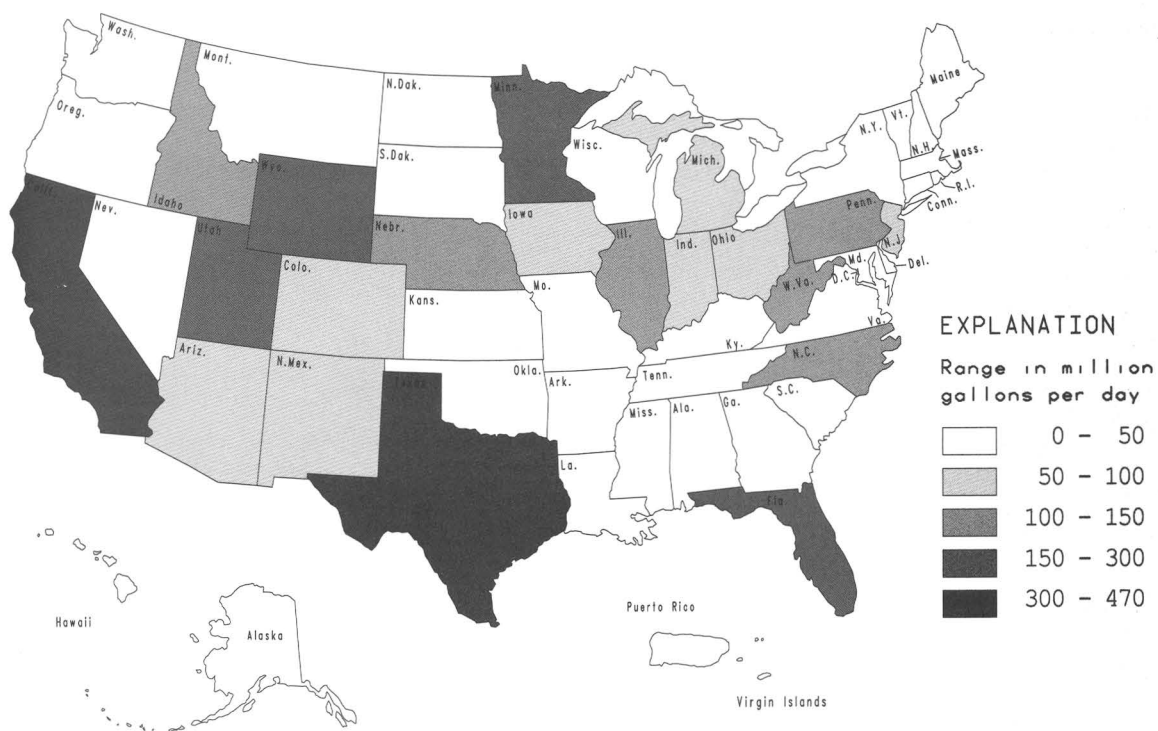
Figure 13. Mining water withdrawals, by water-resources region, 1985.

Table 13.—Mining water use, by water-resources region, 1985

[Figures may not add to totals because of independent rounding. All values in million gallons per day]

	WITHDRAWALS									CONSUMPTIVE USE		
	By source and type						Total					
	Ground water			Surface water						Fresh	Saline	Total
	Fresh	Saline	Total	Fresh	Saline	Total						
New England.....	3.6	.0	3.6	8.9	.0	8.9	13	.0	13	1.5	.0	1.5
Mid-Atlantic.....	94	.0	94	132	.5	133	226	.5	227	27	.1	27
South Atlantic-Gulf..	348	3.4	352	58	.0	58	407	3.4	410	141	.3	141
Great Lakes.....	13	.9	14	240	.0	240	252	.9	253	61	.1	61
Ohio.....	260	18	277	163	.0	163	423	18	440	55	17	72
Tennessee.....	2.5	.0	2.5	14	.0	14	16	.0	16	1.9	.0	1.9
Upper Mississippi....	60	20	80	133	.0	133	193	20	213	55	20	76
Lower Mississippi....	2.3	.3	2.6	6.4	5.0	11	8.8	5.3	14	2.4	4.8	7.2
Souris-Red-Rainy.....	.1	.0	.1	22	.0	22	22	.0	22	18	.0	18
Missouri Basin.....	145	29	174	177	.0	177	322	29	351	41	3.6	44
Arkansas-White-Red...	41	26	67	26	.0	26	67	26	93	26	.0	26
Texas-Gulf.....	83	163	246	17	.0	17	100	163	263	89	.0	89
Rio Grande.....	58	40	98	4.9	.0	4.9	63	40	103	38	.0	38
Upper Colorado.....	37	27	64	21	.0	21	59	27	86	20	2.6	23
Lower Colorado.....	84	.1	84	20	.0	20	103	.1	104	74	.0	74
Great Basin.....	61	22	84	6.0	108	114	67	130	198	25	123	148
Pacific Northwest....	5.0	.0	5.0	144	.0	144	149	.0	149	4.3	.0	4.3
California.....	107	276	384	58	25	82	165	301	466	44	79	123
Alaska.....	.1	.0	.1	19	.0	19	19	.0	19	.1	.0	.1
Hawaii.....	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Caribbean.....	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Total.....	1,410	626	2,030	1,270	138	1,410	2,670	764	3,440	724	251	975

## TOTAL WITHDRAWALS



**Figure 14.** Mining water withdrawals, by State, 1985.

Table 14.—Mining water use, by State, 1985

[Figures may not add to totals because of independent rounding. All values in million gallons per day]

STATE	WITHDRAWALS									CONSUMPTIVE USE		
	By source and type						Total					
	Ground water			Surface water								
	Fresh	Saline	Total	Fresh	Saline	Total	Fresh	Saline	Total	Fresh	Saline	Total
Alabama.....	10	3.4	14	.0	.0	.0	10	3.4	14	10	.3	10
Alaska.....	.1	.0	.1	19	.0	19	19	.0	19	.1	.0	.1
Arizona.....	67	.0	67	13	.0	13	80	.0	80	59	.0	59
Arkansas.....	1.0	.0	1.0	2.3	.0	2.3	3.3	.0	3.3	3.3	.0	3.3
California.....	108	276	384	58	25	82	165	301	466	44	79	123
Colorado.....	29	32	61	30	.0	30	59	32	91	17	4.5	21
Connecticut.....	.3	.0	.3	1.4	.0	1.4	1.7	.0	1.7	.0	.0	.0
Delaware.....	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
D.C.....	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Florida.....	236	.0	236	22	.0	22	258	.0	258	100	.0	100
Georgia.....	16	.0	16	2.9	.0	2.9	19	.0	19	2.3	.0	2.3
Hawaii.....	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Idaho.....	.0	.0	.0	135	.0	135	135	.0	135	.0	.0	.0
Illinois.....	14	38	52	53	.0	53	66	38	104	10	38	48
Indiana.....	7.4	.0	7.4	83	.0	83	91	.0	91	.3	.0	.3
Iowa.....	50	.0	50	12	.0	12	63	.0	63	.0	.0	.0
Kansas.....	5.3	.0	5.3	8.3	.0	8.3	14	.0	14	.6	.0	.6
Kentucky.....	3.4	.0	3.4	22	.0	22	25	.0	25	.7	.0	.7
Louisiana.....	.7	.3	1.0	1.2	5.0	6.3	2.0	5.3	7.3	.6	4.8	5.4
Maine.....	.8	.0	.8	3.2	.0	3.2	4.0	.0	4.0	.6	.0	.6
Maryland.....	12	.0	12	8.2	.5	8.7	21	.5	21	4.1	.1	4.2
Massachusetts.....	2.0	.0	2.0	.0	.0	.0	2.0	.0	2.0	.5	.0	.5
Michigan.....	8.5	.8	9.3	52	.0	52	60	.8	61	2.2	.1	2.3
Minnesota.....	1.7	.0	1.7	271	.0	271	273	.0	273	122	.0	122
Mississippi.....	3.1	.0	3.1	.6	.0	.6	3.7	.0	3.7	.8	.0	.8
Missouri.....	24	.3	25	3.3	.0	3.3	28	.3	28	2.8	.0	2.8
Montana.....	.6	.0	.6	3.6	.0	3.6	4.2	.0	4.2	1.1	.0	1.1
Nebraska.....	8.5	.0	8.5	111	.0	111	119	.0	119	1.8	.0	1.8
Nevada.....	19	2.8	22	2.7	.0	2.7	22	2.8	24	18	1.9	20
New Hampshire.....	.1	.0	.1	1.1	.0	1.1	1.2	.0	1.2	.0	.0	.0
New Jersey.....	12	.0	12	68	.0	68	80	.0	80	8.0	.0	8.0
New Mexico.....	69	.0	69	13	.0	13	82	.0	82	35	.0	35
New York.....	.0	.0	.0	50	.0	50	50	.0	50	5.0	.0	5.0
North Carolina.....	81	.0	81	38	.0	38	119	.0	119	28	.0	28
North Dakota.....	2.8	.0	2.8	.9	.0	.9	3.6	.0	3.6	2.5	.0	2.5
Ohio.....	78	.1	78	.4	.0	.4	78	.1	78	11	.0	11
Oklahoma.....	6.7	.0	6.7	.4	.0	.4	7.1	.0	7.1	6.8	.0	6.8
Oregon.....	.3	.0	.3	7.2	.0	7.2	7.5	.0	7.5	1.6	.0	1.6
Pennsylvania.....	118	.0	118	30	.0	30	148	.0	148	20	.0	20
Rhode Island.....	.4	.0	.4	2.3	.0	2.3	2.7	.0	2.7	.3	.0	.3
South Carolina.....	2.9	.0	2.9	2.4	.0	2.4	5.3	.0	5.3	.5	.0	.5
South Dakota.....	16	.0	16	25	.0	25	40	.0	40	10	.0	10
Tennessee.....	2.4	.0	2.4	11	.0	11	13	.0	13	1.1	.0	1.1
Texas.....	103	229	332	18	.0	18	121	229	350	121	.0	121
Utah.....	50	21	71	5.5	108	113	56	129	185	15	123	138
Vermont.....	.0	.0	.0	1.1	.0	1.1	1.1	.0	1.1	.0	.0	.0
Virginia.....	2.1	.0	2.1	14	.0	14	16	.0	16	1.9	.0	1.9
Washington.....	2.4	.0	2.4	.6	.0	.6	3.0	.0	3.0	.4	.0	.4
West Virginia.....	119	.0	119	24	.0	24	142	.0	142	29	.0	29
Wisconsin.....	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Wyoming.....	111	23	134	39	.0	39	150	23	173	24	.0	24
Puerto Rico.....	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Virgin Islands.....	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Total.....	1,410	626	2,030	1,270	138	1,410	2,670	764	3,440	724	251	975

## Thermoelectric Power

The thermoelectric power category includes water used in the production of electric power generated with fossil fuel, geothermal, or nuclear energy. Thermoelectric power generation is a separate category in this report and is listed by energy sources. In previous water-use circulars in this series, thermoelectric power was included in the self-supplied industrial category and was not subdivided by energy source. The estimates for thermoelectric power water withdrawals should be reliable because relatively complete files are maintained by Federal and State agencies. Consumptive-use estimates were based on coefficients, ranging from 0.01 to 1.0, depending on the type of plant, multiplied by withdrawals and deliveries.

The source (surface water) and disposition of water for thermoelectric power are shown in the chart below. The distribution of total thermoelectric power withdrawals and the estimates of thermoelectric power water use (withdrawals, deliveries, consumptive use) by water-resources region are shown in figure 15 and table 15, respectively. Similar information by State is shown in figure 16 and table 16. A more detailed listing by powerplant type by water-resources region and by State is given in tables 17 and 18, respectively.

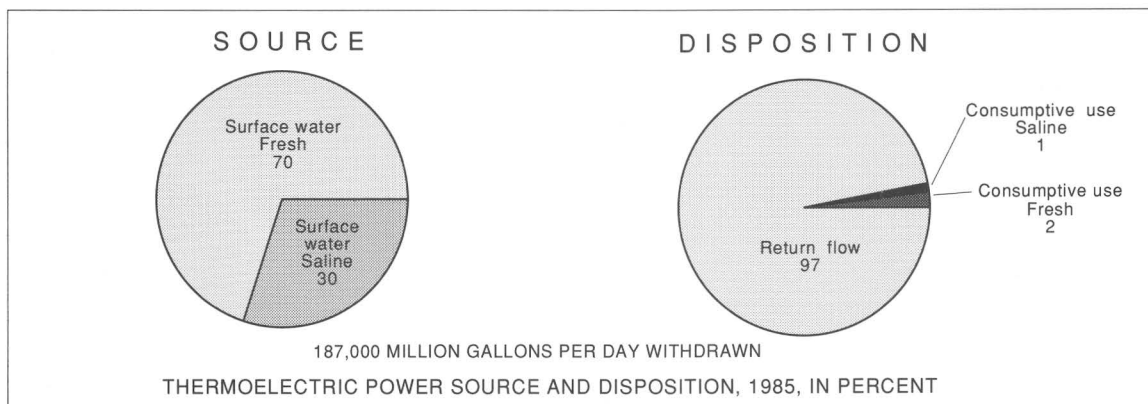
Total water (fresh and saline) withdrawn by thermoelectric power plants during 1985 was 187,000 Mgal/d (tables 15–18), or 13 percent less than during 1980. Surface water was the source for more than 99 percent of total thermoelectric withdrawals. Thermoelectric power plants furnish most of their own water; less than 0.1 percent is obtained from public supplies. About 30 percent of the surface-water withdrawal was saline, and some of the ground-water withdrawal listed in tables 17 and 18 under "Geothermal" as fresh ground water probably was saline. Fossil fuel thermoelectric plants accounted for about 78 percent of total thermoelectric withdrawals; nuclear plants, 22 percent; and geothermal plants, less than 1 percent.

The "Thermoelectric power" category accounts for the largest water withdrawals for offstream use and represents 47 percent of total fresh and saline withdrawals for all offstream categories. Thermoelectric withdrawals were 1.4 times the water withdrawn for irrigation, the next largest category. Most of the water withdrawn by thermoelectric plants was used for condenser and reactor cooling. Plants vary widely as to the techniques used in the disposal of the cooling water after it is passed through the condensers. Less water

is required when cooling water is recycled through cooling towers or ponds, but a higher percentage of the cooling water is evaporated (consumptive use), usually more than 60 percent. When the water withdrawn for cooling is used only once before return to a surface-water body, a great deal more water is required, but evaporation is low, usually less than 2 percent.

About 3 percent of the water withdrawn for thermoelectric power during 1985 was consumed as a result of once-through, cooling-tower, or pond cooling. The total consumptive use during 1985 represents an increase from estimates for previous years and likely is a result of an increase in the use of cooling towers. Consumptive use of water for fossil fuel plants and nuclear plants averaged 2 percent and 7 percent of withdrawals, respectively. The higher consumptive use at nuclear plants may be attributed to their greater use of cooling towers.

About four times more water was used in 1985 for thermoelectric power use in the eastern part of the United States than in the western part to generate twice as much power. (See figure 15.) California, Florida, Illinois, New York, Ohio, Pennsylvania, and Texas accounted for more than one-third of all thermoelectric power withdrawals. (See figure 16.)



## TOTAL WITHDRAWALS

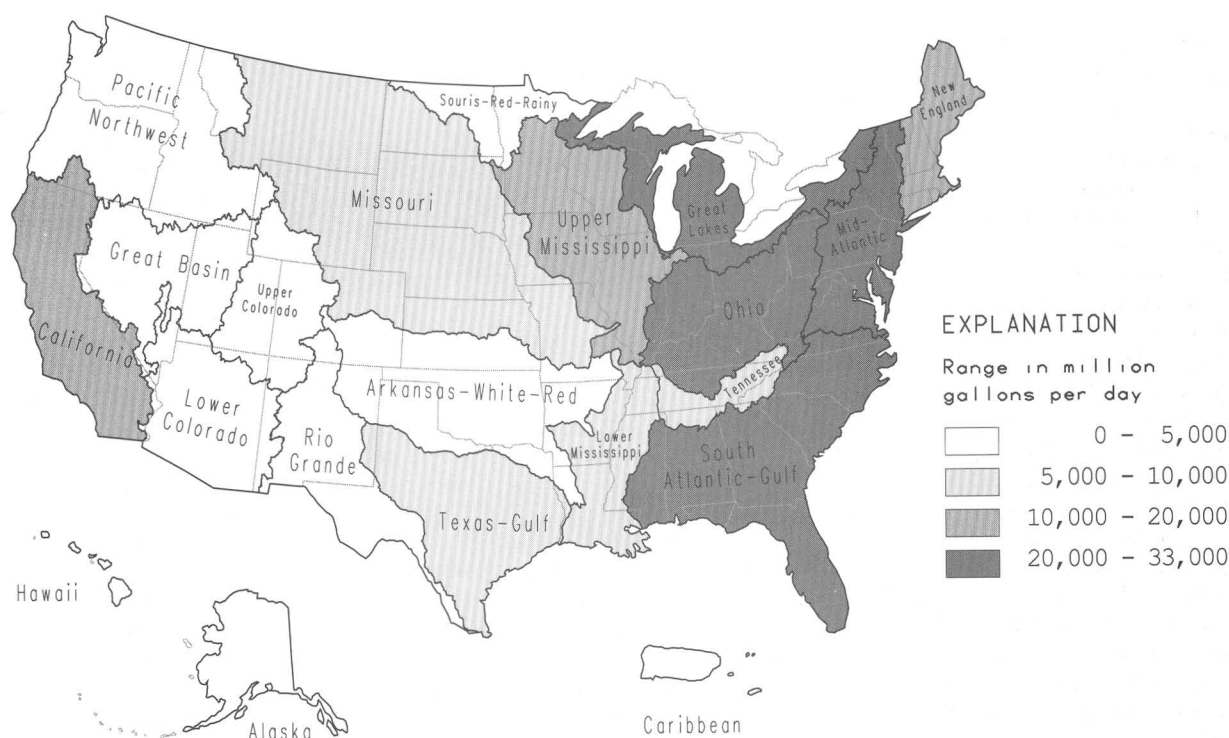
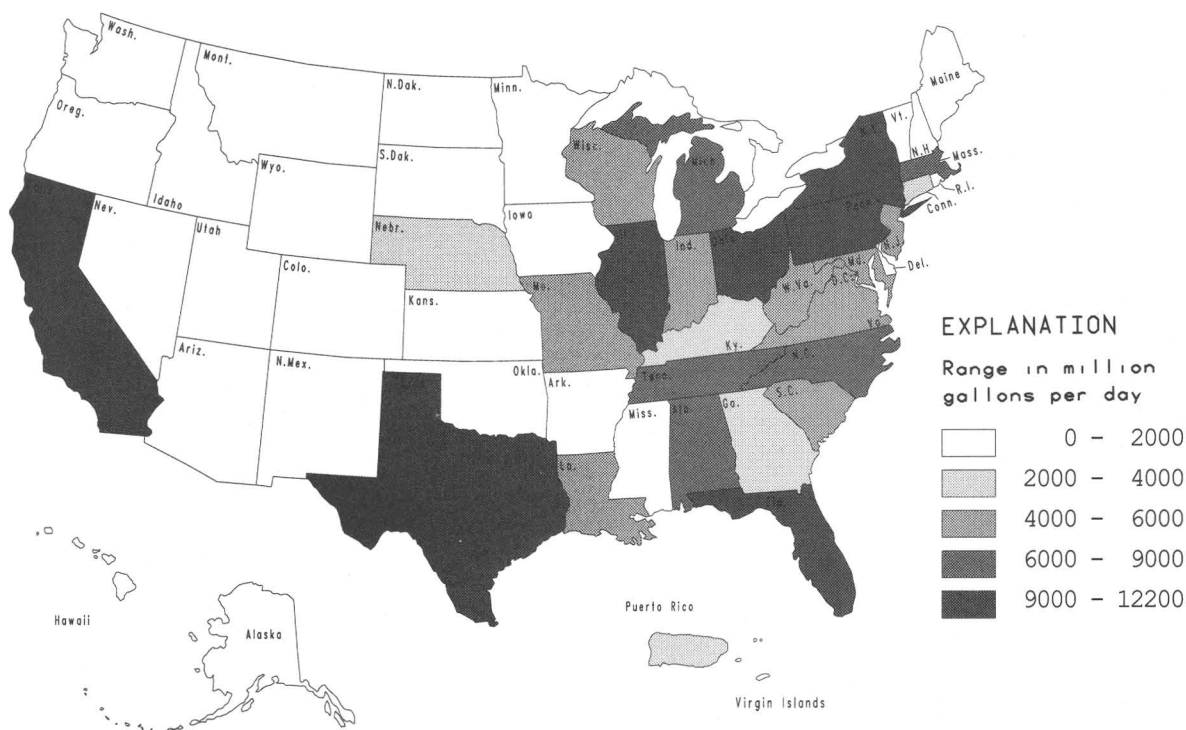


Figure 15. Thermoelectric power water withdrawals, by water-resources region, 1985.

**Table 15.**—Thermoelectric power (electric utility generation) water use, by water-resources region, 1985  
 [Figures may not add to totals because of independent rounding. Mgal/d = million gallons per day; GWh = gigawatthour]

ALL THERMOELECTRIC POWER WATER USE, IN Mgal/d										
REGION	Self-supplied withdrawals, by source and type					Total				
	Ground water	Surface water			Public-supply deliveries	Withdrawals and deliveries	Consumptive use			Power generated, in GWh
		Fresh	Fresh	Saline			Total	Fresh	Fresh	
New England.....	5.8	6200	7000	13200	5.5	6210	85	169	254	79900
Mid-Atlantic.....	6.6	14000	18400	32400	1.2	14000	435	1600	2040	226000
South Atlantic-Gulf..	35	18900	11800	30700	4.8	18900	344	38	382	354000
Great Lakes.....	9.3	22400	.0	22400	.4	22400	1100	.0	1100	163000
Ohio.....	80	24300	.0	24300	.1	24400	1020	.0	1020	369000
Tennessee.....	.0	6810	.0	6810	.0	6810	11	.0	11	60000
Upper Mississippi....	15	12700	.0	12700	4.0	12800	276	.0	276	151000
Lower Mississippi....	72	6930	494	7430	2.1	7010	325	4.9	330	65000
Souris-Red-Rainy....	.3	38	.0	38	.0	38	.3	.0	.3	415
Missouri Basin.....	83	7430	.0	7430	6.5	7520	185	.0	185	119000
Arkansas-White-Red...	28	4040	.0	4040	27	4090	138	.0	138	117000
Texas-Gulf.....	45	4970	3550	8520	8.6	5030	155	12	167	181000
Rio Grande.....	16	1.5	.0	1.5	.0	17	13	.0	13	7380
Upper Colorado.....	.0	131	.0	131	.0	131	107	.0	107	70700
Lower Colorado.....	40	7.1	4.6	12	2.4	49	49	4.6	54	28200
Great Basin.....	8.5	4.5	.0	4.5	.0	13	9.9	.5	10	3840
Pacific Northwest....	.7	438	.0	438	.0	439	25	.0	25	23700
California.....	68	412	11700	12200	31	511	67	5.8	72	98900
Alaska.....	4.3	26	.0	26	.3	31	3.1	.0	3.1	3430
Hawaii.....	86	3.8	880	884	.0	90	.9	8.8	9.7	6150
Caribbean.....	5.1	.0	2110	2110	2.2	7.3	1.5	.0	1.5	12000
Total.....	608	130,000	56,000	186,000	96	131,000	4,350	1,850	6,200	2,140,000

# TOTAL WITHDRAWALS



**Figure 16.** Thermoelectric power water withdrawals, by State, 1985.

**Table 16.—Thermoelectric power (electric utility generation) water use, by State, 1985**

[Figures may not add to totals because of independent rounding. Mgal/d = million gallons per day; GWh = gigawatthour]

ALL THERMOELECTRIC POWER WATER USE, IN Mgal/d										
STATE	Self-supplied withdrawals, by source and type				Public-supply deliveries	Withdrawals and deliveries	Total			Power generated, in GWh
	Ground water	Surface water		Consumptive use						
		Fresh	Fresh	Saline			Total	Fresh	Saline	
Alabama.....	.0	6920	.0	6920	.0	6920	113	.0	113	65500
Alaska.....	4.3	26	.0	26	.3	31	3.1	.0	3.1	3430
Arizona.....	32	21	4.6	25	.0	53	53	4.6	57	26200
Arkansas.....	1.1	1090	.0	1090	.3	1090	26	.0	26	21300
California.....	68	412	11700	12200	31	511	67	5.8	72	98900
Colorado.....	14	96	.0	96	13	123	37	.0	37	26500
Connecticut.....	5.8	694	2510	3210	1.3	701	15	50	65	26400
Delaware.....	.9	.0	1120	1120	.6	1.6	.7	.0	.7	8460
D.C.....	.0	130	.0	130	.0	130	2.0	.0	2.0	107
Florida.....	19	633	10700	11300	4.8	656	20	13	33	95200
Georgia.....	5.0	3280	46	3320	.0	3280	114	.0	114	78100
Hawaii.....	86	3.8	880	884	.0	90	.9	8.8	9.7	6150
Idaho.....	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Illinois.....	6.7	11700	.0	11700	.9	11700	121	.0	121	107000
Indiana.....	24	4450	.0	4450	.0	4480	77	.0	77	43300
Iowa.....	9.2	1800	.0	1800	1.6	1810	54	.0	54	22300
Kansas.....	12	403	.0	403	1.0	416	43	.0	43	27300
Kentucky.....	36	3370	.0	3370	.0	3410	124	.0	124	60100
Louisiana.....	30	5440	494	5930	.0	5470	205	4.9	210	39700
Maine.....	.0	103	642	746	.0	103	.0	.0	.0	8070
Maryland.....	1.8	397	5030	5420	.0	399	290	175	465	25500
Massachusetts.....	.0	5070	3380	8450	4.2	5070	65	116	182	35800
Michigan.....	2.3	8390	.0	8390	.0	8390	108	.0	108	73800
Minnesota.....	1.2	1470	.0	1470	1.5	1480	140	.0	140	30100
Mississippi.....	50	430	191	621	1.5	481	96	5.7	102	30200
Missouri.....	44	4890	.0	4890	.3	4930	89	.0	89	48500
Montana.....	.0	67	.0	67	.0	67	18	.0	18	8750
Nebraska.....	25	2190	.0	2190	.0	2210	1.8	.0	1.8	4140
Nevada.....	16	7.5	.0	7.5	2.4	26	24	.0	24	12400
New Hampshire.....	.0	336	207	542	.0	336	5.3	.0	5.3	5710
New Jersey.....	3.4	722	3820	4540	.6	726	1.4	12	14	34000
New Mexico.....	11	48	.0	48	.0	59	43	.0	43	27000
New York.....	.0	4720	6150	10900	.0	4720	927	1380	2310	81600
North Carolina.....	.0	6400	866	7270	.0	6400	36	19	55	71700
North Dakota.....	.5	891	.0	891	.0	892	23	.0	23	20200
Ohio.....	25	10500	.0	10500	.3	10500	64	.0	64	111000
Oklahoma.....	1.0	133	.0	133	2.2	136	45	.0	45	40100
Oregon.....	.0	12	.0	12	.0	12	2.8	.0	2.8	7500
Pennsylvania.....	.0	10200	.0	10200	.0	10200	193	.0	193	134000
Rhode Island.....	.0	.0	261	261	.0	.0	.0	2.6	2.6	548
South Carolina.....	1.1	5180	6.3	5180	.0	5180	55	.0	55	51700
South Dakota.....	1.7	2.6	.0	2.6	.0	4.2	.1	.0	.1	2520
Tennessee.....	.0	6060	.0	6060	.6	6060	.8	.0	.8	63500
Texas.....	52	7400	3550	10900	23	7480	198	12	210	217000
Utah.....	.0	24	.0	24	.0	24	22	.5	23	14400
Vermont.....	.4	.4	.0	.4	.0	.8	.6	.0	.6	3720
Virginia.....	.1	3460	2300	5760	.0	3460	55	35	89	41200
Washington.....	.7	427	.0	427	.0	427	22	.0	22	16200
West Virginia.....	.0	4210	.0	4210	.0	4210	658	.0	658	80200
Wisconsin.....	1.6	5440	.0	5440	.2	5440	54	.0	54	35200
Wyoming.....	12	224	.0	224	1.9	238	38	.0	38	34200
Puerto Rico.....	5.1	.0	2000	2000	1.4	6.6	1.3	.0	1.3	11500
Virgin Islands.....	.0	.0	103	103	.7	.7	.1	.0	.1	480
Total.....	608	130,000	56,000	186,000	96	131,000	4,350	1,850	6,200	2,140,000

**Table 17.—Thermoelectric power water use, by energy source, by water-resources region, 1985**  
 [Figures may not add to totals because of independent rounding. All values in million gallons per day]

REGION	FOSSIL FUEL					GEOTHERMAL		NUCLEAR						
	Withdrawals, by source and type			Consumptive use		Withdrawals, by source		Consumptive use		Withdrawals, by source and type			Consumptive use	
	Ground water	Surface water				Ground water	Fresh			Fresh	Ground water	Surface water		
		Fresh	Fresh	Saline	Fresh			Saline	Fresh			Fresh	Saline	Fresh
New England.....	4.5	5470	4720	67	146	.0	.0	1.3	735	2280	18	24		
Mid-Atlantic.....	5.0	9960	11300	369	246	.0	.0	1.6	4020	7150	65	1360		
South Atlantic-Gulf..	32	12300	8930	223	17	.0	.0	2.7	6640	2880	121	21		
Great Lakes.....	9.3	16100	.0	165	.0	.0	.0	.0	6360	.0	936	.0		
Ohio.....	80	24300	.0	1010	.0	.0	.0	.0	85	.0	14	.0		
Tennessee.....	.0	5510	.0	8.4	.0	.0	.0	.0	1300	.0	2.6	.0		
Upper Mississippi....	14	9940	.0	185	.0	.0	.0	.8	2800	.0	91	.0		
Lower Mississippi....	38	5850	494	288	4.9	.0	.0	34	1080	.0	36	.0		
Souris-Red-Rainy....	.3	38	.0	.3	.0	.0	.0	.0	.0	.0	.0	.0		
Missouri Basin.....	83	6630	.0	184	.0	.2	.0	.0	797	.0	1.4	.0		
Arkansas-White-Red...	28	3030	.0	138	.0	.0	.0	.0	1010	.0	.2	.0		
Texas-Gulf.....	45	4970	3550	155	12	.0	.0	.0	.0	.0	.0	.0		
Rio Grande.....	16	1.5	.0	13	.0	.0	.0	.0	.0	.0	.0	.0		
Upper Colorado.....	.0	131	.0	107	.0	.0	.0	.0	.0	.0	.0	.0		
Lower Colorado.....	38	7.1	.0	47	.0	.0	.0	2.0	.0	4.6	2.0	4.6		
Great Basin.....	7.5	4.5	.0	9.8	.0	1.0	.2	.0	.0	.0	.0	.0		
Pacific Northwest....	.6	12	.0	12	.0	.0	.0	.1	426	.0	14	.0		
California.....	8.7	412	8400	19	5.8	60	42	.0	.2	3340	5.6	.0		
Alaska.....	4.3	26	.0	3.1	.0	.0	.0	.0	.0	.0	.0	.0		
Hawaii.....	86	3.8	880	.9	8.8	.0	.0	.0	.0	.0	.0	.0		
Caribbean.....	5.1	.0	2110	1.5	.0	.0	.0	.0	.0	.0	.0	.0		
Total.....	505	105,000	40,300	3,000	440	61	42	42	25,200	15,700	1,310	1,410		



**Table 18.—Thermoelectric power water use, by energy source, by State, 1985**  
 [Figures may not add to totals because of independent rounding. All values in million gallons per day]

STATE	FOSSIL FUEL					GEOTHERMAL		NUCLEAR				
	Withdrawals, by source and type			Consumptive use		Withdrawals, by source		Withdrawals, by source and type			Consumptive use	
	Ground water	Surface water		Fresh	Saline	Ground water	Fresh	Ground water	Surface water		Fresh	Saline
		Fresh	Saline						Fresh	Saline		
Alabama.....	.0	5640	.0	75	.0	.0	.0	.0	1290	.0	38	.0
Alaska.....	4.3	26	.0	3.1	.0	.0	.0	.0	.0	.0	.0	.0
Arizona.....	30	21	.0	51	.0	.0	.0	2.0	.0	4.6	2.0	4.6
Arkansas.....	1.1	91	.0	26	.0	.0	.0	.0	1000	.0	.0	.0
California.....	8.7	412	8400	19	5.8	60	42	.0	.2	3340	5.6	.0
Colorado.....	14	94	.0	37	.0	.0	.0	.0	1.6	.0	.0	.0
Connecticut.....	4.5	158	1340	3.7	27	.0	.0	1.3	537	1170	11	24
Delaware.....	.9	.0	1120	.7	.0	.0	.0	.0	.0	.0	.0	.0
D.C.....	.0	130	.0	2.0	.0	.0	.0	.0	.0	.0	.0	.0
Florida.....	18	633	8680	19	11	.0	.0	.7	.0	2010	.5	2.0
Georgia.....	3.9	3220	46	75	.0	.0	.0	1.1	55	.0	40	.0
Hawaii.....	86	3.8	880	.9	8.8	.0	.0	.0	.0	.0	.0	.0
Idaho.....	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Illinois.....	5.9	7950	.0	46	.0	.0	.8	3720	.0	.0	76	.0
Indiana.....	24	4450	.0	77	.0	.0	.0	.0	.0	.0	.0	.0
Iowa.....	9.2	1780	.0	54	.0	.0	.0	.0	27	.0	.0	.0
Kansas.....	12	401	.0	43	.0	.0	.0	.0	2.1	.0	.2	.0
Kentucky.....	36	3370	.0	124	.0	.0	.0	.0	.0	.0	.0	.0
Louisiana.....	30	4350	494	188	4.9	.0	.0	.2	1080	.0	17	.0
Maine.....	.0	103	21	.0	.0	.0	.0	.0	.5	621	.0	.0
Maryland.....	1.5	397	2600	289	175	.0	.0	.3	.0	2430	.2	.0
Massachusetts.....	.0	4880	2890	63	116	.0	.0	.0	191	487	2.3	.0
Michigan.....	2.3	6220	.0	80	.0	.0	.0	.0	2170	.0	28	.0
Minnesota.....	1.2	712	.0	125	.0	.0	.0	.0	762	.0	15	.0
Mississippi.....	16	430	191	77	5.7	.0	.0	34	.0	.0	19	.0
Missouri.....	44	4880	.0	88	.0	.0	.0	.0	2.3	.0	1.4	.0
Montana.....	.0	67	.0	18	.0	.0	.0	.0	.0	.0	.0	.0
Nebraska.....	25	1390	.0	1.8	.0	.0	.0	.0	794	.0	.0	.0
Nevada.....	15	7.5	.0	23	.0	1.0	.2	.0	.0	.0	.0	.0
New Hampshire.....	.0	329	207	.0	.0	.0	.0	.0	6.9	.0	5.3	.0
New Jersey.....	2.1	722	2100	1.4	12	.0	.0	1.3	.0	1720	.0	.0
New Mexico.....	11	48	.0	43	.0	.0	.0	.0	.0	.0	.0	.0
New York.....	.0	3730	4660	37	47	.0	.0	.0	989	1480	890	1340
North Carolina.....	.0	3710	.0	21	.0	.0	.0	.0	2690	866	16	19
North Dakota.....	.4	891	.0	23	.0	.2	.0	.0	.0	.0	.0	.0
Ohio.....	25	10500	.0	61	.0	.0	.0	.0	23	.0	3.2	.0
Oklahoma.....	1.0	133	.0	45	.0	.0	.0	.0	.0	.0	.0	.0
Oregon.....	.0	.5	.0	.5	.0	.0	.0	.0	11	.0	2.3	.0
Pennsylvania.....	.0	7920	.0	142	.0	.0	.0	.0	2280	.0	51	.0
Rhode Island.....	.0	.0	261	.0	2.6	.0	.0	.0	.0	.0	.0	.0
South Carolina.....	.2	1400	6.3	25	.0	.0	.0	.9	3780	.0	30	.0
South Dakota.....	1.7	2.6	.0	.1	.0	.0	.0	.0	.0	.0	.0	.0
Tennessee.....	.0	5930	.0	.8	.0	.0	.0	.0	128	.0	.0	.0
Texas.....	52	7400	3550	198	12	.0	.0	.0	.0	.0	.0	.0
Utah.....	.0	24	.0	22	.0	.0	.0	.0	.0	.0	.0	.0
Vermont.....	.4	.4	.0	.6	.0	.0	.0	.0	.0	.0	.0	.0
Virginia.....	.0	1630	779	27	12	.0	.0	.0	1830	1520	27	23
Washington.....	.6	12	.0	11	.0	.0	.0	.1	415	.0	11	.0
West Virginia.....	.0	4210	.0	658	.0	.0	.0	.0	.0	.0	.0	.0
Wisconsin.....	1.6	3970	.0	40	.0	.0	.0	.0	1470	.0	15	.0
Wyoming.....	12	224	.0	38	.0	.0	.0	.0	.0	.0	.0	.0
Puerto Rico.....	5.1	.0	2000	1.3	.0	.0	.0	.0	.0	.0	.0	.0
Virgin Islands.....	.0	.0	103	.1	.0	.0	.0	.0	.0	.0	.0	.0
Total.....	505	105,000	40,300	3,000	440	61	42	42	25,200	15,700	1,310	1,410

## INSTREAM USE

### Hydroelectric Power

The hydroelectric power generation water-use category is an instream use and refers to the water used in the generation of electricity at plants where the turbine generators are driven by falling water. Hydroelectric power in this report is equivalent to the "Hydroelectric power" category used in previous water-use circulars in this series. Estimated quantities of water used for hydroelectric power generation may differ because of the way individual estimates are made of the quantities of water passed through the plants. If the water is passed through the plants only one time, then accurate estimates of water use can be obtained. However, if hydroelectric plants have pumped-storage facilities and recycle the same water a number of times, then it is difficult to obtain net water use.

Estimates of hydroelectric power water use and electric power generation, as with the thermoelectric category, are based on more information and fewer extrapolations than for the other water-use categories. Most of the information was obtained from hydroelectric utility companies. If information was not available

from utilities, then records of power generation were obtained from the U.S. Department of Energy's Energy Information Administration (1986). The power-generation data were multiplied by water-use coefficients to obtain estimates of hydroelectric power water use. It is assumed that none of the water used for hydroelectric power is consumed.

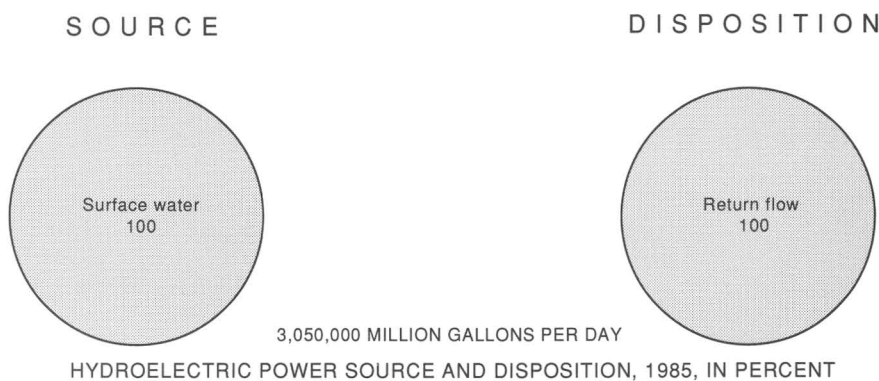
Fresh surface water provides virtually all water for hydroelectric power, and nearly all the water used is returned to streams, as shown in the chart below. The distribution of hydroelectric power water use and the estimates of hydroelectric power water use by water-resources region are shown in figure 17 and table 19, respectively. Similar information by State is shown in figure 18 and table 20.

Water used for hydroelectric power generation during 1985 was an estimated 3,050,000 Mgal/d (see tables 19 and 20), or 7 percent less than during 1980. This total is 2.4 times the average annual runoff in the conterminous United States (Graczyk and others, in press). It is possible for the hydroelectric power water use to exceed

average annual runoff because some water is used several times. During the period from 1980 to 1985, installed hydroelectric nameplate capacity increased 9 percent, and hydroelectric power generation increased 7 percent, from 277,000 to 296,000 gigawatt-hours.

Although the quantity of water evaporated in the generation of hydroelectric power (consumptive use) is very small, considerable depletion of the available water supply related to hydroelectric power use occurs as an indirect result of evaporation from reservoirs and repeated reuse of water within a pumped-storage power facility. However, reservoir evaporation is not included as a consumptive use for hydroelectric power in this report.

The Pacific Northwest water-resources region had by far the largest use of water for hydroelectric power generation in 1985 and accounted for almost one-half the water used for hydroelectric power in the Nation. More water was used for hydroelectric power generation in Washington, New York, and Oregon than in the rest of the United States.



## TOTAL WITHDRAWALS

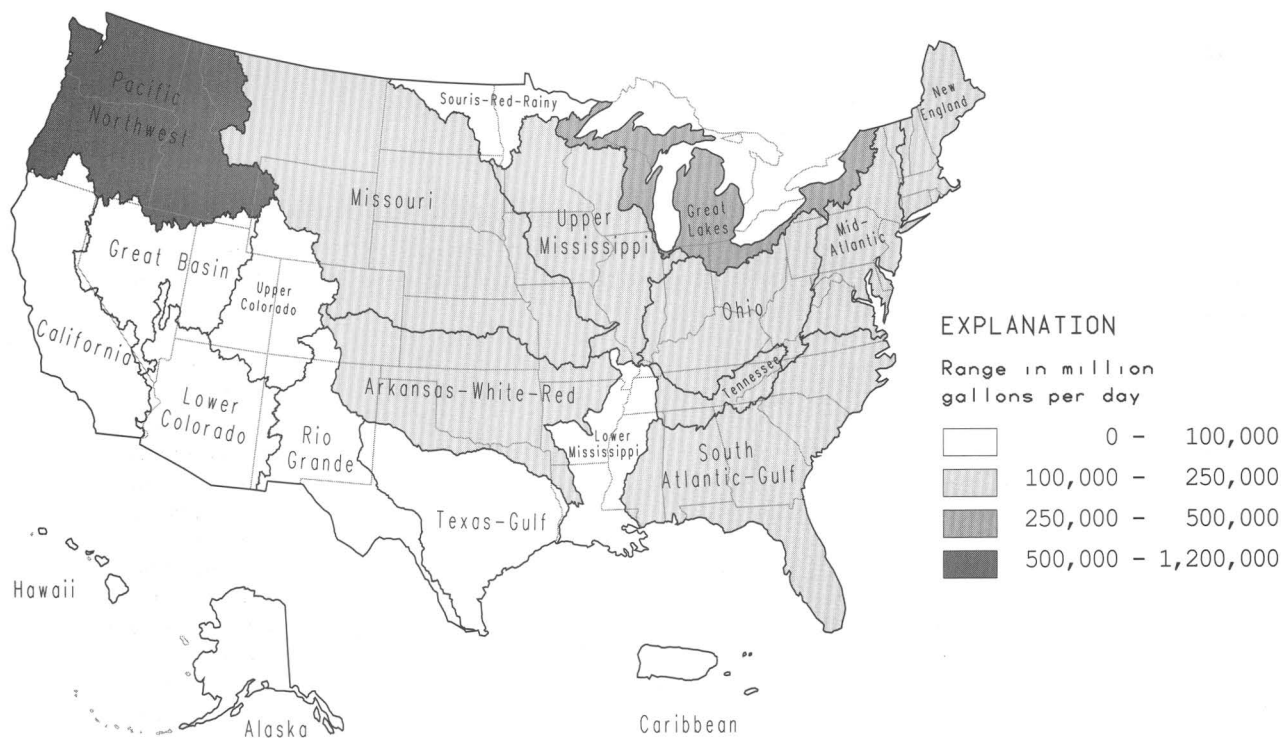


Figure 17. Hydroelectric power water use, by water-resources region, 1985.

Table 19.—Hydroelectric power water use, by region, 1985

[Figures may not add to totals because of independent rounding.  
Mgal/d = million gallons per day; GWh = gigawatt-hours]

REGION	WATER USE		POWER GENERATED, in GWh
	Mgal/d	thousand acre-feet per year	
New England.....	165000	185000	5910
Mid-Atlantic.....	175000	196000	4680
South Atlantic-Gulf..	200000	224000	14000
Great Lakes.....	456000	512000	31700
Ohio.....	137000	153000	4960
Tennessee.....	181000	203000	14700
Upper Mississippi....	107000	120000	3590
Lower Mississippi....	5190	5820	562
Souris-Red-Rainy....	3230	3620	95
Missouri Basin.....	135000	152000	17500
Arkansas-White-Red..	130000	146000	9380
Texas-Gulf.....	10600	11900	706
Rio Grande.....	3340	3750	429
Upper Colorado.....	21400	24000	9920
Lower Colorado.....	43300	48600	11700
Great Basin.....	4860	5450	759
Pacific Northwest....	1200000	1340000	133000
California.....	72000	80700	31300
Alaska.....	1480	1650	764
Hawaii.....	283	317	63
Caribbean.....	884	990	216
Total.....	3,050,000	3,420,000	296,000

TOTAL WITHDRAWALS

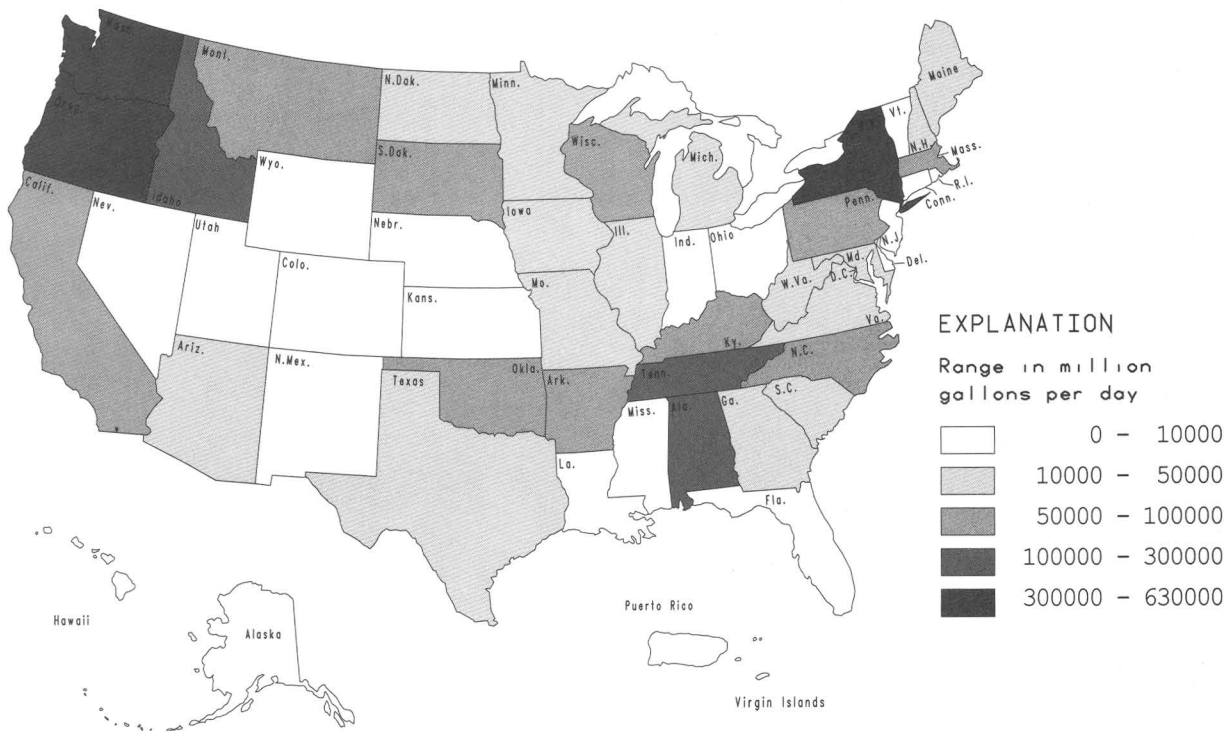


Figure 18. Hydroelectric power water use, by State, 1985.

**Table 20.—Hydroelectric power water use, by State, 1985**

[Figures may not add to totals because of independent rounding.  
Mgal/d = million gallons per day; GWh = gigawatt hours]

STATE	WATER USE		POWER GENERATED, in GWh
	Mgal/d	thousand acre-feet per year	
Alabama.....	114000	127000	7020
Alaska.....	1480	1650	764
Arizona.....	36300	40700	13900
Arkansas.....	59900	67200	4430
California.....	83800	93900	32000
Colorado.....	7270	8150	2400
Connecticut.....	4150	4650	276
Delaware.....	.0	.0	.0
D.C.....	.0	.0	.0
Florida.....	8040	9010	252
Georgia.....	40300	45200	3330
Hawaii.....	283	317	63
Idaho.....	103000	115000	11700
Illinois.....	23300	26100	594
Indiana.....	9620	10800	362
Iowa.....	17200	19300	918
Kansas.....	893	1000	7.4
Kentucky.....	91000	102000	2940
Louisiana.....	1380	1550	81
Maine.....	44300	49600	1690
Maryland.....	17400	19500	1540
Massachusetts.....	98100	110000	1990
Michigan.....	13400	15000	635
Minnesota.....	22700	25400	1050
Mississippi.....	.0	.0	.0
Missouri.....	20200	22600	3930
Montana.....	65500	73500	10200
Nebraska.....	7080	7940	683
Nevada.....	8910	9980	4350
New Hampshire.....	14500	16200	1470
New Jersey.....	77	86	3.5
New Mexico.....	717	803	129
New York.....	515000	577000	31400
North Carolina.....	53500	60000	6580
North Dakota.....	12700	14200	2180
Ohio.....	8290	9300	169
Oklahoma.....	68800	77200	4010
Oregon.....	437000	489000	38900
Pennsylvania.....	60700	68100	1330
Rhode Island.....	1410	1580	24
South Carolina.....	42100	47200	2660
South Dakota.....	60500	67900	6090
Tennessee.....	118000	132000	8420
Texas.....	15200	17000	1320
Utah.....	3340	3740	1010
Vermont.....	8640	9680	779
Virginia.....	17700	19900	1320
Washington.....	628000	704000	76900
West Virginia.....	16000	18000	907
Wisconsin.....	63300	71000	1730
Wyoming.....	6440	7220	1070
Puerto Rico.....	884	990	216
Virgin Islands.....	.0	.0	.0
Total.....	3,050,000	3,420,000	296,000

## MISCELLANEOUS USE

### Sewage Treatment

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Water-use terminology is continuing to expand. In addition to water withdrawals and consumptive use, the term "water use" also includes return flow. Because quality considerations are increasingly important in water management, knowledge is needed concerning the location of wastewater-treatment facilities and the quantities of treated wastewater released to surface- or ground-water sources.

The sewage-treatment category is a new category in this series of water-use circulars and includes information on facilities engaged primarily in the collection and disposal of wastewater conveyed through a sewer system. Water typically is collected from domestic, commercial, and

industrial users. Releases of treated water generally are to surface waters. The sewage-treatment category includes water released by public, industrial, and commercial wastewater-treatment facilities. However, only the quantities released from public wastewater-treatment facilities are given in this report, along with the numbers of public and other wastewater-treatment facilities.

The return-flow or release information usually is obtained from wastewater-treatment facility operators, municipal utility departments, or discharge permit files maintained by local, State, or Federal agencies. Return flows to surface water usually are regulated by State or Federal agencies. The number of wastewater-treatment

facilities typically is available from permit files at State or Federal agencies. The reliability of the data varies by State depending on available information.

About 20,600 public-treatment facilities released about 30,800 Mgal/d of treated wastewater nationwide during 1985. For each facility, an average of from 1 million to 2 million gal of treated wastewater was released daily to streams or other surface-water bodies. Largest return flows occurred in States and regions that have large populations and the largest withdrawals for public supply. California and New York, which had the largest public-supply withdrawals, reported the largest releases of treated water.

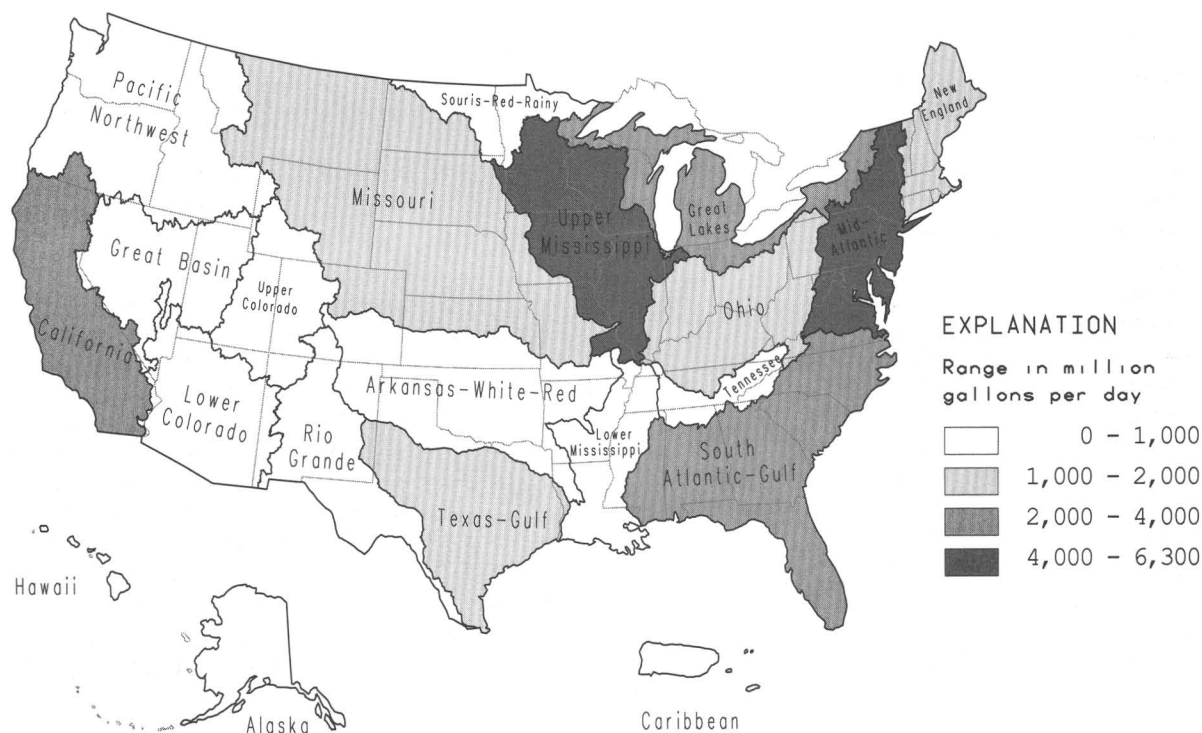


Figure 19. Sewage treatment water releases, by water-resources region, 1985.

Table 21.—Sewage treatment water releases, by region, 1985

[Figures may not add to totals because of independent rounding.  
Mgal/d = million gallons per day]

REGION	NUMBER OF FACILITIES		TOTAL PUBLIC RELEASES, in Mgal/d
	Public	Other	
New England.....	513	658	1690
Mid-Atlantic.....	1694	2608	6280
South Atlantic-Gulf..	2142	1783	2780
Great Lakes.....	1340	1102	3200
Ohio.....	3831	5340	1730
Tennessee.....	225	640	307
Upper Mississippi....	2633	642	5440
Lower Mississippi....	627	1111	777
Souris-Red-Rainy....	289	52	36
Missouri Basin.....	2290	1037	1190
Arkansas-White-Red...	1253	1726	891
Texas Gulf.....	1490	2072	1550
Rio Grande.....	117	136	143
Upper Colorado.....	173	200	48
Lower Colorado.....	232	75	215
Great Basin.....	176	95	388
Pacific Northwest....	645	303	981
California.....	889	715	2770
Alaska.....	20	38	51
Hawaii.....	29	123	139
Caribbean.....	123	125	153
Total.....	20,631	20,581	30,800

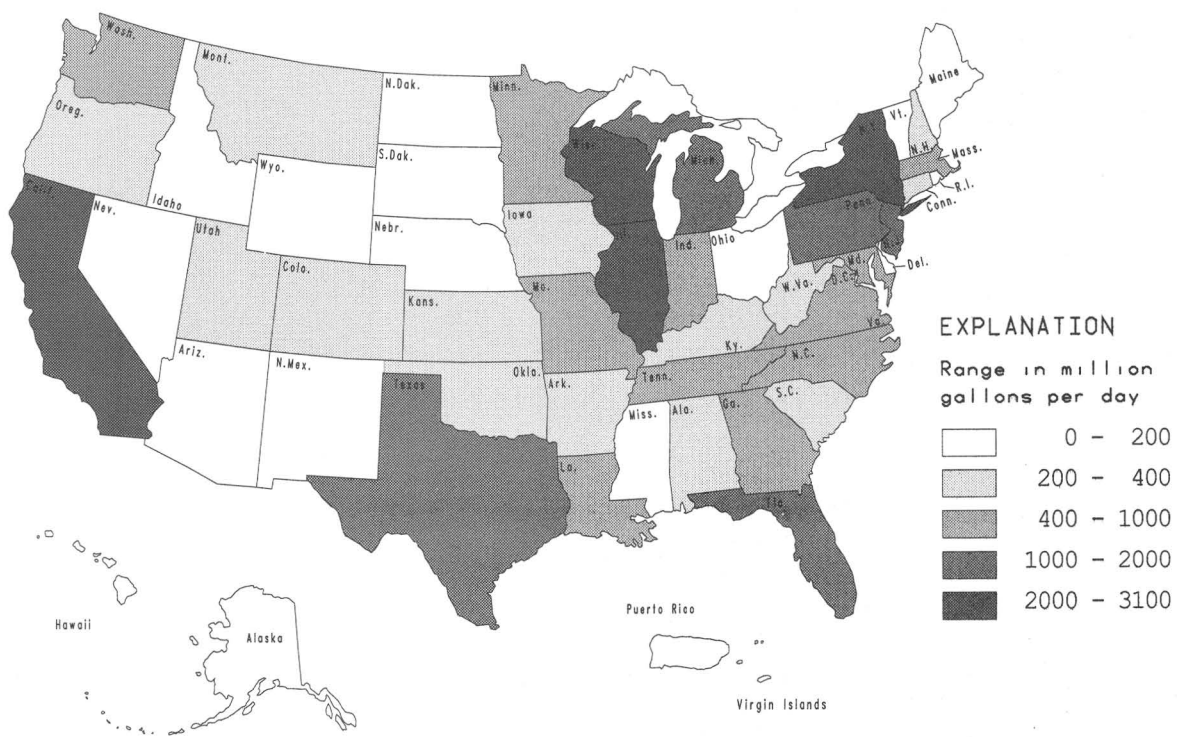


Figure 20. Sewage treatment water releases, by State, 1985.



**Table 22.—Sewage treatment water releases, by State, 1985**

[Figures may not add to totals because of independent rounding.]

Mgal/d = million gallons per day]

STATE	NUMBER OF FACILITIES		TOTAL PUBLIC RELEASES, in Mgal/d
	Public	Other	
Alabama.....	259	0	320
Alaska.....	20	38	51
Arizona.....	197	29	125
Arkansas.....	277	1708	287
California.....	892	745	2770
Colorado.....	255	399	336
Connecticut.....	88	50	371
Delaware.....	16	39	86
D.C.....	2	6	280
Florida.....	774	125	1120
Georgia.....	403	223	485
Hawaii.....	29	123	139
Idaho.....	122	75	140
Illinois.....	764	0	2160
Indiana.....	330	593	717
Iowa.....	626	392	313
Kansas.....	382	302	247
Kentucky.....	120	2746	220
Louisiana.....	257	108	488
Maine.....	96	7	103
Maryland.....	142	228	482
Massachusetts.....	203	511	834
Michigan.....	515	916	1610
Minnesota.....	667	19	454
Mississippi.....	243	209	196
Missouri.....	1660	572	885
Montana.....	229	118	202
Nebraska.....	477	35	170
Nevada.....	83	82	129
New Hampshire.....	65	80	252
New Jersey.....	264	938	1330
New Mexico.....	63	71	82
New York.....	485	0	3070
North Carolina.....	306	886	481
North Dakota.....	301	98	29
Ohio.....	1013	37	146
Oklahoma.....	536	152	287
Oregon.....	252	86	336
Pennsylvania.....	1087	3115	1690
Rhode Island.....	26	8	113
South Carolina.....	276	399	270
South Dakota.....	235	6	48
Tennessee.....	245	854	536
Texas.....	1690	2363	1680
Utah.....	152	38	341
Vermont.....	92	30	80
Virginia.....	270	416	551
Washington.....	232	118	436
West Virginia.....	2194	0	233
Wisconsin.....	511	82	2860
Wyoming.....	85	281	43
Puerto Rico.....	114	125	152
Virgin Islands.....	9	0	1.4
Total.....	20,631	20,581	30,800

## Other Water-Use Categories

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Many Federal and State agencies compile additional information related to water use that is not compiled by the National Water-Use Information Program. Even though additional information may be important in some States, it is not collected uniformly in every State; for example, reservoir evaporation accounts for large losses of water (consumptive use) in some States. The New Mexico State Engineer estimated reservoir evaporation during 1985 to be 423.5 thousand acre-ft (378 Mgal/d) (Wilson, 1986), or 20 percent of the State's total consumptive use. In Montana, reservoir evaporation was estimated to be 3,925 thousand acre-ft (3,500 Mgal/d) (Montana Department of Natural Resources and Conservation, 1986), or 54 percent of the State's total consumptive use during 1980.

In Oregon, the U.S. Geological Survey estimated that fish hatcheries, an instream use, used 783 Mgal/d of water in 1985. The Oregon Department of Environmental Quality and the Oregon Department of Fish and Wildlife can request that the Oregon Water Resources Commission establish minimum streamflows along designated river reaches for pollution abatement and (or) the maintenance of fish habitat. Once the Oregon Water Resources Commission establishes a minimum streamflow, the Oregon Water Resources Department is responsible for ensuring that the minimum streamflow is maintained.

The U.S. Bureau of Reclamation estimates annual consumptive water use (called depletions) for the entire Colorado River Basin. This effort was mandated by the Colorado River Basin Project Act of 1968 to aid in the management of water relative to the various interstate compacts and laws that affect the Colorado River. Types of uses that are estimated include reservoir evaporation, irrigation (including livestock water use and stockpond evaporation), municipal and industrial (including thermoelectric power generation and mining), fish and wildlife, recreation, and basin exports. The data are published in 5-year reports (1971–75, 1976–80). Data are reported by State and by major river subbasins.

Some of the State agencies that maintain information on additional water-use categories are listed on the following page.

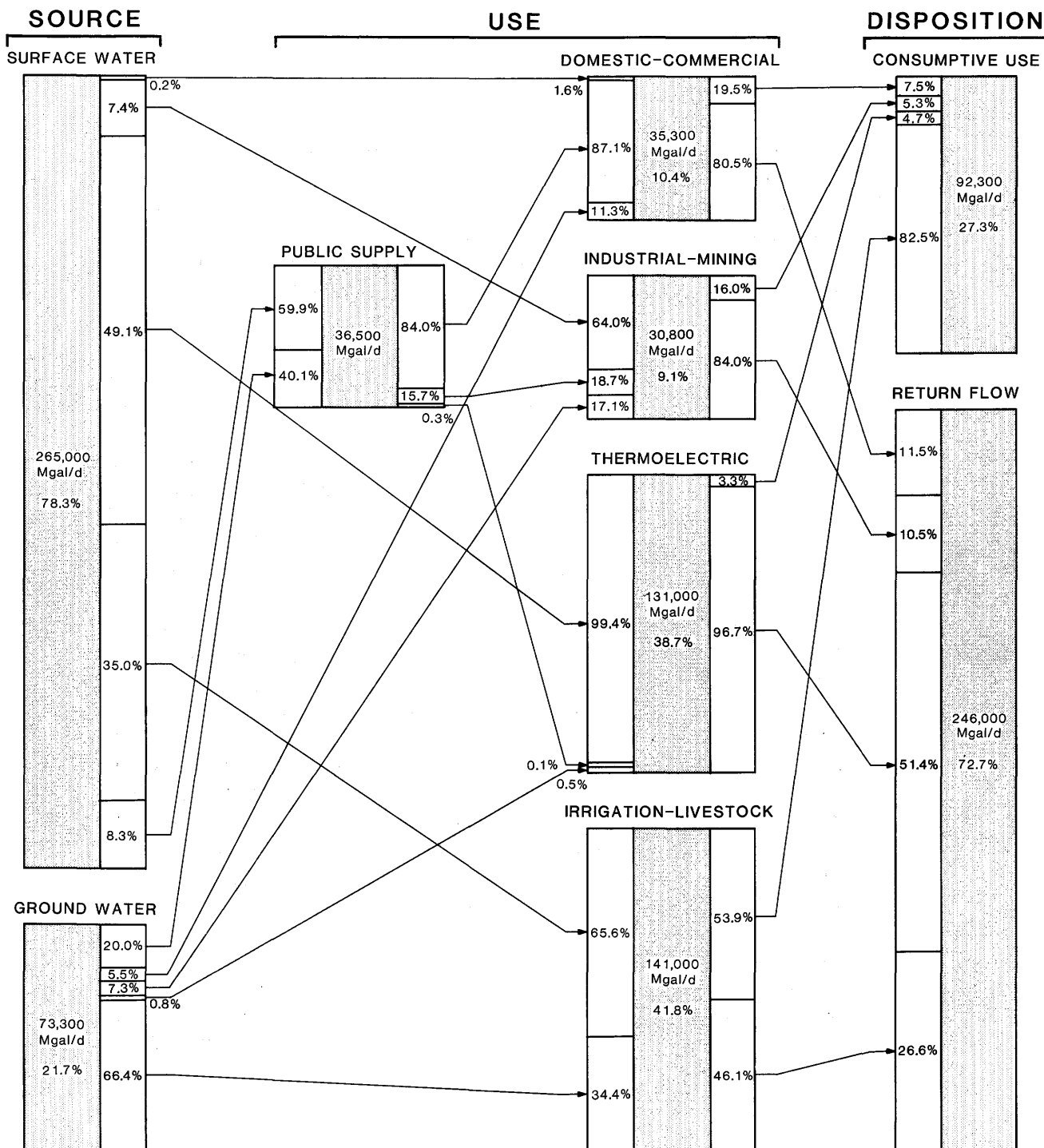
<b>Water-Use Category</b>	<b>Responsible State Agency</b>
<b>Aquaculture</b>	Alaska Department of Fish and Game Arkansas Soil and Water Conservation Commission Maryland Water Resources Administration Minnesota Department of Natural Resources Oregon Water Resources Department Puerto Rico Corporación Para el Desarrollo de Recursos Marinos
<b>Cooling and air conditioning</b>	Maryland Water Resources Administration Minnesota Department of Natural Resources Florida Water Management Districts
<b>Evaporation</b>	Montana Department of Natural Resources and Conservation New Mexico State Engineer Office
<b>Fire protection</b>	Minnesota Department of Natural Resources
<b>Fish and wildlife</b>	Illinois State Water Survey New Mexico State Engineer Office Oregon Department of Fish and Wildlife
<b>Fish farming</b>	Alaska Department of Fish and Game Arkansas Soil and Water Conservation Commission Minnesota Department of Natural Resources
<b>Hydrostatic testing</b>	Maryland Water Resources Administration
<b>Laboratories</b>	Maryland Water Resources Administration
<b>Noncrop irrigation (includes parks and golf courses)</b>	Maryland Water Resources Administration Minnesota Department of Natural Resources
<b>Quality improvement</b>	Minnesota Department of Natural Resources Oregon Department of Environmental Quality Oregon Water Resources Department
<b>Recreation</b>	Maryland Water Resources Administration New Mexico State Engineer Office South Carolina Department of Health and Environmental Control
<b>Residential heat pumps</b>	Florida Water Management Districts Maryland Water Resources Administration
<b>Snow making</b>	Minnesota Department of Natural Resources
<b>Water-level maintenance</b>	Minnesota Department of Natural Resources

## SUMMARY OF OFFSTREAM WATER USES

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Total withdrawals (fresh and saline) during 1985 were estimated to be 399,000 Mgal/d for all offstream water-use categories (public supply, domestic, commercial, irrigation, livestock, industrial, mining, thermoelectric power), or 10 percent less than the withdrawals estimated for 1980. Average per-capita use was 1,650 gal/d of freshwater and saline water and 1,400 gal/d of freshwater. Total surface-water withdrawals were estimated to be 325,000 Mgal/d during 1985, or 10 percent less than during 1980. About 59,600 Mgal/d of surface water withdrawn was saline water. Total ground-water withdrawals were estimated to be 74,000 Mgal/d, or 12 percent less than the 1980 withdrawals of 84,000 Mgal/d (revised). About 99 percent of ground water withdrawn was freshwater. The use of reclaimed sewage averaged about 579 Mgal/d, or 22 percent more than during 1980.

For a comparison of freshwater use, the eight offstream categories mentioned above have been combined into the following major categories: public supply, domestic and commercial, irrigation and livestock, industrial and mining, and thermoelectric power. The "Source," "Use" (withdrawals and deliveries), and "Disposition" of freshwater during 1985 for each category of use are shown in figure 21. The "Source" column shows the proportion of withdrawals by source and the distribution of withdrawals by water-use category. "Source" data indicate, for example, that surface water was the source of 265,000 Mgal/d of freshwater, or 78.3 percent of total freshwater withdrawals in the United States. Public supply is under the "Use" column and shows the total quantity of water withdrawn by public supply, the percentage of surface and ground water withdrawn, and the percentage of water delivered to the other water-use categories. The "Use" column also shows total freshwater use (self-supplied withdrawals and public-supply deliveries) for each category and the percentage that each category represents of all offstream water use. In addition, the "Use" column shows the proportion of consumptive use and return flow for each category. The "Use" data indicate, for example, that domestic and commercial use totaled 35,300 Mgal/d (including losses in the public-supply distribution system), or 10.4 percent of the Nation's total freshwater withdrawals. The "Disposition" column shows the quantity of consumptive use and return flow after use. The "Disposition" data indicate that of the total freshwater withdrawn, consumptive use was 92,300 Mgal/d, or 27.3 percent, and return flow was 246,000 Mgal/d, or 72.7 percent (including 23,600 Mgal/d of irrigation conveyance losses).

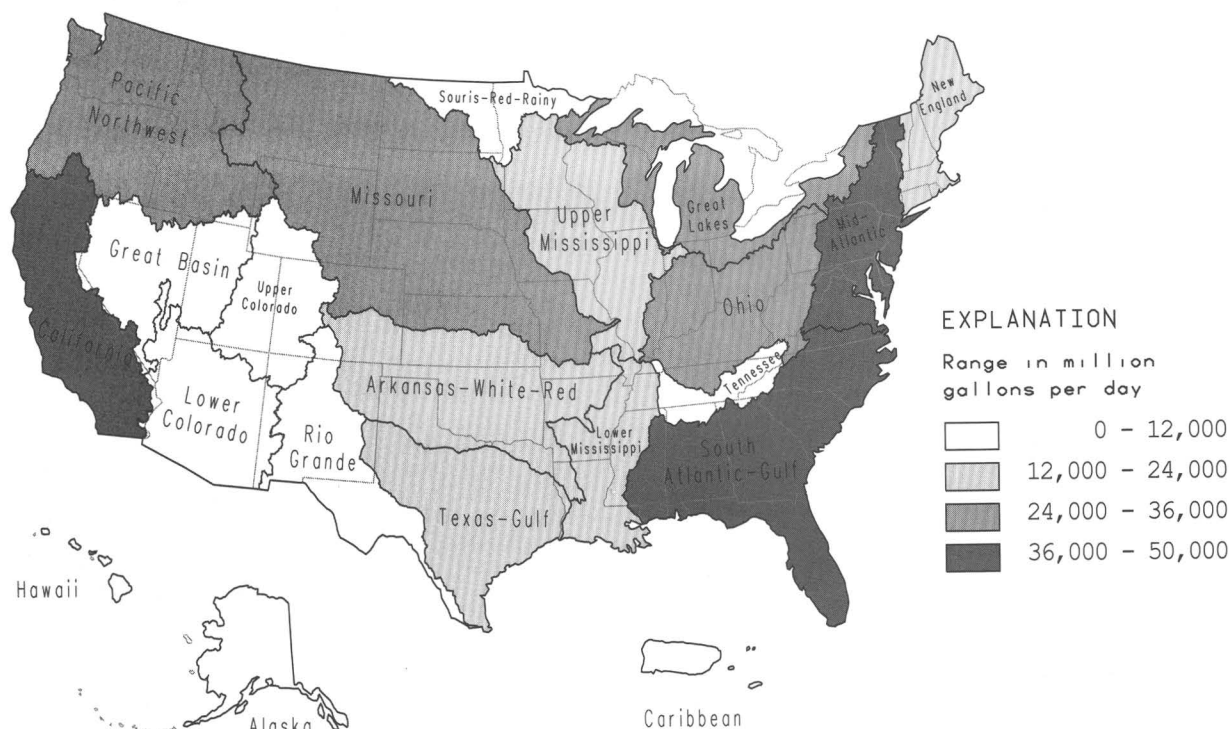


**Figure 21. Source, use, and disposition of freshwater in the United States, 1985.** For each water-use category, this diagram shows the relative proportion of water source and disposition and the general distribution of water from source to disposition. The lines and arrows indicate the distribution of water from source to disposition for each category; for example, surface water was 78.3 percent of total freshwater withdrawn, and, going from the "Source" to "Use" columns, the line from the surface-water block to the domestic and commercial block indicates that 0.2 percent of all surface water withdrawn was the source for 1.6 percent of total water (self-supplied withdrawals and public-supply deliveries) for domestic and commercial purposes. In addition, going from the "Use" to "Disposition" columns, the line from the domestic and commercial block to the consumptive use block indicates that 19.5 percent of the water for domestic and commercial purposes was consumptive use; this represented 7.5 percent of total consumptive use by all water-use categories.

A comparison by water-resources region (see table 23) indicates that the California, the Mid-Atlantic, and the South Atlantic–Gulf regions accounted for about 32 percent of the total water withdrawn in the United States. About 53 percent of the Nation's total withdrawals were in the eastern water-resources regions, which include the Mississippi and Souris Rivers, compared to 55 percent during 1980. Freshwater consumptive use in the East was about 11 percent of freshwater withdrawn and accounted for 21 percent of the Nation's freshwater consumptive use, about the same percentage as during 1980. By comparison, freshwater consumptive use in the West was about 41 percent of the freshwater withdrawals. The higher consumptive use in the West is attributed to the fact that 92 percent of the total water withdrawn for irrigation occurred in the West and irrigation accounts for the largest part of consumptive use. A similar comparison of total withdrawals by State (see table 24) indicates that 37 States and Puerto Rico had less water withdrawn for offstream uses during 1985 than during 1980. California accounted for the largest offstream withdrawals, 49,700 Mgal/d, about equal to the combined withdrawals of Texas and Idaho, the next largest users.

Several tables and illustrations are included in this section to summarize the large amount of data given in this report. The distribution of total self-supplied withdrawals and the estimates of total water use (withdrawals, conveyance losses, consumptive use) for all offstream categories by water-resources region are shown in figure 22 and table 23, respectively. Similar information by State is shown in figure 23 and table 24. The distribution of freshwater consumptive use by water-resources region and by State is shown in figures 24 and 25, respectively. A summary of water withdrawals by water-use categories is given by water-resources region and by State in tables 25 and 26, respectively. Surface- and ground-water withdrawals are listed separately in tables 27–30.

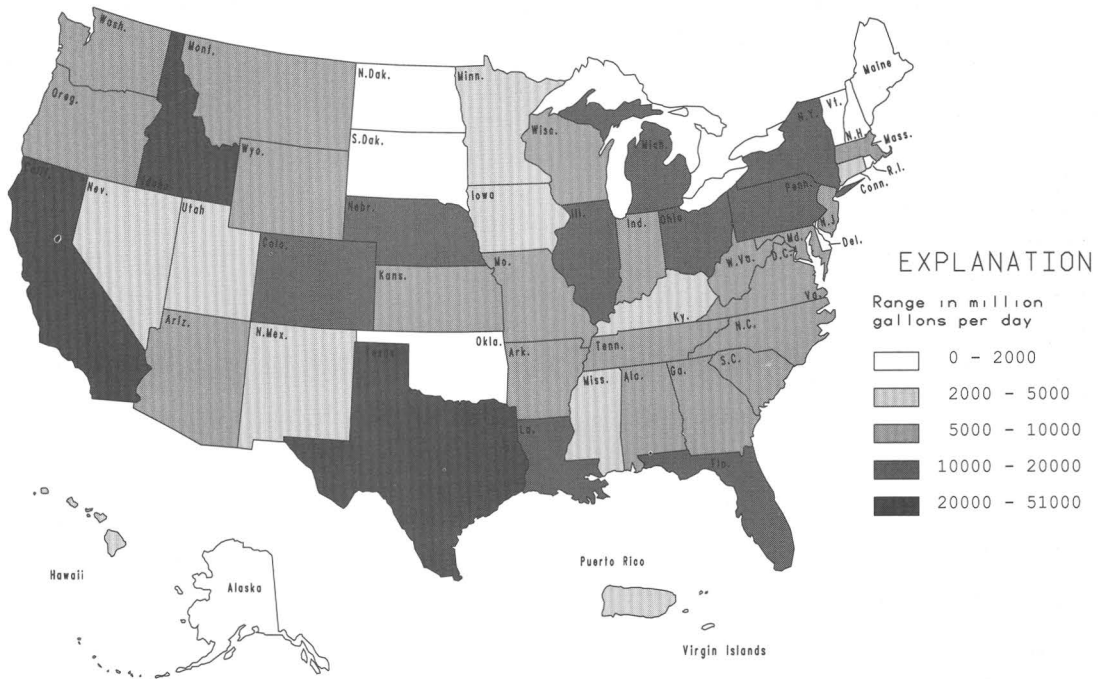
## TOTAL WITHDRAWALS

**Figure 22.** Total water withdrawals for all offshore water-use categories, by water-resources region, 1985.**Table 23.**—Total water use for all offshore water-use categories, by water-resources region, 1985

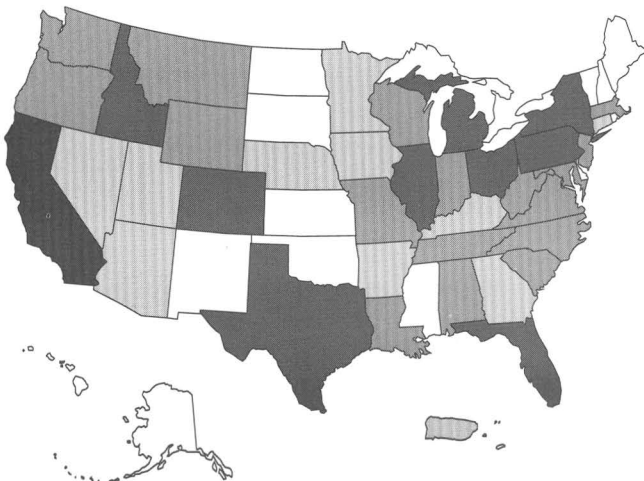
[Figures may not add to totals because of independent rounding. Mgal/d = million gallons per day; gal/d = gallons per day]

REGION	POPULATION, in thou- sands	PER CAPITA USE, fresh- water, in gal/d	WITHDRAWALS, in Mgal/d (includes irrigation conveyance losses)									RECLAIMED SEWAGE, in Mgal/d	CONVEY- ANCE LOSSES, in Mgal/d	CONSUM- TIVE USE, fresh- water, in Mgal/d
			By source and type											
			Ground water			Surface water			Total					
			Fresh	Saline	Total	Fresh	Saline	Total	Fresh	Saline	Total			
New England.....	12290	746	648	.0	648	8520	7120	15600	9160	7120	16300	.0	.0	726
Mid-Atlantic.....	39876	596	2650	.4	2640	21100	20000	41100	23800	20000	43700	82	1.7	1690
South Atlantic-Gulf..	32454	973	6380	3.4	6380	25200	11900	37100	31600	11900	43500	79	61	4920
Great Lakes.....	21319	1500	1160	4.5	1170	30700	.0	30700	31900	4.5	31900	21	.0	2170
Ohio.....	21881	1420	1870	18	1890	29300	.0	29300	31100	18	31200	.0	.3	2070
Tennessee.....	3848	2390	233	.0	233	8960	.0	8960	9190	.0	9190	.1	.0	335
Upper Mississippi....	20922	807	2570	20	2590	14300	.0	14300	16900	20	16900	4.2	12	1760
Lower Mississippi....	7258	2350	6280	5.6	6280	10800	499	11300	17100	505	17600	.0	471	5440
Souris-Red-Rainy....	720	389	101	.0	101	179	.0	179	280	.0	280	.6	8.3	123
Missouri Basin.....	10241	3370	9520	29	9540	24900	.0	24900	34500	29	34500	3.5	8810	12700
Arkansas-White-Red...	8488	1800	7670	26	7700	7610	.0	7610	15300	26	15300	5.4	898	8010
Texas-Gulf.....	14627	934	5110	164	5280	8550	4980	13500	13700	5140	18800	87	681	6010
Rio Grande.....	2094	2670	1680	40	1720	3920	.0	3920	5600	40	5640	2.1	608	2230
Upper Colorado.....	639	11800	129	27	157	7420	.0	7420	7550	27	7580	.0	1090	2400
Lower Colorado.....	3926	1880	3300	8.4	3300	4100	4.6	4100	7390	13	7400	42	1240	4240
Great Basin.....	1980	4090	1650	26	1680	6450	108	6550	8100	134	8230	19	1310	3600
Pacific Northwest....	8227	4310	6680	.0	6680	28800	37	28800	35500	37	35500	5.2	7370	12500
California.....	26358	1430	14800	284	15100	22800	12000	34800	37600	12300	49900	227	942	21000
Alaska.....	558	727	72	.0	72	334	.0	334	406	.0	406	.0	.0	27
Hawaii.....	1152	1100	655	.0	655	613	880	1490	1270	880	2150	1.4	91	132
Caribbean.....	3494	173	177	.2	177	428	2120	2550	605	2120	2730	.0	16	164
Total.....	242,351	1,400	73,300	656	74,000	265,000	59,600	325,000	338,000	60,300	399,000	579	23,600	92,300

# TOTAL WITHDRAWALS



## SURFACE-WATER WITHDRAWALS



## GROUND-WATER WITHDRAWALS

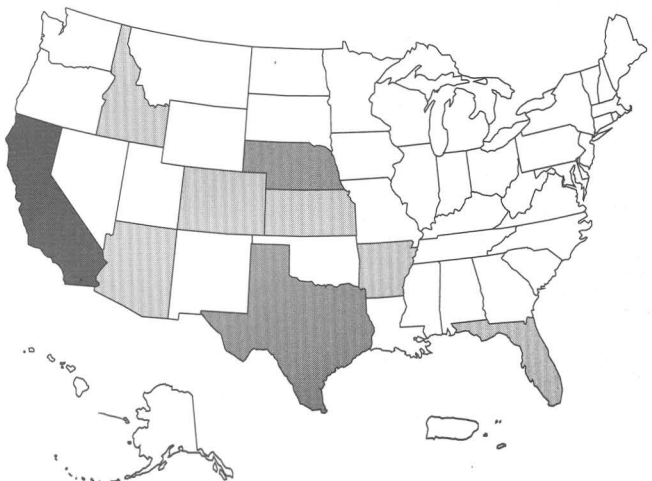


Figure 23. Total water withdrawals for all offstream water-use categories, by source and by State, 1985.



**Table 24.—Total water use for all offstream water-use categories, by State, 1985**

[Figures may not add to totals because of independent rounding. Mgal/d = million gallons per day; gal/d = gallons per day]

STATE	POPULATION, in thou- sands	PER CAPITA USE, fresh- water, in gal/d	WITHDRAWALS, in Mgal/d (includes irrigation conveyance losses)									RECLAIMED SEWAGE, in Mgal/d	CONVEY- ANCE LOSSES, in Mgal/d	CONSUMP- TIVE USE fresh- water, in Mgal/d
			By source and type						Total					
			Ground water			Surface water								
			Fresh	Saline	Total	Fresh	Saline	Total	Fresh	Saline	Total			
Alabama.....	4021	2140	343	3.4	347	8250	.0	8250	8590	3.4	8600	.0	.0	541
Alaska.....	558	727	72	.0	72	334	.0	334	406	.0	406	.0	.0	27
Arizona.....	3279	1960	3090	8.4	3100	3330	4.6	3330	6420	13	6430	34	1180	3700
Arkansas.....	2359	2500	3810	.0	3810	2100	.0	2100	5910	.0	5910	.0	275	3210
California.....	26354	1420	14800	284	15100	22600	12000	34600	37400	12300	49700	238	929	21100
Colorado.....	3231	4190	2310	32	2340	11200	.0	11200	13500	32	13600	4.9	2880	4850
Connecticut.....	3198	375	144	.0	144	1060	2580	3640	1200	2580	3780	.0	.0	106
Delaware.....	622	222	79	.0	79	60	1520	1580	138	1520	1650	.0	.0	39
D.C.....	626	556	.0	.0	.0	348	.0	348	348	.0	348	.0	.0	24
Florida.....	11328	554	4050	.0	4050	2230	10700	13000	6280	10700	17000	51	57	2730
Georgia.....	5976	899	1000	.0	1000	4370	77	4440	5370	77	5450	28	.0	838
Hawaii.....	1152	1100	655	.0	655	613	880	1490	1270	880	2150	1.4	91	132
Idaho.....	1005	22200	4800	.0	4800	17500	.0	17500	22300	.0	22300	.0	6430	5290
Illinois.....	11585	1250	930	38	968	13500	.0	13500	14400	38	14500	.0	.0	686
Indiana.....	5467	1470	635	.0	635	7400	.0	7400	8030	.0	8030	.0	.0	454
Iowa.....	2881	960	671	.0	671	2090	.0	2090	2770	.0	2770	.0	.0	473
Kansas.....	2451	2310	4800	.0	4800	866	.0	866	5670	.0	5670	.0	287	4710
Kentucky.....	3726	1130	205	.0	205	3990	.0	3990	4200	.0	4200	.0	.3	260
Louisiana.....	4480	2210	1430	5.6	1440	8480	499	8980	9920	505	10400	.0	146	2090
Maine.....	1157	733	66	.0	66	783	673	1460	848	673	1520	.0	.0	203
Maryland.....	4392	321	219	.0	219	1190	5300	6490	1410	5300	6710	81	.0	423
Massachusetts...	5822	1070	315	.0	315	5940	3400	9340	6260	3400	9660	.0	.0	316
Michigan.....	9007	1270	596	4.5	600	10800	.0	10800	11400	4.5	11400	21	.0	611
Minnesota.....	4193	676	685	.0	685	2150	.0	2150	2830	.0	2830	4.8	19	768
Mississippi.....	2613	885	1580	.0	1580	736	197	933	2310	197	2510	.0	92	661
Missouri.....	5029	1210	640	.3	640	5470	.0	5470	6110	.3	6110	.0	.0	504
Montana.....	823	10500	203	.0	203	8450	.0	8450	8650	.0	8650	.0	4270	1900
Nebraska.....	1605	6250	5590	.0	5590	4450	.0	4450	10000	.0	10000	.0	2610	4910
Nevada.....	968	3860	905	2.8	908	2830	.0	2830	3740	2.8	3740	11	732	1890
New Hampshire...	998	688	84	.0	84	603	207	810	687	207	894	.0	.0	76
New Jersey.....	7559	307	667	.1	668	1650	4620	6270	2320	4620	6940	.0	.0	279
New Mexico.....	1418	2320	1510	.0	1510	1780	.0	1780	3280	.0	3280	.0	.0	1530
New York.....	17783	508	1100	.0	1100	7950	6150	14100	9040	6150	15200	.0	.0	1400
North Carolina...	6256	1260	435	.0	435	7450	872	8320	7890	872	8760	.0	.0	439
North Dakota...	688	1690	127	.0	127	1040	.0	1040	1160	.0	1160	.0	8.4	201
Ohio.....	10752	1180	730	.1	730	12000	.0	12000	12700	.1	12700	.0	.0	396
Oklahoma.....	3302	386	568	.0	568	707	.0	707	1270	.0	1270	.0	3.3	576
Oregon.....	2676	2450	660	.0	660	5880	.0	5880	6540	.0	6540	5.2	772	2600
Pennsylvania....	11853	1210	799	.0	799	13500	.0	13500	14300	.0	14300	.0	.0	589
Rhode Island....	968	152	27	.0	27	120	261	381	148	261	409	.0	.0	23
South Carolina..	3348	2040	214	0	214	6600	6.3	6610	6810	6.3	6820	.0	.0	340
South Dakota....	706	956	249	.0	249	425	.0	425	675	.0	675	.0	120	361
Tennessee.....	4762	1770	444	.0	444	8010	.0	8010	8450	.0	8450	.1	.0	275
Texas.....	16361	1230	7180	229	7410	12900	4980	17900	20100	5210	25300	93	747	8650
Utah.....	1645	2540	790	25	815	3390	108	3500	4180	133	4320	5.8	305	2130
Vermont.....	535	235	37	.0	37	89	.0	89	126	.0	126	.0	.0	26
Virginia.....	5706	853	341	.2	341	4530	2380	6910	4870	2380	7250	1.5	5.2	269
Washington.....	4384	1600	1220	.0	1220	5780	37	5810	7000	37	7030	.0	39	4700
West Virginia...	1936	2810	227	.0	227	5210	.0	5210	5440	.0	5440	.0	.0	877
Wisconsin.....	4804	1400	570	.0	570	6170	.0	6170	6740	.0	6740	.0	.0	321
Wyoming.....	509	12200	504	23	526	5700	.0	5700	6200	23	6220	.0	1610	2670
Puerto Rico.....	3390	176	175	.0	175	423	2000	2430	598	2000	2600	.0	16	163
Virgin Islands..	104	68	1.4	.2	1.6	5.7	117	123	7.1	117	124	.0	.0	1.2
Total.....	242,351	1,400	73,300	656	74,000	265,000	59,600	325,000	338,000	60,300	399,000	579	23,600	92,300

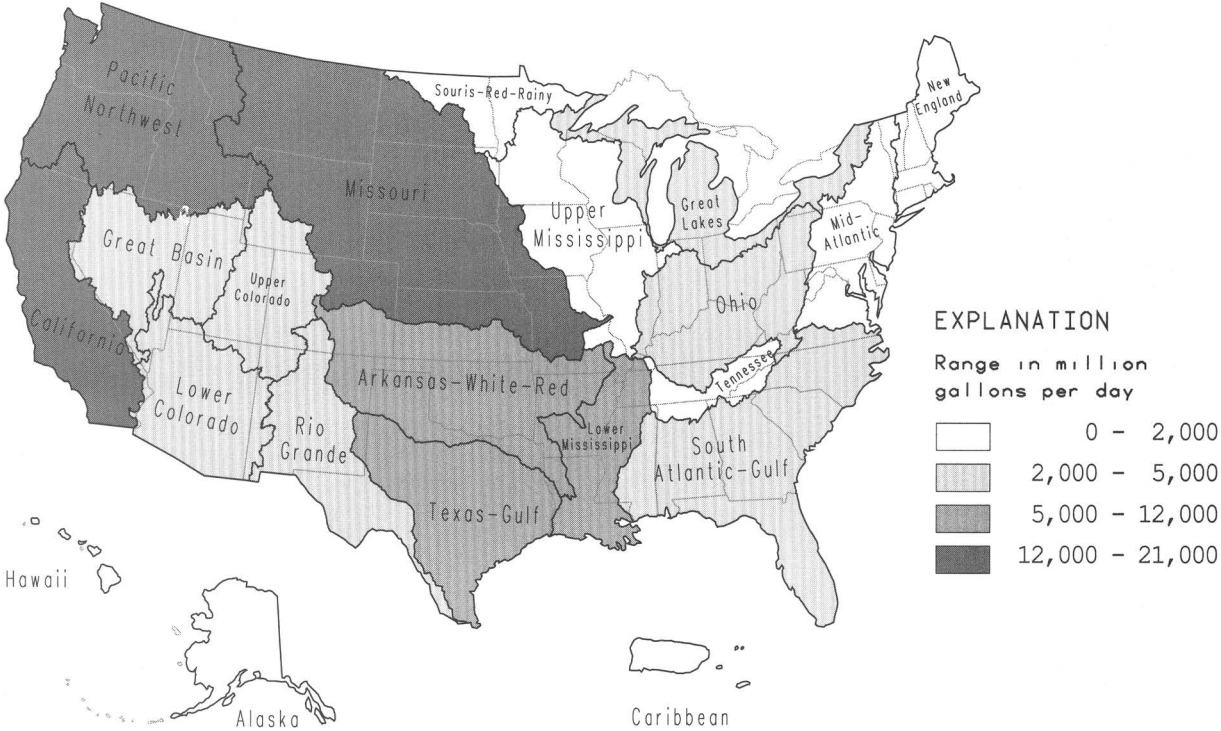
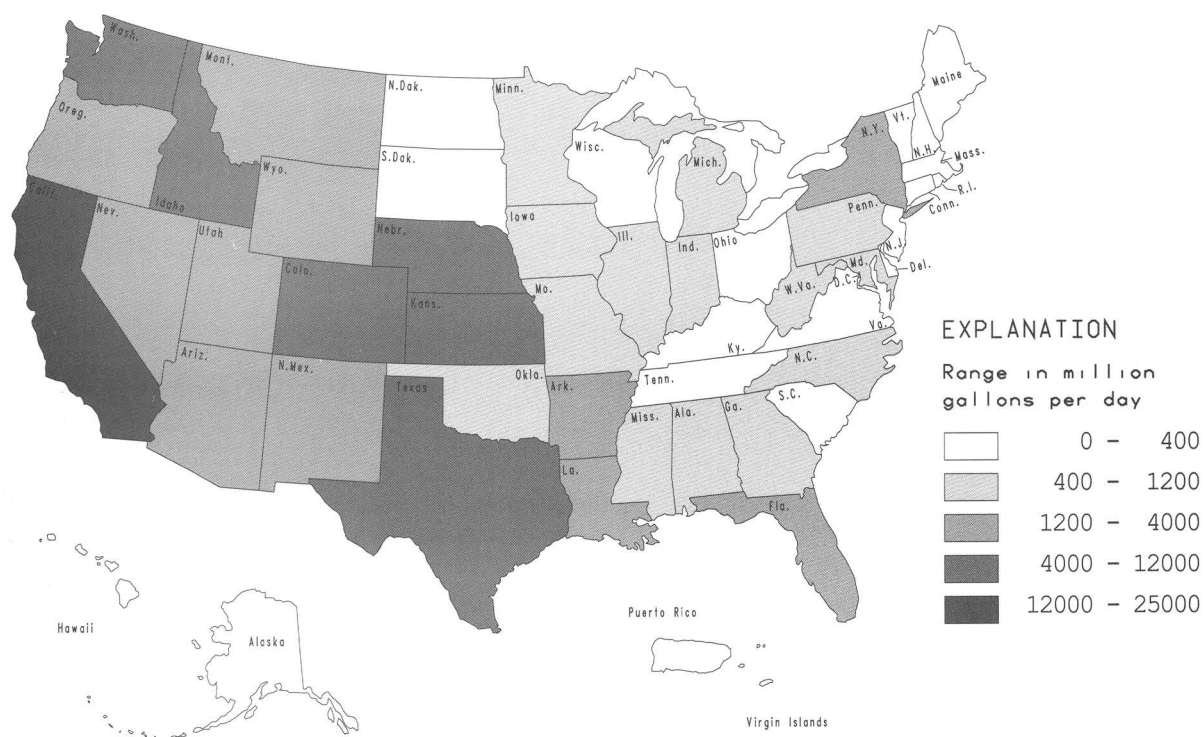


Figure 24. Freshwater consumptive use, by water-resources region, 1985.



**Figure 25.** Freshwater consumptive use, by State, 1985.

**Table 25.—Summary of water withdrawals for offstream water-use categories, by water-resources region, 1985**

[Figures may not add to totals because of independent rounding. All values in million gallons per day]

	PUBLIC SUPPLY	DOMESTIC	COMMER- CIAL	IRRIGATION	LIVESTOCK	INDUSTRIAL		MINING		THERMOELECTRIC		TOTAL	
	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh	Saline	Fresh	Saline	Fresh	Saline	Fresh	Saline
New England.....	1450	125	284	25	44	685	120	13	.0	6540	7000	9160	7120
Mid-Atlantic.....	6040	447	177	248	142	2480	1550	226	.5	14000	18400	23800	20000
South Atlantic-Gulf..	4210	643	157	3630	277	3320	69	407	3.4	18900	11800	31600	11900
Great Lakes.....	4080	286	97	254	78	4410	3.7	252	.9	22400	.0	31900	4.5
Ohio.....	2440	371	69	40	184	3190	.0	423	18	24400	.0	31100	18
Tennessee.....	469	62	3.1	10	59	1760	.0	16	.0	6810	.0	9190	.0
Upper Mississippi....	1880	383	140	358	300	874	.0	193	20	12800	.0	16900	20
Lower Mississippi....	953	82	8.6	5810	892	2300	5.3	8.8	5.3	7010	494	17100	505
Souris-Red-Rainy....	64	22	.0	75	13	46	.0	22	.0	38	.0	280	.0
Missouri Basin.....	1580	131	60	24300	373	204	.0	322	29	7510	.0	34500	29
Arkansas-White-Red...	1380	126	46	8840	255	493	.0	67	26	4070	.0	15300	26
Texas-Gulf.....	2460	94	18	4950	176	849	1430	100	163	5020	3550	13700	5140
Rio Grande.....	455	36	9.1	4970	40	7.4	.0	63	40	17	.0	5600	40
Upper Colorado.....	127	8.9	6.6	7170	39	7.6	.0	59	27	131	.0	7550	27
Lower Colorado.....	829	31	23	6240	69	53	8.3	103	.1	47	4.6	7390	13
Great Basin.....	529	19	3.6	7370	69	25	.0	67	130	13	3.9	8100	134
Pacific Northwest....	1620	268	38	30800	1090	1050	37	149	.0	439	.0	35500	37
California.....	5300	143	53	30800	201	433	262	165	301	480	11700	37600	12300
Alaska.....	76	9.7	.4	.0	156	114	.0	19	.0	30	.0	406	.0
Hawaii.....	204	11	33	906	3.8	20	.0	.0	.0	90	880	1270	880
Caribbean.....	395	20	.9	157	8.7	19	14	.0	.0	5.1	2110	605	2120
Total.....	36,500	3,320	1,230	137,000	4,470	22,300	3,500	2,670	764	131,000	56,000	338,000	60,300

**Table 26.—Summary of water withdrawals for offstream water-use categories, by State, 1985**

[Figures may not add to totals because of independent rounding. All values in million gallons per day]

STATE	PUBLIC SUPPLY	DOMESTIC	COMMER- CIAL	IRRIGATION	LIVESTOCK	INDUSTRIAL		MINING		THERMOELECTRIC		TOTAL	
	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh	Saline	Fresh	Saline	Fresh	Saline	Fresh	Saline
Alabama.....	615	39	3.2	69	96	838	.0	10	3.4	6920	.0	8590	3.4
Alaska.....	76	9.7	.4	.0	156	114	.0	19	.0	30	.0	406	.0
Arizona.....	618	27	17	5520	61	45	8.3	80	.0	53	4.6	6420	13
Arkansas.....	257	60	8.0	3870	440	172	.0	3.3	.0	1090	.0	5910	.0
California.....	5310	140	53	30600	199	431	262	165	301	480	11700	37400	12300
Colorado.....	737	17	8.4	12400	61	120	.0	59	32	110	.0	13500	32
Connecticut.....	362	39	8.6	2.7	8.4	77	68	1.7	.0	700	2510	1200	2589
Delaware.....	77	10	2.0	27	1.9	19	391	.0	.0	.9	1120	138	15.0
D.C.....	218	.0	.0	.0	.0	.0	.0	.0	.0	130	.0	348	.0
Florida.....	1680	259	56	2910	66	394	27	258	.0	651	10700	6280	10700
Georgia.....	836	99	28	453	47	606	31	19	.0	3280	46	5370	77
Hawaii.....	204	11	33	906	3.8	20	.0	.0	.0	90	880	1270	880
Idaho.....	212	89	16	20600	1040	199	.0	135	.0	.0	.0	22300	.0
Illinois.....	1780	130	107	71	57	535	.0	66	38	11700	.0	14400	38
Indiana.....	575	139	1.1	47	48	2660	.0	91	.0	4480	.0	8030	.0
Iowa.....	350	65	38	67	172	197	.0	63	.0	1810	.0	2770	.0
Kansas.....	316	42	.0	4730	68	81	.0	14	.0	415	.0	5670	.0
Kentucky.....	404	47	16	7.7	50	241	.0	25	.0	3410	.0	4200	.0
Louisiana.....	629	46	.2	1480	203	2090	5.3	2.0	5.3	5470	494	9920	505
Maine.....	108	19	38	1.9	29	215	30	4.0	.0	432	642	848	673
Maryland.....	771	63	25	34	23	74	275	21	.5	399	5030	1410	5300
Massachusetts...	767	35	238	16	1.3	129	22	2.0	.0	5070	3380	6260	3400
Michigan.....	1250	123	34	210	25	1320	3.7	60	.8	8390	.0	11400	4.5
Minnesota.....	473	131	26	209	63	184	.0	273	.0	1470	.0	2830	.0
Mississippi.....	312	16	4.1	886	385	227	5.7	3.7	.0	479	191	2310	197
Missouri.....	645	54	17	306	41	88	.0	28	.3	4930	.0	6110	.3
Montana.....	158	16	.0	8300	50	56	.0	4.2	.0	67	.0	8650	.0
Nebraska.....	248	24	.3	7270	120	48	.0	119	.0	2210	.0	10000	.0
Nevada.....	288	12	7.4	3350	26	10	.0	22	2.8	23	.0	3740	2.8
New Hampshire...	89	22	.0	.6	1.2	238	.2	1.2	.0	336	207	687	207
New Jersey.....	1050	64	15	132	3.1	256	801	80	.0	726	3820	2320	4620
New Mexico.....	226	38	7.3	2820	50	.8	.0	82	.0	59	.0	3280	.0
New York.....	2860	191	130	38	20	1030	.0	50	.0	4720	6150	9040	6150
North Carolina..	595	169	23	132	34	414	6.0	119	.0	6400	866	7890	872
North Dakota....	69	15	.1	154	22	8.9	.0	3.6	.0	892	.0	1160	.0
Ohio.....	1420	139	51	17	41	462	.0	78	.1	10500	.0	12700	.1
Oklahoma.....	521	26	32	445	4.6	106	.0	7.1	.0	134	.0	1270	.0
Oregon.....	416	80	1.6	5710	25	293	.0	7.5	.0	12	.0	6540	.0
Pennsylvania....	1600	184	27	11	70	2060	.0	148	.0	10200	.0	14300	.0
Rhode Island....	116	5.6	.0	3.4	2.3	17	.2	2.7	.0	.0	261	148	261
South Carolina..	359	62	41	34	10	1130	.0	5.3	.0	5180	6.3	6810	6.3
South Dakota....	80	16	17	460	47	8.7	.0	40	.0	4.2	.0	675	.0
Tennessee.....	627	70	4.9	8.9	65	1600	.0	13	.0	6060	.0	8450	.0
Texas.....	2990	105	25	8120	261	983	1430	121	229	7460	3550	20100	5210
Utah.....	447	6.1	.4	3590	38	28	.0	56	129	24	3.9	4180	133
Vermont.....	53	12	.0	.5	5.6	54	.0	1.1	.0	.8	.0	126	.0
Virginia.....	579	112	22	52	53	576	81	16	.0	3460	2300	4870	2380
Washington.....	955	98	20	4940	30	519	37	3.0	.0	427	.0	7000	37
West Virginia...	151	21	.8	3.7	26	886	.0	142	.0	4210	.0	5440	.0
Wisconsin.....	575	84	3.8	84	90	461	.0	.0	.0	5440	.0	6740	.0
Wyoming.....	98	13	17	5660	16	11	.0	150	23	236	.0	6200	23
Puerto Rico.....	391	18	.0	157	8.6	18	.0	.0	.0	5.1	2000	598	2000
Virgin Islands..	4.5	1.6	.9	.0	.0	.0	14	.0	.0	.0	103	7.1	117
Total.....	36,500	3,320	1,230	137,000	4,470	22,300	3,500	2,670	764	131,000	56,000	338,000	60,300

**Table 27.—Surface-water withdrawals for offstream water-use categories, by water-resources region, 1985**

[Figures may not add to totals because of independent rounding. All values in million gallons per day]

REGION	PUBLIC SUPPLY	DOMESTIC	COMMER- CIAL	IRRIGATION	LIVESTOCK	INDUSTRIAL		MINING		THERMOELECTRIC		TOTAL	
	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh	Saline	Fresh	Saline	Fresh	Saline	Fresh	Saline
New England.....	1130	.0	198	21	31	597	120	8.9	.0	6530	7000	8520	7120
Mid-Atlantic.....	4810	.0	49	148	36	1960	1550	132	.5	14400	18400	21100	20000
South Atlantic-Gulf..	2000	.0	46	1690	78	2430	69	58	.0	18900	11800	25200	11900
Great Lakes.....	3640	.1	71	136	14	4210	.0	240	.0	22400	.0	30700	.0
Ohio.....	1720	4.7	12	21	87	2920	.0	163	.0	24300	.0	29300	.0
Tennessee.....	372	.0	.1	8.9	24	1730	.0	14	.0	6810	.0	8960	.0
Upper Mississippi....	706	.0	64	65	43	554	.0	133	.0	12700	.0	14300	.0
Lower Mississippi....	324	.0	.6	1390	257	1860	.0	6.4	5.0	6930	494	10800	499
Souris-Red-Rainy....	35	.0	.0	36	3.8	45	.0	22	.0	38	.0	179	.0
Missouri Basin.....	974	2.5	16	16100	151	86	.0	177	.0	7430	.0	24900	.0
Arkansas-White-Red...	1020	1.2	8.3	1980	145	389	.0	26	.0	4040	.0	7610	.0
Texas-Gulf.....	1410	.0	7.3	1340	113	689	1430	17	.0	4970	3550	8550	4980
Rio Grande.....	158	.0	.3	3730	24	1.1	.0	4.9	.0	1.5	.0	3920	.0
Upper Colorado.....	88	.4	1.2	7140	35	6.1	.0	21	.0	131	.0	7420	.0
Lower Colorado.....	371	1.5	.5	3640	43	8.1	.0	20	.0	7.1	4.6	4100	4.6
Great Basin.....	207	2.0	.9	6200	21	3.5	.0	6.0	108	4.5	.0	6450	108
Pacific Northwest....	994	23	.4	26400	32	717	37	144	.0	438	.0	28800	37
California.....	1570	15	5.6	20500	160	105	254	58	25	412	11700	22800	12000
Alaska.....	35	.7	.0	.0	146	106	.0	19	.0	26	.0	334	.0
Hawaii.....	31	.3	.0	570	3.1	4.8	.0	.0	.0	3.8	880	613	880
Caribbean.....	311	10	.4	107	.0	.0	14	.0	.0	.0	2110	428	2120
Total.....	21,900	62	481	91,300	1,450	18,400	3,480	1,270	138	130,000	56,000	265,000	59,600

**Table 28.—Surface-water withdrawals for offstream water-use categories, by State, 1985**

[Figures may not add to totals because of independent rounding. All values in million gallons per day]

STATE	PUBLIC SUPPLY	DOMESTIC	COMMER- CIAL	IRRIGATION	LIVESTOCK	INDUSTRIAL		MINING		THERMOELECTRIC		TOTAL	
	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh	Saline	Fresh	Saline	Fresh	Saline	Fresh	Saline
Alabama.....	442	.0	.0	51	29	804	.0	.0	.0	6920	.0	8250	.0
Alaska.....	35	.7	.0	.0	146	106	.0	19	.0	26	.0	334	.0
Arizona.....	233	1.4	.1	3020	36	.7	.0	13	.0	21	4.6	3330	4.6
Arkansas.....	156	.0	1.9	541	198	108	.0	2.3	.0	1090	.0	2100	.0
California.....	1570	15	5.7	20300	159	105	254	58	25	412	11700	22600	12000
Colorado.....	651	.0	.3	10300	45	113	.0	30	.0	96	.0	11200	.0
Connecticut.....	296	.0	.0	2.6	2.0	59	68	1.4	.0	694	2510	1060	2580
Delaware.....	49	.0	.0	8.0	.0	3.1	391	.0	.0	.0	1120	60	1520
D.C.....	218	.0	.0	.0	.0	.0	.0	.0	.0	130	.0	348	.0
Florida.....	185	.0	1.0	1320	8.1	54	27	22	.0	633	10700	2230	10700
Georgia.....	631	.0	4.6	145	22	283	31	2.9	.0	3280	46	4370	77
Hawaii.....	31	.3	.0	570	3.1	4.8	.0	.0	.0	3.8	880	613	880
Idaho.....	27	13	.0	17300	.0	26	.0	135	.0	.0	.0	17500	.0
Illinois.....	1320	.0	74	.0	.0	385	.0	53	.0	11700	.0	13500	.0
Indiana.....	304	.0	.1	11	.0	2550	.0	83	.0	4450	.0	7400	.0
Iowa.....	92	.0	9.0	15	37	126	.0	12	.0	1800	.0	2090	.0
Kansas.....	158	.0	.0	260	26	11	.0	8.3	.0	403	.0	866	.0
Kentucky.....	356	4.8	11	7.4	48	175	.0	22	.0	3370	.0	3990	.0
Louisiana.....	352	.0	.0	775	127	1790	.0	1.2	5.0	5440	494	8480	499
Maine.....	84	.0	28	1.7	26	207	30	3.2	.0	432	642	783	673
Maryland.....	702	.0	6.3	15	9.8	54	275	8.2	.5	397	5030	1190	5300
Massachusetts....	586	.0	171	12	.9	103	22	.0	.0	5070	3380	5940	3400
Michigan.....	1030	.1	26	119	5.4	1200	.0	52	.0	8390	.0	10800	.0
Minnesota.....	208	.0	1.8	78	9.5	108	.0	271	.0	1470	.0	2150	.0
Mississippi.....	37	.0	.0	161	12	69	5.7	.6	.0	430	191	736	197
Missouri.....	474	.0	.0	23	30	52	.0	3.3	.0	4890	.0	5470	.0
Montana.....	96	.8	.0	8220	34	27	.0	3.6	.0	67	.0	8450	.0
Nebraska.....	39	.0	.0	2090	19	7.2	.0	111	.0	2190	.0	4450	.0
Nevada.....	193	.6	.4	2600	20	7.8	.0	2.7	.0	7.5	.0	2830	.0
New Hampshire....	61	.0	.0	.6	.7	204	.2	1.1	.0	336	207	603	207
New Jersey.....	641	.0	1.1	95	.0	127	801	68	.0	722	3820	1650	4620
New Mexico.....	28	.0	.0	1650	39	.4	.0	13	.0	48	.0	1780	.0
New York.....	2330	.0	66	18	7.3	760	.0	50	.0	4720	6150	7950	6150
North Carolina...	507	.0	7.9	123	5.1	371	6.0	38	.0	6400	866	7450	872
North Dakota.....	39	.0	.0	90	8.9	6.8	.0	.9	.0	891	.0	1040	.0
Ohio.....	1020	.0	.4	9.4	16	451	.0	.4	.0	10500	.0	12000	.0
Oklahoma.....	414	1.2	6.9	65	2.6	84	.0	.4	.0	133	.0	707	.0
Oregon.....	332	9.6	.1	5240	21	263	.0	7.2	.0	12	.0	5880	.0
Pennsylvania.....	1340	.0	.0	9.2	8.4	1910	.0	30	.0	10200	.0	13500	.0
Rhode Island.....	101	.0	.0	3.1	.8	13	.2	2.3	.0	.0	261	120	261
South Carolina...	283	.0	32	13	5.0	1090	.0	2.4	.0	5180	6.3	6600	6.3
South Dakota.....	16	.9	5.2	347	28	.9	.0	25	.0	2.6	.0	425	.0
Tennessee.....	384	.0	.0	6.6	34	1510	.0	11	.0	6060	.0	8010	.0
Texas.....	1760	.0	7.7	2700	150	834	1430	18	.0	7400	3550	12900	4980
Utah.....	148	1.6	.0	3200	7.2	7.5	.0	5.5	108	24	.0	3390	108
Vermont.....	36	.0	.0	.5	1.7	50	.0	1.1	.0	.4	.0	89	.0
Virginia.....	504	.0	3.8	46	25	477	81	14	.0	3460	2300	4530	2380
Washington.....	616	.0	.3	4310	8.8	411	37	.6	.0	427	.0	5780	37
West Virginia....	114	.0	.5	3.4	9.6	853	.0	24	.0	4210	.0	5210	.0
Wisconsin.....	301	.0	.0	2.0	3.1	424	.0	.0	.0	5440	.0	6170	.0
Wyoming.....	50	1.3	7.1	5360	13	3.6	.0	39	.0	224	.0	5700	.0
Puerto Rico.....	307	9.1	.0	107	.0	.0	.0	.0	.0	.0	2000	423	2000
Virgin Islands...	4.3	1.0	.4	.0	.0	.0	14	.0	.0	.0	103	5.7	117
Total.....	21,900	62	481	91,300	1,450	18,400	3,480	1,270	138	130,000	56,000	265,000	59,600

**Table 29.—Ground-water withdrawals for offstream water-use categories, by water-resources region, 1985**

[Figures may not add to totals because of independent rounding. All values in million gallons per day]

REGION	PUBLIC SUPPLY	DOMESTIC	COMMER- CIAL	IRRIGATION	LIVESTOCK	INDUSTRIAL		MINING		THERMO- ELECTRIC	TOTAL	
	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh	Saline	Fresh	Saline	Fresh	Fresh	Saline
New England.....	323	125	86	4.6	13	88	.0	3.6	.0	5.8	648	.0
Mid-Atlantic.....	1240	447	128	100	106	526	.4	94	.0	6.6	2650	.4
South Atlantic-Gulf..	2200	643	111	1950	199	890	.0	348	3.4	35	6380	3.4
Great Lakes.....	445	286	26	118	64	203	3.7	13	.9	9.3	1160	4.5
Ohio.....	718	366	57	19	98	271	.0	260	18	80	1870	18
Tennessee.....	97	62	3.0	1.3	35	33	.0	2.5	.0	.0	233	.0
Upper Mississippi....	1170	383	76	293	257	320	.0	60	20	15	2570	20
Lower Mississippi....	629	82	8.0	4410	634	437	5.3	2.3	.3	72	6280	5.6
Souris-Red-Rainy....	30	22	.0	38	8.8	1.4	.0	.1	.0	.3	101	.0
Missouri Basin.....	606	128	44	8170	222	118	.0	145	29	83	9520	29
Arkansas-White-Red...	367	124	38	6860	110	104	.0	41	26	28	7670	26
Texas-Gulf.....	1050	94	11	3600	63	159	.4	83	163	45	5110	164
Pio Grande.....	297	36	8.8	1250	16	6.3	.0	58	40	16	1680	40
Upper Colorado.....	39	8.5	5.3	34	3.9	1.5	.0	37	27	.0	129	27
Lower Colorado.....	458	30	23	2590	26	45	8.3	84	.1	40	3300	8.4
Great Basin.....	323	17	2.7	1170	48	21	.0	61	22	8.5	1650	26
Pacific Northwest....	623	245	38	4370	1060	337	.0	5.0	.0	.7	6680	.0
California.....	3730	128	47	10300	41	328	7.9	107	276	68	14800	284
Alaska.....	41	9.0	.4	.0	10	7.7	.0	.1	.0	4.3	72	.0
Hawaii.....	172	11	33	336	.7	16	.0	.0	.0	86	655	.0
Caribbean.....	84	9.8	.5	50	8.6	19	.2	.0	.0	5.1	177	.2
Total.....	14,600	3,250	746	45,700	3,020	3,930	26	1,410	626	608	73,300	656



**Table 30.—Ground-water withdrawals for offstream water-use categories, by State, 1985**

[Figures may not add to totals because of independent rounding. All values in million gallons per day]

STATE	PUBLIC SUPPLY	DOMESTIC	COMMER- CIAL	IRRIGATION	LIVESTOCK	INDUSTRIAL		MINING		THERMO- ELECTRIC	TOTAL	
	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh	Saline	Fresh	Saline	Fresh	Fresh	Saline
Alabama.....	173	39	3.2	18	67	34	.0	10	3.4	.0	343	3.4
Alaska.....	41	9.0	.4	.0	10	7.7	.0	.1	.0	4.3	72	.0
Arizona.....	385	26	17	2500	25	44	8.3	67	.0	32	3090	8.4
Arkansas.....	101	60	6.0	3330	242	64	.0	1.0	.0	1.1	3810	.0
California.....	3730	125	47	10400	41	326	7.9	108	276	68	14800	284
Colorado.....	86	17	8.1	2130	16	7.4	.0	29	32	14	2310	32
Connecticut.....	66	39	8.6	.2	6.4	18	.0	.3	.0	5.8	144	.0
Delaware.....	29	10	2.0	19	1.9	16	.0	.0	.0	.9	79	.0
D.C.....	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Florida.....	1490	259	55	1590	58	340	.0	236	.0	19	4050	.0
Georgia.....	205	99	24	308	25	323	.0	16	.0	5.0	1000	.0
Hawaii.....	172	11	33	336	.7	16	.0	.0	.0	86	655	.0
Idaho.....	185	76	16	3310	1040	172	.0	.0	.0	.0	4800	.0
Illinois.....	467	130	33	71	57	150	.0	14	38	6.7	930	38
Indiana.....	271	139	1.0	36	48	109	.0	7.4	.0	24	635	.0
Iowa.....	259	65	29	53	135	71	.0	50	.0	9.2	671	.0
Kansas.....	158	42	.0	4470	42	70	.0	5.3	.0	12	4800	.0
Kentucky.....	49	43	5.1	.3	2.5	66	.0	3.4	.0	36	205	.0
Louisiana.....	276	46	.2	709	75	297	5.3	.7	.3	30	1430	5.6
Maine.....	24	19	10	.2	3.0	8.3	.0	.8	.0	.0	66	.0
Maryland.....	70	63	19	20	13	20	.0	12	.0	1.8	219	.0
Massachusetts.....	181	35	67	3.9	.4	26	.0	2.0	.0	.0	315	.0
Michigan.....	222	123	8.0	91	19	121	3.7	8.5	.8	2.3	596	4.5
Minnesota.....	265	131	24	131	53	76	.0	1.7	.0	1.2	685	.0
Mississippi.....	275	16	4.1	725	373	131	.0	3.1	.0	50	1580	.0
Missouri.....	171	54	17	283	10	37	.0	24	.3	44	640	.3
Montana.....	62	15	.0	80	16	29	.0	.6	.0	.0	203	.0
Nebraska.....	208	24	.3	5180	101	41	.0	8.5	.0	25	5590	.0
Nevada.....	94	12	7.0	750	5.9	2.3	.0	19	2.8	16	905	2.8
New Hampshire.....	28	22	.0	.0	.6	33	.0	.1	.0	.0	84	.0
New Jersey.....	406	64	14	37	3.1	129	.1	12	.0	3.4	667	.1
New Mexico.....	198	38	7.3	1170	11	.4	.0	69	.0	11	1510	.0
New York.....	535	191	65	20	12	272	.0	.0	.0	.0	1100	.0
North Carolina.....	88	169	15	9.8	29	43	.0	81	.0	.0	435	.0
North Dakota.....	30	15	.1	64	13	2.2	.0	2.8	.0	.5	127	.0
Ohio.....	395	139	51	7.3	25	11	.0	78	.1	25	730	.1
Oklahoma.....	106	25	25	380	2.0	22	.0	6.7	.0	1.0	568	.0
Oregon.....	83	70	1.5	471	3.8	29	.0	.3	.0	.0	660	.0
Pennsylvania.....	258	184	27	1.5	62	149	.0	118	.0	.0	799	.0
Rhode Island.....	15	5.6	.0	.3	1.5	3.9	.0	.4	.0	.0	27	.0
South Carolina.....	76	62	8.5	21	5.2	38	.0	2.9	.0	1.1	214	.0
South Dakota.....	65	15	12	113	19	7.8	.0	16	.0	1.7	249	.0
Tennessee.....	243	70	4.9	2.4	32	89	.0	2.4	.0	.0	444	.0
Texas.....	1230	105	17	5420	111	149	.4	103	229	52	7180	229
Utah.....	299	4.5	.4	384	31	20	.0	50	21	.0	790	25
Vermont.....	17	12	.0	.0	3.8	4.0	.0	.0	.0	.4	37	.0
Virginia.....	75	112	18	6.5	29	99	.2	2.1	.0	.1	341	.2
Washington.....	339	98	20	629	21	108	.0	2.4	.0	.7	1220	.0
West Virginia.....	37	21	.3	.3	16	33	.0	119	.0	.0	227	.0
Wisconsin.....	275	84	3.8	82	87	38	.0	.0	.0	1.6	570	.0
Wyoming.....	48	12	9.9	300	3.2	7.8	.0	111	23	12	504	23
Puerto Rico.....	84	9.1	.0	50	8.6	18	.0	.0	.0	5.1	175	.0
Virgin Islands.....	.2	.6	.5	.0	.0	.0	.2	.0	.0	.0	1.4	.2
Total.....	14,600	3,250	746	45,700	3,020	3,930	26	1,410	626	608	73,300	656

## TRENDS IN WATER USE, 1950–85

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To facilitate the following discussion of trends, the water-use estimates for some categories used in this report have been combined to correspond to the categories used in previous water-use circulars in this series (public supply, rural use, irrigation, self-supplied industrial, thermoelectric power, hydroelectric power). Self-supplied domestic withdrawals were combined with livestock withdrawals in this report to compare to rural withdrawals listed in previous water-use circulars; and self-supplied industrial withdrawals were combined with commercial and mining withdrawals to compare to “other” industries, which were listed under self-supplied industrial in previous water-use circulars.

Data in table 31 summarize the estimated water use—offstream withdrawals, source of water, consumptive use, reclaimed sewage, and instream use (hydroelectric power)—at 5-year intervals from 1950 to 1985. Table 31 also shows the percentage increase or decrease for the offstream water-use categories, sources of supply, reclaimed sewage, consumptive use, and instream use for the years 1980 and 1985.

After continual increases in the Nation’s water-use estimates made at 5-year intervals from 1950 to 1980, total offstream and instream uses were less during 1985 than during 1980, as shown graphically in figure 26. Figure 27 shows trends in water withdrawals by water-use category and source of supply. For most water-use categories, the general slackening in the rate of increase that had been indicated by the estimates compiled for 1970 and 1975 and for 1975 and 1980 changed to a decrease between 1980 and 1985. Total withdrawals were about 10 percent less during 1985 than during 1980. This is the result of declines in surface- and ground-water withdrawals of 10 and 12 percent, respectively. Some of the indicated decrease may be attributed to better estimating techniques, which tend to produce estimates lower than previously reported values, but the overall decline seems to be valid.

Two exceptions to this decreasing trend are in the “Public supply” and “Rural use” categories. Withdrawals for public supply and rural use during 1985 were about 7 and 39 percent, respectively, more than during 1980. The 7-percent increase in public-supply withdrawals corresponds to a 7-percent increase in population served, and the large increase in rural withdrawals mainly reflects large increases in fish farming, particularly in Arkansas, Idaho, and Mississippi.

Total irrigation withdrawals were less during 1960 in comparison to 1955, then increased progressively for the years reported from 1965 to 1980. Estimated irrigation withdrawals during 1985 reversed that trend, however, and were 6 percent less than during 1980. The reduction was mainly in ground-water withdrawals for irrigation. Ground-water withdrawals decreased from a maximum of 57,000 Mgal/d during 1975 to 55,000 Mgal/d (revised)

during 1980 and then to 45,700 Mgal/d during 1985. The decrease in estimated ground-water withdrawals from 1980 to 1985 was partly the result of increased availability of surface water. The surface-water withdrawals for irrigation increased progressively for the years reported from 1960 to 1985. The average amount of water applied per acre for irrigation in the United States during 1985 (2.2 acre-ft) was less than the 2.4 acre-ft (revised) applied during 1975 and 1980. The rate of increase in the number of acres irrigated has been decreasing. The acreage reported for 1970 was about 13 percent more than for 1965; for 1975, 9 percent more than for 1970; for 1980, 7 percent more than for 1975; and for 1985, about 1 percent less than for 1980.

**Table 31. —Summary of estimated water use in the United States, in thousands of million gallons per day, at 5-year intervals, 1950–85.**

[Data for 1950–80 adapted from MacKichan (1951, 1957), MacKichan and Kammerer (1961), Murray (1968), Murry and Reeves (1972, 1977), and Solley and others (1983). The data generally are rounded to two significant figures; percentage changes are calculated from unrounded numbers]

	Year								Percentage change
	<sup>1</sup> 1950	<sup>1</sup> 1955	<sup>2</sup> 1960	<sup>2</sup> 1965	<sup>3</sup> 1970	<sup>4</sup> 1975	<sup>4</sup> 1980	<sup>4</sup> 1985	
Population, in millions . . . . .	150.7	164.0	179.3	193.8	205.9	216.4	229.6	242.4	+6
Offstream use:									
Total withdrawals . . . . .	180	240	270	310	370	420	<sup>5</sup> 440	400	-10
Public supply . . . . .	14	17	21	24	27	29	34	37	+7
Rural domestic and livestock . . . . .	3.6	3.6	3.6	4.0	4.5	4.9	5.6	7.8	+39
Irrigation . . . . .	89	110	110	120	130	140	150	140	-6
Industrial:									
Thermoelectric power use . . . . .	40	72	100	130	170	200	210	190	-13
Other industrial use . . . . .	37	39	38	46	47	45	45	31	-33
Source of water:									
Ground:									
Fresh . . . . .	34	47	50	60	68	82	<sup>5</sup> 83	73	-12
Saline . . . . .	( <sup>6</sup> )	.6	.4	.5	1	1	.9	.7	-29
Surface:									
Fresh . . . . .	140	180	190	210	250	260	290	260	-8
Saline . . . . .	10	18	31	43	53	69	71	60	-16
Reclaimed sewage . . . . .	( <sup>6</sup> )	.2	.6	.7	.5	.5	.5	.6	+22
Consumptive use . . . . .	( <sup>6</sup> )	( <sup>6</sup> )	61	77	<sup>7</sup> 87	<sup>7</sup> 96	<sup>7</sup> 100	<sup>7</sup> 92	-9
Instream use:									
Hydroelectric power . . . . .	1,100	1,500	2,000	2,300	2,800	3,300	3,300	3,100	-7

<sup>1</sup> 48 States and District of Columbia.

<sup>2</sup> 50 States and District of Columbia.

<sup>3</sup> 50 States, District of Columbia, and Puerto Rico.

<sup>4</sup> 50 States, District of Columbia, Puerto Rico, and Virgin Islands.

<sup>5</sup> Revised.

<sup>6</sup> Data not available.

<sup>7</sup> Freshwater only.

To compare self-supplied industrial withdrawals during 1985 with comparable withdrawals during 1980, the 1985 estimates for industrial withdrawals need to be combined with those for commercial and mining withdrawals. Total self-supplied withdrawals (fresh and saline) for industrial, commercial, and mining uses during 1985 were estimated to be 30,500 Mgal/d, or apparently 33 percent less than withdrawals for "other" industries during 1980, after remaining about the same during 1970, 1975, and 1980. In fact, self-supplied withdrawals for industrial, commercial, and mining uses during 1985 were the lowest reported since 1950. Surface-water withdrawals for industrial, commercial, and mining uses during 1985 totaled 23,800 Mgal/d, a 30-percent decrease from 1980; ground-water withdrawals totaled about 6,730 Mgal/d, a 40-percent decrease from 1980. The large apparent decreases in surface- and ground-water withdrawals, however, probably reflect more realistic estimates for 1985 as well as actual decreases in use. Previously, water-use estimates were based on water-use coefficients, plant capacities, or permit values that apparently yielded erroneously high estimates. Available data are inadequate for determining what part of the apparent decrease is the result of better estimating techniques for 1985 and what part is the result of actual decreases in industrial withdrawals from 1980 to 1985.

The consumptive use of freshwater and saline water for industrial, commercial, and mining uses during 1985 was about 7,330 Mgal/d, or 24 percent of withdrawals, an increase from 13 percent during 1980. The increase in percentage of consumptive use probably indicates increased plant efficiencies and an increased reuse of water, thus reducing withdrawals at some industrial sites.

More water continues to be withdrawn for thermoelectric power generation than for any other category, even though less water was withdrawn for this use during 1985 than during 1980. (See figure 27.) The decline (13 percent) during the period from 1980 to 1985 was the first since records were begun, although the water-use estimates of this series have indicated that the rates of increase in water withdrawals for thermoelectric power production have been slowing since the 1965–70 period.

Water used for hydroelectric power generation had been increasing steadily from 1950 to 1975, but, during 1980, it was about the same as during 1975. Estimates in this report indicate water use for hydroelectric power generation during 1985 was 7 percent less than during 1980.

Even though population continued to increase at a rate of about 1 percent per year between 1980 and 1985, withdrawal and consumptive-use estimates for most categories were markedly less for 1985 than for 1980. This is in contrast to 1970 and 1975, when the increases in withdrawals were more than double population growth.

The differences shown for the reporting years in table 31 and figures 26 and 27 can be attributed to the following important factors:

- Availability of water in a particular year, especially precipitation and streamflow, strongly affects the quantity of water used for irrigation and hydroelectric power generation.
- Streamflow generally was more plentiful in 1985 than in 1980 because of more rainfall; this reduced the dependence on ground water in many areas and also the need to irrigate in some areas.
- Demands on the ground-water system can influence the pumping lift, availability, or quality of the water. Each of these factors, in turn, can influence the cost of water and make water users, especially irrigators, more selective and efficient in their use of ground water.
- The economic slowdown and depressed commodity prices probably decreased the requirements for industrial and irrigation water-withdrawals, respectively, as fewer products and crops were produced.
- The 1985 estimates are based on more reliable information and analysis than previous estimates in this series. In many instances, it seems that previous estimates may have been too high.

As shown by the footnotes to table 31, the areal coverage of water-use estimates in this series has increased progressively, from just 48 States and the District of Columbia to the addition of our two newest States beginning in 1960, of Puerto Rico in 1970, and of the U.S. Virgin Islands in 1975. These extensions in coverage, of course, have contributed to the reported increases in water use, especially in water use for public supply and irrigation. However, these additions in coverage represent relatively small increments of water use in relation to the entire Nation (less than 1 percent of the total in table 26, for example) and have not been significant influences in the indicated trends.

Projections of future water use are beyond the scope of this report, although the trends established over the past 35 years may provide a basis for estimating future water demands. Several other agencies and commissions have made projections of national water use to the year 2000 and beyond. Notable examples are studies by the Senate Select Committee on National Water Resources (U.S. Congress, 1961), Resources for the Future, Inc. (Wollman and Bonem, 1971), the National Water Commission (1973), and the U. S. Water Resources Council (1968, 1978). Summaries of these national projections and projections for individual States to the year 2000 are included in a report prepared by the Congressional Research Service (Viessman and DeMoncada, 1980). The projections vary greatly, reflecting the varying availability of reliable data and of different assumptions for future population growth, economic conditions, energy-resources development, and environmental regulations.

Regardless of which projection proves correct, major attention needs to be given to water-management problems to ensure that maximum benefits will be obtained from use of the Nation's water resources. This has become more evident, particularly with ground water, because, in addition to the need for an adequate water supply, water-quality conditions need to be suitable if supply and demand are to be in balance.

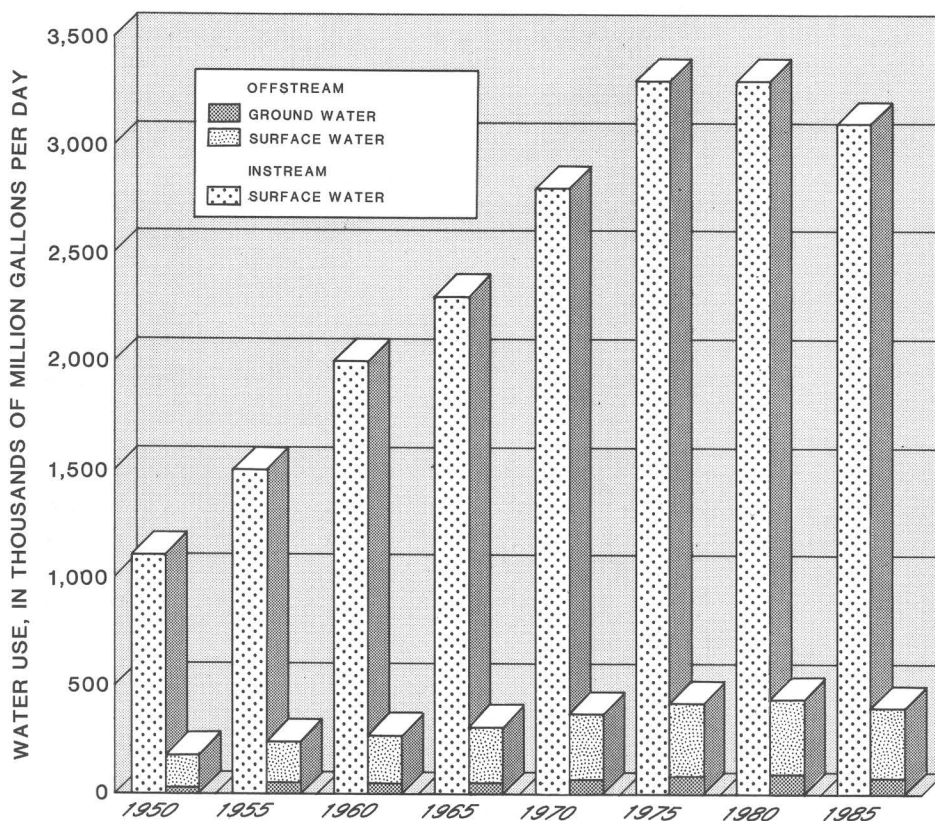


Figure 26. Trends in offstream and instream water uses, 1950-85.

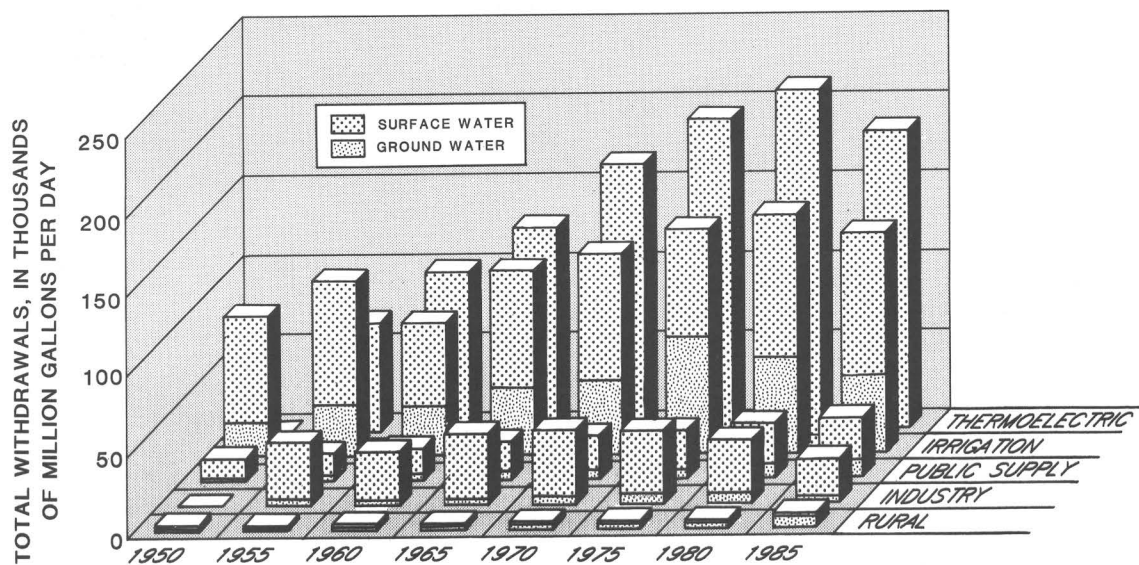


Figure 27. Trends in water withdrawals by water-use category and source of supply for rural, industry, public supply, irrigation, and thermoelectric power uses, 1950-85.

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