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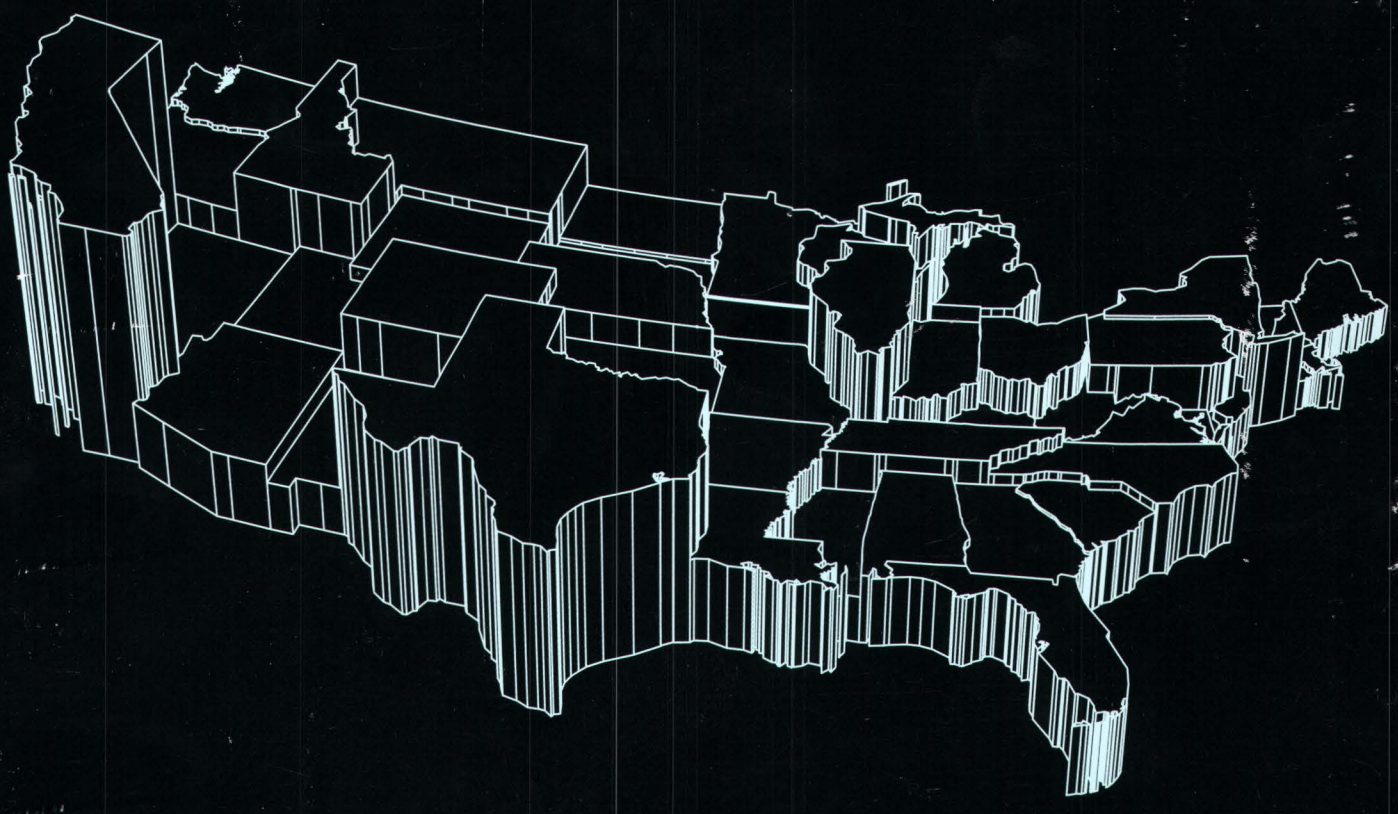
Estimated Use of Water in the United States in 1995

U.S. Geological Survey Circular 1200



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ESTIMATED USE OF WATER IN THE UNITED STATES IN 1995

By Wayne B. Solley, Robert R. Pierce,
and Howard A. Perlman

U.S. GEOLOGICAL SURVEY CIRCULAR 1200

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Foreword

The balance between supply and demand for water is a delicate one, marked over time by political and environmental conflicts, the impacts of natural disasters and human actions, and the day-to-day demands for a multiplicity of uses for this most vital resource. Although a renewable resource, water is not always available to a thirsty Nation when and where it is needed, nor is it always of suitable quality for the intended use. Water must be considered as a finite resource that has limits and boundaries to its availability and suitability for use.

In the United States, many existing sources of water are being stressed by withdrawals from aquifers and diversions from rivers and reservoirs to meet the needs of homes, cities, farms, and industries. Increasing requirements to leave water in the streams and rivers to meet environmental, fish and wildlife, and recreational needs further complicate the matter. After continual increases in the Nation's total withdrawal of surface water and ground water for the years reported from 1950 to 1980, water withdrawals declined and have remained fairly constant since the mid 1980's. The decline in withdrawals is especially significant in light of the fact that population continued to increase during the same period. Clearly as a Nation, we are using our surface- and ground-water resources more efficiently. This decline signals that water use does respond to economic and regulatory factors, and that the general public has an enhanced awareness about water-resources and conservation issues.

As planners, managers, and elected officials wrestle with the varied water-management problems facing the Nation at the beginning of the new century, they need consistent information on water supply and use by State, watershed, and water-use category. This will help the Nation realize the maximum benefit from its water resources and will help strike that crucial balance between supply and demand.

The U.S. Geological Survey has compiled and disseminated estimates of water use for the Nation at 5-year intervals since 1950. In 1977, the Congress expanded the Survey's water-use activities by establishing a National Water-Use Information Program, which, in cooperation with the States, collects reliable and uniform information on the sources, uses, and dispositions of water in the United States. The result of that cooperative effort is a valuable long-term data set of national water-use estimates that can be used to assess the effectiveness of alternative water-management policies, regulations, and conservation activities, and to make projections of future demands. This Circular documents water use in 1995 and identifies changes in water use that have occurred over the past 45 years.

More detailed water-use information is available on our Web site at URL:
http://water.usgs.gov/public/watuse/

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CONVERSION FACTORS

Multiply	By	To Obtain
Area		
acre	43,560	square foot (ft^2)
	4,047	square meter (m^2)
	0.001562	square mile (mi^2)
Flow		
gallon per day (gal/d)	3.785	liter per day
million gallons per day (Mgal/d)	1.121	thousand acre-feet per year
	0.001547	thousand cubic feet per second
	0.6944	thousand gallons per minute
	0.003785	million cubic meters per day
	1.3815	million cubic meters per year
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

Some water relations in inch-pounds 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 inch of rain	=	17.4 million gallons per sqare mile
	=	27,200 gallons per acre
	=	100 tons per acre

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 in 1978 the term was again redefined to include return flow and offstream and instream uses. In the report for 1985, the term was redefined to include withdrawals plus deliveries.

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

animal specialties—water use associated with the production of fish in captivity except fish hatcheries, fur-bearing animals in captivity, horses, rabbits, and pets. *See also* livestock water use.

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, other commercial facilities, and institutions. 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.

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 a liquid into a vapor. *See also* evapotranspiration.

evapotranspiration—a collective term that includes water discharged to the atmosphere as a result of evaporation from the soil and surface-water bodies and as a result of plant transpiration. *See* also evaporation and transpiration.

freshwater—water that contains less than 1,000 parts per million (ppm) of dissolved solids; generally, more than 500 ppm of dissolved solids is undesirable for drinking and many industrial uses.

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).

hydroelectric power water use—the use of water in the generation of electricity at plants where the turbine generators are driven by falling water. Hydroelectric water use is classified as an instream use in this report.

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 that is used, but not withdrawn, from a ground- or surface-water source 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—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 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.

kilowatthour (kWh)—a unit of energy equivalent to one thousand watthours.

livestock water use—water for livestock 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 animal specialties. *See* also rural water use and animal specialties.

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, milling (crushing, screening, washing, floatation, and so forth), and other preparations customarily done at the mine site or as part of a mining activity. Does not include water used in processing, such as smelting, refining petroleum, or slurry pipeline operations. These uses are included in industrial water 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 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, and industrial water use.

public-supply deliveries—water provided to 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 wastewater—wastewater treatment plant effluent that has been diverted for beneficial 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—term used in previous water-use circulars to describe 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—slightly saline water contains from 1,000 to 3,000 parts per million (ppm) of dissolved solids. Moderatly saline water contains from 3,000 ppm to 10,000 ppm, and highly saline water contains from 10,000 to 35,000 ppm.

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

standard industrial classification (SIC) codes—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 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.

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

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

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

water use—1) in a restrictive sense, the term refers to water that is actually used for a specific purpose, such as for domestic use, irrigation, or industrial processing. In this report, the quantity of water use for a specific category is the combination of self-supplied withdrawals and public-supply deliveries. 2) More broadly, water use pertains to human's interaction with and influence on the hydrologic cycle, and includes elements such as water withdrawal, delivery, consumptive use, wastewater release, reclaimed wastewater, return flow, and instream use. *See also* offstream use and instream use.

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.

ESTIMATED USE OF WATER IN THE UNITED STATES IN 1995

By Wayne B. Solley, Robert R. Pierce, *and* Howard A. Perlman

ABSTRACT

Estimates indicate that after continual increases in the Nation's total water withdrawals for the years reported from 1950 to 1980, withdrawals declined from 1980 to 1995. The withdrawal of fresh- and saline water in the United States during 1995 is estimated to have been 402,000 million gallons per day (Mgal/d) for all offstream uses—2 percent less than the 1990 estimate. The 1995 withdrawal estimate is nearly 10 percent less than the 1980 estimate, which is the peak year of water use documented in this 5-year compilation series that began in 1950. This decline in water withdrawals occurred even though population increased 16 percent from 1980 to 1995. Total freshwater withdrawals are an estimated 341,000 Mgal/d for 1995, or about the same as in 1990. Per-capita use for all offstream uses in 1995 was 1,500 gallons per day (gal/d) of fresh- and saline water combined and 1,280 gal/d of freshwater, compared to 1990 when per-capita use was 1,620 gal/d of fresh- and saline water and 1,340 gal/d of freshwater.

Estimates of withdrawals by source indicate that during 1995, total surface-water withdrawals were 324,000 Mgal/d, which is about the same as during 1990, and total ground-water withdrawals were 77,500 Mgal/d, or 4 percent less than during 1990. Total saline-water withdrawals during 1995 were 60,800 Mgal/d, or 12 percent less than during 1990, most of which was saline surface water. The use of reclaimed wastewater is estimated to have been 1,020 Mgal/d during 1995, which is 36 percent more than the 750 Mgal/d used during 1990.

Offstream water-use categories are classified in this report as public supply, domestic, commercial, irrigation, livestock, industrial, mining, and thermoelectric power. The two largest water-use categories continue to be thermoelectric power and irrigation. In 1995, the most water (190,000 Mgal/d, of which 57,900 Mgal/d was saline) was withdrawn for thermoelectric power cooling, whereas the most freshwater (134,000 Mgal/d) was withdrawn for irrigation. The estimate of total (fresh, saline) self-supplied withdrawals for "other" industrial uses during 1995 is 29,100 Mgal/d, or about 3 percent less than during 1990. Industrial withdrawals declined from 1980 to 1995 after remaining about the same for the years reported from 1965 to 1980. In fact, self-supplied withdrawals for "other" industrial use during 1995 are the lowest since records began in 1950.

Water for hydroelectric power generation, the only instream use compiled in this report, is estimated to have been about 3,160,000 Mgal/d during 1995. This is 4 percent less than the 1990 estimate.

Total freshwater consumptive use is estimated to have been about 100,000 Mgal/d during 1995, or 6 percent more than during 1990. Consumptive use by irrigation accounts for the largest part of total consumptive use and is an estimated 81,300 Mgal/d for 1995. Freshwater consumptive use in the East (water-resources regions east of and including the Mississippi regions) is about 12 percent of freshwater withdrawn in the East and accounts for only 20 percent of the Nation's consumptive use. By comparison, freshwater consumptive use in the West is about 47 percent of freshwater withdrawals. The higher consumptive use in the West is attributable to the 90 percent of the water withdrawn for irrigation that occurs in the West.

A comparison of total withdrawals by water-resources region indicates that the California, South Atlantic-Gulf, and Mid-Atlantic regions account for one-third of the total water withdrawn in the United States. The largest amount of irrigation occurs in the California, Pacific Northwest, and Missouri regions; and the largest withdrawals for thermoelectric power occur in the Mid-Atlantic and South Atlantic-Gulf regions. A similar comparison of total withdrawals by State indicates that California accounts for the largest withdrawal, which is about 45,900 Mgal/d, followed by Texas, Illinois, and Florida. Some 24 States and Puerto Rico had less water withdrawn for offstream uses during 1995 than during 1990.

INTRODUCTION

Many existing sources of water are being stressed by withdrawals from aquifers and diversions from rivers and reservoirs to meet the needs of homes, cities, farms, and industries. Increasing requirements to leave water in the streams and rivers to meet environmental, human, and recreational needs further complicate the matter.

Traditionally, water management in the United States has focused on manipulating the country's supplies of freshwater to meet the needs of users. A number of large dams were built during the early 20th century to increase the supply of freshwater for any given time. This era of building large dams to meet water demand in the United States has passed. As we approach the 21st century, the finite water supply and established infrastructure require that demand be managed effectively within the available sustainable supply. Quantitative assessments derived from this type of national water-use compilation can be used to evaluate the impacts of population growth and the effectiveness of alternative water-management policies, regulations, and conservation activities. As the focus on water management is increasingly on the river basin or watershed, often spanning multiple States, this national compilation of data also can be used to develop and evaluate trends in water use, to plan for more effective uses of the Nation's water resources, and to make projections of future demands.

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 United States, Puerto Rico, the U.S. Virgin Islands, and the District of Columbia. Estimates of water withdrawn from surface- and ground-water sources, estimates of consumptive use, and estimates of instream use and wastewater releases during 1995 are presented in this report. The U.S. Geological Survey (USGS) has compiled similar national estimates at 5-year intervals since 1950 (MacKichan, 1951, 1957; MacKichan and Kammerer, 1961; Murray, 1968; Murray and Reeves, 1972, 1977; and Solley and others, 1983, 1988, 1993). This series of water-use reports serves as one of the few sources of information about regional or naional trends in water use. This report discusses eight categories of offstream water use—public supply, domestic, commercial, irrigation, livestock, industrial, mining, and thermoelectric power—and one category of instream use: hydroelectric power. Detailed information for other instream uses, such as navigation, recreation, pollution abatement, and fish habitat is beyond the scope of this report. Information on wastewater-treatment facilities is given in the "Wastewater Release" section.

For each category of offstream water use, 1995 withdrawal and consumptive-use estimates are discussed and those estimates are compared with corresponding 1990 estimates. The text is supplemented with illustrations and tables showing data for each State, Puerto Rico, the U.S. Virgin Islands, and the District of Columbia and for each of the 21 water-resources regions. (Water-resources regions are shown on a map on the inside of the front cover.) Totals are highlighted in the tables for ease of reference. At the beginning of this report is a section on total water use by category and source of water, and at the end is a section on trends in water use for the period 1950-95.

TERMINOLOGY

The terms and units used in this report are similar to those used in previous water-use circulars in this series. In this report, the term "offstream use" refers to water diverted or withdrawn from a surface- or groundwater source and conveyed to a place of use. "Instream use" refers to uses taking place within the river channel itself. Hydroelectric power generation is discussed as an "instream use," although some hydroelectric power water use was reported as offstream use. The hydroelectric power offstream use is included in the instream totals for consistency with previous reports. The terms "freshwater," "saline water," and "reclaimed wastewater," as types of water, are defined in the glossary. The definition of saline water has been expanded in the glossary to include slightly saline, moderately saline, and highly saline. Slightly saline withdrawals, 1,000 to 3,000 parts per million (ppm) of dissolved solids, are reported as freshwater in this series. Saline water is tabulated only for the industrial, mining, and thermoelectric power categories. A few States reported saline withdrawals for the commercial, animal specialties, and public-supply categories. These withdrawals are small and are included under freshwater for the commercial and public-supply categories. The saline withdrawals reported for animal specialties are not listed in the tables or included in the totals. Some public supplies treat slightly saline water

before it is distributed, but all public-supply withdrawals are considered as freshwater in this report. Surface water and ground water, 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. "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.

Sources of Data and Methods of Analysis

In cooperation with State and local agencies, the water-use estimates for 1995 were compiled by the USGS's District offices for each county in the United States, Puerto Rico, and the U.S. Virgin Islands, and for the 2,149 water-resources cataloging units. [For an explanation of cataloging units, see Seaber and others (1987)]. These estimates were entered into a State aggregate water-use data base in each District office, reviewed by a regional water-use specialist, and submitted to the USGS's headquarters in Reston, Va. The information was aggregated by State (including Puerto Rico, the U.S. Virgin Islands, and the District of Columbia) and by the 21 water-resources regions for each category of water use. All the water-use information compiled for this report is stored in the USGS's Aggregate Water-Use Data System (AWUDS) and is available by both county and cataloging unit on the World Wide Web through URL:

http://water.usgs.gov/public/watuse/

Sources of information and accuracy of data vary and are discussed for each category in subsequent parts of this report. This compilation effort was coordinated by the USGS's National Water-Use Information Program which was implemented in 1977 to provide more uniform, current, and reliable information on water use. "Guidelines for Preparing U.S. Geological Survey Water-Use Estimates in the United States for 1995" were developed and distributed on the Web, and are available at the site identified above. USGS water-use project chiefs also are identified at the Web site mentioned above. Each project chief compiled and analyzed information from various State cooperators, made estimates of missing data elements, and prepared documentation that identifies the sources of water-use information for each State and describes how the water-use estimates were determined for this report. Many state agencies publish reports on water use as part of their participation in the National Water-Use Information Program, and a list of these publications is given at the end of this report.

The following national data files were made available to each USGS District office for reference: U.S. Environmental Protection Agency Permit Compliance files and Safe Drinking Water Information System (SDWIS) files, U.S. Bureau of Census population files, and the U.S. Department of Energy, Energy Information Administration reports. Each District is responsible for determining the most reliable source of information available for that State.

Water-use numerical data are the average daily quantities used. Irrigation water is applied during only a part of each year and at variable rates; therefore, the actual rate of application is much greater than the average daily rate given in tables in this report. In this report, numerical data generally are rounded to three significant figures for values greater than 100 and two significant figures for values less than 100. Most tables 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 and hydroelectric power data in thousand-acre feet per year. A conversion table is given before the glossary to assist those readers who may wish to convert the data to other units of measurement. All numbers were rounded independently; thus, the sums of individual rounded numbers may not equal the totals. The percentage changes discussed in the text were calculated from the unrounded data.

Population data, which are from the U.S. Bureau of the Census population estimates and projections (U.S. Bureau of the Census, 1996), are shown to the nearest thousand. Data on population served by public supply were compiled in cooperation with State and local agencies and are rounded to three significant figures.

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 USGS State water-use project chiefs that participated in the collection and compilation of data for this report. USGS water-use project chiefs responsible for the 1995 compilation for each state are identified on the Web through the URL:

http://water.usgs.gov/public/watuse/

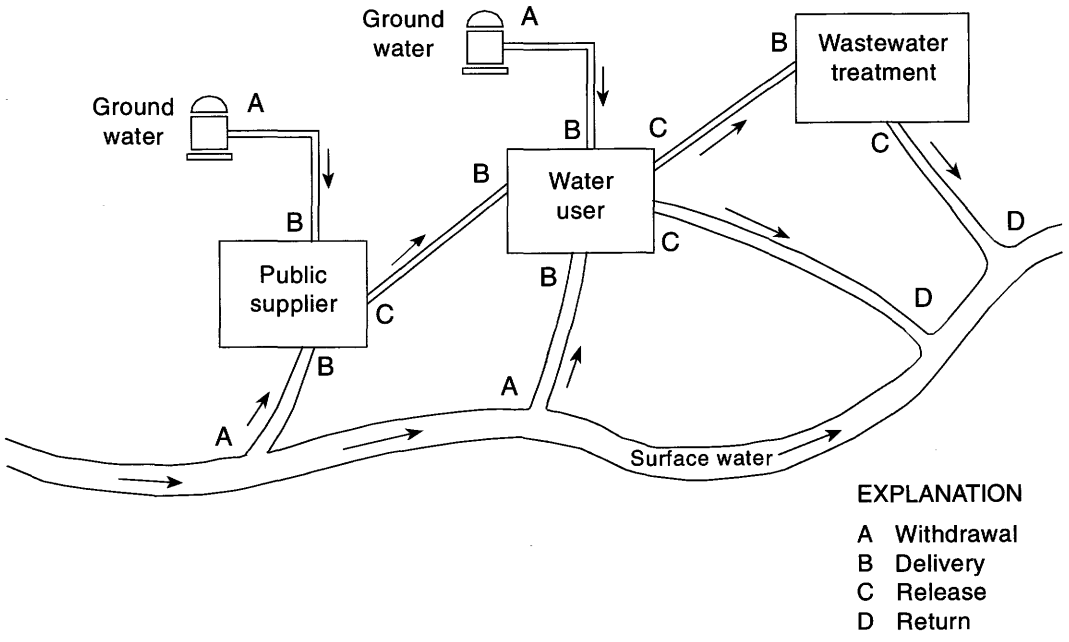
In many States, such as West Virginia and New Mexico, cooperator personnel worked as full partners with the USGS in this compilation and analysis effort.

WATER USE

Water use in this report is subdivided into offstream use, instream use, and wastewater release. The difference among these types of use is explained below.

Offstream use is a water use that refers to 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 offstream water use (self-supplied withdrawals and public-supply deliveries), five 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) and the quantity released after use (C).
3. Conveyance loss—The quantity of water that is lost in transit, for example, from point of withdrawal to point of delivery (A-B), or from point of release to point of return (C-D).
4. Consumptive use—That part of water withdrawn that is evaporated, transpired, or incorporated into products or crops. In some instances, consumptive use will be the difference between the volume of water delivered and the volume released (B-C).
5. 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.



In this report, self-supplied withdrawals by source, deliveries from public suppliers (where applicable), and consumptive-use estimates are given for the following categories of offstream use: domestic, commercial, irrigation, livestock, industrial, mining, and thermoelectric power. For the public-supply category, in addition to withdrawals, the report also gives water delivered to domestic, commercial, industrial, and thermoelectric power users.

Each category of offstream use typically effects the reuse potential of return flows differently. Reuse potential reflects the quality and the quantity of water available for subsequent uses; for example, irrigation return flow may be contaminated by pesticides and fertilizers, and, because of the high consumptive use of water during irrigation, the mineral content of the return flow often is substantially greater than that of the water applied. Consequently, irrigation return flow frequently may have little reuse potential. This is a significant contrast to the reuse potential of most water discharged from thermoelectric plants, where the principal change is an increase in water temperature.

Instream use is a water use that takes place without the water being diverted or withdrawn from surface- or ground-water sources. Examples of instream uses are hydroelectric power generation, navigation, freshwater dilution of saline estuaries, maintenance of minimum streamflows to support fish and wildlife habitat, and wastewater assimilation.

Quantitative estimates for most instream uses are difficult to compile on a national scale. However, because such uses compete with offstream uses and affect the quality and 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. California is one of the first States to quantify various types of instream uses.

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 created by hydroelectric dams) generally is negligible.

In this report, wastewater release refers to water released from private and public wastewater-treatment facilities. Information is provided on the number of publicly and privately owned wastewater-treatment facilities and on releases from only the public wastewater-treatment facilities. The releases can be either returned to the natural environment or reclaimed for beneficial uses, such as irrigation of golf courses and parks.

OFFSTREAM USE

Total Water Use — 402,000 million gallons per day

Total fresh and saline withdrawals during 1995 are estimated to have been 402,000 million gallons per day (Mgal/d) for all offstream water-use categories (public supply, domestic, commercial, irrigation, livestock, industrial, mining, thermoelectric power), which is nearly 2 percent less than the withdrawal estimate for 1990. Total freshwater withdrawals were an estimated 341,000 Mgal/d during 1995, which is about the same as during 1990. Per-capita use for all offstream uses in 1995 was 1,500 gallons per day (gal/d) of fresh- and saline water combined and 1,280 gal/d of freshwater, compared to 1990 when per-capita use was 1,620 gal/d of fresh- and saline water and 1,340 gal/d of freshwater (Solley and others, 1993).

Estimates of withdrawals by source indicate that during 1995, total surface-water withdrawals were 324,000 Mgal/d, which is about the same as during 1990. About 59,700 Mgal/d of surface water withdrawn was saline water. Total ground-water withdrawals were 77,500 Mgal/d, or 4 percent less than during 1990. About 99 percent of ground water withdrawn was freshwater.

A comparison of total withdrawals by water-resources region (figure 1; table 1) indicates that the California, South Atlantic-Gulf, and Mid-Atlantic regions account for one-third of the total water withdrawn in the United States. The largest amount of irrigation occurs in the California, Pacific Northwest, and Missouri regions; and the largest withdrawals (fresh and saline) for thermoelectric power occur in the Mid-Atlantic and South Atlantic-Gulf regions. A similar comparison of total withdrawals by State (figure 2; table 2) indicates that California accounts for the largest withdrawals, 45,900 Mgal/d, followed by Texas, Illinois, and Florida. Some 24 States and Puerto Rico had less water withdrawn for offstream uses during 1995 than during 1990.

The two largest water-use categories continue to be thermoelectric power and irrigation. During 1995, the most water (190,000 Mgal/d, of which 57,900 Mgal/d was saline) was withdrawn for thermoelectric power cooling, whereas the most freshwater (134,000 Mgal/d) was withdrawn for irrigation (tables 3, 4). California accounts for the largest irrigation withdrawals; whereas, Illinois accounts for the largest thermoelectric freshwater withdrawals (table 4).

Surface-water withdrawals by water-use category are shown by water-resources region in table 5 and by State in table 6. Ground-water withdrawals by water-use category are shown by water-resources region in table 7 and by State in table 8.

Total freshwater consumptive use was about 100,000 Mgal/d during 1995, or 6 percent more than during 1990. Freshwater consumptive use in the East (water-resource regions east of and including the Mississippi regions) is about 12 percent of freshwater withdrawn in the East and accounts for only 20 percent of Nation's consumptive use (figure 3; table 1). By comparison, freshwater consumptive use in the West is about 47 percent of freshwater withdrawals. The higher consumptive use in the West is attributable to the 90 percent of the water withdrawn for irrigation that occurs in the West and irrigation accounts for the largest part of consumptive use. California accounts for the largest consumptive use (figure 4) because it has the largest amount of irrigation.

The distribution of per-capita freshwater withdrawals by State is shown in figure 5 and table 2. High per-capita values are characteristic of thinly populated states having large acreages of irrigated land such as Idaho, Montana, and Wyoming. In contrast, figure 6 shows the intensity of freshwater withdrawals by State in million gallons per day per square mile. The smaller states in the northeast show the most intense withdrawals by area.

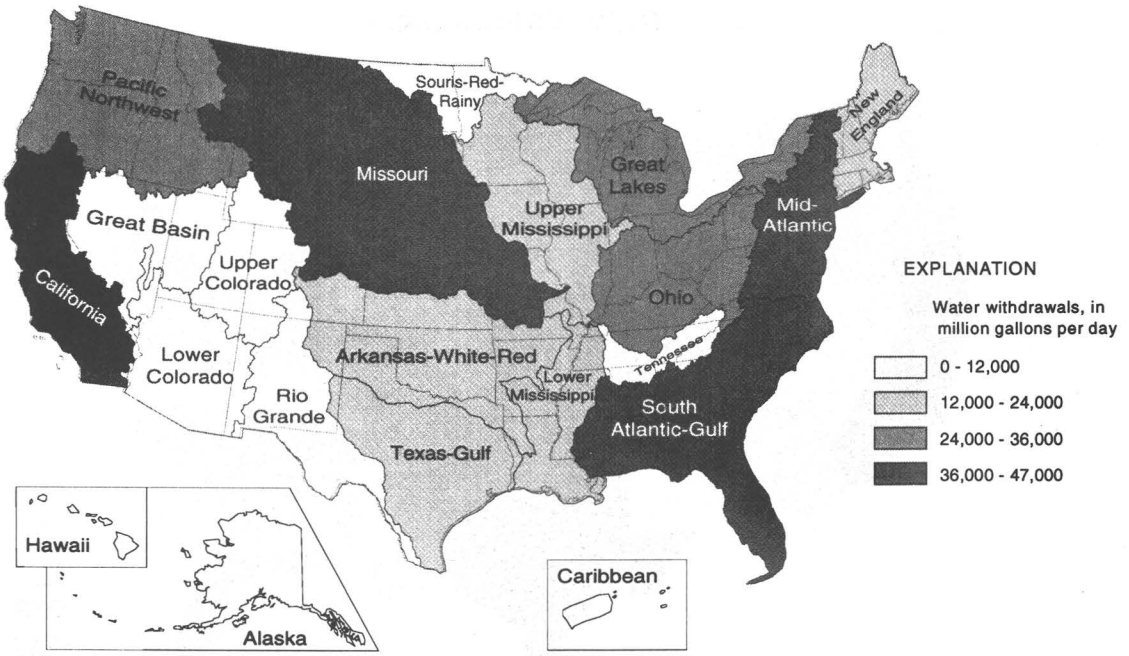


Figure 1. Total water withdrawals by water-resources region, 1995.

Table 1. Total offstream water use by water-resources region, 1995

[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	PER CAPITA USE, freshwater, in gal/d	WITHDRAWALS, in Mgal/d (includes irrigation conveyance losses)									RECLAIMED WASTEWATER, in Mgal/d	CONVEYANCE LOSSES, in Mgal/d	CONSUMPTIVE USE, freshwater, in Mgal/d
			By source and type						Total					
			Ground water			Surface water								
			Fresh	Saline	Total	Fresh	Saline	Total	Fresh	Saline	Total			
New England	12,849	289	725	0	725	2,980	8,800	11,800	3,710	8,800	12,500	0	0	388
Mid-Atlantic	42,412	509	2,690	1.0	2,690	18,900	20,300	39,200	21,600	20,300	41,900	72	1.9	1,170
South Atlantic-Gulf	37,845	848	7,110	16	7,120	25,000	12,700	37,700	32,100	12,700	44,800	237	33	5,570
Great Lakes	21,836	1,500	1,510	4.6	1,520	31,100	6.5	31,100	32,700	11	32,700	0	.1	1,580
Ohio	22,631	1,330	1,980	22	2,000	28,100	.6	28,100	30,100	23	30,100	1.1	.7	1,870
Tennessee	4,198	2,140	258	0	258	8,730	0	8,730	8,980	0	8,980	.3	0	289
Upper Mississippi	22,268	1,050	2,570	4.2	2,570	20,700	0	20,700	23,300	4.2	23,300	11	0	1,660
Lower Mississippi	7,324	2,720	9,180	0	9,180	10,800	0	10,800	20,000	0	20,000	.7	553	7,740
Souris-Red-Rainy	693	364	115	0	115	138	0	138	253	0	253	0	1.8	122
Missouri Basin	10,664	3,380	9,320	38	9,360	26,700	0	26,700	36,000	38	36,100	22	7,840	14,200
Arkansas-White-Red	8,931	1,800	7,490	284	7,780	8,590	0	8,590	16,100	284	16,400	37	944	8,190
Texas-Gulf	16,755	1,050	5,960	324	6,280	11,700	4,860	16,600	17,700	5,190	22,900	71	390	7,340
Rio Grande	2,566	2,600	1,930	61	1,990	4,740	0	4,740	6,670	61	6,730	7.2	1,360	2,960
Upper Colorado	714	10,400	116	14	130	7,310	0	7,310	7,420	14	7,440	1.7	1,940	2,520
Lower Colorado	5,318	1,500	3,000	12	3,010	4,970	2.3	4,970	7,960	14	7,980	187	1,090	4,520
Great Basin	2,405	2,510	1,610	56	1,660	4,420	143	4,560	6,030	199	6,230	33	1,140	3,260
Pacific Northwest	9,948	3,220	5,500	0	5,500	26,500	38	26,500	32,000	38	32,000	.1	8,050	10,600
California	32,060	1,140	14,600	185	14,800	21,900	9,450	31,300	36,500	9,640	46,100	330	1,860	25,300
Alaska	604	350	58	75	132	154	43	196	211	117	329	0	.1	25
Hawaii	1,187	853	515	16	531	497	906	1,400	1,010	922	1,930	6.2	98	542
Caribbean	3,858	152	156	.2	156	433	2,450	2,880	588	2,450	3,040	0	15	189
Total	267,068	1,280	76,400	1,110	77,500	264,000	59,700	324,000	341,000	60,800	402,000	1,020	25,300	100,000

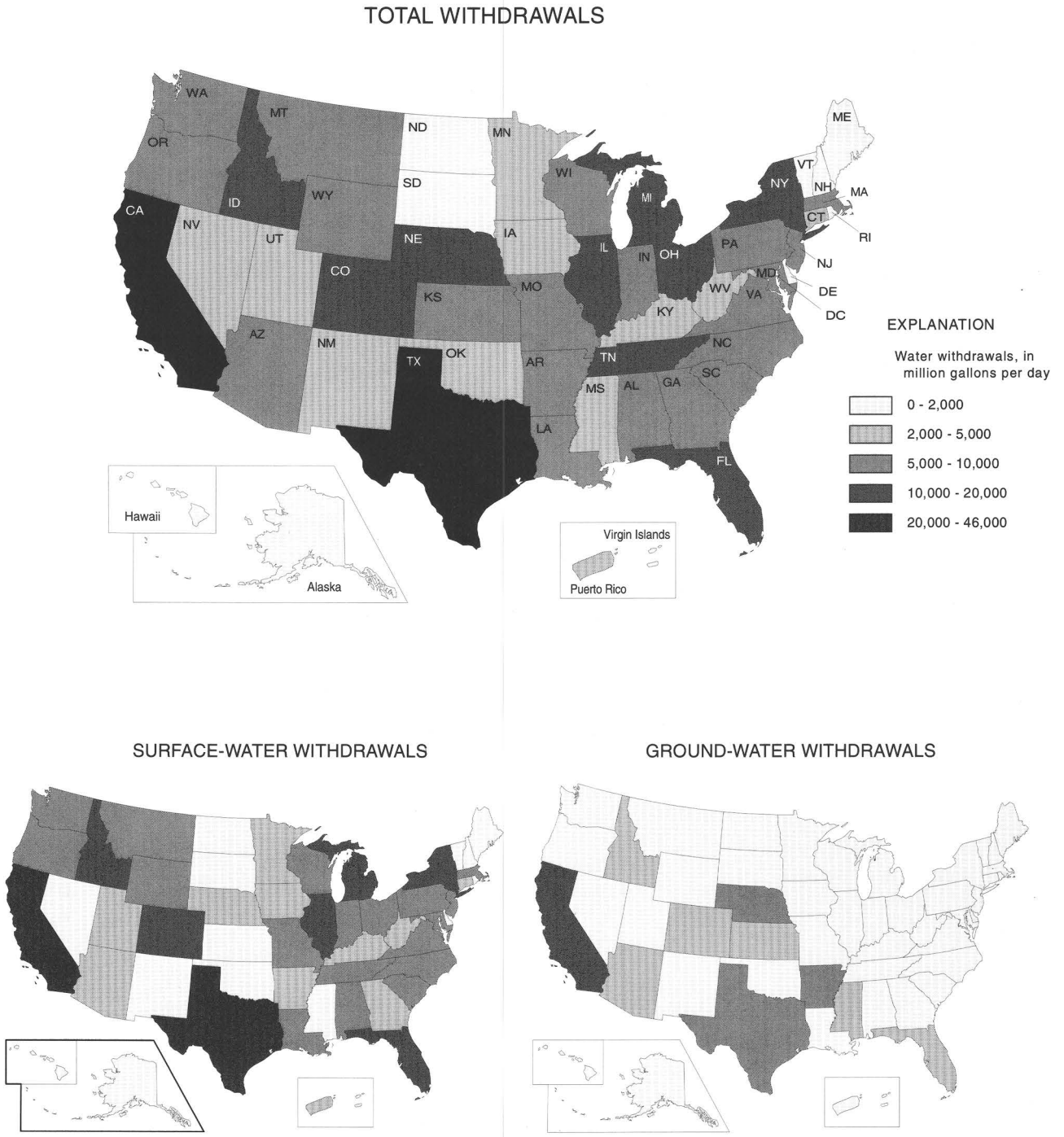


Figure 2. Total water withdrawals by source and State, 1995.

Table 2. Total offstream water use by State, 1995

[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	PER CAPITA USE, freshwater, in gal/d	WITHDRAWALS, in Mgal/d (includes irrigation conveyance losses)									RECLAIMED WASTEWATER, in Mgal/d	CONVEYANCE LOSSES, in Mgal/d	CONSUMPTIVE USE, freshwater, in Mgal/d
			By source and type						Total					
			Ground water			Surface water								
			Fresh	Saline	Total	Fresh	Saline	Total	Fresh	Saline	Total			
Alabama	4,253	1,670	436	9.1	445	6,650	0	6,650	7,090	9.1	7,100	0.1	0	532
Alaska	604	350	58	75	132	154	43	196	211	117	329	0	.1	25
Arizona	4,218	1,620	2,830	12	2,840	3,980	2.3	3,990	6,820	14	6,830	180	1,030	3,830
Arkansas	2,484	3,530	5,460	0	5,460	3,310	0	3,310	8,770	0	8,770	0	416	4,760
California	32,063	1,130	14,500	185	14,700	21,800	9,450	31,300	36,300	9,640	45,900	334	1,670	25,500
Colorado	3,747	3,690	2,260	17	2,270	11,600	0	11,600	13,800	17	13,800	11	3,770	5,230
Connecticut	3,275	389	166	0	166	1,110	3,180	4,290	1,280	3,180	4,450	0	0	97
Delaware	717	1,050	110	0	110	642	743	1,390	752	743	1,500	0	0	71
D.C.	554	18	.5	0	.5	9.7	0	9.7	10	0	10	0	0	15
Florida	14,166	509	4,340	4.6	4,340	2,880	11,000	13,800	7,210	11,000	18,200	236	32	2,780
Georgia	7,201	799	1,190	0	1,190	4,560	64	4,630	5,750	64	5,820	.6	0	1,170
Hawaii	1,187	853	515	16	531	497	906	1,400	1,010	922	1,930	6.2	98	542
Idaho	1,163	13,000	2,830	0	2,830	12,300	0	12,300	15,100	0	15,100	0	5,480	4,340
Illinois	11,830	1,680	928	25	953	19,000	0	19,000	19,900	25	19,900	2.0	0	857
Indiana	5,803	1,570	709	0	709	8,430	0	8,430	9,140	0	9,140	0	0	505
Iowa	2,842	1,070	528	0	528	2,510	0	2,510	3,030	0	3,030	0	0	290
Kansas	2,565	2,040	3,510	0	3,510	1,720	0	1,720	5,240	0	5,240	6.8	143	3,620
Kentucky	3,860	1,150	226	0	226	4,190	0	4,190	4,420	0	4,420	0	.5	318
Louisiana	4,342	2,270	1,350	0	1,350	8,500	0	8,500	9,850	0	9,850	0	166	1,930
Maine	1,241	178	80	0	80	141	105	246	221	105	326	0	0	48
Maryland	5,042	289	246	0	246	1,210	6,270	7,480	1,460	6,270	7,730	70	0	150
Massachusetts	6,074	189	351	0	351	795	4,370	5,160	1,150	4,370	5,510	0	0	180
Michigan	9,549	1,260	858	4.4	862	11,200	0	11,200	12,100	4.4	12,100	0	0	667
Minnesota	4,610	736	714	0	714	2,680	0	2,680	3,390	0	3,390	0	0	417
Mississippi	2,697	1,140	2,590	0	2,590	502	112	614	3,090	112	3,200	0	17	1,570
Missouri	5,324	1,320	891	0	891	6,140	0	6,140	7,030	0	7,030	11	0	692
Montana	870	10,200	204	13	217	8,640	0	8,640	8,850	13	8,860	0	4,410	1,960
Nebraska	1,637	6,440	6,200	4.7	6,200	4,350	0	4,350	10,500	4.7	10,500	2.0	906	7,020
Nevada	1,530	1,480	855	42	896	1,400	0	1,400	2,260	42	2,300	24	473	1,340
New Hampshire	1,148	388	81	0	81	364	877	1,240	446	877	1,320	0	0	35
New Jersey	7,945	269	580	0	580	1,560	3,980	5,530	2,140	3,980	6,110	1.1	0	210
New Mexico	1,686	2,080	1,700	0	1,700	1,800	0	1,800	3,510	0	3,510	0	628	1,980
New York	18,136	567	1,010	1.5	1,010	9,270	6,500	15,800	10,300	6,500	16,800	0	0	469
North Carolina	7,195	1,070	535	2.1	535	7,200	1,550	8,750	7,730	1,560	9,290	1.0	0	713
North Dakota	641	1,750	122	0	122	1,000	0	1,000	1,120	0	1,120	0	5.1	181
Ohio	11,151	944	905	0	905	9,620	0	9,620	10,500	0	10,500	0	.2	791
Oklahoma	3,278	543	959	259	1,220	822	0	822	1,780	259	2,040	0	4.9	716
Oregon	3,140	2,520	1,050	0	1,050	6,860	0	6,860	7,910	0	7,910	0	1,300	3,210
Pennsylvania	12,072	802	860	0	860	8,820	0	8,820	9,680	0	9,680	1.1	0	565
Rhode Island	990	138	27	0	27	109	275	383	136	275	411	0	0	19
South Carolina	3,673	1,690	322	0	322	5,880	0	5,880	6,200	0	6,200	0	0	321
South Dakota	729	631	187	0	187	273	0	273	460	0	460	0	54	249
Tennessee	5,256	1,920	435	0	435	9,640	0	9,640	10,100	0	10,100	.5	0	233
Texas	18,724	1,300	8,370	411	8,780	16,000	4,860	20,800	24,300	5,280	29,600	109	540	10,500
Utah	1,951	2,200	776	14	790	3,530	143	3,670	4,300	157	4,460	14	612	2,200
Vermont	585	967	50	0	50	515	0	515	565	0	565	0	0	24
Virginia	6,618	826	358	0	358	5,110	2,800	7,900	5,470	2,800	8,260	0	2.9	218
Washington	5,431	1,620	1,760	0	1,760	7,060	38	7,100	8,820	38	8,860	0	1,090	3,080
West Virginia	1,828	2,530	146	.5	146	4,470	0	4,470	4,620	.5	4,620	0	0	352
Wisconsin	5,102	1,420	759	0	759	6,490	0	6,490	7,250	0	7,250	0	0	443
Wyoming	480	14,700	317	18	335	6,720	0	6,720	7,040	18	7,060	9.1	2,470	2,800
Puerto Rico	3,755	154	155	0	155	422	2,260	2,680	576	2,260	2,840	0	15	187
Virgin Islands	103	113	.5	.2	.7	11	190	201	12	190	202	0	0	1.9
Total	267,068	1,280	76,400	1,110	77,500	264,000	59,700	324,000	341,000	60,800	402,000	1,020	25,300	100,000

Table 3. Total water withdrawals by water-use category and water-resources region, 1995

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

REGION	PUBLIC SUPPLY	DOMESTIC	COMMERCIAL	IRRIGATION	LIVESTOCK	INDUSTRIAL		MINING		THERMOELECTRIC		TOTAL	
	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh	Saline	Fresh	Saline	Fresh	Saline	Fresh	Saline
New England	1,440	169	90	146	19	153	0	24	0	1,670	8,800	3,710	8,800
Mid-Atlantic	6,000	486	283	293	134	1,430	526	321	8.6	12,600	19,700	21,600	20,300
South Atlantic-Gulf	5,470	719	130	4,600	405	2,790	40	339	9.1	17,600	12,700	32,100	12,700
Great Lakes	4,420	355	152	315	70	4,170	3.6	390	7.6	22,800	0	32,700	11
Ohio	2,680	328	170	104	141	3,690	0	327	23	22,600	0	30,100	23
Tennessee	574	64	22	48	205	1,070	0	11	0	6,990	0	8,980	0
Upper Mississippi	1,880	311	208	484	255	988	0	134	4.2	19,100	0	23,300	4.2
Lower Mississippi	1,070	73	36	8,130	1,010	2,890	0	5.3	0	6,730	0	20,000	0
Souris-Red-Rainy	66	17	.3	88	20	22	0	1.4	0	38	0	253	0
Missouri Basin	1,570	138	34	24,600	426	152	0	306	38	8,800	0	36,000	38
Arkansas-White-Red	1,550	105	115	9,250	395	438	0	56	284	4,170	0	16,100	284
Texas-Gulf	2,840	115	42	5,530	208	1,060	996	197	324	7,680	3,870	17,700	5,190
Rio Grande	487	25	19	6,020	35	10	0	55	60	18	1.0	6,670	61
Upper Colorado	141	12	6.2	7,030	54	6.4	0	23	14	146	0	7,420	14
Lower Colorado	1,170	45	30	6,410	40	47	0	152	14	63	0	7,960	14
Great Basin	605	14	25	5,110	86	91	.1	74	162	24	37	6,030	199
Pacific Northwest	1,910	260	1,070	25,700	1,510	1,080	38	35	0	385	0	32,000	38
California	5,610	124	396	29,100	453	541	36	78	151	205	9,450	36,500	9,640
Alaska	81	8.7	11	.6	.5	55	1.8	24	116	31	0	211	117
Hawaii	214	3.7	46	652	10	19	.9	.5	0	67	903	1,010	922
Caribbean	437	13	3.4	107	6.4	14	17	4.5	0	2.2	2,440	588	2,450
Total	40,200	3,390	2,890	134,000	5,490	20,700	1,660	2,560	1,210	132,000	57,900	341,000	60,800

Table 4. Total water withdrawals by water-use category and State, 1995

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

STATE	PUBLIC SUPPLY	DOMESTIC	COMMERCIAL	IRRIGATION	LIVESTOCK	INDUSTRIAL		MINING		THERMOELECTRIC		TOTAL	
	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh	Saline	Fresh	Saline	Fresh	Saline	Fresh	Saline
Alabama	813	62	4.9	139	129	733	0	11	9.1	5,200	0	7,090	9.1
Alaska	81	8.6	11	.6	.5	55	1.8	24	116	31	0	211	117
Arizona	807	39	21	5,670	32	39	0	144	14	62	0	6,820	14
Arkansas	381	38	100	5,940	354	187	0	.1	0	1,770	0	8,800	0
California	5,620	120	385	28,900	459	538	36	76	151	205	9,450	36,300	9,640
Colorado	705	27	8.6	12,700	59	123	0	52	17	114	0	13,800	17
Connecticut	393	55	27	28	1.4	9.6	0	1.7	0	760	3,180	1,280	3,180
Delaware	89	12	2.8	48	4.1	61	3.2	0	0	534	740	752	743
D.C.	0	0	0	0	0	.5	0	0	0	9.7	0	10	0
Florida	2,070	297	50	3,470	56	345	8.0	296	0	636	11,000	7,210	11,000
Georgia	1,150	99	46	722	48	633	32	12	0	3,040	33	5,750	64
Hawaii	214	3.7	46	652	10	19	.9	.5	0	67	903	1,010	922
Idaho	189	65	306	13,000	1,460	47	0	29	0	0	0	15,100	0
Illinois	1,820	129	104	180	56	452	0	50	25	17,100	0	19,900	25
Indiana	669	115	93	116	46	2,270	0	137	0	5,690	0	9,140	0
Iowa	373	45	43	39	110	258	0	43	0	2,120	0	3,030	0
Kansas	370	24	5.2	3,380	109	53	0	24	0	1,270	0	5,240	0
Kentucky	496	25	22	12	46	347	0	28	0	3,440	0	4,420	0
Louisiana	638	39	11	769	325	2,580	0	1.8	0	5,480	0	9,850	0
Maine	100	35	11	27	1.9	11	0	5.0	0	30	105	221	105
Maryland	834	73	24	62	35	65	261	5.2	0	360	6,000	1,460	6,270
Massachusetts	725	34	12	82	10	85	0	3.2	0	196	4,370	1,150	4,370
Michigan	1,300	194	41	227	14	1,850	3.6	58	.8	8,370	0	12,100	4.4
Minnesota	485	88	66	157	62	140	0	298	0	2,090	0	3,390	0
Mississippi	344	33	18	1,740	396	290	0	3.7	0	263	112	3,090	112
Missouri	699	58	14	567	76	39	0	24	0	5,550	0	7,030	0
Montana	143	18	0	8,550	52	60	0	6.6	13	22	0	8,850	13
Nebraska	286	42	.3	7,550	142	30	0	141	4.7	2,350	0	10,500	4.7
Nevada	468	11	21	1,640	5.7	15	0	68	11	27	30	2,260	42
New Hampshire	98	32	30	6.3	.8	43	0	7.0	0	229	877	446	877
New Jersey	1,040	86	18	125	1.5	201	195	90	0	580	3,780	2,140	3,980
New Mexico	311	26	20	2,990	30	8.3	0	61	0	56	0	3,510	0
New York	3,000	144	200	30	34	259	0	45	16	6,570	6,490	10,300	6,500
North Carolina	769	172	7.6	239	297	369	0	16	0	5,860	1,550	7,730	1,560
North Dakota	73	12	.2	117	24	11	0	5.8	0	880	0	1,120	0
Ohio	1,420	140	68	27	27	557	0	93	0	8,190	0	10,500	0
Oklahoma	567	30	23	864	147	21	0	5.4	259	124	0	1,780	259
Oregon	504	68	756	6,170	23	378	0	1.2	0	9.0	0	7,910	0
Pennsylvania	1,550	181	30	16	55	1,680	0	252	0	5,920	0	9,680	0
Rhode Island	114	7.3	1.5	2.3	3.6	1.1	0	6.2	0	0	275	136	275
South Carolina	543	71	1.7	52	25	700	0	2.9	0	4,810	0	6,200	0
South Dakota	88	9.4	10	269	46	5.1	0	27	0	5.4	0	460	0
Tennessee	777	54	20	24	37	863	0	5.5	0	8,300	0	10,100	0
Texas	3,290	130	44	9,450	315	1,300	996	211	409	9,590	3,870	24,300	5,280
Utah	497	9.4	3.8	3,530	108	86	.1	16	150	48	6.7	4,300	157
Vermont	47	19	26	3.9	5.3	9.4	0	3.0	0	453	0	565	0
Virginia	786	125	41	30	36	516	67	39	0	3,890	2,730	5,470	2,800
Washington	1,180	125	24	6,470	34	611	38	3.5	0	376	0	8,820	38
West Virginia	176	41	46	0	18	1,320	0	11	.5	3,010	0	4,620	.5
Wisconsin	600	92	17	169	92	441	0	12	0	5,830	0	7,250	0
Wyoming	90	10	1.6	6,590	25	2.8	0	96	18	220	0	7,040	18
Puerto Rico	431	12	2.7	107	6.3	11	0	4.2	0	2.2	2,260	576	2,260
Virgin Islands	6.5	1.4	.8	0	.1	3.0	17	0	0	0	173	12	190
Total	40,200	3,390	2,890	134,000	5,490	20,700	1,660	2,560	1,210	132,000	57,900	341,000	60,800

Table 5. Surface-water withdrawals by water-use category and water-resources region, 1995

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

STATE	PUBLIC SUPPLY	DOMESTIC	COMMERCIAL	IRRIGATION	LIVESTOCK	INDUSTRIAL		MINING		THERMOELECTRIC		TOTAL	
	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh	Saline	Fresh	Saline	Fresh	Saline	Fresh	Saline
New England	1,100	0.5	26	99	13	100	0	21	0	1,620	8,800	2,960	8,800
Mid-Atlantic	4,730	.6	65	165	55	1,090	526	163	7.5	12,600	19,700	18,900	20,300
South Atlantic-Gulf	2,710	0	16	2,320	217	2,010	40	162	0	17,500	12,700	25,000	12,700
Great Lakes	3,830	1.0	108	145	20	3,900	0	356	6.5	22,800	0	31,100	6.5
Ohio	1,800	5.0	80	43	81	3,310	0	212	.6	22,600	0	28,100	.6
Tennessee	449	0	18	39	187	1,030	0	7.2	0	6,990	0	8,730	0
Upper Mississippi	731	0	114	54	39	660	0	112	0	19,000	0	20,700	0
Lower Mississippi	330	.1	21	1,200	272	2,280	0	2.2	0	6,670	0	10,800	0
Souris-Red-Rainy	32	0	.1	43	3.0	20	0	1.0	0	38	0	138	0
Missouri Basin	926	1.2	15	16,600	173	50	0	201	0	8,770	0	26,700	0
Arkansas-White-Red	1,170	0	99	2,590	205	360	0	26	0	4,140	0	8,590	0
Texas-Gulf	1,860	0	8.0	1,170	126	846	996	79	0	7,630	3,870	11,700	4,860
Rio Grande	131	0	1.8	4,600	8.5	.1	0	2.1	0	2.2	0	4,740	0
Upper Colorado	106	.4	.7	6,990	50	4.0	0	3.5	0	146	0	7,310	0
Lower Colorado	698	.2	7.5	4,200	6.8	5.5	0	26	2.3	17	0	4,970	2.3
Great Basin	254	1.6	15	4,020	77	31	0	2.8	143	21	0	4,420	143
Pacific Northwest	993	7.3	1,030	21,700	1,470	866	38	29	0	384	0	26,500	38
California	2,880	12	319	18,200	222	19	26	62	0	202	9,430	21,900	9,450
Alaska	50	.4	.1	.5	.4	51	1.8	24	41	26	0	154	43
Hawaii	14	1.3	.4	479	2.6	0	0	.1	0	0	903	497	906
Caribbean	342	6.9	2.1	75	1.8	4.0	17	1.1	0	0	2,440	433	2,450
Total	25,100	38	1,950	84,700	3,230	16,700	1,640	1,490	201	131,000	57,900	264,000	59,700

Table 6. Surface-water withdrawals by water-use category and State, 1995

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

STATE	PUBLIC SUPPLY	DOMESTIC	COMMERCIAL	IRRIGATION	LIVESTOCK	INDUSTRIAL		MINING		THERMOELECTRIC		TOTAL	
	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh	Saline	Fresh	Saline	Fresh	Saline	Fresh	Saline
Alabama	560	0	0	88	107	699	0	7.0	0	5,190	0	6,650	0
Alaska	50	.3	.1	.5	.4	51	1.8	24	41	26	0	154	43
Arizona	398	0	0	3,540	2.4	0	0	25	2.3	20	0	3,980	2.3
Arkansas	246	0	100	1,010	110	80	0	.1	0	1,770	0	3,310	0
California	2,880	12	309	18,100	225	16	26	62	0	202	9,430	21,800	9,450
Colorado	605	0	.9	10,700	36	86	0	27	0	93	0	11,600	0
Connecticut	329	0	1.5	12	.1	6.2	0	1.4	0	760	3,180	1,110	3,180
Delaware	49	0	0	15	.4	43	3.2	0	0	534	740	642	743
D.C.	0	0	0	0	0	0	0	0	0	9.7	0	9.7	0
Florida	210	0	.2	1,800	5.9	106	8.0	148	0	615	11,000	2,880	11,000
Georgia	890	0	13	243	38	337	32	2.9	0	3,040	33	4,560	64
Hawaii	14	1.3	.4	479	2.6	0	0	.1	0	0	903	497	906
Idaho	9.9	0	297	10,500	1,440	7.9	0	27	0	0	0	12,300	0
Illinois	1,450	0	88	0	2.2	290	0	44	0	17,100	0	19,000	0
Indiana	350	0	48	55	18	2,160	0	126	0	5,680	0	8,430	0
Iowa	116	0	25	3.6	27	184	0	42	0	2,110	0	2,510	0
Kansas	209	0	.3	230	19	3.2	0	11	0	1,250	0	1,720	0
Kentucky	441	2.5	14	11	44	255	0	21	0	3,410	0	4,190	0
Louisiana	344	0	.7	294	181	2,230	0	1.4	0	5,450	0	8,500	0
Maine	75	0	1.7	24	.5	5.9	0	3.7	0	30	105	141	105
Maryland	751	0	4.9	26	23	45	261	4.3	0	358	6,000	1,210	6,270
Massachusetts	533	0	0	54	8.5	47	0	2.7	0	150	4,370	795	4,370
Michigan	952	.1	25	127	1.4	1,670	0	51	0	8,370	0	11,200	0
Minnesota	154	0	20	37	0	83	0	292	0	2,090	0	2,680	0
Mississippi	41	0	0	97	19	124	0	.2	0	220	112	502	112
Missouri	473	0	.5	33	57	18	0	15	0	5,540	0	6,140	0
Montana	89	1.0	0	8,460	35	29	0	3.8	0	22	0	8,640	0
Nebraska	53	0	0	1,770	33	4.4	0	134	0	2,350	0	4,350	0
Nevada	351	.2	14	1,000	4.7	7.5	0	3.5	0	21	0	1,400	0
New Hampshire	66	.5	18	6.1	.2	38	0	7.0	0	228	877	364	877
New Jersey	640	0	1.2	93	0	158	195	87	0	578	3,780	1,560	3,980
New Mexico	34	0	1.6	1,710	3.6	2.0	0	.7	0	46	0	1,800	0
New York	2,450	0	65	14	12	132	0	34	15	6,570	6,490	9,270	6,500
North Carolina	633	0	.3	181	207	308	0	4.3	0	5,860	1,550	7,200	1,550
North Dakota	43	0	.2	57	9.9	7.9	0	2.0	0	879	0	1,000	0
Ohio	923	2.8	41	16	19	399	0	46	0	8,170	0	9,620	0
Oklahoma	468	0	16	98	101	17	0	0	0	121	0	822	0
Oregon	417	7.2	752	5,290	20	365	0	0	0	9.0	0	6,860	0
Pennsylvania	1,300	0	14	7.7	7.1	1,530	0	41	0	5,920	0	8,820	0
Rhode Island	99	0	0	1.6	3.1	0	0	5.7	0	0	275	109	275
South Carolina	436	0	0	25	12	640	0	0	0	4,770	0	5,880	0
South Dakota	35	0	4.1	184	28	1.0	0	20	0	1.9	0	273	0
Tennessee	500	0	18	15	15	795	0	2.7	0	8,300	0	9,640	0
Texas	2,160	0	11	2,920	176	1,070	996	83	0	9,530	3,870	16,000	4,860
Utah	204	1.7	0	3,140	100	31	0	.9	143	48	0	3,530	143
Vermont	32	.4	16	3.5	1.3	7.4	0	2.8	0	452	0	515	0
Virginia	704	0	13	24	28	410	67	37	0	3,890	2,730	5,110	2,800
Washington	548	0	.4	5,650	11	478	38	.7	0	375	0	7,060	38
West Virginia	139	.8	9.2	0	3.6	1,300	0	7.5	0	3,010	0	4,470	0
Wisconsin	289	0	0	1.5	13	363	0	4.3	0	5,820	0	6,490	0
Wyoming	52	.5	.6	6,410	11	1.2	0	25	0	219	0	6,720	0
Puerto Rico	336	5.5	1.5	75	1.8	1.1	0	1.4	0	0	2,260	422	2,260
Virgin Islands	6.2	1.4	.6	0	0	2.9	17	0	0	0	173	11	190
Total	25,100	38	1,950	84,700	3,230	16,700	1,640	1,490	201	131,000	57,900	264,000	59,700

Table 7. Ground-water withdrawals by water-use category and water-resources region, 1995

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

REGION	PUBLIC SUPPLY	DOMESTIC	COMMERCIAL	IRRIGATION	LIVESTOCK	INDUSTRIAL		MINING		THERMOELECTRIC	TOTAL	
	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh	Saline	Fresh	Saline	Fresh	Fresh	Saline
New England	335	168	64	47	6.4	53	0	2.9	0	48	725	0
Mid-Atlantic	1,270	485	217	128	79	344	0	159	1.0	11	2,690	1.0
South Atlantic-Gulf	2,760	719	114	2,280	188	787	0	177	9.1	79	7,110	16
Great Lakes	585	354	44	170	50	270	3.6	34	1.0	7.6	1,510	4.6
Ohio	880	323	91	61	60	379	0	115	22	70	1,980	22
Tennessee	125	64	3.6	8.7	19	35	0	3.7	0	0	258	0
Upper Mississippi	1,150	311	94	430	216	328	0	22	4.2	24	2,570	4.2
Lower Mississippi	741	73	15	6,930	740	611	0	3.1	0	69	9,180	0
Souris-Red-Rainy	34	17	.2	45	17	1.7	0	.4	0	0	115	0
Missouri Basin	643	137	19	8,030	253	102	0	104	38	30	9,320	38
Arkansas-White-Red	378	105	16	6,660	190	78	0	30	284	37	7,490	284
Texas-Gulf	978	115	34	4,370	82	214	.5	118	324	50	5,960	324
Rio Grande	356	25	17	1,420	27	10	0	53	60	16	1,930	61
Upper Colorado	35	11	5.6	38	4.2	2.4	0	20	14	0	116	14
Lower Colorado	476	44	22	2,210	33	42	0	126	12	45	3,000	12
Great Basin	350	13	10	1,090	9.2	60	.1	71	19	2.6	1,610	56
Pacific Northwest	917	253	37	4,030	44	215	0	6.5	0	.5	5,500	0
California	2,730	112	77	10,900	231	522	10	16	151	3.6	14,600	185
Alaska	30	8.3	11	.1	.1	3.8	0	0	75	4.2	58	75
Hawaii	200	2.4	45	173	7.5	19	.9	.5	0	67	515	16
Caribbean	95	6.4	1.3	33	4.5	10	.2	3.4	0	2.2	156	.2
Total	15,100	3,350	939	49,000	2,260	4,090	15	1,070	1,010	565	76,400	1,110

Table 8. Ground-water withdrawals by water-use category and State, 1995

[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	253	62	4.9	51	22	34	0	4.0	9.1	6.0	436	9.1
Alaska	30	8.3	11	.1	.1	3.8	0	0	75	4.2	58	75
Arizona	409	39	21	2,130	29	39	0	119	12	42	2,830	12
Arkansas	135	38	.4	4,930	244	108	0	0	0	5.2	5,460	0
California	2,740	108	77	10,800	234	522	10	14	151	3.6	14,500	185
Colorado	100	27	7.7	2,020	23	37	0	25	17	22	2,260	17
Connecticut	65	55	25	16	1.4	3.5	0	.3	0	.2	166	0
Delaware	40	12	2.8	34	3.8	17	0	0	0	.2	110	0
D.C.	0	0	0	0	0	.5	0	0	0	0	.5	0
Florida	1,860	297	50	1,670	50	240	0	148	0	21	4,340	4.6
Georgia	263	99	33	479	9.7	295	0	8.7	0	4.8	1,190	0
Hawaii	200	2.4	45	173	7.5	19	.9	.5	0	67	515	16
Idaho	180	65	9.8	2,520	17	39	0	1.2	0	0	2,830	0
Illinois	371	129	16	180	54	162	0	5.5	25	11	928	25
Indiana	319	115	45	61	28	119	0	10	0	11	709	0
Iowa	257	45	18	35	82	74	0	1.1	0	15	528	0
Kansas	161	24	4.9	3,150	91	50	0	13	0	14	3,510	0
Kentucky	55	23	8.0	.5	2.3	92	0	7.4	0	38	226	0
Louisiana	294	39	10	475	144	356	0	.4	0	31	1,350	0
Maine	25	35	9.8	2.6	1.4	4.6	0	1.3	0	.7	80	0
Maryland	83	73	19	37	13	19	0	.9	0	1.8	246	0
Massachusetts	192	34	12	28	1.5	38	0	.5	0	46	351	0
Michigan	348	194	16	101	13	177	3.6	7.1	.8	3.0	858	4.4
Minnesota	331	88	46	120	62	58	0	6.3	0	1.9	714	0
Mississippi	302	33	18	1,640	377	166	0	3.5	0	42	2,590	0
Missouri	226	58	13	535	20	21	0	8.6	0	9.5	891	0
Montana	55	17	0	82	16	31	0	2.8	13	0	204	13
Nebraska	232	42	.3	5,780	108	26	0	6.1	4.7	4.4	6,200	4.7
Nevada	117	11	7.1	641	1.0	7.4	0	65	11	6.3	855	42
New Hampshire	31	31	12	.3	.6	5.6	0	0	0	.8	81	0
New Jersey	397	86	17	32	1.5	43	0	2.4	0	1.9	580	0
New Mexico	277	26	18	1,280	26	6.3	0	61	0	9.3	1,700	0
New York	552	144	136	16	22	127	0	11	1.5	0	1,010	1.5
North Carolina	136	172	7.3	57	89	61	0	12	0	.1	535	2.1
North Dakota	30	12	.1	59	14	3.6	0	3.8	0	.3	122	0
Ohio	497	138	28	12	7.6	158	0	47	0	19	905	0
Oklahoma	99	30	6.6	766	45	3.8	0	5.4	259	3.5	959	259
Oregon	87	61	4.4	878	3.4	13	0	1.2	0	0	1,050	0
Pennsylvania	243	181	16	8.2	48	147	0	211	0	6.2	860	0
Rhode Island	16	7.3	1.5	.7	.5	1.1	0	.5	0	0	27	0
South Carolina	107	71	1.7	27	12	60	0	2.9	0	39	322	0
South Dakota	53	9.3	6.1	85	18	4.1	0	7.8	0	3.4	187	0
Tennessee	277	54	2.0	9.9	21	68	0	2.8	0	0	435	0
Texas	1,130	130	33	6,530	139	226	.5	128	409	59	8,370	411
Utah	293	7.7	3.8	393	7.6	55	.1	16	7.3	0	776	14
Vermont	15	18	9.6	.4	4.0	1.9	0	.3	0	.4	50	0
Virginia	82	125	28	5.6	7.8	107	0	2.6	0	.4	358	0
Washington	631	125	24	819	24	133	0	2.8	0	.5	1,760	0
West Virginia	38	40	36	0	15	13	0	3.7	.5	.5	146	.5
Wisconsin	311	92	17	167	79	78	0	7.9	0	5.8	759	0
Wyoming	38	9.7	.9	181	13	1.6	0	71	18	1.0	317	18
Puerto Rico	95	6.4	1.2	33	4.5	10	0	2.8	0	2.2	155	0
Virgin Islands	.3	0	.1	0	.1	.1	.2	0	0	0	.5	.2
Total	15,100	3,350	939	49,000	2,260	4,090	15	1,070	1,010	565	76,400	1,110

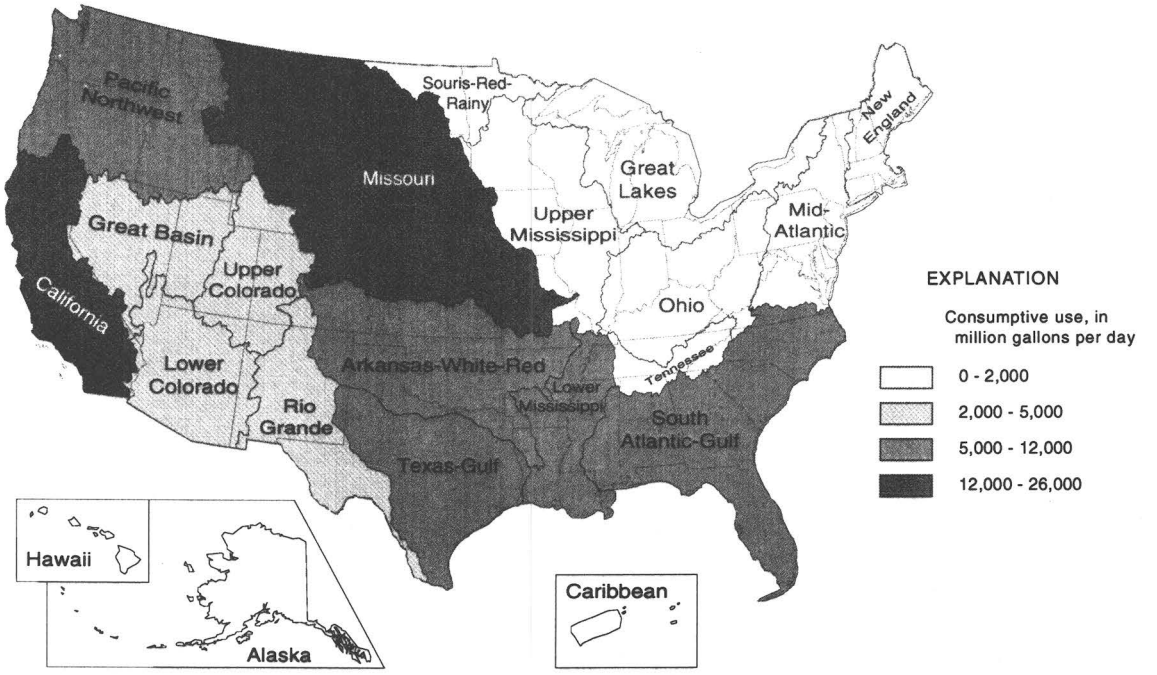


Figure 3. Freshwater consumptive use by water-resources region, 1995.

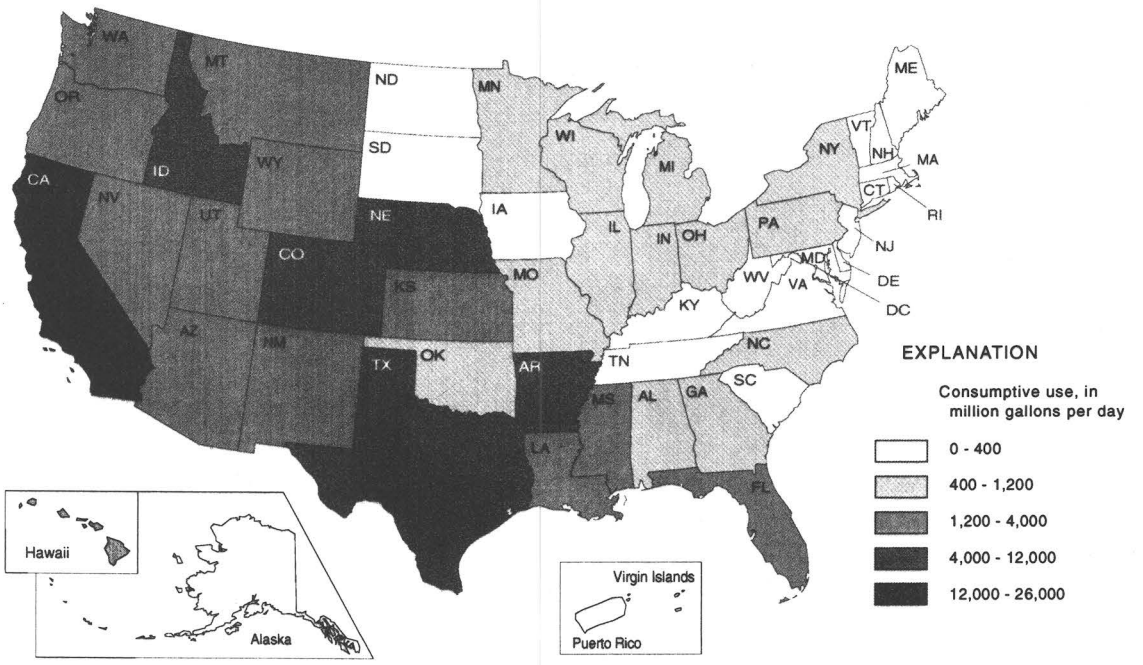


Figure 4. Freshwater consumptive use by State, 1995.

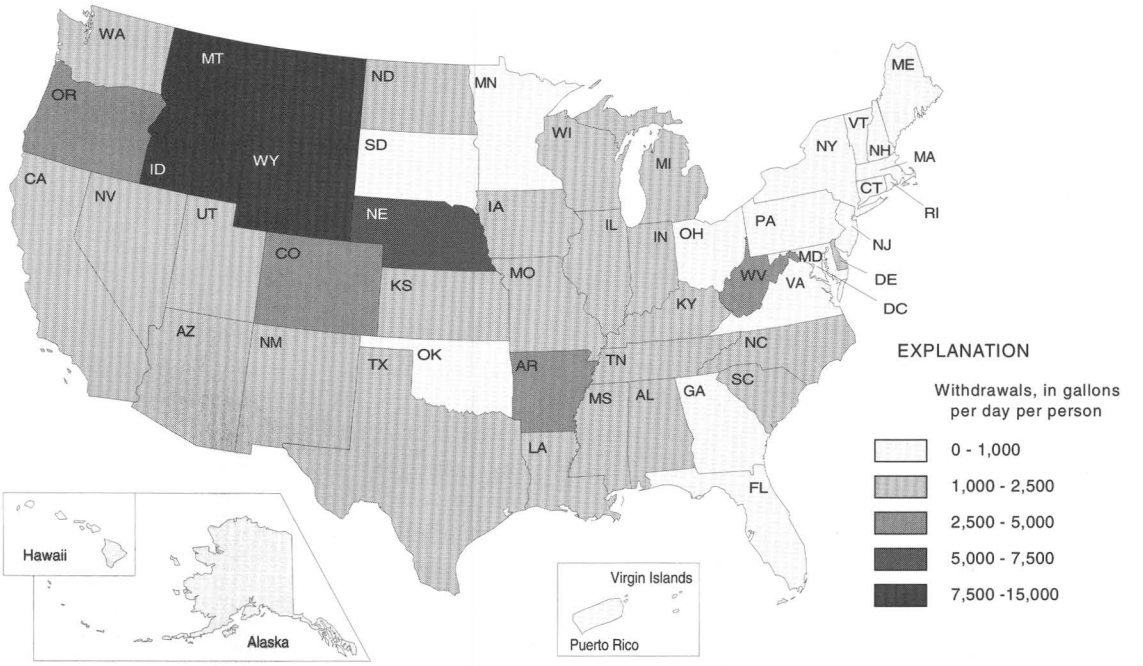


Figure 5. Intensity of freshwater withdrawals per capita by State, 1995.

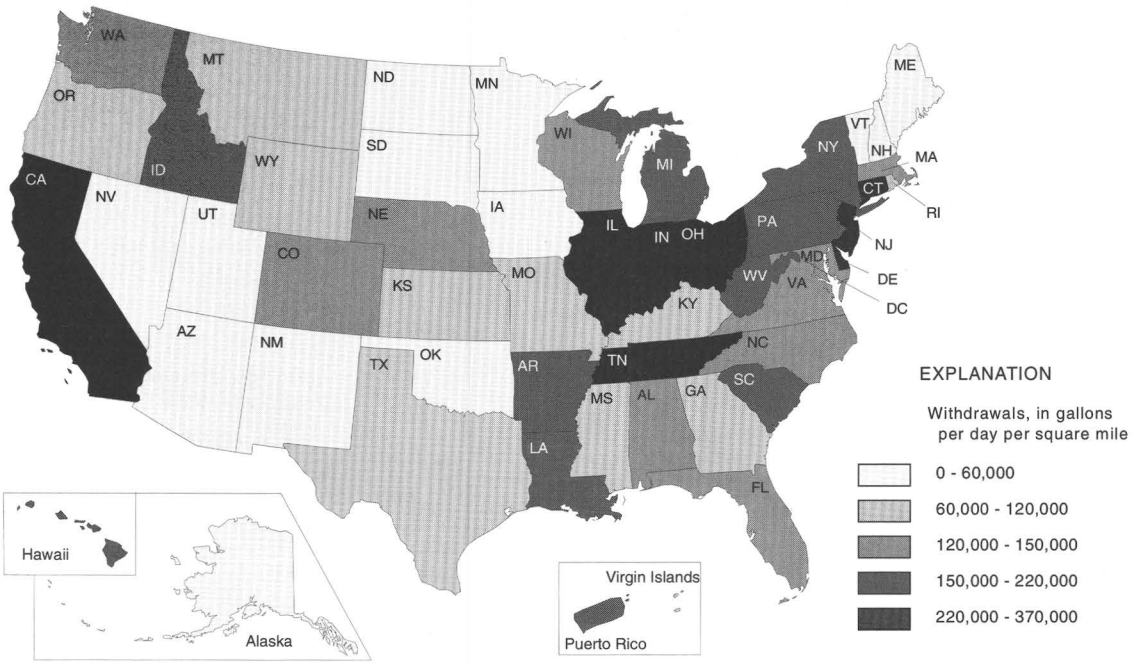


Figure 6. Intensity of freshwater withdrawals per area by State, 1995.

For an overview of how the 341,000 Mgal/d of freshwater withdrawn in the United States during 1995 was used (table 2), the eight offstream categories mentioned above have been combined into five major categories: public supply, domestic and commercial, irrigation and livestock, industrial and mining, and thermoelectric power. The source (withdrawals), use (withdrawals, deliveries), and disposition of freshwater for each category of use are summarized in figure 7. 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 264,000 Mgal/d of freshwater (table 2), or 77.6 percent of total freshwater withdrawals. Of the 264,000 Mgal/d of surface water withdrawn, 49.6 percent was for thermoelectric power. Public supply is considered a source of water and figure 7 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 shows total freshwater use for each category, and the percentage each category represents total offstream water use. In addition, the use column shows the proportion of the source (surface water, ground water, public supply) and disposition (consumptive use, return flow) for each category. The use data indicate, for example, that domestic and commercial use totaled 41,700 Mgal/d (tables 12 and 14), (including losses in the public-supply distribution system), or 12.2 percent of the Nation's total freshwater withdrawals. Of this 41,700 Mgal/d, 84.9 percent was supplied by public-supply systems, and 80.8 percent was returned to a surface- or groundwater source after use. The disposition column shows the quantity of consumptive use and return flow after use (figure 7). The disposition data indicate that of the total freshwater withdrawn, consumptive use was 100,000 Mgal/d (table 2), or 29.3 percent, and return flow was 241,000 Mgal/d, or 70.7 percent (including 25,300 Mgal/d of irrigation conveyance losses) (figure 7). Irrigation-Livestock accounted for 84.6 percent of consumptive use and thermoelectric power accounted for 53.4 percent of return flow.

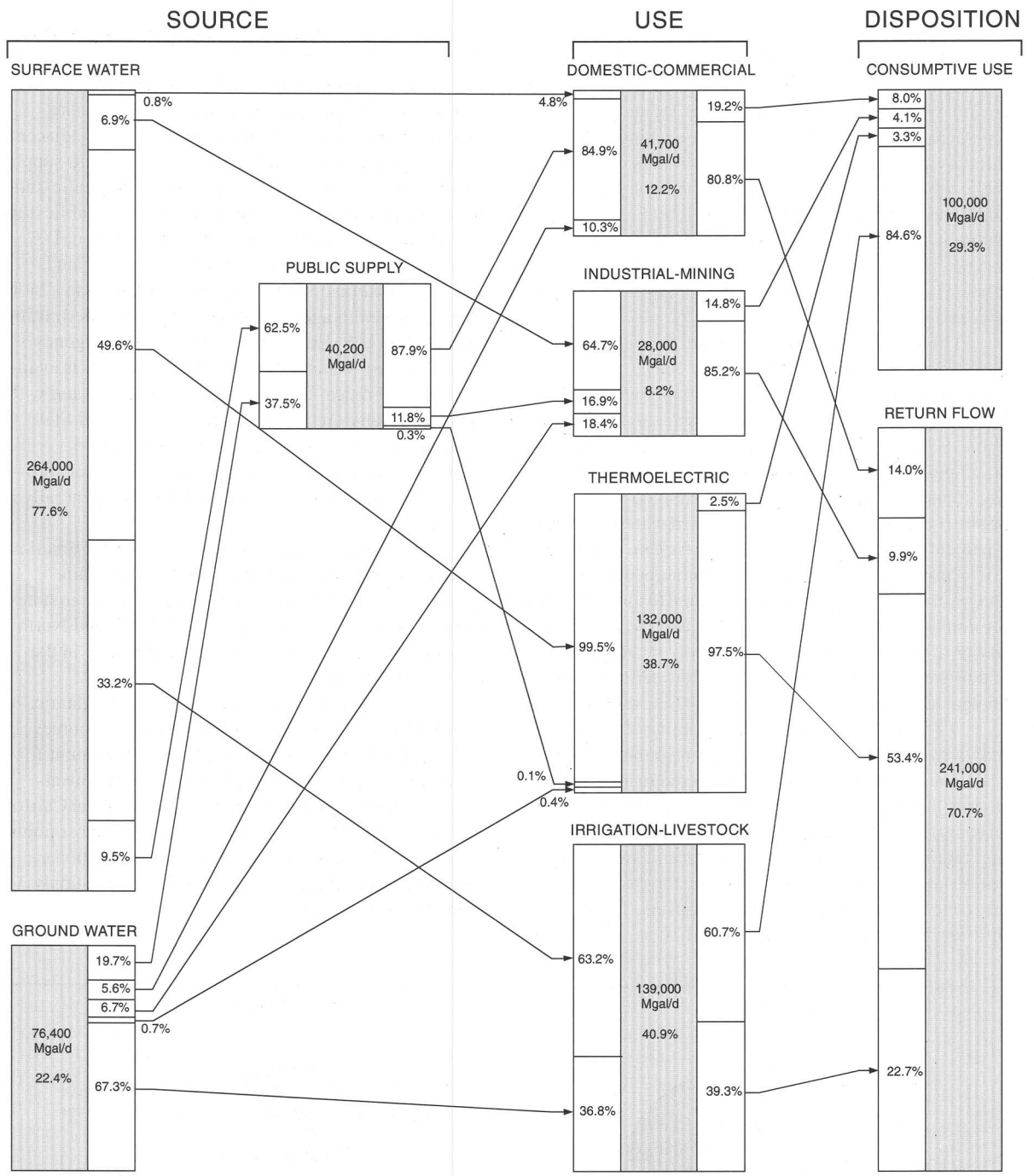


Figure 7. Source, use, and disposition of freshwater in the United States, 1995. For each water-use category, this diagram shows the relative proportion of water source and disposition and the general distribution of water from source to disposition. The lines and arrows indicate the distribution of water from source to disposition for each category; for example, surface water was 77.6 percent of total freshwater withdrawn, and going from "Source" to "Use" columns, the line from the surface-water block to the domestic and commercial block indicates that 0.8 percent of all surface water withdrawn was the source for 4.8 percent of total water (self-supplied withdrawals, 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 19.2 percent of the water for domestic and commercial purposes was consumptive use; this represents 8.0 percent of total consumptive use by all water-use categories.

Public Supply

40,200 million gallons per day

The quantity of water withdrawn for public supply during 1995 was an estimated 40,200 Mgal/d, or 4 percent more than during 1990. (See tables 9, 10). Public suppliers served about 225 million people during 1995, which is about 84 percent of the total population and a 7-percent increase from 1990. Total public-supply withdrawals in 1995 averaged 179 gal/d for each person served compared to 184 gal/d in 1990 and 183 gal/d in 1985. This is the first time public supply per-capita use declined since 1950.

The source and delivery of water for public supply for 1995 are shown in the chart below. Surface water was the source for 63 percent of public-supply withdrawals. Public-supply water was distributed to users as follows: domestic, 56 percent; commercial, 17 percent; industrial, 12 percent; and thermoelectric power, 0.3 percent. The remaining 15 percent was unaccounted water or public use and losses. This unaccounted water represents 2 percent of freshwater use for all offstream categories.

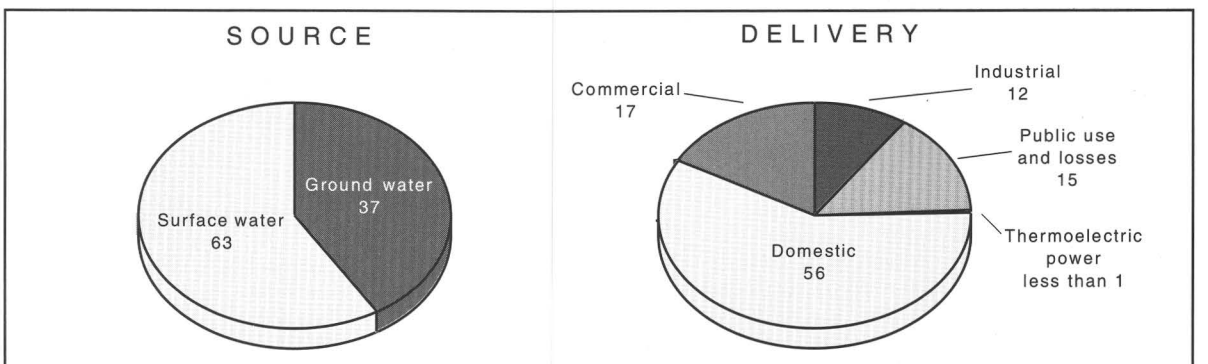
Public supply refers to water withdrawn by public and private water suppliers and delivered to multiple users for domestic, commercial, industrial, and thermoelectric power uses. In this report, public supply includes public and private water systems that furnish water to at least 25 people, or that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

The difference between the quantity of water withdrawn by public suppliers in a water-resources region or State and the quantity of water delivered to all users represents losses in the distribution systems, filter back flushing, public use (water for firefighting, street washing, municipal office buildings, parks and swimming pools) and, in a few areas, water transferred between adjacent States or water-resources regions. These differences are shown in tables 9 and 10 as "Public use and losses." Large positive values of "Public use and losses" may indicate, in addition to public use and losses, large exports of public-supply water to adjacent areas; negative values indicate 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. This is the case in Washington, D.C., which imports public-supply water from Maryland.

Information on public supply generally is available from State health agencies and through State permitting offices. The U.S. Environmental Protection Agency's Safe Drinking Water Information System also is available as a reference. Data on population served and withdrawals usually are accurate because local and State agencies maintain nearly complete information. Deliveries from public suppliers to various users are more difficult to obtain, and the information generally is less accurate.

State agencies were asked in 1995 for the first time to report saline-water withdrawals. Slightly saline ground-water withdrawals were reported for three states: Florida, 60 Mgal/d; California, 2.0 Mgal/d; and North Carolina, 2 Mgal/d. These values are included in the tables as freshwater.

Public-supply withdrawals in the Mid-Atlantic, South Atlantic-Gulf, and California water-resources regions, the three most populated regions, account for about 42 percent of total public-supply withdrawals (figure 8; table 9). Public-supply withdrawals in California, Texas, New York, and Florida, the four most populous States (31 percent of the Nation's population), account for 35 percent of nation-wide public-supply withdrawals (figure 9; table 10).



PUBLIC–SUPPLY SOURCE AND DELIVERY, 1995, IN PERCENT

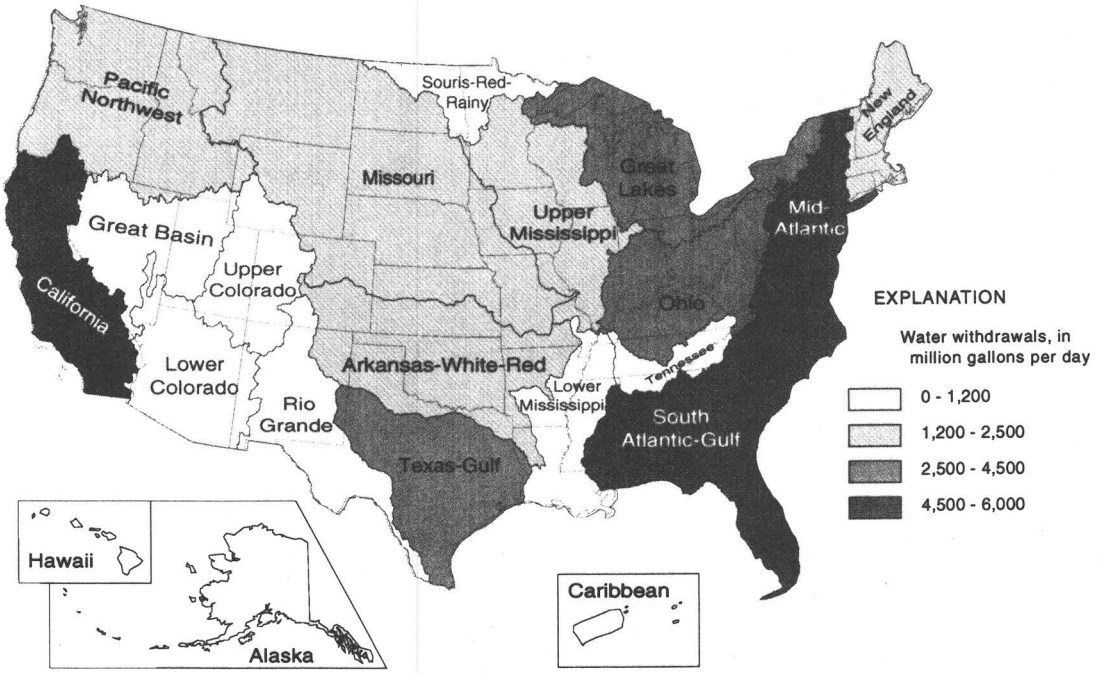


Figure 8. Public-supply freshwater withdrawals by water-resources region, 1995.

Table 9. Public-supply freshwater use by water-resources region, 1995

[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			PER CAPITA USE, in gal/d	WATER DELIVERIES, BY TYPE OF USE, in Mgal/d				PUBLIC USE AND LOSSES[1]
	Source			Source								
	Ground water	Surface water	Total	Ground water	Surface water	Total		Domestic	Commercial	Industrial	Thermoelectric power	
New England	3,950	6,470	10,400	335	1,100	1,440	138	717	343	168	2.3	210
Mid-Atlantic	10,100	25,600	35,700	1,270	4,730	6,000	168	3,340	942	516	27	1,170
South Atlantic-Gulf	17,000	13,100	30,100	2,760	2,710	5,470	182	3,080	866	742	5.6	779
Great Lakes	3,340	13,600	17,000	585	3,830	4,420	260	1,400	600	775	.1	1,640
Ohio	6,140	11,900	18,000	880	1,800	2,680	149	1,140	461	590	.3	494
Tennessee	862	2,380	3,250	125	449	574	177	274	134	101	0	64
Upper Mississippi	7,750	10,200	18,000	1,150	731	1,880	104	1,450	653	361	7.4	-599
Lower Mississippi	4,780	1,540	6,330	741	330	1,070	169	703	144	94	1.1	129
Souris-Red-Rainy	262	184	446	34	32	66	149	26	15	3.9	0	21
Missouri Basin	3,890	5,090	8,980	643	926	1,570	175	966	279	106	4.7	212
Arkansas-White-Red	2,540	5,140	7,680	378	1,170	1,550	202	767	275	291	28	193
Texas-Gulf	6,580	9,110	15,700	978	1,860	2,840	181	2,160	126	171	13	372
Rio Grande	1,560	735	2,300	356	131	487	212	340	73	20	0	55
Upper Colorado	154	407	561	35	106	141	252	86	25	4.2	0	26
Lower Colorado	2,440	2,510	4,950	476	698	1,170	237	757	235	68	1.5	113
Great Basin	1,230	1,050	2,280	350	254	605	265	417	132	17	0	39
Pacific Northwest	3,460	4,020	7,480	917	993	1,910	256	1,020	267	407	0	221
California	13,000	17,400	30,400	2,730	2,880	5,610	184	3,700	992	284	5.3	626
Alaska	161	220	381	30	50	81	212	38	23	12	.6	8.0
Hawaii	1,080	45	1,120	200	14	214	191	131	47	5.6	.3	31
Caribbean	835	2,750	3,580	95	342	437	122	173	64	15	2.2	183
Total	91,200	134,000	225,000	15,100	25,100	40,200	179	22,700	6,690	4,750	100	5,980

[1] Includes transfers from adjacent areas.

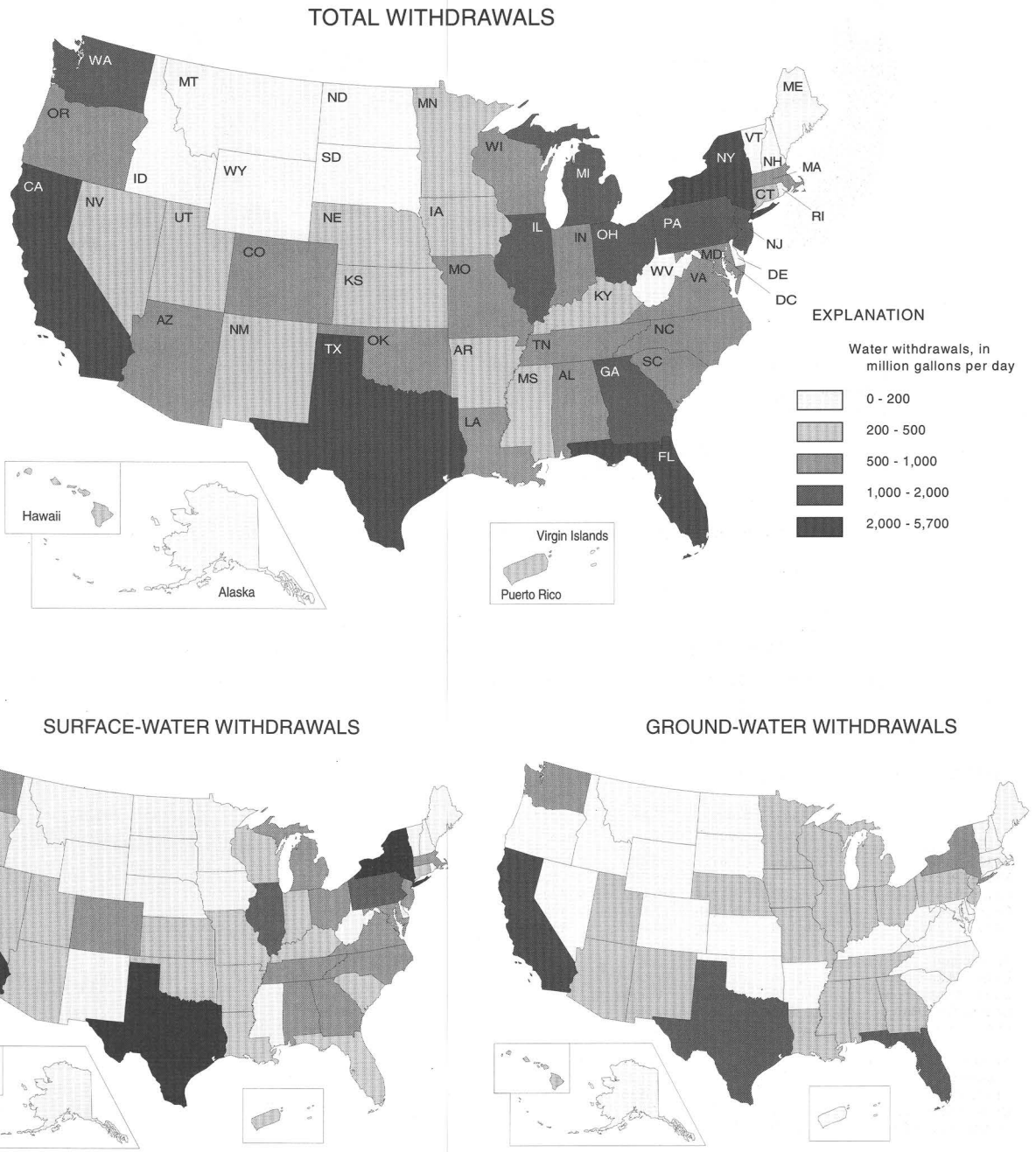


Figure 9. Public-supply freshwater withdrawals by source and State, 1995.

Table 10. Public-supply freshwater use by State, 1995

[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			PER CAPITA USE, in gal/d	WATER DELIVERIES, BY TYPE OF USE, in Mgal/d				PUBLIC USE AND LOSSES[1]
	Source			Source								
	Ground water	Surface water	Total	Ground water	Surface water	Total		Domestic	Commercial	Industrial	Thermoelectric power	
Alabama	1,380	2,040	3,430	253	560	813	237	383	122	213	0	94
Alaska	161	220	381	30	50	81	212	38	23	12	.6	8.0
Arizona	2,240	1,670	3,920	409	398	807	206	526	135	66	0	81
Arkansas	831	1,160	2,000	135	246	381	191	193	58	57	0	73
California	13,000	17,500	30,500	2,740	2,880	5,620	185	3,710	994	283	5.3	629
Colorado	475	2,920	3,390	100	605	705	208	481	101	19	14	90
Connecticut	1,030	1,500	2,530	65	329	393	155	191	89	42	1.0	70
Delaware	321	243	564	40	49	89	159	43	20	16	.5	11
D.C.	0	554	554	0	0	0	0	95	50	.7	0	-146
Florida	11,200	1,040	12,200	1,860	210	2,070	169	1,260	386	103	3.6	312
Georgia	1,680	4,220	5,900	263	890	1,150	195	629	168	194	0	161
Hawaii	1,080	45	1,120	200	14	214	191	131	47	5.6	.3	31
Idaho	736	44	780	180	9.9	189	243	141	18	6.7	0	23
Illinois	2,500	7,900	10,400	371	1,450	1,820	175	936	440	118	5.2	324
Indiana	2,170	2,120	4,280	319	350	669	156	326	119	125	0	99
Iowa	1,530	619	2,150	257	116	373	173	139	65	78	3.0	88
Kansas	1,050	1,270	2,320	161	209	370	159	191	67	37	.8	74
Kentucky	465	2,890	3,360	55	441	496	148	235	23	197	0	42
Louisiana	2,150	1,690	3,850	294	344	638	166	468	55	35	0	80
Maine	217	491	708	25	75	100	142	46	25	14	.9	14
Maryland	679	3,490	4,170	83	751	834	200	433	85	44	0	271
Massachusetts	2,280	3,300	5,580	192	533	725	130	362	188	86	0	88
Michigan	1,740	5,170	6,900	348	952	1,300	188	623	253	270	0	154
Minnesota	2,410	936	3,340	331	154	485	145	239	103	41	.1	103
Mississippi	2,050	214	2,260	302	41	344	152	248	33	20	2.2	40
Missouri	1,870	2,460	4,330	226	473	699	161	374	59	140	.2	125
Montana	240	405	645	55	89	143	222	77	26	1.0	0	39
Nebraska	1,080	212	1,290	232	53	286	221	155	79	26	0	26
Nevada	380	1,060	1,440	117	351	468	325	306	116	2.2	1.5	42
New Hampshire	257	440	697	31	66	98	140	57	21	13	.3	6.7
New Jersey	3,220	3,710	6,930	397	640	1,040	150	538	179	91	25	203
New Mexico	1,210	174	1,380	277	34	311	225	188	78	15	.1	30
New York	4,350	11,900	16,200	552	2,450	3,000	185	1,810	409	356	0	424
North Carolina	1,130	3,620	4,750	136	633	769	162	332	138	193	.4	105
North Dakota	213	276	489	30	43	73	149	40	15	2.5	0	15
Ohio	3,290	5,990	9,280	497	923	1,420	153	497	355	355	0	213
Oklahoma	759	2,170	2,930	99	468	567	194	241	170	122	1.2	34
Oregon	374	1,770	2,150	87	417	504	235	292	79	71	0	62
Pennsylvania	1,950	7,110	9,050	243	1,300	1,550	171	559	218	193	1.6	574
Rhode Island	150	728	878	16	99	114	130	57	20	12	0	26
South Carolina	698	2,020	2,720	107	436	543	200	368	50	44	0	81
South Dakota	382	220	602	53	35	88	147	52	21	7.9	0	7.1
Tennessee	1,630	2,790	4,420	277	500	777	176	355	214	130	.5	78
Texas	7,330	10,200	17,600	1,130	2,160	3,290	188	2,450	130	268	29	412
Utah	1,010	840	1,850	293	204	497	269	340	115	17	0	25
Vermont	110	204	315	15	32	47	148	26	7.7	7.7	0	5.5
Virginia	594	4,360	4,960	82	704	786	159	424	152	88	.5	121
Washington	2,300	2,130	4,430	631	548	1,180	266	565	161	331	0	122
West Virginia	282	1,040	1,320	38	139	176	134	96	23	14	.2	44
Wisconsin	2,020	1,540	3,560	311	289	600	169	189	111	151	.1	148
Wyoming	145	199	344	38	52	90	261	54	16	2.4	0	17
Puerto Rico	827	2,710	3,540	95	336	431	122	171	61	15	2.2	182
Virgin Islands	7.6	39	47	.3	6.2	6.5	138	1.6	3.3	0	.8	.8
Total	91,200	134,000	225,000	15,100	25,100	40,200	179	22,700	6,690	4,750	100	5,980

[1] Includes transfers from adjacent areas.

Domestic

26,100 million gallons per day

Domestic water use during 1995 was an estimated 26,100 Mgal/d, or 3 percent more than during 1990. Domestic use represents about 8 percent of freshwater use for all offstream categories. Self-supplied domestic withdrawals were an estimated 3,390 Mgal/d (tables 11, 12). Ground water was the source for about 99 percent of self-supplied domestic withdrawals. Public suppliers delivered about 22,700 Mgal/d of water to domestic users; this accounted for 56 percent of total public-supply withdrawals.

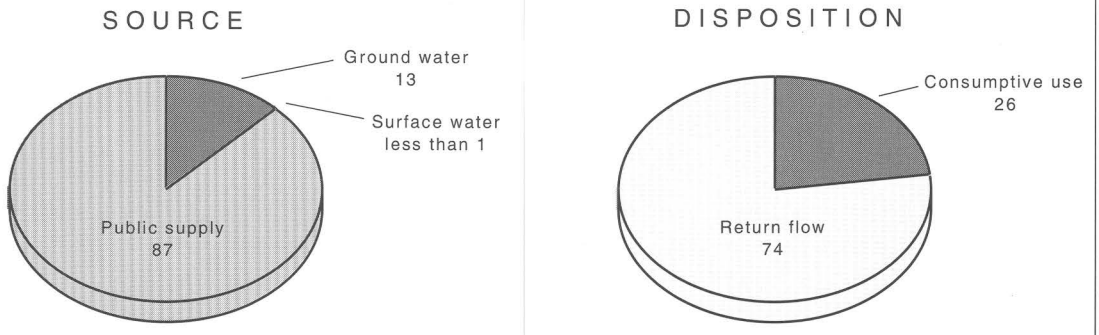
The source and disposition of water for domestic purposes for 1995 are shown in the chart below. Public supply is the dominant source of water (87 percent) for domestic use. The consumptive use of water for domestic purposes in 1995 was estimated at about 6,680 Mgal/d, or about 26 percent of withdrawals and deliveries.

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. Information from public suppliers about withdrawals and population served generally is reliable. Information on deliveries to various users is more difficult to obtain and generally is estimated from the population served.

The number of people served by their own water systems (self supplied) is determined by subtracting the number of people served by public suppliers from the total population as reported by the U.S. Bureau of the Census (1996). The difference between these totals indicates that 42.4 million people, or 16 percent of the Nation's total population, were served by their own water-supply systems in 1995, compared with 42.8 million people in 1990. Self-supplied domestic systems rarely are metered and few data exist. Self-supplied domestic withdrawals are estimated using per-capita use coefficients generally ranging from 60 to 120 gallons per person per day. Consumptive-use estimates are based on coefficients generally ranging from 10 to 50 percent of withdrawals and deliveries.

Withdrawals for the population served by their own water systems averaged about 80 gal/d for each person in 1995, about the same as 1990. Public-supply domestic deliveries averaged 101 gal/d for each person served in 1995, compared to 105 gal/d during 1990 and 1985. Per-capita use has remained about the same or declined in some areas for the last decade as the result of active conservation programs in many states that include the installation of additional meters and water-conserving plumbing fixtures.

In 1995, the South Atlantic-Gulf and Mid-Atlantic water-resources region had the largest self-supplied withdrawals for domestic purposes (figure 10), whereas the Mid-Atlantic, California, and South Atlantic-Gulf regions had a large total of domestic withdrawals and deliveries (table 11). Self-supplied withdrawals for domestic purposes are fairly evenly distributed among the States, led by Florida, Michigan, Pennsylvania, and North Carolina. (See figure 11; table 12.) California and Texas, along with New York, Florida, and Illinois, lead the Nation in total domestic use (withdrawals, deliveries) as shown in figure 12.



DOMESTIC SOURCE AND DISPOSITION, 1995, IN PERCENT

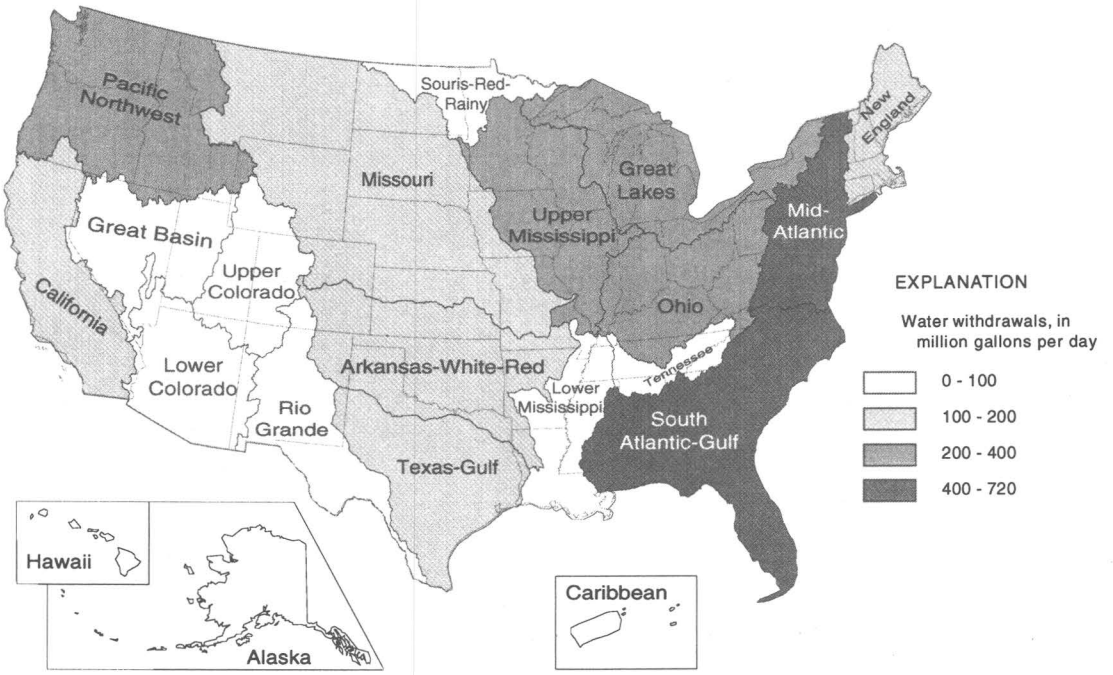


Figure 10. Domestic self-supplied withdrawals by water-resources region, 1995.

Table 11. Domestic freshwater use by water-resources region, 1995

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

REGION	SELF SUPPLIED					PUBLIC SUPPLY			TOTAL USE	
	Population, in thousands	Water withdrawals, in Mgal/d			Per capita use, in gal/d	Population served, in thousands	Water deliveries, in Mgal/d	Per capita use, in gal/d	Withdrawals and deliveries, in Mgal/d	Consumptive use, in Mgal/d
		Source		Total						
		Ground water	Surface water							
New England	2,420	168	0.5	169	70	10,400	717	69	886	139
Mid-Atlantic	6,730	485	.6	486	72	35,700	3,340	94	3,830	355
South Atlantic-Gulf	7,700	719	0	719	93	30,100	3,080	102	3,800	888
Great Lakes	4,870	354	1.0	355	73	17,000	1,400	83	1,760	248
Ohio	4,640	323	5.0	328	71	18,000	1,140	63	1,470	189
Tennessee	953	64	0	64	67	3,250	274	85	338	51
Upper Mississippi	4,290	311	0	311	72	18,000	1,450	81	1,760	329
Lower Mississippi	996	73	.1	73	74	6,330	703	111	776	529
Souris-Red-Rainy	248	17	0	17	67	446	26	59	43	17
Missouri Basin	1,690	137	1.2	138	82	8,980	966	108	1,100	423
Arkansas-White-Red	1,250	105	0	105	84	7,680	767	100	872	374
Texas-Gulf	1,070	115	0	115	108	15,700	2,160	138	2,270	958
Rio Grande	269	25	0	25	94	2,300	340	148	365	173
Upper Colorado	153	11	.4	12	76	561	86	154	98	36
Lower Colorado	367	44	.2	45	121	4,950	757	153	802	397
Great Basin	126	13	1.6	14	114	2,280	417	183	431	160
Pacific Northwest	2,470	253	7.3	260	105	7,480	1,020	136	1,280	190
California	1,620	112	12	124	76	30,400	3,700	122	3,830	1,060
Alaska	223	8.3	.4	8.7	39	381	38	99	46	4.5
Hawaii	65	2.4	1.3	3.7	57	1,120	131	117	134	76
Caribbean	274	6.4	6.9	13	49	3,580	173	48	186	83
Total	42,400	3,350	38	3,390	80	225,000	22,700	101	26,100	6,680

Figure 11. Domestic self-supplied withdrawals by State, 1995.

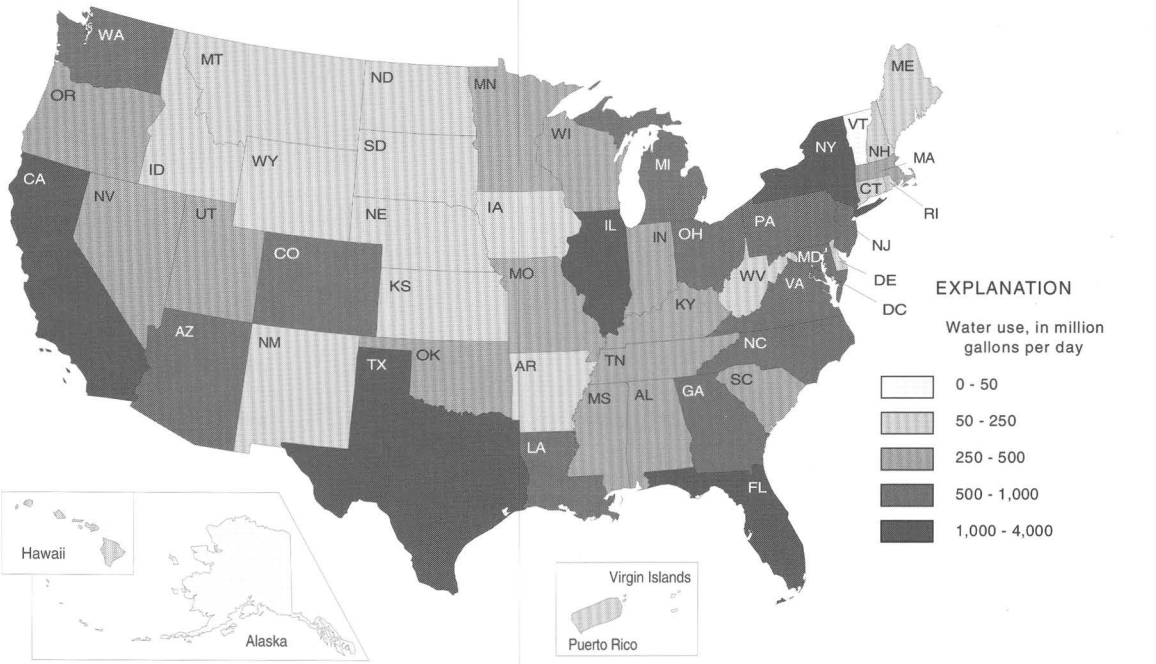


Figure 12. Domestic freshwater use (withdrawals, deliveries) by State, 1995.

Table 12. Domestic freshwater use by State, 1995

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

STATE	SELF SUPPLIED					PUBLIC SUPPLY			TOTAL USE	
	Population, in thousands	Water withdrawals, in Mgal/d			Per capita use, in gal/d	Population served, in thousands	Water deliveries, in Mgal/d	Per capita use, in gal/d	Withdrawals and deliveries, in Mgal/d	Consumptive use, in Mgal/d
		Source		Total						
		Ground water	Surface water							
Alabama	826	62	0	62	75	3,430	383	112	445	89
Alaska	223	8.3	.3	8.6	39	381	38	99	46	4.5
Arizona	301	39	0	39	131	3,920	526	134	565	283
Arkansas	488	38	0	38	78	2,000	193	97	231	100
California	1,600	108	12	120	75	30,500	3,710	122	3,830	1,060
Colorado	353	27	0	27	76	3,390	481	142	508	154
Connecticut	742	55	0	55	74	2,530	191	75	246	49
Delaware	153	12	0	12	80	564	43	76	55	5.5
D.C.	0	0	0	0	0	554	95	171	95	9.5
Florida	1,950	297	0	297	152	12,200	1,260	103	1,560	389
Georgia	1,300	99	0	99	76	5,900	629	107	728	131
Hawaii	65	2.4	1.3	3.7	57	1,120	131	117	134	76
Idaho	383	65	0	65	168	780	141	181	206	9.8
Illinois	1,430	129	0	129	90	10,400	936	90	1,060	107
Indiana	1,520	115	0	115	76	4,280	326	76	441	66
Iowa	689	45	0	45	65	2,150	139	65	184	73
Kansas	242	24	0	24	100	2,320	191	82	215	140
Kentucky	505	23	2.5	25	50	3,360	235	70	260	34
Louisiana	496	39	0	39	79	3,850	468	122	508	508
Maine	533	35	0	35	65	708	46	65	81	12
Maryland	875	73	0	73	83	4,170	433	104	506	51
Massachusetts	497	34	0	34	68	5,580	362	65	396	54
Michigan	2,650	194	.1	194	73	6,900	623	90	817	119
Minnesota	1,270	88	0	88	69	3,340	239	71	326	110
Mississippi	434	33	0	33	75	2,260	248	110	281	75
Missouri	995	58	0	58	59	4,330	374	86	433	108
Montana	225	17	1.0	18	78	645	77	119	94	46
Nebraska	346	42	0	42	121	1,290	155	120	197	100
Nevada	91	11	.2	11	120	1,440	306	213	317	158
New Hampshire	451	31	.5	32	70	697	57	82	89	13
New Jersey	1,010	86	0	86	85	6,930	538	78	624	122
New Mexico	306	26	0	26	86	1,380	188	136	215	118
New York	1,930	144	0	144	75	16,200	1,810	112	1,960	107
North Carolina	2,450	172	0	172	70	4,750	332	70	504	163
North Dakota	152	12	0	12	79	489	40	82	52	16
Ohio	1,870	138	2.8	140	75	9,280	497	54	637	96
Oklahoma	351	30	0	30	85	2,930	241	82	270	81
Oregon	995	61	7.2	68	68	2,150	292	136	360	83
Pennsylvania	3,020	181	0	181	60	9,050	559	62	740	74
Rhode Island	112	7.3	0	7.3	65	878	57	65	64	9.6
South Carolina	951	71	0	71	75	2,720	368	135	439	88
South Dakota	127	9.3	0	9.4	74	602	52	87	62	15
Tennessee	838	54	0	54	65	4,420	355	80	409	41
Texas	1,170	130	0	130	110	17,600	2,450	140	2,580	1,080
Utah	103	7.7	1.7	9.4	91	1,850	340	184	349	118
Vermont	270	18	.4	19	70	315	26	82	45	6.7
Virginia	1,660	125	0	125	75	4,960	424	86	548	55
Washington	1,000	125	0	125	125	4,430	565	128	691	83
West Virginia	509	40	.8	41	80	1,320	96	72	136	14
Wisconsin	1,540	92	0	92	60	3,560	189	53	281	56
Wyoming	136	9.7	.5	10	75	344	54	157	64	33
Puerto Rico	217	6.4	5.5	12	55	3,540	171	48	183	83
Virgin Islands	57	0	1.4	1.4	24	47	1.6	35	3.0	.7
Total	42,400	3,350	38	3,390	80	225,000	22,700	101	26,100	6,680

Commercial

9,590 million gallons per day

Commercial water use during 1995 was an estimated 9,590 Mgal/d, or 16 percent more than during 1990. Commercial use represents about 3 percent of freshwater use for all offstream categories. Self-supplied commercial withdrawals were an estimated 2,890 Mgal/d. Surface water was the source for about 67 percent of self-supplied commercial withdrawals. Public suppliers delivered about 6,690 Mgal/d of water to commercial users during 1995; this accounted for 17 percent of total public-supply withdrawals.

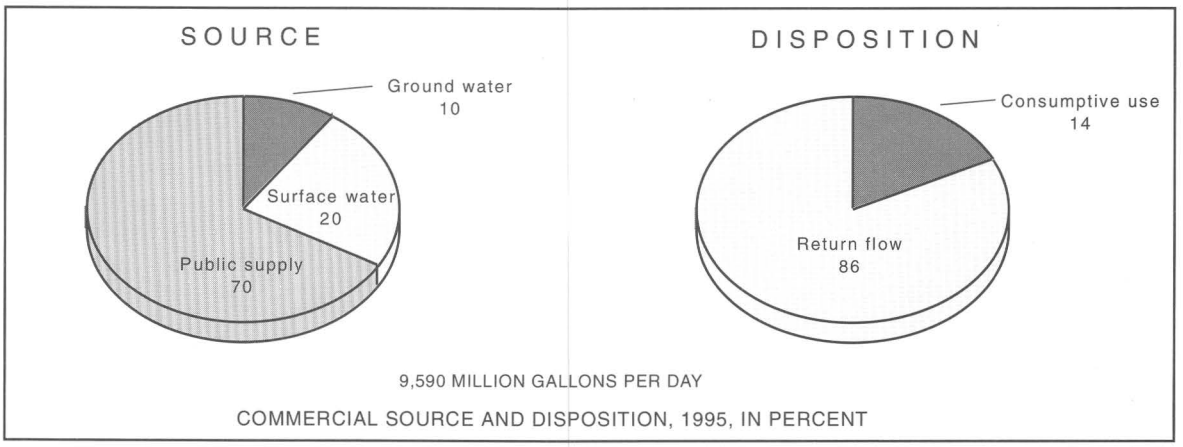
The source and disposition of water for commercial purposes are shown in the chart below. Public supply is the dominant source of water (70 percent) for commercial use. The consumptive use of water for commercial purposes during 1995 was estimated at about 1,310 Mgal/d, or about 14 percent of withdrawals and deliveries.

Commercial water was higher in 34 states in 1995 compared to commercial use in 1990. Some of the larger increases in commercial water use probably are because of different sources of information, changes in how the estimates are calculated, and how fish hatcheries and military establishments are reported, rather than actual changes in water use. California, Idaho, New York, Florida, and Oklahoma reported large increases in commercial use; whereas, Arkansas and Illinois reported large decreases.

Commercial water use includes water for motels, hotels, restaurants, office buildings, other commercial facilities, and civilian and military institutions. Also included are public-supply deliveries to golf courses. A few States, such as Arkansas, Oregon, and California, have some offstream fish hatcheries that also are included in the commercial category in this report. Most fish hatcheries are located instream and are not included in this compilation. Information on commercial withdrawals is limited but may be available through State agencies that permit withdrawals or require permits to operate potable water supplies. In many cases, withdrawal estimates are 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 occupancy rate of a hotel, rather than actual reported use. Information on deliveries from public suppliers to commercial users are estimated from a variety of methods if not available directly from public suppliers. Consumptive-use estimates are difficult to obtain and generally are based on coefficients, most ranging from 5 to 30 percent of withdrawals and deliveries.

States agencies were asked in 1995 for the first time to report saline-water withdrawals. Maryland was the only State to identify slightly-saline withdrawals for commercial use (8.8 Mgal/d). This value is included in the tables as freshwater.

In 1995, the Pacific Northwest water-resources region had the most water withdrawn for commercial purposes as shown in figure 13 and table 13. Oregon reported the largest self-supplied commercial withdrawals as shown in figure 14 and table 14. California, Oregon, New York, and Illinois reported the most commercial water use (figure 15).



COMMERCIAL SOURCE AND DISPOSITION, 1995, IN PERCENT

Figure 13. Commercial self-supplied withdrawals by water-resources region, 1995.

Table 13. Commercial freshwater use by water-resources region, 1995

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

REGION	SELF-SUPPLIED WITHDRAWALS			PUBLIC-SUPPLY DELIVERIES	TOTAL USE	
	Source		Total			
	Ground water	Surface water			Withdrawals and deliveries	Consumptive use
New England	64	26	90	343	433	46
Mid-Atlantic	217	65	283	942	1,230	102
South Atlantic-Gulf	114	16	130	866	996	138
Great Lakes	44	108	152	600	752	82
Ohio	91	80	170	461	631	93
Tennessee	3.6	18	22	134	156	18
Upper Mississippi	94	114	208	653	861	86
Lower Mississippi	15	21	36	144	180	16
Souris-Red-Rainy	.2	.1	.3	15	15	2.0
Missouri Basin	19	15	34	279	313	79
Arkansas-White-Red	16	99	115	275	390	51
Texas-Gulf	34	8.0	42	126	168	37
Rio Grande	17	1.8	19	73	91	49
Upper Colorado	5.6	.7	6.2	25	31	6.4
Lower Colorado	22	7.5	30	235	265	101
Great Basin	10	15	25	132	158	39
Pacific Northwest	37	1,030	1,070	267	1,330	42
California	77	319	396	992	1,390	257
Alaska	11	.1	11	23	34	5.1
Hawaii	45	.4	46	47	92	43
Caribbean	1.3	2.1	3.4	64	68	20
Total	939	1,950	2,890	6,690	9,590	1,310

Figure 14. Commercial self-supplied withdrawals by State, 1995.

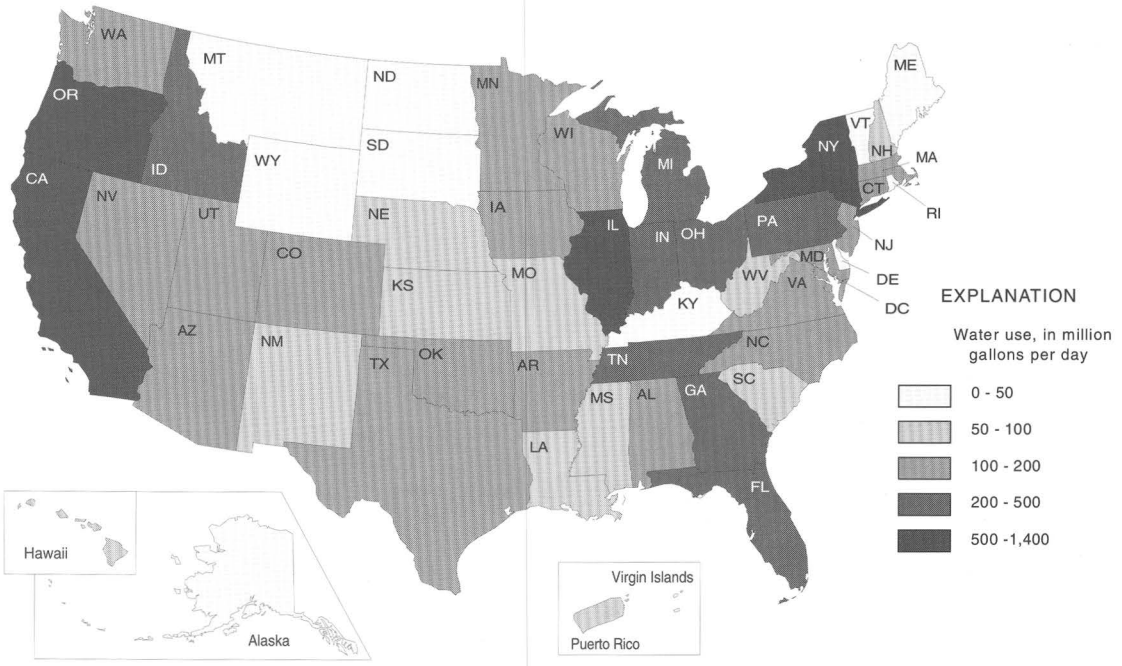


Figure 15. Commercial freshwater use (withdrawals, deliveries) by State, 1995.

Table 14. Commercial freshwater use by State, 1995

[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 USE	
	Source		Total		Withdrawals and deliveries	Consumptive use
	Ground water	Surface water				
Alabama	4.9	0	4.9	122	127	28
Alaska	11	.1	11	23	34	5.1
Arizona	21	0	21	135	155	78
Arkansas	.4	100	100	58	158	12
California	77	309	385	994	1,380	259
Colorado	7.7	.9	8.6	101	109	16
Connecticut	25	1.5	27	89	116	12
Delaware	2.8	0	2.8	20	22	2.2
D.C.	0	0	0	50	50	5.0
Florida	50	.2	50	386	436	54
Georgia	33	13	46	168	215	39
Hawaii	45	.4	46	47	92	43
Idaho	9.8	297	306	18	324	1.4
Illinois	16	88	104	440	544	44
Indiana	45	48	93	119	212	32
Iowa	18	25	43	65	108	14
Kansas	4.9	.3	5.2	67	72	38
Kentucky	8.0	14	22	23	45	1.6
Louisiana	10	.7	11	55	66	8.8
Maine	9.8	1.7	11	25	37	3.7
Maryland	19	14	33	85	118	11
Massachusetts	12	0	12	188	200	25
Michigan	16	25	41	253	294	31
Minnesota	46	20	66	103	169	18
Mississippi	18	0	18	33	51	8.6
Missouri	13	.5	14	59	73	5.3
Montana	0	0	0	26	26	9.6
Nebraska	.3	0	.3	79	79	30
Nevada	7.1	14	21	116	137	24
New Hampshire	12	18	30	21	51	3.5
New Jersey	17	1.2	18	179	197	7.5
New Mexico	18	1.6	20	78	97	56
New York	136	65	200	409	609	61
North Carolina	7.3	.3	7.6	138	146	7.2
North Dakota	.1	.2	.2	15	15	2.3
Ohio	28	41	68	355	424	66
Oklahoma	6.6	16	23	170	193	18
Oregon	4.4	752	756	79	835	.7
Pennsylvania	16	14	30	218	247	11
Rhode Island	1.5	0	1.5	20	21	2.1
South Carolina	1.7	0	1.7	50	52	7.8
South Dakota	6.1	4.1	10	21	31	3.1
Tennessee	2.0	18	20	214	234	21
Texas	33	11	44	130	174	35
Utah	3.8	0	3.8	115	119	35
Vermont	9.6	16	26	7.7	33	2.4
Virginia	28	13	41	152	193	23
Washington	24	.4	24	161	185	37
West Virginia	36	9.2	46	23	68	10
Wisconsin	17	0	17	111	128	26
Wyoming	.9	.6	1.6	16	18	2.7
Puerto Rico	1.2	1.5	2.7	61	64	19
Virgin Islands	.1	.6	.8	3.3	4.1	.6
Total	939	1,950	2,890	6,690	9,590	1,310

Irrigation

134,000 million gallons per day

The quantity of water withdrawn for irrigation during 1995 was an estimated 134,000 Mgal/d or 150 million acre-feet. Irrigation withdrawals during 1995 were 2 percent less than during 1990 and acres irrigated were 1 percent more. This indicates lower irrigation application rates because of improved irrigation techniques. In addition, many areas received more precipitation during 1995 than during 1990. Irrigation use represents 39 percent of freshwater use for all offstream categories.

The source and disposition of water for irrigation are shown in the chart below. Surface water was the source for about 63 percent of irrigation withdrawals, and, except for a small fraction of 1 percent that was reclaimed wastewater, ground water was the source for the remainder. Surface-water withdrawals for irrigation during 1995 were about 1 percent less than during 1990, and ground-water withdrawals were about 4 percent less. Of the 134,000 Mgal/d withdrawn for irrigation, 19 percent was lost in conveyance, 61 percent was consumptive use, and 20 percent was returned to surface- or ground-water supplies.

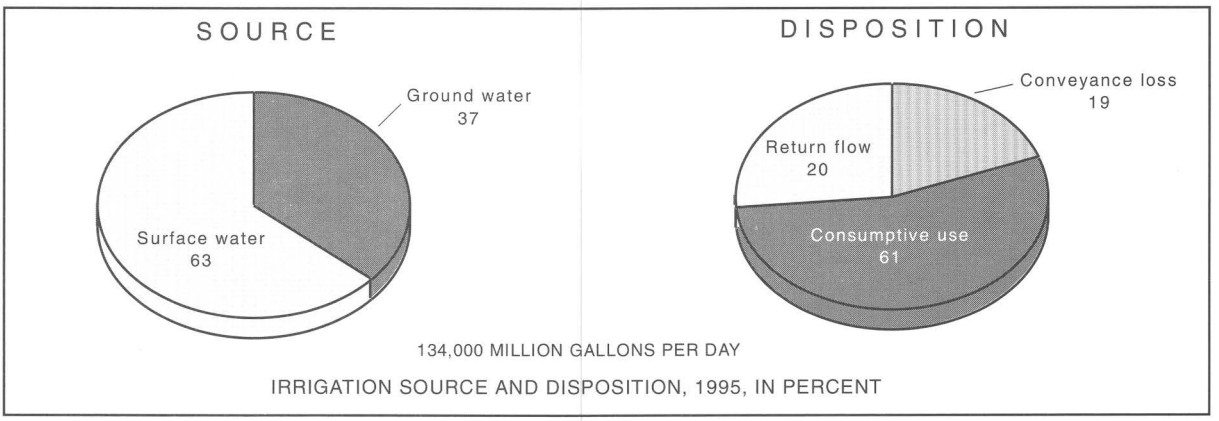
Irrigation water use includes all water artificially applied to farm and horticultural crops as well as self-supplied water used to irrigate public and private golf courses. Irrigation water can be self supplied or supplied by irrigation companies or districts. However, all irrigation withdrawals in this report are identified as self-supplied.

Irrigation of crops developed concurrently with the settlement of the arid West, where natural precipitation was insufficient to raise many crops. In the humid East, irrigation is used to supplement natural precipitation to increase the number of plantings per year or the yields of crops, and to reduce the risk of crop failures during droughts.

Information about the number of acres irrigated and the quantity of water withdrawn is obtained from a variety of sources such as State agencies responsible for permitting or allocating the withdrawal of water, the U.S. Soil Conservation Service, U.S. Bureau of Reclamation, county Cooperative Extension Service, individual farmers, agricultural research stations, and the U.S. Bureau of the Census, Agricultural Census, and the Farm and Ranch Survey. Total acres irrigated are reported in three types—sprinkler (includes center pivot and travelling gun), micro (includes trickle and drip), and surface (includes flooding, furrow, and ditch).

Methods of estimating withdrawals for irrigation vary greatly. In some instances, they are based on theoretical estimates of water required to raise a given crop in an area. In other instances, accurate records of water application rates are 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, consumptive use is based on coefficients ranging from 40 to 100 percent of withdrawals, or on theoretical crop requirements. In a few States, consumptive use is calculated as the difference between reported withdrawals and reported return flows.

Irrigation is by far the largest water use in the West. The nine western water-resources regions (excluding Alaska and Hawaii), led by the California region, account for 89 percent of the total water withdrawn for irrigation (figure 16; table 15). In the eastern regions, most of the water withdrawn for irrigation is in the Lower Mississippi and South Atlantic-Gulf regions. By State, California, is the largest user of irrigation water (figure 17) and, together with Idaho, Colorado, Texas, and Montana account for 54 percent of the national total (table 16). Florida has the most water withdrawn for irrigation in the East although it ranks thirteenth nationwide.



IRRIGATION SOURCE AND DISPOSITION, 1995, IN PERCENT

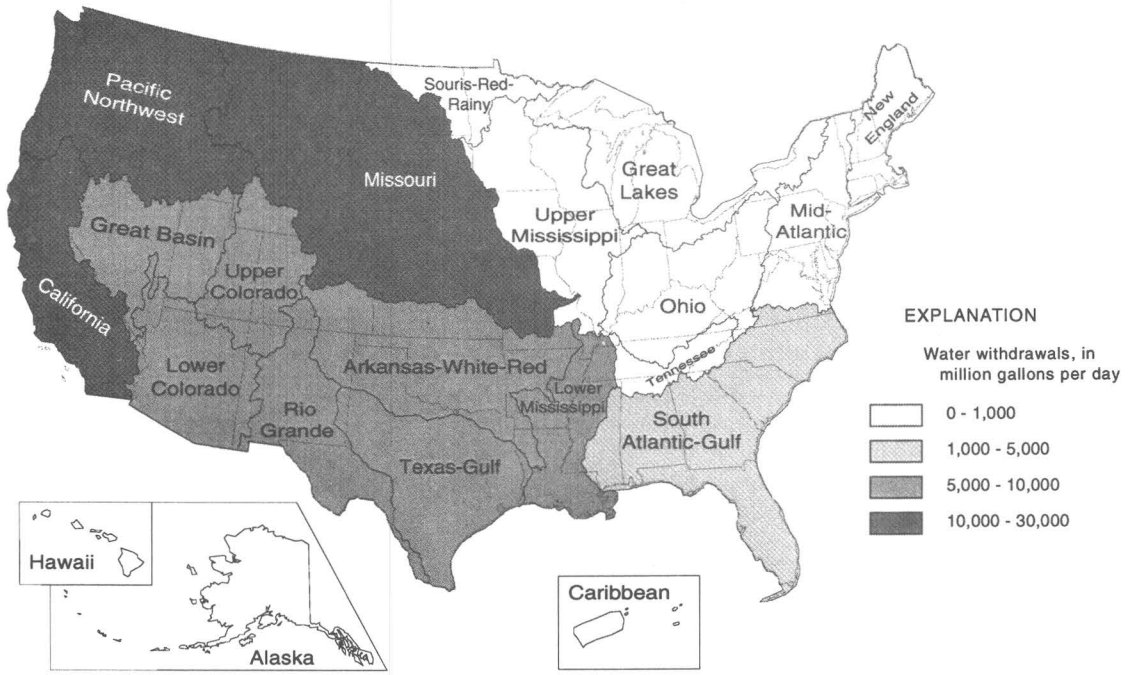
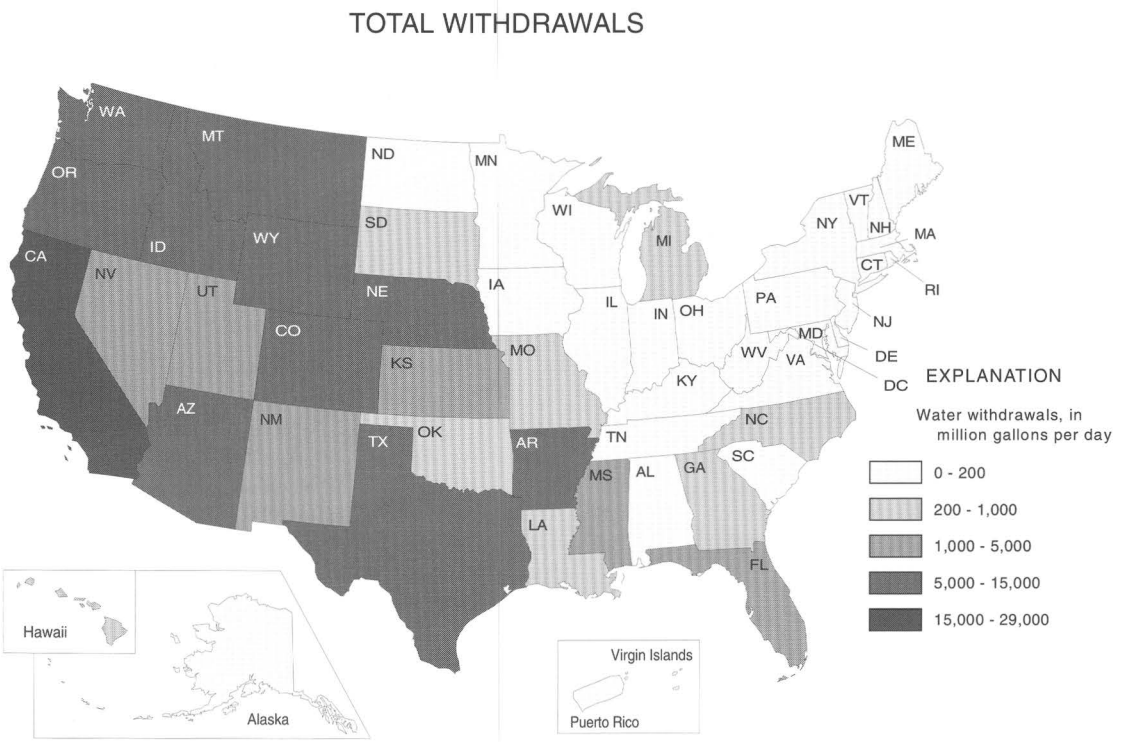


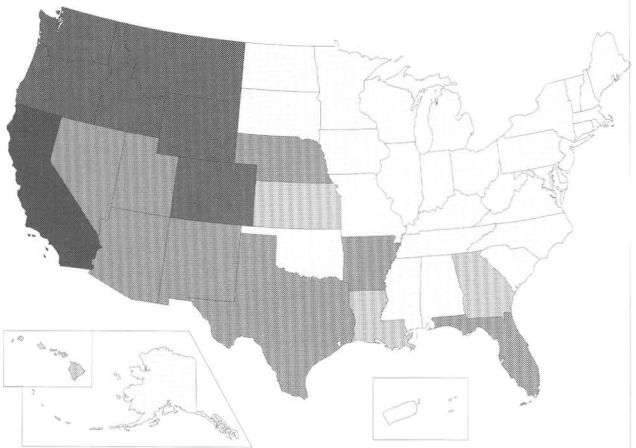
Figure 16. Irrigation freshwater withdrawals by water-resources region, 1995.

Table 15. Irrigation water use by water-resources region, 1995

[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			Withdrawals, by source					
					Freshwater		Total	Freshwater		Total	Reclaimed wastewater	Conveyance losses	Consumptive use, fresh water
	Sprinkler	Micro	Surface	Total	Ground	Surface		Ground	Surface				
New England	88	2.6	12	103	53	111	164	47	99	146	0	0	142
Mid Atlantic	310	15	3.6	328	144	185	328	128	165	293	0	1.9	200
South Atlantic-Gulf	1,840	670	1,040	3,550	2,560	2,600	5,160	2,280	2,320	4,600	221	33	3,290
Great Lakes	535	19	1.6	556	191	162	353	170	145	315	0	.1	295
Ohio	219	1.2	1.3	222	68	48	117	61	43	104	1.1	.7	97
Tennessee	39	4.6	.3	44	9.7	44	54	8.7	39	48	.3	0	48
Upper Mississippi	1,040	.8	13	1,050	482	60	542	430	54	484	1.2	0	449
Lower Mississippi	1,230	1.9	4,490	5,730	7,770	1,350	9,110	6,930	1,200	8,130	.1	553	5,860
Souris-Red-Rainy	130	0	37	168	50	48	99	45	43	88	0	1.8	78
Missouri Basin	5,980	9.5	7,170	13,200	9,000	18,600	27,600	8,030	16,600	24,600	18	7,840	13,000
Arkansas White Red	3,240	3.3	2,870	6,120	7,470	2,900	10,400	6,660	2,590	9,250	13	944	7,070
Texas Gulf	1,920	40	2,320	4,280	4,890	1,310	6,200	4,370	1,170	5,530	38	390	5,320
Rio Grande	282	15	968	1,260	1,600	5,150	6,750	1,420	4,600	6,020	3.0	1,360	2,640
Upper Colorado	236	.1	1,470	1,710	42	7,840	7,880	38	6,990	7,030	1.7	1,940	2,320
Lower Colorado	315	2.9	938	1,260	2,480	4,710	7,190	2,210	4,200	6,410	131	1,090	3,710
Great Basin	537	8.7	1,060	1,610	1,230	4,500	5,730	1,090	4,020	5,110	33	1,140	2,900
Pacific Northwest	4,630	105	2,300	7,030	4,510	24,300	28,900	4,030	21,700	25,700	.1	8,050	10,100
California	1,850	628	7,060	9,540	12,200	20,400	32,600	10,900	18,200	29,100	252	1,860	23,300
Alaska	1.4	0	0	1.4	.1	.6	.6	.1	.5	.6	0	.1	.3
Hawaii	17	108	10	136	194	537	731	173	479	652	6.2	98	415
Caribbean	0	17	21	38	36	84	120	33	75	107	0	15	70
Total	24,400	1,650	31,800	57,900	55,000	94,900	150,000	49,000	84,700	134,000	718	25,300	81,300





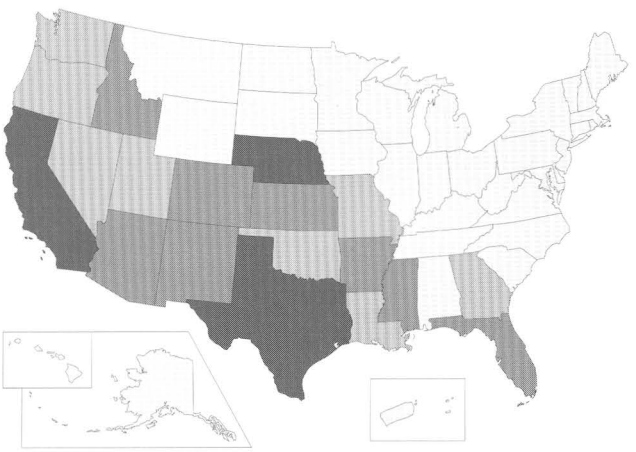


Figure 17. Irrigation freshwater withdrawals by source and State, 1995.

Table 16. Irrigation water use by State, 1995

[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			Withdrawals, by source					
					Freshwater		Total	Freshwater		Total	Reclaimed waste-water	Convey-ance losses	Consump-tive use, fresh water
	Sprinkler	Micro	Surface	Total	Ground	Surface		Ground	Surface				
Alabama	52	.4	0	52	57	98	155	51	88	139	.1	0	139
Alaska	1.4	0	0	1.4	.1	.6	.6	.1	.5	.6	0	.1	.3
Arizona	289	0	799	1,090	2,390	3,970	6,360	2,130	3,540	5,670	124	1,030	3,180
Arkansas	527	0	2,980	3,510	5,520	1,130	6,650	4,930	1,010	5,940	0	416	4,390
California	1,800	631	7,050	9,480	12,100	20,300	32,400	10,800	18,100	28,900	256	1,670	23,500
Colorado	797	0	2,510	3,310	2,260	12,000	14,300	2,020	10,700	12,700	7.1	3,770	4,910
Connecticut	18	.7	0	19	18	13	31	16	12	28	0	0	28
Delaware	66	0	0	66	38	17	54	34	15	48	0	0	48
D.C.	0	0	0	0	0	0	0	0	0	0	0	0	0
Florida	484	606	1,040	2,130	1,880	2,010	3,890	1,670	1,800	3,470	220	32	2,170
Georgia	1,090	60	0	1,150	537	273	810	479	243	722	0	0	722
Hawaii	17	108	10	136	194	537	731	173	479	652	6.2	98	415
Idaho	2,010	0	1,000	3,010	2,820	11,800	14,600	2,520	10,500	13,000	0	5,480	4,310
Illinois	359	0	0	359	202	0	202	180	0	180	2.0	0	180
Indiana	241	0	0	241	69	61	130	61	55	116	0	0	104
Iowa	158	0	0	158	39	4.0	43	35	3.6	39	0	0	39
Kansas	2,100	2.9	986	3,090	3,540	258	3,790	3,150	230	3,380	6.6	143	3,220
Kentucky	32	0	.7	32	.5	12	13	.5	11	12	0	.5	11
Louisiana	190	0	620	810	533	330	862	475	294	769	0	166	596
Maine	25	1.9	0	27	2.9	27	30	2.6	24	27	0	0	24
Maryland	74	0	0	74	41	29	70	37	26	62	0	0	57
Massachusetts	28	0	12	40	31	60	91	28	54	82	0	0	81
Michigan	334	19	1.5	354	113	142	255	101	127	227	0	0	216
Minnesota	377	0	25	401	135	41	176	120	37	157	0	0	140
Mississippi	389	0	985	1,370	1,840	109	1,950	1,640	97	1,740	0	17	1,110
Missouri	351	4.4	431	786	599	37	636	535	33	567	0	0	421
Montana	526	0	1,280	1,810	92	9,490	9,580	82	8,460	8,550	0	4,410	1,820
Nebraska	3,940	0	3,510	7,450	6,480	1,990	8,460	5,780	1,770	7,550	1.0	906	6,740
Nevada	136	0	424	560	719	1,120	1,840	641	1,000	1,640	24	473	1,060
New Hampshire	8.6	0	0	8.6	.3	6.8	7.1	.3	6.1	6.3	0	0	5.7
New Jersey	89	6.8	3.2	99	36	104	140	32	93	125	0	0	46
New Mexico	410	5.2	544	959	1,430	1,920	3,360	1,280	1,710	2,990	0	628	1,680
New York	44	2.8	.4	47	17	16	33	16	14	30	0	0	26
North Carolina	163	4.4	0	167	64	203	267	57	181	239	1.0	0	239
North Dakota	135	0	61	196	66	64	131	59	57	117	0	5.1	105
Ohio	59	0	0	59	13	17	31	12	16	27	0	.2	26
Oklahoma	377	0	184	560	859	110	969	766	98	864	0	4.9	401
Oregon	1,070	5.3	766	1,840	985	5,930	6,910	878	5,290	6,170	0	1,300	3,070
Pennsylvania	18	4.6	0	23	9.2	8.6	18	8.2	7.7	16	0	0	16
Rhode Island	7.1	0	0	7.1	.8	1.8	2.6	.7	1.6	2.3	0	0	2.3
South Carolina	23	0	0	23	31	28	58	27	25	52	0	0	52
South Dakota	225	0	77	301	95	206	301	85	184	269	0	54	175
Tennessee	55	4.6	4.1	63	11	16	27	9.9	15	24	.5	0	24
Texas	2,740	51	3,520	6,310	7,320	3,280	10,600	6,530	2,920	9,450	48	540	8,140
Utah	411	8.9	722	1,140	441	3,520	3,960	393	3,140	3,530	14	612	1,930
Vermont	3.8	0	0	3.8	.4	3.9	4.3	.4	3.5	3.9	0	0	3.5
Virginia	66	2.8	0	69	6.3	27	33	5.6	24	30	0	2.9	18
Washington	1,510	100	512	2,120	918	6,330	7,250	819	5,650	6,470	0	1,090	2,800
West Virginia	1.9	0	.9	2.8	0	0	0	0	0	0	0	0	0
Wisconsin	331	0	0	331	187	1.7	189	167	1.5	169	0	0	151
Wyoming	286	6.5	1,700	1,990	203	7,190	7,390	181	6,410	6,590	9.1	2,470	2,660
Puerto Rico	0	17	21	38	36	84	120	33	75	107	0	15	70
Virgin Islands	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	24,400	1,650	31,800	57,900	55,000	94,900	150,000	49,000	84,700	134,000	718	25,300	81,300

Livestock

5,490 million gallons per day

The quantity of water withdrawn for total livestock purposes (livestock, animal specialties) during 1995 was an estimated 5,490 Mgal/d, or 22 percent more than withdrawn during 1990. Livestock use represents nearly 2 percent of freshwater use for all offstream categories. Idaho reported a substantial increase in withdrawals for animal specialties based on more reliable information.

The source and disposition of water for total livestock use are shown in the chart below. Surface water was the source for about 59 percent of withdrawals for total livestock use, and ground water was the source for the remaining 41 percent. The consumptive use of water for total livestock during 1995 was about 3,200 Mgal/d, or 58 percent of withdrawals.

Livestock water use includes water for livestock, feed lots, dairies, fish farms, and other on-farm needs. The "Livestock category" includes livestock water use, which is defined as water associated with the production of red meat, poultry, eggs, milk, and wool; and animal specialities water use, which is defined as water use associated with the production of fish in captivity (except fish hatcheries), fur-bearing animals in captivity, horses, rabbits, and pets (Office of Management and Budget, 1987, p. 27-29). A few States, such as Arkansas, Oregon, and California, have some offstream fish hatcheries that are included in the commercial category in this report. Water used instream for fish hatcheries is not included in this compilation.

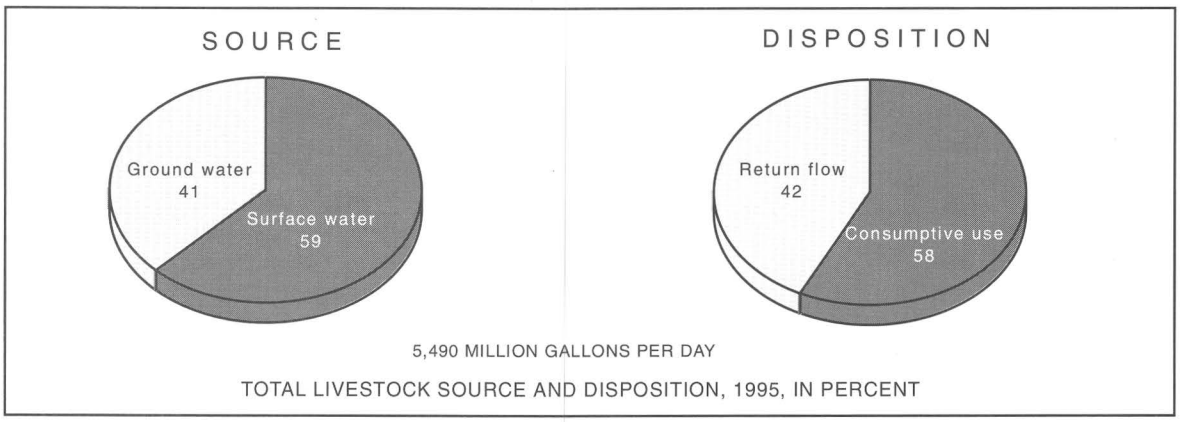
Livestock use in this report is equivalent to the livestock category listed under "Livestock" or "Rural use" in previous water-use circulars in this series. Beginning in 1990, animal specialties were identified as a subset of livestock activities because of the large increase in fish-farming water use. Fish farms are primarily engaged in the production of food fish under controlled feeding, sanitation, and harvesting procedures (Office of Management and Budget, 1987, p. 29). Most water used for fish farms is required to maintain acceptable pond levels and water quality.

The quantities of surface water and ground water withdrawn for use by livestock are estimated from the numbers of animals in a county. The livestock and poultry numbers are available in most States from the U.S. Department of Agriculture Crop and Livestock Reporting Service or the Cooperative Extension Service. The number of each type of animal in each county is multiplied by an average water use per animal to obtain the water-use estimate. The Crop and Livestock Reporting Service or the Cooperative Extension Service generally have pond acreage for fish farms. Water use is estimated by multiplying pond acreage by an application rate. In some States, water use for fish farms is reported under a permit system.

The uncertainties in the livestock water-use estimates include difficulties in determining the sources of water and great variations in estimates of consumptive use. Consumptive-use estimates generally are based on coefficients ranging from 10 to 100 percent of withdrawals.

State agencies in Hawaii and Maryland reported 18 Mgal/d and 3.3 Mgal/d, respectively, of saline withdrawals for animal specialties. These saline withdrawals are not listed in the tables or included in the totals.

In 1995, the Pacific Northwest and Lower Mississippi water-resources regions had the most water withdrawn for total livestock (figure 18; table 17) and accounted for nearly 46 percent of the Nation's total livestock use. The Missouri Basin and Arkansas-White-Red regions have the most water withdrawn for livestock, and the Pacific Northwest and Lower Mississippi regions have the most water withdrawn for animal specialties. By State, Idaho accounts for the largest use of water for total livestock (figure 19; table 18). Idaho, Mississippi, Louisiana, and Arkansas account for 76 percent of the Nation's animal-specialties water use, largely because of fish farming.



TOTAL LIVESTOCK SOURCE AND DISPOSITION, 1995, IN PERCENT

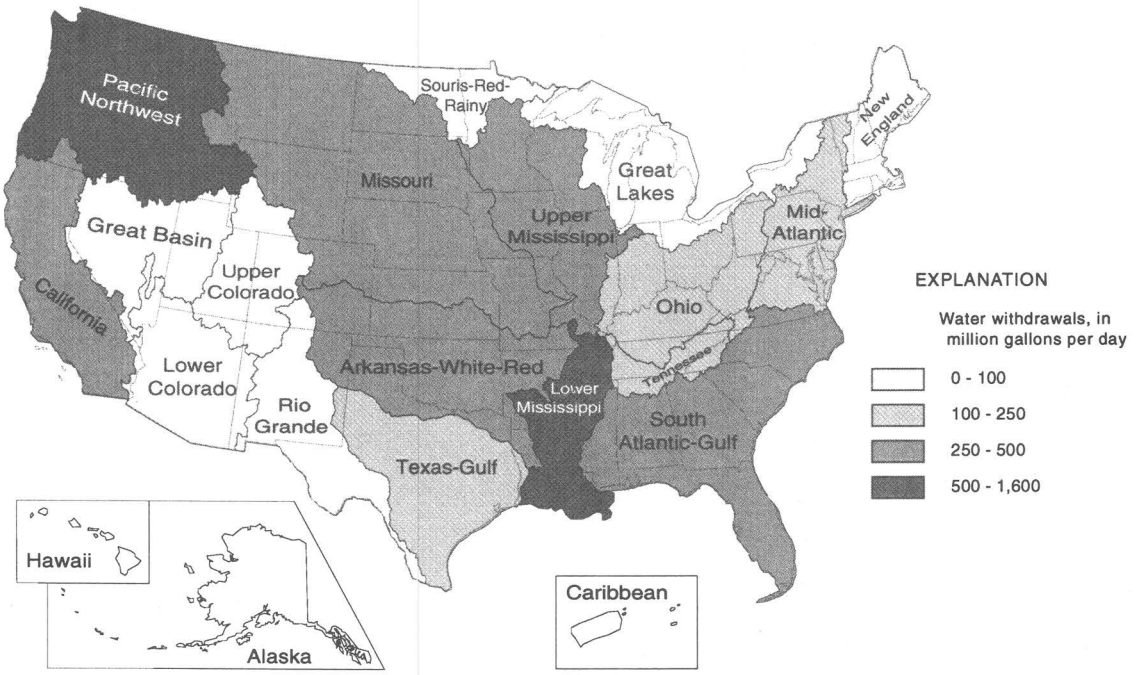


Figure 18. Total livestock freshwater withdrawals by water-resources region, 1995.

Table 17. Livestock freshwater use by water-resources region, 1995

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

REGION	LIVESTOCK				ANIMAL SPECIALTIES				TOTAL LIVESTOCK			
	Withdrawals				Withdrawals				Withdrawals			
	Ground water	Surface water	Total	Consumptive use	Ground water	Surface water	Total	Consumptive use	Ground water	Surface water	Total	Consumptive use
New England	5.4	1.8	7.2	6.0	1.0	11	12	9.5	6.4	13	19	16
Mid-Atlantic	70	37	107	92	8.6	18	26	1.3	79	55	134	94
South Atlantic-Gulf	156	100	256	256	33	117	150	122	188	217	405	378
Great Lakes	45	17	61	53	4.8	3.7	8.6	1.8	50	20	70	55
Ohio	47	77	123	111	13	4.2	18	4.6	60	81	141	115
Tennessee	6.6	11	18	18	12	176	188	26	19	187	205	44
Upper Mississippi	188	35	223	205	28	4.4	32	13	216	39	255	219
Lower Mississippi	9.2	13	22	22	730	259	990	760	740	272	1,010	782
Souris-Red-Rainy	17	3.0	20	20	0	0	0	0	17	3.0	20	20
Missouri Basin	230	157	386	386	24	16	40	5.3	253	173	426	391
Arkansas-White-Red	178	192	370	370	12	12	24	15	190	205	395	385
Texas-Gulf	77	118	195	194	5.0	8.1	13	13	82	126	208	207
Rio Grande	26	6.3	32	31	1.0	2.2	3.2	1.2	27	8.5	35	32
Upper Colorado	3.5	9.7	13	12	.7	40	41	.3	4.2	50	54	13
Lower Colorado	33	6.8	39	39	.4	.1	.5	.5	33	6.8	40	40
Great Basin	9.0	11	20	13	.2	66	66	.4	9.2	77	86	14
Pacific Northwest	43	43	86	60	1.0	1,420	1,420	1.5	44	1,470	1,510	62
California	128	165	293	293	103	58	160	32	231	222	453	325
Alaska	0	.3	.3	.3	.1	.2	.2	.2	.1	.4	.5	.5
Hawaii	2.7	1.9	4.6	4.6	4.8	.6	5.4	.1	7.5	2.6	10	4.7
Caribbean	4.5	1.8	6.3	6.3	0	0	.1	.1	4.5	1.8	6.4	6.4
Total	1,280	1,010	2,290	2,190	982	2,220	3,200	1,010	2,260	3,230	5,490	3,200

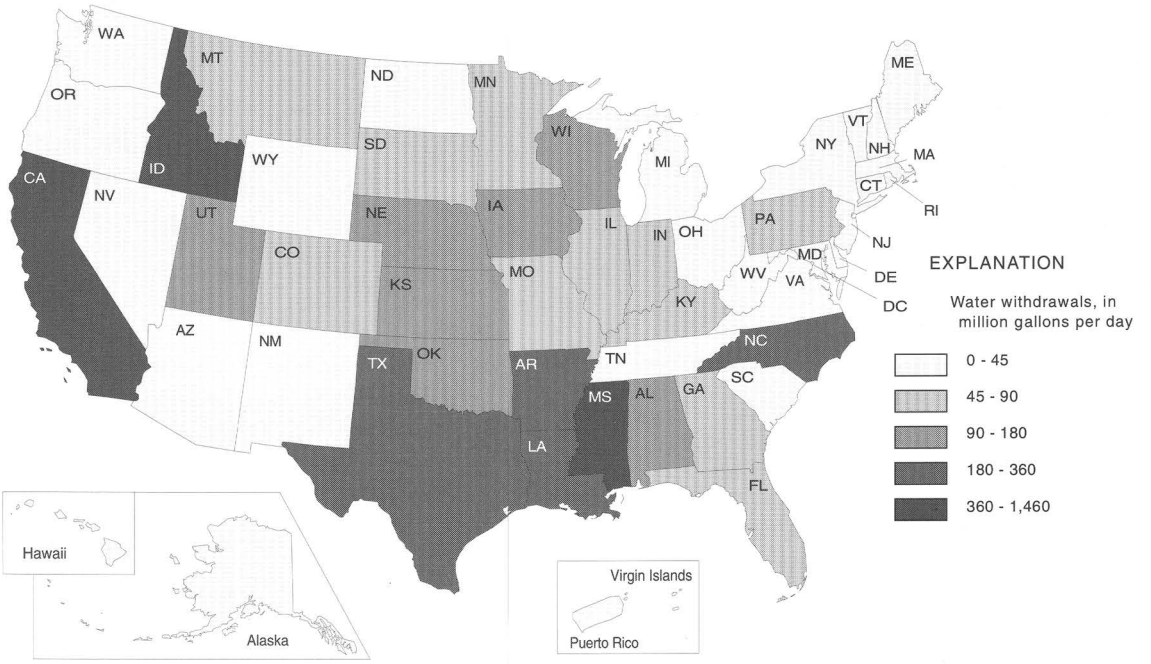


Figure 19. Total livestock freshwater withdrawals by State, 1995.

Table 18. Livestock freshwater use by State, 1995

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

STATE	LIVESTOCK				ANIMAL SPECIALTIES				TOTAL LIVESTOCK			
	Withdrawals			Consumptive use	Withdrawals			Consumptive use	Withdrawals			Consumptive use
	Ground water	Surface water	Total		Ground water	Surface water	Total		Ground water	Surface water	Total	
Alabama	15	20	35	35	6.9	87	94	94	22	107	129	129
Alaska	0	.3	.3	.3	.1	.2	.2	.2	.1	.4	.5	.5
Arizona	29	2.3	31	31	.4	.1	.5	.5	29	2.4	32	32
Arkansas	15	23	39	39	228	87	315	176	244	110	354	215
California	132	167	299	299	103	58	160	32	234	225	459	331
Colorado	23	21	45	45	0	14	14	0	23	36	59	45
Connecticut	1.1	.1	1.2	1.0	.3	0	.3	.3	1.4	.1	1.4	1.3
Delaware	3.8	.4	4.1	3.7	0	0	0	0	3.8	.4	4.1	3.7
D.C.	0	0	0	0	0	0	0	0	0	0	0	0
Florida	45	4.9	50	50	5.2	1.0	6.2	6.2	50	5.9	56	56
Georgia	1.6	29	30	30	8.1	9.2	17	17	9.7	38	48	47
Hawaii	2.7	1.9	4.6	4.6	4.8	.6	5.4	.1	7.5	2.6	10	4.7
Idaho	16	11	27	5.4	.3	1,430	1,430	0	17	1,440	1,460	5.4
Illinois	45	0	45	36	9.0	2.2	11	11	54	2.2	56	47
Indiana	28	18	46	37	.6	0	.6	.5	28	18	46	37
Iowa	82	27	109	109	.5	0	.5	.5	82	27	110	110
Kansas	89	18	107	107	1.5	1.2	2.7	2.5	91	19	109	109
Kentucky	2.3	43	45	45	0	.9	.9	.9	2.3	44	46	46
Louisiana	4.2	4.8	9.0	9.0	140	176	316	316	144	181	325	325
Maine	1.4	.5	1.8	1.6	0	0	0	0	1.4	.5	1.9	1.7
Maryland	7.8	3.5	11	10	5.0	19	24	0	13	23	35	10
Massachusetts	1.0	.8	1.8	1.4	.4	7.7	8.2	6.5	1.5	8.5	10	7.9
Michigan	12	1.3	13	12	.6	.1	.6	.6	13	1.4	14	13
Minnesota	62	0	62	62	.4	0	.4	.4	62	0	62	62
Mississippi	7.0	11	18	18	370	8.8	378	280	377	19	396	298
Missouri	19	57	76	76	.8	.2	1.0	1.0	20	57	76	76
Montana	16	35	51	51	.3	.6	.9	.9	16	35	52	52
Nebraska	94	22	116	115	14	12	26	2.0	108	33	142	117
Nevada	1.0	4.2	5.1	2.1	0	.5	.5	0	1.0	4.7	5.7	2.1
New Hampshire	.6	.2	.8	.5	0	0	.1	.1	.6	.2	.8	.6
New Jersey	1.2	0	1.2	1.2	.3	0	.3	.3	1.5	0	1.5	1.5
New Mexico	26	3.6	30	28	0	0	0	0	26	3.6	30	28
New York	22	12	33	30	.4	.1	.5	.5	22	12	34	30
North Carolina	86	35	121	121	3.7	172	175	4.1	89	207	297	125
North Dakota	14	9.2	23	23	0	.6	.7	0	14	9.9	24	23
Ohio	6.9	19	26	25	.7	0	.7	0	7.6	19	27	25
Oklahoma	45	101	146	146	0	.7	.7	0	45	101	147	146
Oregon	3.3	19	23	23	.1	.5	.6	.6	3.4	20	23	23
Pennsylvania	48	7.1	55	41	.6	0	.6	.6	48	7.1	55	42
Rhode Island	.3	0	.4	.3	.2	3.1	3.2	2.6	.5	3.1	3.6	2.8
South Carolina	4.0	4.9	8.9	8.9	8.3	7.5	16	.8	12	12	25	9.7
South Dakota	18	28	46	46	0	0	0	0	18	28	46	46
Tennessee	4.0	4.4	8.4	8.4	17	11	28	28	21	15	37	37
Texas	132	166	298	298	6.7	10	17	17	139	176	315	315
Utah	6.8	9.4	16	12	.8	91	92	.5	7.6	100	108	13
Vermont	3.8	1.3	5.1	4.6	.2	0	.2	.2	4.0	1.3	5.3	4.8
Virginia	7.8	28	36	36	0	.1	.1	.1	7.8	28	36	36
Washington	23	10	34	29	.5	.2	.7	.7	24	11	34	29
West Virginia	1.6	3.5	5.1	4.4	13	.1	13	.1	15	3.6	18	4.4
Wisconsin	57	6.4	64	51	22	6.2	29	2.8	79	13	92	54
Wyoming	5.5	11	16	16	7.9	.4	8.3	.5	13	11	25	17
Puerto Rico	4.4	1.8	6.2	6.2	0	0	.1	.1	4.5	1.8	6.3	6.3
Virgin Islands	.1	0	.1	.1	0	0	0	0	.1	0	.1	.1
Total	1,280	1,010	2,290	2,190	982	2,220	3,200	1,010	2,260	3,230	5,490	3,200

Industrial

27,100 million gallons per day

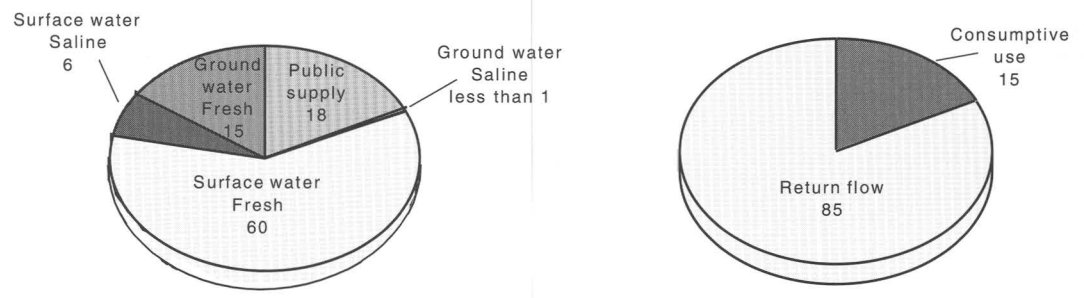
Total industrial water use during 1995 was an estimated 27,100 Mgal/d (tables 19, 20), or 2 percent less than during 1990. Most of the decrease, 1,620 Mgal/d, was in saline surface-water withdrawals. Industrial freshwater use was an estimated 25,500 Mgal/d during 1995, about 4 percent more than in 1990, and represents about 7 percent of freshwater use for all offstream categories. Self-supplied industrial withdrawals were an estimated 20,700 Mgal/d of freshwater and 1,660 Mgal/d of saline water. (See tables 19, 20.) Surface water was the source for 82 percent of self-supplied industrial withdrawals; ground water, 18 percent; and reclaimed wastewater less than 1 percent. Public-supply deliveries to industries were about 4,750 Mgal/d and accounted for 12 percent of total public-supply withdrawals.

The source and disposition of water for industrial purposes for 1995 are shown in the chart below. The consumptive use of freshwater for industrial purposes during 1995 was 3,370 Mgal/d, or 13 percent of freshwater withdrawals and deliveries; saline consumptive use was 665 Mgal/d, or 40 percent of saline withdrawals. Total consumptive use was 15 percent of combined fresh and saline withdrawals.

Industrial water use includes water for such purposes as processing, washing, and cooling in facilities that manufacture products. Major water-using industries include, but are not limited to, steel, chemical and allied products, paper and allied products, and petroleum refining.

Many States have developed permit programs that require reporting of industrial withdrawals and return flows. Information on deliveries from public suppliers to industrial users are estimated from a variety of methods if not available directly from the public suppliers. Consumptive-use estimates generally are based on coefficients, most ranging from 10 to 40 percent (depending on the type of industry) of withdrawals and deliveries.

In 1995, the Great Lakes and Ohio water-resources regions had the largest total (fresh, saline) withdrawals for industrial purposes as shown in figure 20. By State, Louisiana, Texas, Indiana, Michigan, and Pennsylvania reported the largest withdrawals for industries as shown in figure 21. Louisiana and Indiana, reported the largest freshwater use (figure 22), and Maryland and Texas reported the largest quantities of reclaimed wastewater used by industries.



INDUSTRIAL SOURCE AND DISPOSITION, 1995, IN PERCENT

Figure 20. Industrial self-supplied water withdrawals (fresh, saline) by water-resources region, 1995.

Table 19. Industrial water use by water-resources region, 1995

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

REGION	SELF-SUPPLIED WITHDRAWALS								TOTAL USE		
	By source and type										
	Ground water		Surface water		Total			RECLAIMED WASTE-WATER	PUBLIC-SUPPLY DELIV-ERIES	With-drawals and deliveries	Consumptive use	
	Fresh	Saline	Fresh	Saline	Fresh	Saline	Total		Fresh	Fresh	Fresh	Saline
New England	53	0	100	0	153	0	153	0	168	321	24	0
Mid-Atlantic	344	0	1,090	526	1,430	526	1,960	71	516	1,950	198	49
South Atlantic-Gulf	787	0	2,010	40	2,790	40	2,830	1.2	742	3,530	502	2.2
Great Lakes	270	3.6	3,900	0	4,170	3.6	4,180	0	775	4,950	436	.4
Ohio	379	0	3,310	0	3,690	0	3,690	.1	590	4,280	480	0
Tennessee	35	0	1,030	0	1,070	0	1,070	0	101	1,170	115	0
Upper Mississippi	328	0	660	0	988	0	988	0	361	1,350	176	0
Lower Mississippi	611	0	2,280	0	2,890	0	2,890	0	94	2,990	294	0
Souris-Red-Rainy	1.7	0	20	0	22	0	22	0	3.9	26	4.9	0
Missouri Basin	102	0	50	0	152	0	152	0	106	258	76	0
Arkansas-White-Red	78	0	360	0	438	0	438	13	291	728	119	0
Texas-Gulf	214	.5	846	996	1,060	996	2,060	17	171	1,230	375	599
Rio Grande	10	0	.1	0	10	0	10	2.1	20	30	16	0
Upper Colorado	2.4	0	4.0	0	6.4	0	6.4	0	4.2	11	3.5	0
Lower Colorado	42	0	5.5	0	47	0	47	2.3	68	115	102	0
Great Basin	60	.1	31	0	91	.1	91	0	17	109	46	0
Pacific Northwest	215	0	866	38	1,080	38	1,120	0	407	1,490	148	4.2
California	522	10	19	26	541	36	577	3.6	284	824	239	9.1
Alaska	3.8	0	51	1.8	55	1.8	57	0	12	66	9.9	.3
Hawaii	19	.9	0	0	19	.9	20	0	5.6	25	2.5	.1
Caribbean	10	.2	4.0	17	14	17	31	0	15	29	8.0	.3
Total	4,090	15	16,700	1,640	20,700	1,660	22,400	110	4,750	25,500	3,370	665

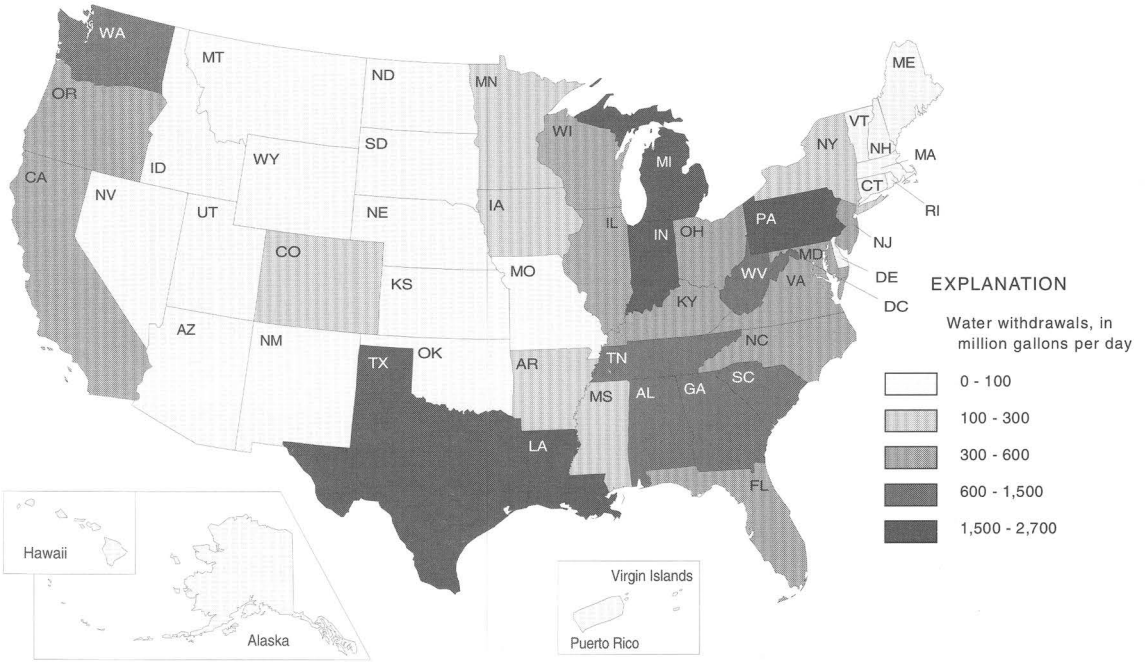


Figure 21. Industrial self-supplied water withdrawals (fresh, saline) by State, 1995.

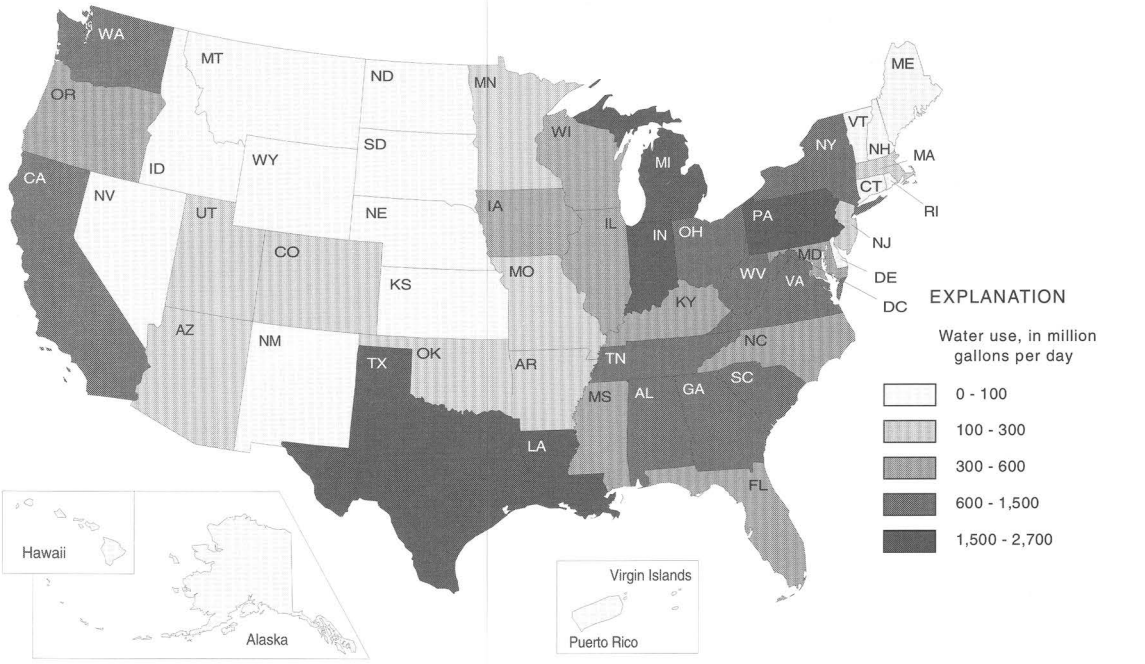


Figure 22. Industrial freshwater use (withdrawals, deliveries) by State, 1995.

Table 20. Industrial water use by State, 1995

[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 USE		
	By source and type				Total			RECLAIMED WASTEWATER		Withdrawals and deliveries	Consumptive use	
	Ground water		Surface water									
	Fresh	Saline	Fresh	Saline	Fresh	Saline	Total		Fresh	Fresh	Fresh	Saline
Alabama	34	0	699	0	733	0	733	0	213	946	116	0
Alaska	3.8	0	51	1.8	55	1.8	57	0	12	66	9.9	.3
Arizona	39	0	0	0	39	0	39	2.3	66	106	98	0
Arkansas	108	0	80	0	187	0	187	0	57	245	14	0
California	522	10	16	26	538	36	575	3.6	283	821	239	9.1
Colorado	37	0	86	0	123	0	123	0	19	143	42	0
Connecticut	3.5	0	6.2	0	9.6	0	9.6	0	42	51	1.1	0
Delaware	17	0	43	3.2	61	3.2	64	0	16	76	11	0
D.C.	.5	0	0	0	.5	0	.5	0	.7	1.2	.1	0
Florida	240	0	106	8.0	345	8.0	353	.7	103	449	46	0
Georgia	295	0	337	32	633	32	664	.6	194	827	85	2.2
Hawaii	19	.9	0	0	19	.9	20	0	5.6	25	2.5	.1
Idaho	39	0	7.9	0	47	0	47	0	6.7	54	3.1	0
Illinois	162	0	290	0	452	0	452	0	118	570	63	0
Indiana	119	0	2,160	0	2,270	0	2,270	0	125	2,400	144	0
Iowa	74	0	184	0	258	0	258	0	78	335	44	0
Kansas	50	0	3.2	0	53	0	53	.2	37	90	45	0
Kentucky	92	0	255	0	347	0	347	0	197	543	22	0
Louisiana	356	0	2,230	0	2,580	0	2,580	0	35	2,620	266	0
Maine	4.6	0	5.9	0	11	0	11	0	14	25	2.5	0
Maryland	19	0	45	261	65	261	326	70	44	109	16	26
Massachusetts	38	0	47	0	85	0	85	0	86	171	13	0
Michigan	177	3.6	1,670	0	1,850	3.6	1,850	0	270	2,120	160	.4
Minnesota	58	0	83	0	140	0	140	0	41	181	26	0
Mississippi	166	0	124	0	290	0	290	0	20	310	49	0
Missouri	21	0	18	0	39	0	39	0	140	179	27	0
Montana	31	0	29	0	60	0	60	0	1.0	61	9.3	0
Nebraska	26	0	4.4	0	30	0	30	0	26	57	16	0
Nevada	7.4	0	7.5	0	15	0	15	0	2.2	17	4.9	0
New Hampshire	5.6	0	38	0	43	0	43	0	13	56	6.6	0
New Jersey	43	0	158	195	201	195	396	0	91	292	22	15
New Mexico	6.3	0	2.0	0	8.3	0	8.3	0	15	23	12	0
New York	127	0	132	0	259	0	259	0	356	615	62	0
North Carolina	61	0	308	0	369	0	369	0	193	562	112	0
North Dakota	3.6	0	7.9	0	11	0	11	0	2.5	14	9.4	0
Ohio	158	0	399	0	557	0	557	0	355	912	190	0
Oklahoma	3.8	0	17	0	21	0	21	0	122	142	8.9	0
Oregon	13	0	365	0	378	0	378	0	71	448	18	0
Pennsylvania	147	0	1,530	0	1,680	0	1,680	1.1	193	1,870	158	0
Rhode Island	1.1	0	0	0	1.1	0	1.1	0	12	13	1.3	0
South Carolina	60	0	640	0	700	0	700	0	44	744	112	0
South Dakota	4.1	0	1.0	0	5.1	0	5.1	0	7.9	13	1.9	0
Tennessee	68	0	795	0	863	0	863	0	130	993	109	0
Texas	226	.5	1,070	996	1,300	996	2,300	32	268	1,570	430	599
Utah	55	.1	31	0	86	.1	86	0	17	103	45	0
Vermont	1.9	0	7.4	0	9.4	0	9.4	0	7.7	17	1.7	0
Virginia	107	0	410	67	516	67	583	0	88	605	72	8.0
Washington	133	0	478	38	611	38	649	0	331	942	120	4.2
West Virginia	13	0	1,300	0	1,320	0	1,320	0	14	1,330	200	0
Wisconsin	78	0	363	0	441	0	441	0	151	592	95	0
Wyoming	1.6	0	1.2	0	2.8	0	2.8	0	2.4	5.1	.8	0
Puerto Rico	10	0	1.1	0	11	0	11	0	15	26	7.6	0
Virgin Islands	.1	.2	2.9	17	3.0	17	20	0	0	3.0	.4	.3
Total	4,090	15	16,700	1,640	20,700	1,660	22,400	110	4,750	25,500	3,370	665

Mining

3,770 million gallons per day

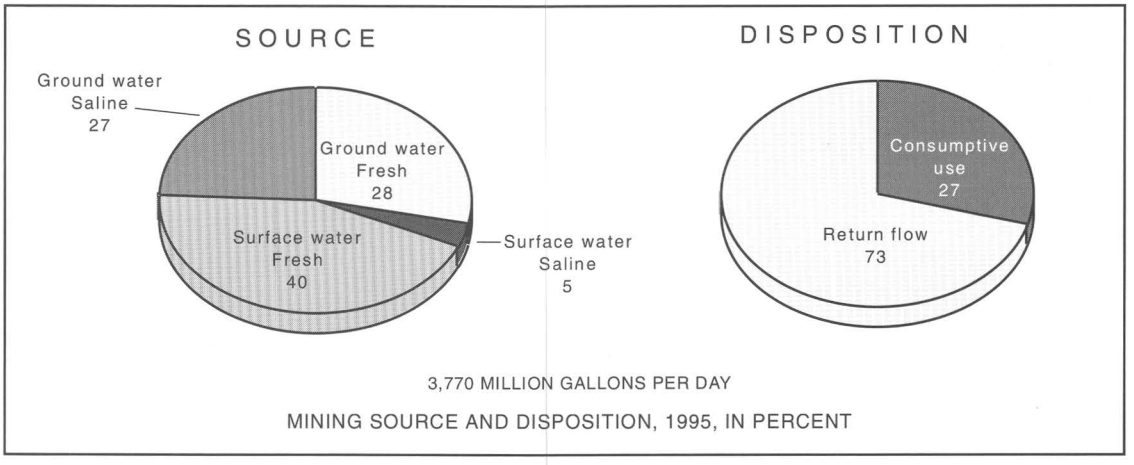
Total mining water use during 1995 was an estimated 3,770 Mgal/d and included 1,210 Mgal/d of saline water (table 21). Mining freshwater use during 1995 was 22 percent less than during 1990, and represents less than 1 percent of freshwater use for all offstream categories. Much of the decrease can be attributed to not including dewatering as a mining water use.

The source and disposition of water for mining purposes for 1995 are shown in the chart below. Ground water was the source for about 55 percent of total mining withdrawals, and surface water was the source for the remaining 45 percent. Saline water accounted for approximately one-third of total mining withdrawals. Total consumptive use in 1995 was about 1,020 Mgal/d or 27 percent of total withdrawals.

Mining water use includes water for the extraction of naturally occurring minerals; solids, such as coal and ores; liquids, such as crude petroleum; and gases, such as natural gas. The category includes quarrying, milling (crushing, screening, washing, and flotation), and other operations as part of mining activity. All water is self supplied, and saline water is significant. Dewatering is no longer considered as a mining water use unless the water is put to a beneficial use, such as washing or dust control.

Water used in mining is difficult to quantify. Except for some washing and milling, water used at mining sites tends to be an impediment to or a by-product of the extraction process. Unless water is needed for the mining operation, little attention is paid to quantities withrawn. Estimates for mining withdrawals were obtained from State agencies that regulate discharges, or by use of coefficients for the relation between the quantity of water withdrawn and the quantity of material extracted. Consumptive-use estimates were based on coefficients, ranging from 10 to 90 percent of withdrawals, depending on the type of mining activity.

Most water withdrawn for mining use during 1995 was in the Texas-Gulf water-resources region, followed by the Great Lakes region, as shown in figure 23 and table 21. By State, Texas, Minnesota, and Florida had the most freshwater and saline water withdrawn for mining (figure 24; table 22), and accounted for about 32 percent of the Nation's total mining withdrawals. Minnesota, Florida, Texas and Pennsylvania had the most freshwater withdrawn for mining. (See figure 25 and table 22.)



MINING SOURCE AND DISPOSITION, 1995, IN PERCENT

Figure 23. Mining water withdrawals (fresh, saline) by water-resources region, 1995.

Table 21. Mining water use by water-resources region, 1995

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

REGION	WITHDRAWALS									CONSUMPTIVE USE		
	By source and type						Total					
	Ground water			Surface water								
	Fresh	Saline	Total	Fresh	Saline	Total	Fresh	Saline	Total	Fresh	Saline	Total
New England	2.9	0	2.9	21	0	21	24	0	24	3.8	0	3.8
Mid-Atlantic	159	1.0	160	163	7.5	170	321	8.6	330	34	2.2	36
South Atlantic-Gulf	177	9.1	186	162	0	162	339	9.1	348	26	0	26
Great Lakes	34	1.0	35	356	6.5	363	390	7.6	398	35	1.9	37
Ohio	115	22	137	212	.6	213	327	23	349	54	22	76
Tennessee	3.7	0	3.7	7.2	0	7.2	11	0	11	1.4	0	1.4
Upper Mississippi	22	4.2	26	112	0	112	134	4.2	138	19	4.2	24
Lower Mississippi	3.1	0	3.1	2.2	0	2.2	5.3	0	5.3	.7	0	.7
Souris-Red-Rainy	.4	0	.4	1.0	0	1.0	1.4	0	1.4	.4	0	.4
Missouri Basin	104	38	143	201	0	201	306	38	344	58	8.6	66
Arkansas-White-Red	30	284	314	26	0	26	56	284	340	25	0	25
Texas-Gulf	118	324	442	79	0	79	197	324	521	194	0	194
Rio Grande	53	60	113	2.1	0	2.1	55	60	115	36	0	36
Upper Colorado	20	14	34	3.5	0	3.5	23	14	38	12	1.7	14
Lower Colorado	126	12	138	26	2.3	28	152	14	166	116	11	126
Great Basin	71	19	90	2.8	143	146	74	162	236	71	145	216
Pacific Northwest	6.5	0	6.5	29	0	29	35	0	35	12	0	12
California	16	151	167	62	0	62	78	151	229	77	34	110
Alaska	0	75	75	24	41	65	24	116	140	1.3	9.7	11
Hawaii	.5	0	.5	.1	0	.1	.5	0	.5	.5	0	.5
Caribbean	3.4	0	3.4	1.1	0	1.1	4.5	0	4.5	1.4	0	1.4
Total	1,070	1,010	2,080	1,490	201	1,690	2,560	1,210	3,770	780	240	1,020

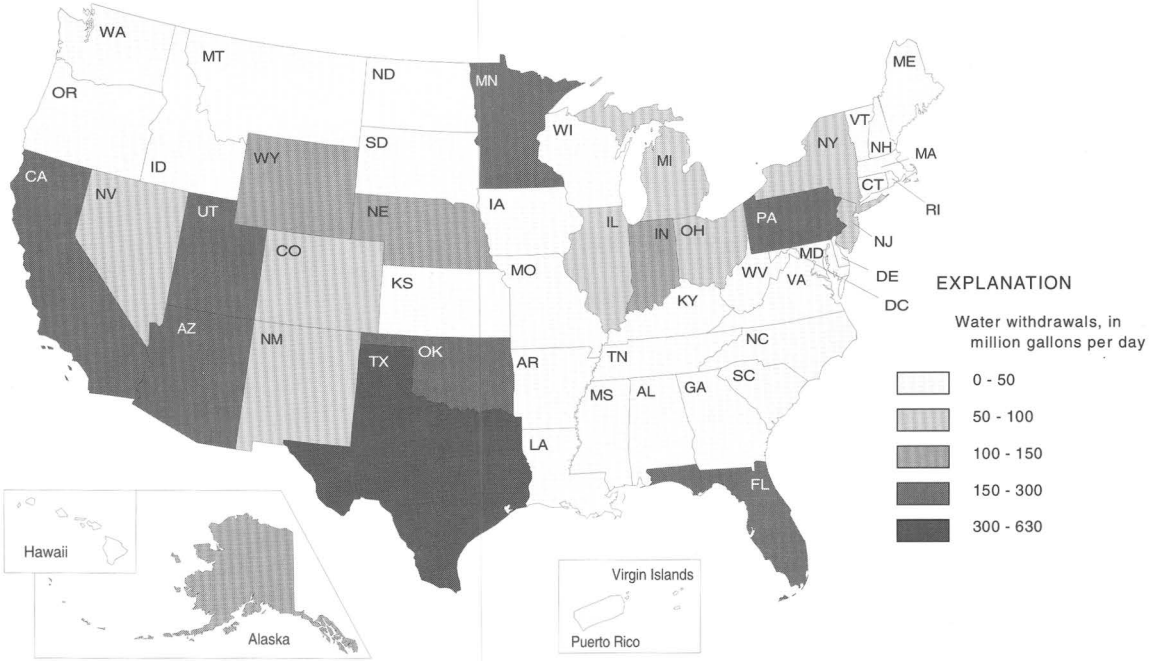


Figure 24. Mining withdrawals (fresh, saline) by State, 1995.

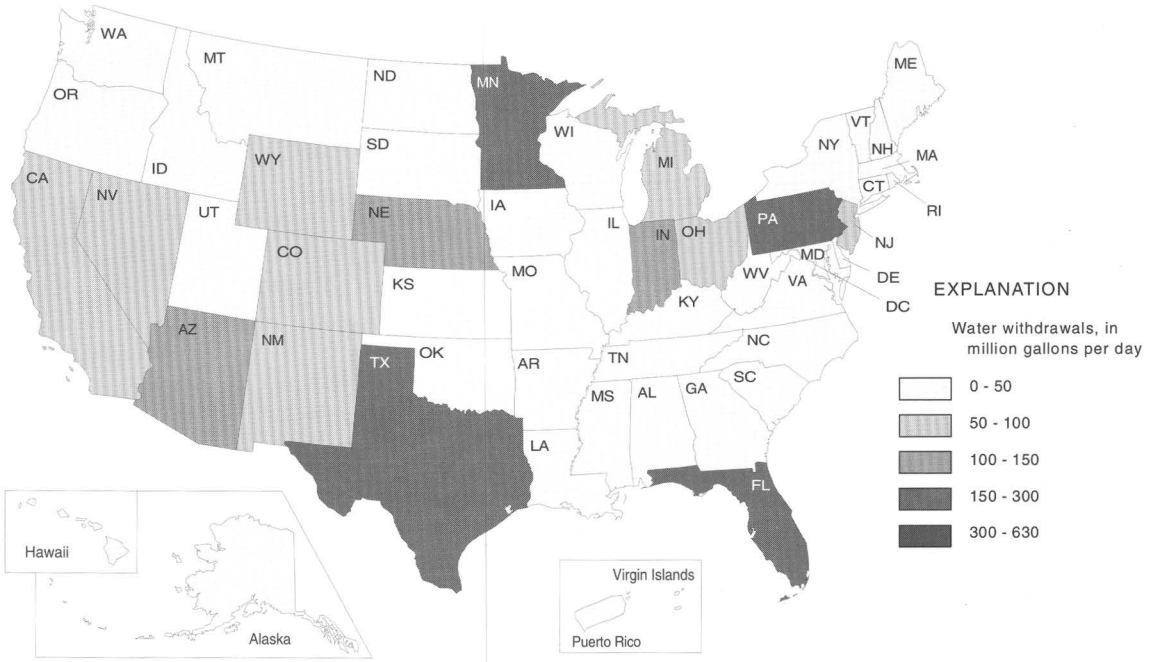


Figure 25. Mining freshwater withdrawals by State, 1995.

Table 22. Mining water use by State, 1995

[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	4.0	9.1	13	7.0	0	7.0	11	9.1	20	0	0	0
Alaska	0	75	75	24	41	65	24	116	140	1.3	9.7	11
Arizona	119	12	131	25	2.3	27	144	14	158	109	11	120
Arkansas	0	0	0	.1	0	.1	.1	0	.1	0	0	0
California	14	151	165	62	0	62	76	151	227	75	34	109
Colorado	25	17	41	27	0	27	52	17	68	20	2.8	23
Connecticut	.3	0	.3	1.4	0	1.4	1.7	0	1.7	.3	0	.3
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	148	0	148	148	0	148	296	0	296	15	0	15
Georgia	8.7	0	8.7	2.9	0	2.9	12	0	12	1.4	0	1.4
Hawaii	.5	0	.5	.1	0	.1	.5	0	.5	.5	0	.5
Idaho	1.2	0	1.2	27	0	27	29	0	29	10	0	10
Illinois	5.5	25	31	44	0	44	50	25	75	10.0	25	35
Indiana	10	0	10	126	0	126	137	0	137	8.2	0	8.2
Iowa	1.1	0	1.1	42	0	42	43	0	43	0	0	0
Kansas	13	0	13	11	0	11	24	0	24	5.1	0	5.1
Kentucky	7.4	0	7.4	21	0	21	28	0	28	.8	0	.8
Louisiana	.4	0	.4	1.4	0	1.4	1.8	0	1.8	0	0	0
Maine	1.3	0	1.3	3.7	0	3.7	5.0	0	5.0	.9	0	.9
Maryland	.9	0	.9	4.3	0	4.3	5.2	0	5.2	1.0	0	1.0
Massachusetts	.5	0	.5	2.7	0	2.7	3.2	0	3.2	.3	0	.3
Michigan	7.1	.8	7.9	51	0	51	58	.8	58	2.9	.1	3.0
Minnesota	6.3	0	6.3	292	0	292	298	0	298	12	0	12
Mississippi	3.5	0	3.5	.2	0	.2	3.7	0	3.7	.9	0	.9
Missouri	8.6	0	8.6	15	0	15	24	0	24	2.4	0	2.4
Montana	2.8	13	16	3.8	0	3.8	6.6	13	20	1.1	0	1.1
Nebraska	6.1	4.7	11	134	0	134	141	4.7	145	2.1	0	2.1
Nevada	65	11	76	3.5	0	3.5	68	11	80	68	11	80
New Hampshire	0	0	0	7.0	0	7.0	7.0	0	7.0	1.4	0	1.4
New Jersey	2.4	0	2.4	87	0	87	90	0	90	7.2	0	7.2
New Mexico	61	0	61	.7	0	.7	61	0	61	39	0	39
New York	11	1.5	13	34	15	49	45	16	62	13	4.4	17
North Carolina	12	0	12	4.3	0	4.3	16	0	16	9.3	0	9.3
North Dakota	3.8	0	3.8	2.0	0	2.0	5.8	0	5.8	.7	0	.7
Ohio	47	0	47	46	0	46	93	0	93	52	0	52
Oklahoma	5.4	259	264	0	0	0	5.4	259	264	1.5	0	1.5
Oregon	1.2	0	1.2	0	0	0	1.2	0	1.2	.6	0	.6
Pennsylvania	211	0	211	41	0	41	252	0	252	25	0	25
Rhode Island	.5	0	.5	5.7	0	5.7	6.2	0	6.2	.8	0	.8
South Carolina	2.9	0	2.9	0	0	0	2.9	0	2.9	.3	0	.3
South Dakota	7.8	0	7.8	20	0	20	27	0	27	6.8	0	6.8
Tennessee	2.8	0	2.8	2.7	0	2.7	5.5	0	5.5	.6	0	.6
Texas	128	409	538	83	0	83	211	409	621	211	0	211
Utah	16	7.3	23	.9	143	144	16	150	167	12	133	145
Vermont	.3	0	.3	2.8	0	2.8	3.0	0	3.0	.6	0	.6
Virginia	2.6	0	2.6	37	0	37	39	0	39	4.7	0	4.7
Washington	2.8	0	2.8	.7	0	.7	3.5	0	3.5	.5	0	.5
West Virginia	3.7	.5	4.2	7.5	0	7.5	11	.5	12	2.2	.5	2.7
Wisconsin	7.9	0	7.9	4.3	0	4.3	12	0	12	2.5	0	2.5
Wyoming	71	18	90	25	0	25	96	18	115	40	7.5	47
Puerto Rico	2.8	0	2.8	1.4	0	1.4	4.2	0	4.2	1.3	0	1.3
Virgin Islands	0	0	0	0	0	0	0	0	0	0	0	0
Total	1,070	1,010	2,080	1,490	201	1,690	2,560	1,210	3,770	780	240	1,020

Thermoelectric Power — 190,000 million gallons per day

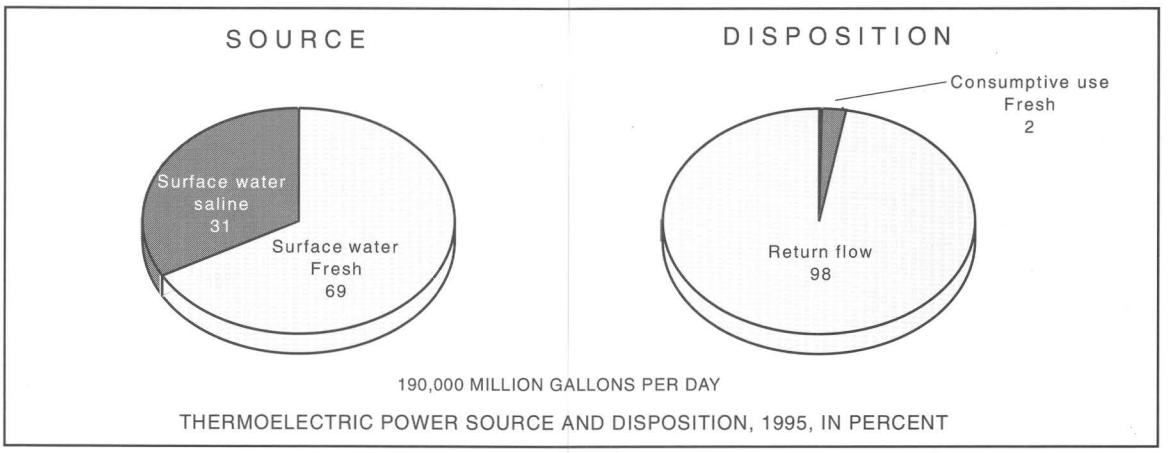
The total quantity of water used for thermoelectric power generation during 1995 was an estimated 190,000 Mgal/d, or about 3 percent less than during 1990. This use included 57,900 Mgal/d of saline water, or 10 percent less than during 1990). (See tables 23, 24.) Withdrawals for thermoelectric power generation account for 39 percent of freshwater use for all offstream categories and represent 47 percent of combined fresh and saline withdrawals. Public suppliers only delivered about 100 Mgal/d of water to thermoelectric plants during 1995; this accounted for less than 1 percent of total public-supply withdrawals. Fossil-fuel thermoelectric plants account for about 71 percent of total thermoelectric withdrawals; nuclear plants, 29 percent; and geothermal plants, less than 1 percent.

The source and disposition of water for thermoelectric power are shown in the chart below. Surface water was the source for more than 99 percent of total thermoelectric withdrawals, and about 31 percent of the surface-water withdrawal was saline. About 2 percent of the water withdrawn for thermoelectric power during 1995 was consumptively used as a result of once-through, cooling-tower, or pond cooling.

The thermoelectric power category includes water used in the generation of electric power with fossil-fuel, nuclear, or geothermal energy. The estimates of water withdrawals for thermoelectric power estimates should be reliable because relatively complete files on power generation are maintained by Federal and State agencies. The Electric Power Annual is prepared by the U.S. Department of Energy, Energy Information Administration, and contains information about electric power net generation. Most of the water withdrawn by thermoelectric plants is 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 it is returned to a surface water body, significantly more water is required, but evaporation is low (less than 3 percent). Withdrawal estimates generally are based on power generation. Consumptive use is based on coefficients ranging from 1 to 100 percent of withdrawals.

Thermoelectric power is by far the largest water use in the East. The eight eastern water-resources regions, led by the Mid-Atlantic region, account for 75 percent of the total water withdrawn for thermoelectric power cooling (figure 26; table 23). The highly populated States of Illinois, Texas, New York, Florida, and California use the most water for thermoelectric power. Illinois leads the Nation, nearly double Texas, in the use of freshwater for thermoelectric power.

Saline ground water was only reported for geothermal plants in California (22 Mgal/d), Nevada (30 Mgal/d), and Utah (6.7 Mgal/d), and is not listed in the tables or included in the totals.



THERMOELECTRIC POWER SOURCE AND DISPOSITION, 1995, IN PERCENT

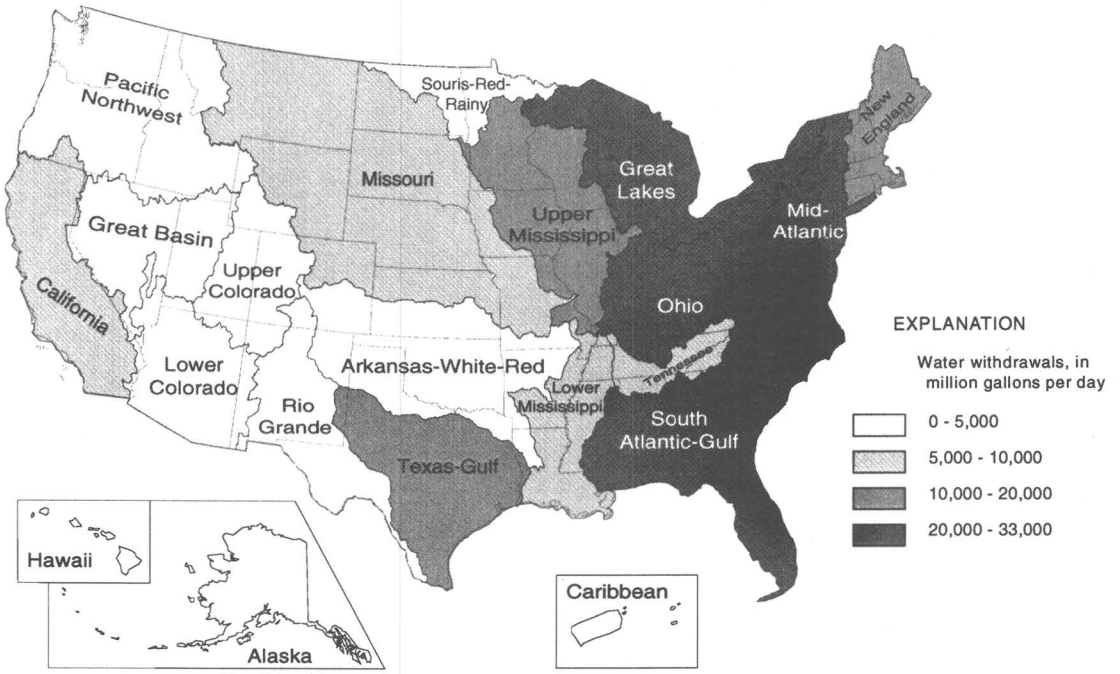


Figure 26. Thermoelectric power water withdrawals (fresh, saline) by water-resources region, 1995.

Table 23. Thermoelectric power water use by water-resources region, 1995

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

REGION	ALL THERMOELECTRIC POWER WATER USE, in Mgal/d									POWER GENERATED, in million kWh
	Self-supplied withdrawals, by source and type				Public-supply deliveries	Total use				
	Ground water	Surface water				Withdrawals and deliveries	Consumptive use			
	Fresh	Fresh	Saline	Total	Fresh	Fresh	Fresh	Saline	Total	
New England	48	1,620	8,800	10,400	2.3	1,670	17	88	105	84,600
Mid-Atlantic	11	12,600	19,700	32,400	27	12,700	188	213	401	259,000
South Atlantic-Gulf	79	17,500	12,700	30,200	5.6	17,600	344	20	365	478,000
Great Lakes	7.6	22,800	0	22,800	.1	22,800	429	0	429	219,000
Ohio	70	22,600	0	22,600	.3	22,600	838	0	838	451,000
Tennessee	0	6,990	0	6,990	0	6,990	13	0	13	76,600
Upper Mississippi	24	19,000	0	19,000	7.4	19,100	388	0	388	211,000
Lower Mississippi	69	6,670	0	6,670	1.1	6,740	253	0	253	78,100
Souris-Red-Rainy	0	38	0	38	0	38	0	0	0	396
Missouri Basin	30	8,770	0	8,770	4.7	8,810	172	0	172	167,000
Arkansas-White-Red	37	4,140	0	4,140	28	4,200	163	0	163	143,000
Texas-Gulf	50	7,630	3,870	11,500	13	7,700	252	12	264	224,000
Rio Grande	16	2.2	0	2.2	0	18	14	0	14	7,780
Upper Colorado	0	146	0	146	0	146	130	0	130	94,000
Lower Colorado	45	17	0	17	1.5	64	57	0	57	62,400
Great Basin	2.6	21	0	21	0	24	23	8.6	32	16,300
Pacific Northwest	.5	384	0	384	0	385	18	0	18	17,000
California	3.6	202	9,430	9,630	5.3	211	9.7	19	29	76,000
Alaska	4.2	26	0	26	.6	31	3.1	0	3.1	3,770
Hawaii	67	0	903	903	.3	67	.7	9.0	9.7	6,370
Caribbean	2.2	0	2,440	2,440	2.2	4.3	.9	0	.9	16,500
Total	565	131,000	57,900	189,000	100	132,000	3,310	369	3,680	2,690,000

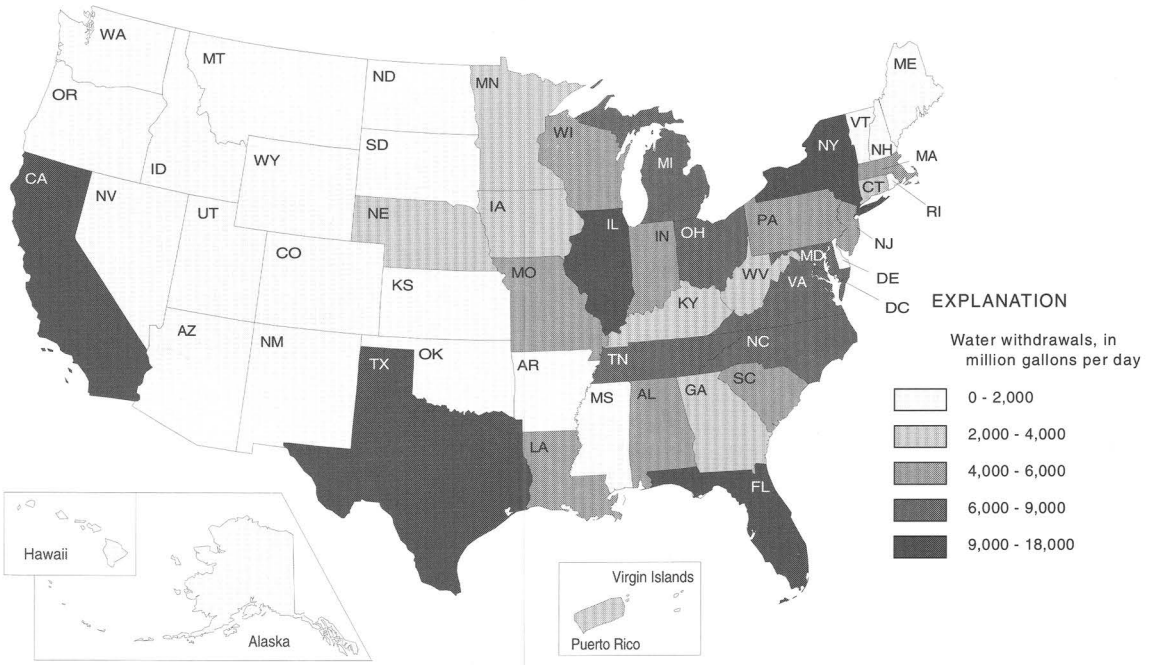


Figure 27. Thermoelectric power water withdrawals (fresh, saline) by State, 1995.

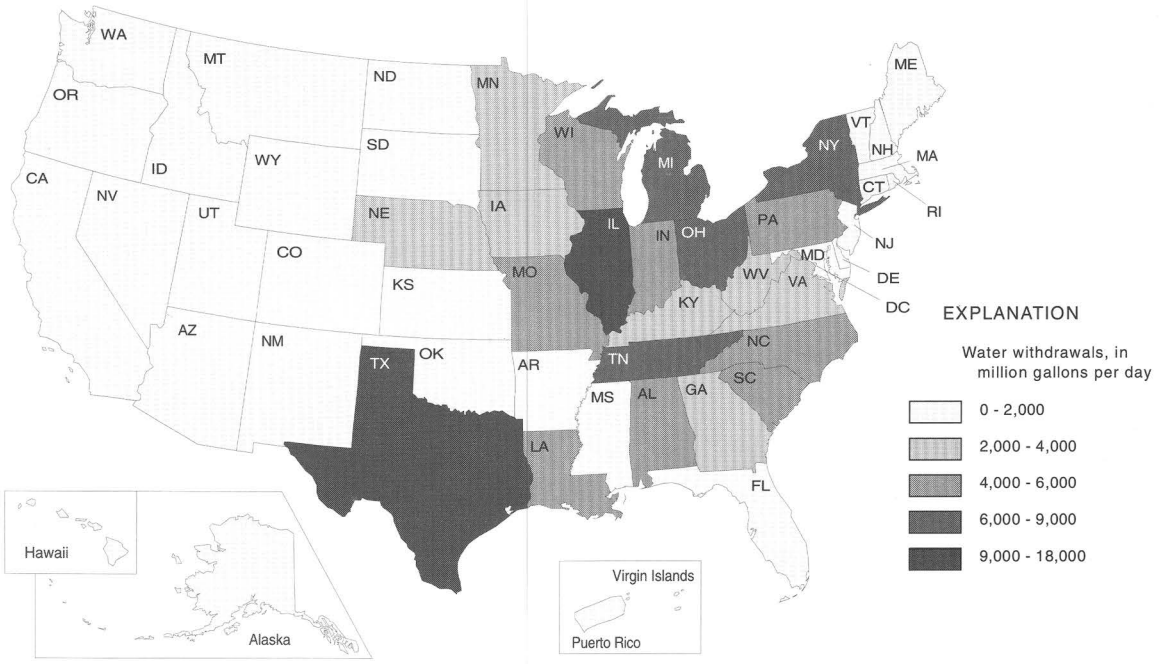


Figure 28. Thermoelectric power freshwater withdrawals by State, 1995.

Table 24. Thermoelectric power water use by State, 1995

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

STATE	ALL THERMOELECTRIC POWER WATER USE, in Mgal/d									POWER GENERATED, in million kWh
	Self-supplied withdrawals, by source and type				Public-supply deliveries	Total use				
	Ground water	Surface water				Withdrawals and deliveries	Consumptive use			
	Fresh	Fresh	Saline	Total	Fresh	Fresh	Fresh	Saline	Total	
Alabama	6.0	5,190	0	5,190	0	5,200	32	0	32	85,300
Alaska	4.2	26	0	26	.6	31	3.1	0	3.1	3,770
Arizona	42	20	0	20	0	62	54	0	54	65,300
Arkansas	5.2	1,770	0	1,770	0	1,770	28	0	28	37,400
California	3.6	202	9,430	9,630	5.3	211	9.7	19	29	76,000
Colorado	22	93	0	93	14	128	41	0	41	30,600
Connecticut	.2	760	3,180	3,940	1.0	761	5.9	74	80	27,500
Delaware	.2	534	740	1,270	.5	535	.2	2.9	3.1	6,060
D.C.	0	9.7	0	9.7	0	9.7	.8	0	.8	189
Florida	21	615	11,000	11,600	3.6	640	56	0	56	149,000
Georgia	4.8	3,040	33	3,070	0	3,040	145	0	145	92,700
Hawaii	67	0	903	903	.3	67	.7	9.0	9.7	6,370
Idaho	0	0	0	0	0	0	0	0	0	0
Illinois	11	17,100	0	17,100	5.2	17,100	407	0	407	147,000
Indiana	11	5,680	0	5,680	0	5,690	114	0	114	105,000
Iowa	15	2,110	0	2,110	3.0	2,130	10	0	10	32,600
Kansas	14	1,250	0	1,250	.8	1,270	58	0	58	38,100
Kentucky	38	3,410	0	3,410	0	3,440	203	0	203	70,600
Louisiana	31	5,450	0	5,450	0	5,480	222	0	222	54,200
Maine	.7	30	105	135	.9	31	3.5	1.7	5.2	4,600
Maryland	1.8	358	6,000	6,360	0	360	3.7	48	52	43,200
Massachusetts	46	150	4,370	4,520	0	196	0	6.0	6.0	34,000
Michigan	3.0	8,370	0	8,370	0	8,370	126	0	126	96,700
Minnesota	1.9	2,090	0	2,090	.1	2,090	48	0	48	41,300
Mississippi	42	220	112	333	2.2	265	27	3.6	31	26,100
Missouri	9.5	5,540	0	5,540	.2	5,550	51	0	51	63,600
Montana	0	22	0	22	0	22	22	0	22	8,770
Nebraska	4.4	2,350	0	2,350	0	2,350	12	0	12	23,800
Nevada	6.3	21	0	21	1.5	28	28	8.3	37	18,900
New Hampshire	.8	228	877	1,110	.3	229	4.3	0	4.3	14,000
New Jersey	1.9	578	3,780	4,360	25	605	4.4	32	36	23,600
New Mexico	9.3	46	0	46	.1	56	48	0	48	29,100
New York	0	6,570	6,490	13,100	0	6,570	170	130	300	76,100
North Carolina	.1	5,860	1,550	7,420	.4	5,860	57	17	74	93,400
North Dakota	.3	879	0	879	0	880	25	0	25	26,300
Ohio	19	8,170	0	8,170	0	8,190	336	0	336	135,000
Oklahoma	3.5	121	0	121	1.2	126	60	0	60	44,700
Oregon	0	9.0	0	9.0	0	9.0	7.8	0	7.8	3,620
Pennsylvania	6.2	5,920	0	5,920	1.6	5,930	239	0	239	168,000
Rhode Island	0	0	275	275	0	0	0	5.5	5.5	278
South Carolina	39	4,770	0	4,770	0	4,810	51	0	51	74,200
South Dakota	3.4	1.9	0	1.9	0	5.4	.1	0	.1	2,800
Tennessee	0	8,300	0	8,300	.5	8,300	.5	0	.5	73,800
Texas	59	9,530	3,870	13,400	29	9,620	297	12	309	259,000
Utah	0	48	0	48	0	48	47	.3	47	31,600
Vermont	.4	452	0	452	0	453	4.0	0	4.0	4,400
Virginia	.4	3,890	2,730	6,620	.5	3,890	8.8	0	8.8	50,900
Washington	.5	375	0	375	0	376	10	0	10	13,300
West Virginia	.5	3,010	0	3,010	.2	3,010	122	0	122	79,100
Wisconsin	5.8	5,820	0	5,820	.1	5,830	58	0	58	44,700
Wyoming	1.0	219	0	219	0	220	50	0	50	38,600
Puerto Rico	2.2	0	2,260	2,260	2.2	4.4	.7	0	.7	15,800
Virgin Islands	0	0	173	173	.8	.8	.2	0	.2	771
Total	565	131,000	57,900	189,000	100	132,000	3,310	369	3,680	2,690,000

Table 25. Thermoelectric power water use by energy source and water-resources region, 1995

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

REGION	FOSSIL FUEL						NUCLEAR					
	Withdrawals, by source and type				Consumptive use		Withdrawals, by source and type				Consumptive use	
	Ground water	Surface water					Ground water	Surface water				
	Fresh	Fresh	Saline	Total	Fresh	Saline	Fresh	Fresh	Saline	Total	Fresh	Saline
New England	48	684	5,460	6,150	14	82	0.1	936	3,340	4,270	3.2	6.0
Mid-Atlantic	9.6	8,490	10,900	19,400	95	155	1.2	4,140	8,790	12,900	93	58
South Atlantic-Gulf	39	11,200	9,290	20,500	220	3.6	40	6,340	3,360	9,700	124	17
Great Lakes	7.4	15,300	0	15,300	180	0	.2	7,520	0	7,520	249	0
Ohio	70	22,500	0	22,500	810	0	0	65	0	65	29	0
Tennessee	0	4,750	0	4,750	11	0	0	2,240	0	2,240	1.5	0
Upper Mississippi	20	12,300	0	12,300	163	0	3.4	6,690	0	6,690	225	0
Lower Mississippi	37	5,650	0	5,650	223	0	32	1,020	0	1,020	30	0
Souris-Red-Rainy	0	38	0	38	0	0	0	0	0	0	0	0
Missouri Basin	28	7,700	0	7,700	161	0	.4	1,080	0	1,080	11	0
Arkansas-White-Red	37	3,150	0	3,150	149	0	0	989	0	989	14	0
Texas-Gulf	49	4,820	3,870	8,680	226	12	.8	2,820	0	2,820	26	0
Rio Grande	16	2.2	0	2.2	14	0	0	0	0	0	0	0
Upper Colorado	0	146	0	146	130	0	0	0	0	0	0	0
Lower Colorado	45	17	0	17	57	0	0	0	0	0	0	0
Great Basin	2.5	21	0	21	23	0	0	0	0	0	0	0
Pacific Northwest	.4	26	0	26	8.2	0	.1	358	0	358	9.8	0
California	3.5	190	4,730	4,920	9.4	2.8	.1	12	4,690	4,710	.3	1.3
Alaska	4.2	26	0	26	3.1	0	0	0	0	0	0	0
Hawaii	67	0	903	903	.7	9.0	0	0	0	0	0	0
Caribbean	2.2	0	2,440	2,440	.9	0	0	0	0	0	0	0
Total	486	97,000	37,600	135,000	2,500	263	78	34,300	20,200	54,500	815	82

Table 26. Thermoelectric power water use by energy source and State, 1995

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

STATE	FOSSIL FUEL						NUCLEAR					
	Withdrawals, by source and type				Consumptive use		Withdrawals, by source and type				Consumptive use	
	Ground water	Surface water					Ground water	Surface water				
	Fresh	Fresh	Saline	Total	Fresh	Saline	Fresh	Fresh	Saline	Total	Fresh	Saline
Alabama	6.0	4,330	0	4,330	30	0	0	862	0	862	1.7	0
Alaska	4.2	26	0	26	3.1	0	0	0	0	0	0	0
Arizona	42	20	0	20	54	0	0	0	0	0	0	0
Arkansas	5.2	798	0	798	27	0	0	967	0	967	1.2	0
California	3.5	190	4,730	4,920	9.4	2.8	.1	12	4,690	4,710	.3	1.3
Colorado	22	93	0	93	41	0	0	0	0	0	0	0
Connecticut	.1	276	882	1,160	5.9	74	.1	484	2,300	2,780	0	0
Delaware	.2	534	740	1,270	.2	2.9	0	0	0	0	0	0
D.C.	0	9.7	0	9.7	.8	0	0	0	0	0	0	0
Florida	21	615	9,140	9,760	54	0	.3	0	1,810	1,810	1.2	0
Georgia	3.9	2,910	33	2,950	52	0	1.0	122	0	122	93	0
Hawaii	67	0	903	903	.7	9.0	0	0	0	0	0	0
Idaho	0	0	0	0	0	0	0	0	0	0	0	0
Illinois	9.5	9,570	0	9,570	144	0	1.3	7,520	0	7,520	263	0
Indiana	11	5,680	0	5,680	114	0	0	0	0	0	0	0
Iowa	13	2,100	0	2,100	7.8	0	2.0	8.1	0	8.1	2.6	0
Kansas	14	1,230	0	1,230	45	0	0	22	0	22	13	0
Kentucky	38	3,410	0	3,410	203	0	0	0	0	0	0	0
Louisiana	31	4,430	0	4,430	212	0	.1	1,020	0	1,020	10	0
Maine	.7	30	105	135	3.5	1.7	0	0	0	0	0	0
Maryland	1.6	358	2,780	3,140	3.7	32	.2	0	3,220	3,220	0	16
Massachusetts	46	150	3,910	4,060	0	0	0	0	454	454	0	6.0
Michigan	3.0	6,030	0	6,030	50	0	.1	2,340	0	2,340	76	0
Minnesota	1.8	1,210	0	1,210	28	0	.1	886	0	886	20	0
Mississippi	10	220	112	333	8.0	3.6	32	0	0	0	19	0
Missouri	9.1	5,520	0	5,520	40	0	.4	21	0	21	11	0
Montana	0	22	0	22	22	0	0	0	0	0	0	0
Nebraska	4.4	1,290	0	1,290	12	0	0	1,060	0	1,060	0	0
Nevada	6.2	21	0	21	28	0	0	0	0	0	0	0
New Hampshire	.8	228	292	521	4.3	0	0	0	585	585	0	0
New Jersey	1.2	578	980	1,560	3.7	9.9	.7	0	2,800	2,800	.7	22
New Mexico	9.3	46	0	46	48	0	0	0	0	0	0	0
New York	0	5,140	5,470	10,600	103	109	0	1,420	1,010	2,440	68	20
North Carolina	.1	3,210	0	3,210	56	0	0	2,660	1,550	4,210	1.5	17
North Dakota	0	879	0	879	25	0	0	0	0	0	0	0
Ohio	19	8,040	0	8,040	309	0	0	137	0	137	27	0
Oklahoma	3.5	121	0	121	60	0	0	0	0	0	0	0
Oregon	0	9.0	0	9.0	7.8	0	0	0	0	0	0	0
Pennsylvania	6.2	3,870	0	3,870	120	0	0	2,050	0	2,050	119	0
Rhode Island	0	0	275	275	0	5.5	0	0	0	0	0	0
South Carolina	.4	1,290	0	1,290	23	0	39	3,470	0	3,470	28	0
South Dakota	2.6	1.9	0	1.9	.1	0	0	0	0	0	0	0
Tennessee	0	6,830	0	6,830	.5	0	0	1,470	0	1,470	0	0
Texas	58	6,710	3,870	10,600	271	12	.8	2,820	0	2,820	26	0
Utah	0	48	0	48	47	0	0	0	0	0	0	0
Vermont	.4	.5	0	.5	.7	0	0	452	0	452	3.2	0
Virginia	.1	1,820	973	2,790	8.8	0	.3	2,080	1,760	3,830	0	0
Washington	.4	17	0	17	.4	0	.1	358	0	358	9.8	0
West Virginia	.5	3,010	0	3,010	122	0	0	0	0	0	0	0
Wisconsin	5.6	3,860	0	3,860	39	0	.1	1,970	0	1,970	20	0
Wyoming	1.0	219	0	219	50	0	0	0	0	0	0	0
Puerto Rico	2.2	0	2,260	2,260	.7	0	0	0	0	0	0	0
Virgin Islands	0	0	173	173	.2	0	0	0	0	0	0	0
Total	486	97,000	37,600	135,000	2,500	263	78	34,300	20,200	54,500	815	82

INSTREAM USE

Hydroelectric Power

3,160,000 million gallons per day

Water used for hydroelectric power generation in 1995 was an estimated 3,160,000 Mgal/d, or 4 percent less than during 1990. (See tables 27, 28.) This total is 2.6 times the average annual runoff in the conterminous United States. (Graczyk and others, 1986). It is possible for the hydroelectric power water use to exceed average annual runoff because some water is used several times as it passes through several hydroelectric dams on a river.

Water used for hydroelectric power generation is classified as 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. Estimates of water used for hydroelectric power generation may vary 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 by streamflow measurements and gate openings. However, it is difficult to define and obtain net water use at pumped-storage hydroelectric plants because the same water is recycled a number of times. Pumped-storage plants usually generate electric energy during peak-load periods by using water previously pumped into an elevated storage reservoir during off-peak periods when excess generating capacity is available to do so. When additional generating capacity is needed, the water can be released from the pumped-storage reservoir through a conduit to turbine generators located in a power plant at a lower level.

State agencies were asked in 1995 for the first time to report offstream hydroelectric power generation. Offstream hydroelectric power generation water use was reported for ten states and totaled 90,000 Mgal/d. California reported the most water use (69,000 Mgal/d), followed by Maine (6,290 Mgal/d), Oregon (5,880 Mgal/d) and Pennsylvania (5,260 Mgal/d). The reported offstream uses were included in the instream uses to be consistent with previous reports in this series.

Estimates of hydroelectric power water use and power generation, as with the thermoelectric power category, are based on more information and fewer extrapolations than for the other water-use categories. Most of the information is obtained from hydroelectric utility companies. If information is not available from utilities, then records of the power generated are obtained from the U.S. Department of Energy's Energy Information Administration (1996). The power-generation data are multiplied by water-use coefficients to obtain estimates of hydroelectric power water use. In this report, it is assumed that none of the water used for hydroelectric power generation is consumptively used. Although the quantity of water evaporated in the actual generation of hydroelectric power (consumptive use) is small, considerable depletion of the available water supply for hydroelectric power generation occurs as an indirect result of evaporation from reservoirs and repeated reuse of water within a pumped-storage power facility.

Fresh surface water provides virtually all water for hydroelectric power generation. The Pacific Northwest water-resources region had by far the largest use of water for hydroelectric power generation during 1995, more than triple the use in the Great Lakes region (figure 29), and accounts for about 40 percent of the water use for hydroelectric power generation in the Nation. Almost one-half of the water use for hydroelectric power generation in the United States occurs in Washington; Oregon, primarily on the Columbia River system; and New York (figure 30), on the Niagara and the St. Lawrence River systems.

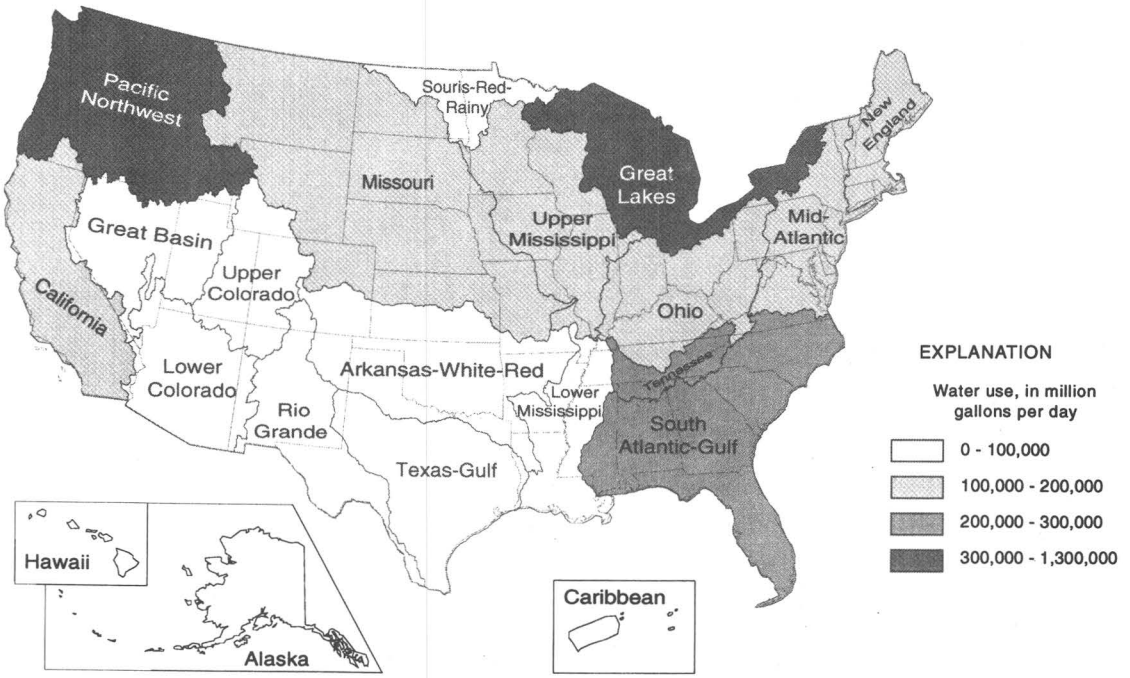


Figure 29. Hydroelectric power water use by water-resources region, 1995.

Table 27. Hydroelectric power water use by water-resources region, 1995

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

REGION	WATER USE		POWER GENERATED, in million kWh
	Mgal/d	Thousand acre-feet per year	
New England	156,000	175,000	6,720
Mid-Atlantic	144,000	162,000	5,260
South Atlantic-Gulf	229,000	256,000	17,100
Great Lakes	340,000	382,000	24,200
Ohio	172,000	192,000	5,250
Tennessee	209,000	235,000	16,000
Upper Mississippi	119,000	133,000	2,990
Lower Mississippi	78,200	87,700	1,320
Souris-Red-Rainy	3,970	4,450	100
Missouri Basin	141,000	159,000	16,000
Arkansas-White-Red	95,400	107,000	6,740
Texas-Gulf	14,500	16,300	1,050
Rio Grande	3,860	4,320	464
Upper Colorado	17,900	20,000	7,220
Lower Colorado	23,400	26,300	9,740
Great Basin	5,060	5,670	633
Pacific Northwest	1,260,000	1,410,000	140,000
California	140,000	157,000	47,000
Alaska	2,090	2,340	1,440
Hawaii	229	256	148
Caribbean	349	391	101
Total	3,160,000	3,540,000	310,000

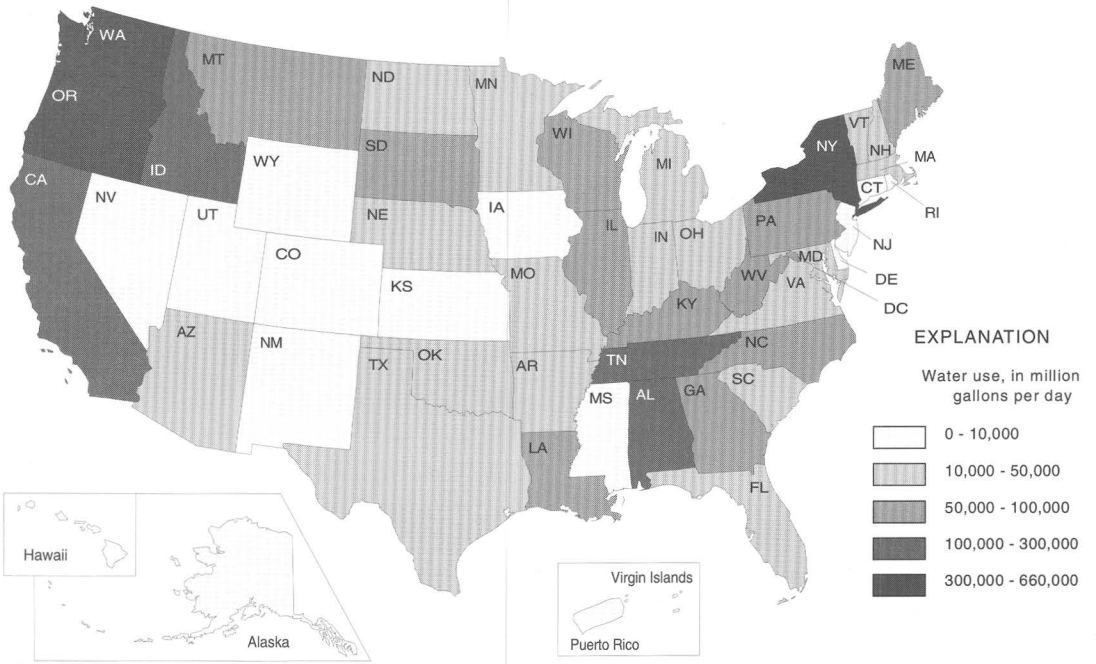


Figure 30. Hydroelectric power water use by State, 1995.

Table 28. Hydroelectric power water use by State, 1995

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

STATE	WATER USE		POWER GENERATED, in million kWh
	Mgal/d	Thousand acre-feet per year	
Alabama	157,000	177,000	9,510
Alaska	2,090	2,340	1,440
Arizona	21,200	23,700	7,960
Arkansas	42,700	47,900	2,630
California	146,000	164,000	47,100
Colorado	6,810	7,630	2,140
Connecticut	3,610	4,050	317
Delaware	0	0	0
D.C.	0	0	0
Florida	16,900	19,000	443
Georgia	50,900	57,100	4,850
Hawaii	229	256	148
Idaho	115,000	129,000	11,300
Illinois	55,800	62,500	1,010
Indiana	12,300	13,800	467
Iowa	2,350	2,630	21
Kansas	1,250	1,410	11
Kentucky	83,000	93,100	2,880
Louisiana	76,100	85,400	1,110
Maine	85,200	95,500	3,440
Maryland	14,400	16,100	1,450
Massachusetts	24,200	27,100	992
Michigan	39,800	44,600	1,410
Minnesota	19,800	22,200	1,030
Mississippi	0	0	0
Missouri	17,100	19,200	1,920
Montana	66,200	74,200	10,400
Nebraska	15,000	16,800	1,040
Nevada	6,080	6,810	6,320
New Hampshire	33,000	37,000	1,460
New Jersey	309	346	241
New Mexico	2,750	3,090	353
New York	356,000	399,000	24,600
North Carolina	56,400	63,200	5,810
North Dakota	13,900	15,600	2,480
Ohio	14,200	15,900	227
Oklahoma	49,100	55,100	3,300
Oregon	456,000	511,000	40,400
Pennsylvania	55,900	62,600	352
Rhode Island	339	380	6.1
South Carolina	42,200	47,300	3,070
South Dakota	62,400	69,900	6,420
Tennessee	122,000	137,000	9,430
Texas	18,600	20,900	1,520
Utah	3,720	4,170	931
Vermont	17,500	19,600	983
Virginia	14,800	16,600	922
Washington	653,000	733,000	82,300
West Virginia	51,500	57,700	1,210
Wisconsin	50,800	57,000	1,600
Wyoming	5,150	5,770	793
Puerto Rico	349	391	101
Virgin Islands	0	0	0
Total	3,160,000	3,540,000	310,000

Wastewater Release

Wastewater Treatment

In addition to water withdrawals, public-supply deliveries, and consumptive use, the term "water use" also includes wastewater releases and return flow. Because quality as well as quantity considerations are increasingly important in water management, more information is needed concerning the location of wastewater-treatment facilities and the quantities of treated wastewater released from the facilities and returned to the hydrologic system.

The wastewater treatment category includes information on facilities engaged primarily in the collection, treatment, and disposal of wastewater conveyed through a sewer system. Return of treated water generally is to surface waters. Treatment facilities are separated into two categories in this report: publicly owned (municipal) treatment works and "other." Publicly-owned treatment works are publicly owned or receive some form of public funding, and receive and treat wastewater from various users such as domestic, commercial, and industrial. Other wastewater facilities are privately owned and include commercial and industrial facilities that treat their own wastewater. Information on the quantities of water treated and released from publicly-owned treatment facilities and returned directly to the hydrologic system, or released for beneficial reuse (reclaimed wastewater), are given in this report, along with the number of public and other wastewater-treatment facilities.

The release information usually is obtained from wastewater-treatment facility operators, utility departments, or from discharge permit files maintained by 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 16,400 publicly-owned treatment facilities released some 41,000 Mgal/d of treated wastewater nationwide during 1995. (See tables 29, 30.) Nationally, an average of from 1 million to 2 million gallons of treated wastewater per public-treatment facility was returned daily to streams or other surface-water bodies. In addition, over 2 percent (983 Mgal/d) of the treated wastewater that was released was reclaimed for beneficial uses such as irrigation of golf courses and public parks. The largest return flows occurred in regions (figure 31) and States (figure 32) that have large populations and large public-supply withdrawals. Illinois and Ohio, which have large public-supply withdrawals, reported the largest releases of treated wastewater. Florida, California, and Arizona reported large uses of reclaimed wastewater.

Figure 31. Wastewater treatment return flow by water-resources region, 1995.

Table 29. Wastewater treatment water releases by water-resources region, 1995

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

REGION	NUMBER OF FACILITIES		PUBLIC RELEASES	
	Public	Other	Return flow, in Mgal/d	Reclaimed wastewater, in Mgal/d
New England	488	490	1,670	0
Mid-Atlantic	1,066	1,543	5,260	71
South Atlantic-Gulf	1,798	3,154	4,520	298
Great Lakes	1,152	1,537	5,030	0
Ohio	2,144	5,002	5,310	.1
Tennessee	224	301	645	.1
Upper Mississippi	1,950	1,480	6,330	0
Lower Mississippi	598	1,041	1,850	0
Souris-Red-Rainy	251	41	61	0
Missouri Basin	2,103	1,555	1,360	12
Arkansas-White-Red	1,047	1,133	868	26
Texas-Gulf	1,106	2,686	2,030	71
Rio Grande	116	127	165	10
Upper Colorado	193	90	62	1.8
Lower Colorado	179	344	500	217
Great Basin	101	73	287	59
Pacific Northwest	636	1,850	1,390	0
California	1,040	827	3,250	211
Alaska	127	108	61	0
Hawaii	32	171	137	6.2
Caribbean	78	0	189	0
Total	16,428	23,700	41,000	983

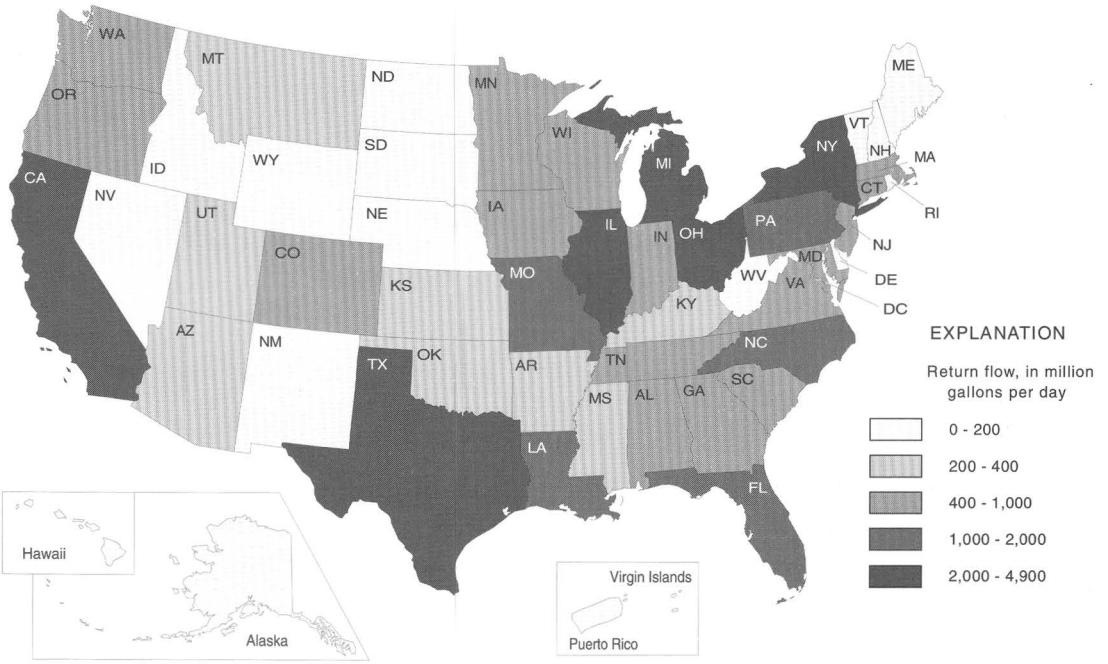


Figure 32. Wastewater treatment return flow by State, 1995.

Table 30. Wastewater treatment water releases by State, 1995

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

STATE	NUMBER OF FACILITIES		PUBLIC RELEASES	
	Public	Other	Return flow, in Mgal/d	Reclaimed wastewater, in Mgal/d
Alabama	255	0	474	0
Alaska	126	107	61	0
Arizona	150	300	359	209
Arkansas	313	442	241	0
California	1,049	857	3,250	216
Colorado	393	179	422	11
Connecticut	94	47	411	0
Delaware	15	48	103	0
D.C.	1	6	309	0
Florida	387	228	1,540	271
Georgia	501	370	777	4.0
Hawaii	32	171	137	6.2
Idaho	76	6	99	0
Illinois	532	610	4,850	0
Indiana	407	422	762	0
Iowa	754	475	522	0
Kansas	442	343	217	7.4
Kentucky	223	1,465	341	0
Louisiana	153	159	1,450	0
Maine	71	0	115	0
Maryland	161	870	422	70
Massachusetts	86	443	867	0
Michigan	295	698	2,540	0
Minnesota	436	0	516	0
Mississippi	307	1,575	307	0
Missouri	1,164	1,284	1,030	0
Montana	228	118	202	0
Nebraska	290	285	181	1.0
Nevada	68	67	179	24
New Hampshire	79	0	89	0
New Jersey	209	467	915	0
New Mexico	46	59	99	5.6
New York	596	0	2,760	0
North Carolina	307	1,348	1,330	1.5
North Dakota	277	99	45	0
Ohio	1,236	2,510	4,690	0
Oklahoma	332	159	312	0
Oregon	189	23	483	0
Pennsylvania	289	140	1,340	.6
Rhode Island	115	0	182	0
South Carolina	274	481	404	22
South Dakota	207	0	64	0
Tennessee	251	0	739	.1
Texas	1,308	3,113	2,180	96
Utah	50	10	236	39
Vermont	95	0	42	0
Virginia	67	1	561	0
Washington	329	1,791	736	0
West Virginia	594	1,342	199	0
Wisconsin	411	231	653	0
Wyoming	79	203	50	0
Puerto Rico	70	0	185	0
Virgin Islands	8	0	4.1	0
Total	16,428	23,700	41,000	983

TRENDS IN WATER USE, 1950-1995

These national water-use compilations began in 1950 and are conducted at 5-year intervals. To facilitate the following discussion of trends in water use, the estimates for some categories used in this report have been combined to correspond to the categories used in previous water-use compilations (public supply, rural use, irrigation, industrial, thermoelectric power, hydroelectric power). Self-supplied domestic withdrawals are combined with livestock withdrawals in this section to compare to the rural-use category listed in some previous water-use circulars; and self-supplied industrial withdrawals are combined with commercial and mining withdrawals to compare to "other industries," which were listed with thermoelectric power generation under "industrial" in some previous water-use circulars.

Estimates in table 31summarize the water use—withdrawals, source of water, reclaimed wastewater, consumptive use, and instream use (hydroelectric power)—at 5-year intervals from 1950 to 1995. Table 31 also shows the percentage change in the 1990 and 1995 summary estimates.

Estimates in table 31 and figure 33 show that after continual increases in the Nation's total water withdrawals for offstream use for the years reported from 1950 to 1980, withdrawals declined from 1980 to 1995. The 1995 estimate of total withdrawals (402,000 Mgal/d) is 2 percent less than the 1990 estimate and nearly 10 percent less than the 1980 estimate, which is the peak year of water use documented in this 5-year compilation series. This decline in water withdrawals occurred even though population increased 16 percent from 1980 to 1995.

The "Public supply" and "Rural domestic and livestock" categories are the only two categories to show continual increases from 1950 to 1995, largely because of continual increases in population (figure 34). The 4-percent increase in public-supply withdrawals from 1990 to 1995, compared to a 7-percent increase in population served by public supply, indicates that conservation programs have been effective in lowering public supply per-capita use from about 184 gal/d in 1990 to 179 gal/d in 1995. The 13-percent increase in rural domestic and livestock withdrawals is attributable to an increase in livestock withdrawals, especially animal specialities withdrawals, which were 43 percent higher during 1995 than during 1990. Rural (self-supplied) domestic withdrawals were the same in 1995 (3,390 Mgal/d) as in 1990.

More water (fresh, saline) continues to be withdrawn for thermoelectric power generation than for any other category (figure 34). Withdrawals for thermoelectric power generation peaked in 1980 at 210,000 Mgal/d and fluctuated around 190,000 Mgal/d during 1985, 1990, and 1995.

The estimate of total self-supplied withdrawals (fresh, saline) for "other" industrial uses for 1995 is 29,100 Mgal/d, or about 3 percent less than for 1990. Industrial withdrawals declined from 1980 to 1995 after remaining about the same for the years reported between 1965 and 1980. In fact, self-supplied withdrawals for "other" industrial use during 1995 are the lowest in this series since records began in 1950. Lower industrial withdrawals are the result of new industries and technologies that require less water, improved plant efficiencies, increased water recycling, changes in laws and regulations to reduce the discharge of pollutants, and conservation measures.

Total irrigation withdrawals were about the same during 1955 and 1960, then steadily increased for the individual years reported from 1965 to 1980, and gradually decreased from 1980 to 1995 (figure 34; table 31). Estimated irrigation withdrawals during 1995 (134,000 Mgal/d) were about 2 percent less than during 1990 and 1985. Irrigation application rates vary from year to year and depend on annual rainfall, surface water availability, energy costs, farm commodity prices, application technologies, and conservation practices. The average amount of water applied per acre for irrigation in the United States during 1995 was about 2.1 acre-feet, which is about the same as in 1990, slightly less than the 1985 average of 2.2 acre-feet, and well below the 1975 and 1980 average of 2.5 acre-feet. This decline in application rates is the result of implementation of improved

and more efficient irrigation systems and techniques. Also, application rates in the more humid Eastern United States tend to be lower than in the dryer Western United States and the amount of irrigated acreage continues to increase in the Eastern United States.

The total number of acres irrigated in the United States steadily increased for the individual years reported from 1950 to 1980 and remained fairly constant at around 58 million acres for the years reported from 1980 to 1995. The increase in acres irrigated from 1950 to 1980 was the result of increases in both the Western and Eastern United States. Acres irrigated in the 19 western states decreased from 1980 to 1995 as a result of irrigated acreage being replaced by dry land farming and urban development, and irrigation water rights being sold to municipal water suppliers. Acres irrigated in the eastern United States, however, continued to increase more than offsetting the decrease in the western states.

Instream use (hydroelectric power) during 1995 was 4 percent less than during 1990. Water used for hydroelectric power generation increased steadily from 1950 to 1975, but, during 1980, it was about the same as during 1975. Hydroelectric power water use during 1985, 1990, and 1995 fluctuated above 3,000 billion gallons per day. Changes in hydroelectric power water use are closely related to the availability of surface water. The use of reclaimed wastewater is estimated to have been about 1,020 Mgal/d in 1995, which is 36 percent more than the estimated 750 Mgal/d used in 1990.

Table 31. Trends of estimated water use in the United States, 1950-95

[Data for 1950-90 adapted from MacKichan (1951, 1957), MacKichan and Kammerer (1961), Murray (1968), Murray and Reeves (1972, 1977), and Solley and others (1983, 1988, 1993). The water-use data are in thousands of million gallons per day and are rounded to two significant figures for 1950-80, and to three significant figures for 1985-95; percentage change is calculated from unrounded numbers]

	Year										Percentage change
	[1]1950	[1]1955	[2]1960	[2]1965	[3]1970	[4]1975	[4]1980	[4]1985	[4]1990	[4]1995	1990-95
Population, in millions	150.7	164.0	179.3	193.8	205.9	216.4	229.6	242.4	252.3	267.1	+6
Offstream use:											
Total withdrawals	180	240	270	310	370	420	[5]440	399	408	402	-2
Public supply	14	17	21	24	27	29	34	36.5	38.5	40.2	+4
Rural domestic and livestock	3.6	3.6	3.6	4.0	4.5	4.9	5.6	7.79	7.89	8.89	+13
Irrigation	89	110	110	120	130	140	150	137	137	134	-2
Industrial:											
Thermoelectric power use	40	72	100	130	170	200	210	187	195	190	-3
Other industrial use	37	39	38	46	47	45	45	30.5	29.9	29.1	-3
Source of water:											
Ground:											
Fresh	34	47	50	60	68	82	[5]83	73.2	79.4	76.4	-4
Saline	([6])	.6	.4	.5	1	1	.9	.652	1.22	1.11	-9
Surface:											
Fresh	140	180	190	210	250	260	290	265	259	264	+2
Saline	10	18	31	43	53	69	71	59.6	68.2	59.7	-12
Reclaimed wastewater	([6])	.2	.6	.7	.5	.5	.5	.579	.750	1.02	+36
Consumptive use	([6])	([6])	61	77	[7]87	[7]96	[7]100	[7]92.3	[7]94.0	[7]100	+6
Instream use:											
Hydroelectric power	1,100	1,500	2,000	2,300	2,800	3,300	3,300	3,050	3,290	3,160	-4

[1]48 States and District of Columbia.
[2]50 States and District of Columbia.
[3]50 States and District of Columbia, and Puerto Rico.
[4]50 States and District of Columbia, Puerto Rico, and Virgin Islands.
[5]Revised
[6]Data not available.
[7]Freshwater only.

The general increase in water use from 1950 to 1980 and the decrease from 1980 to 1995 can be attributed, in part, to the following major factors:

- Most of the increases in water use from 1950 to 1980 were the result of expansion of irrigation systems and increases in energy development.
- The development of center-pivot irrigation systems and the availability of plentiful and inexpensive ground-water resources supported the expansion of irrigation systems.
- Higher energy prices in the 1970's, and large drawdown in ground-water levels in some areas increased the cost of irrigation water. In the 1980's, improved application techniques, increased competition for water, and a downturn in the farm economy reduced demands for irrigation water.
- The transition from water-supply management to water-demand management encouraged more efficient use of water.
- New technologies in the industrial sector that require less water, improved plant efficiencies, increased water recycling, higher energy prices, and changes in laws and regulations to reduce the discharge of pollutants resulted in decreased water use and less water being returned to the natural system after use.
- The enhanced awareness by the general public to water resources and active conservation programs in many States have contributed to reduced water demands.

Projections of future water use are beyond the scope of this report, although the trends established over the past 45 years from these national compilations provide some basis for estimating future water demands. It seems likely that water withdrawals for public supply and domestic uses will continue to increase as population increases. Higher water prices and active water conservation programs, however, may reduce the per-capita use rates. With increased competition for water for instream uses, such as river-based recreation, esthetic enjoyment, fish and wildlife habitat, and hydroelectric power, along with higher municipal uses, irrigators will have increasing difficulty competing economically for available water supplies. Thus, a leveling in the rate of agricultural water use combined with growing population and urbanization suggests that, for the foreseeable future, new balances will have to be struck in water use between the rural and urban areas, especially in the Western United States (Moore and others, 1990, p. 97). It seems likely that, for the foreseeable future, industrial water use and use per unit of production will continue to decline in most sectors, although probably not as sharply as in the recent past (David, 1990, p. 85).

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, 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 kept in balance.

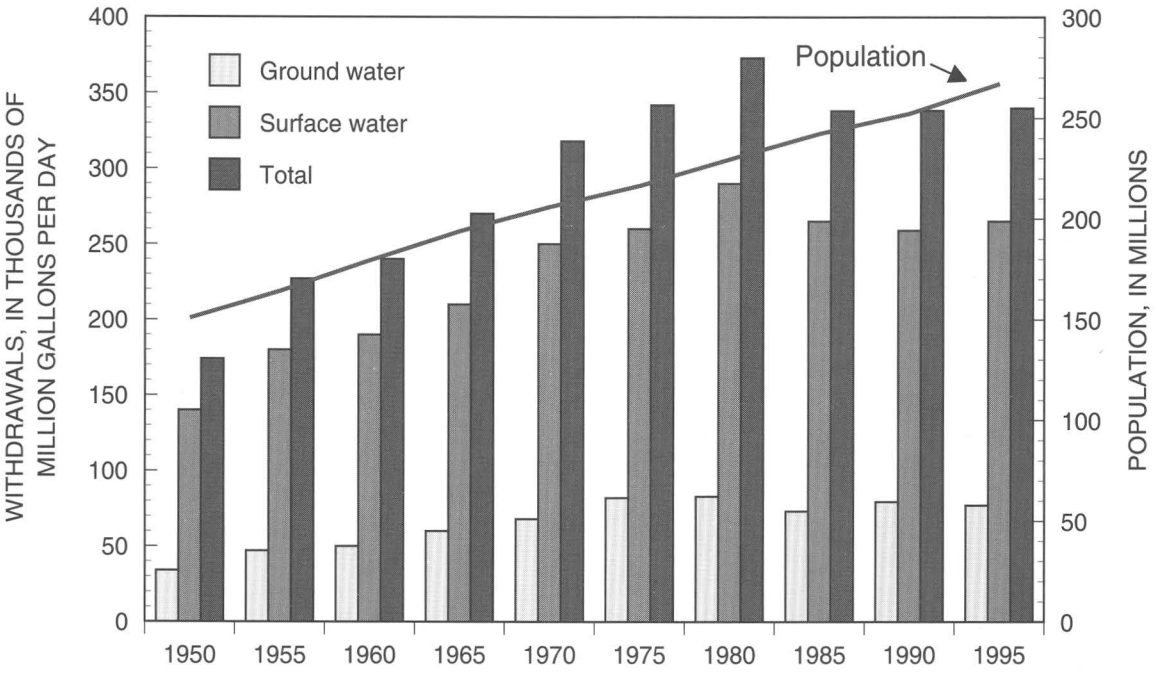


Figure 33. Trends in fresh ground- and surface-water withdrawals, and population, 1950-95.

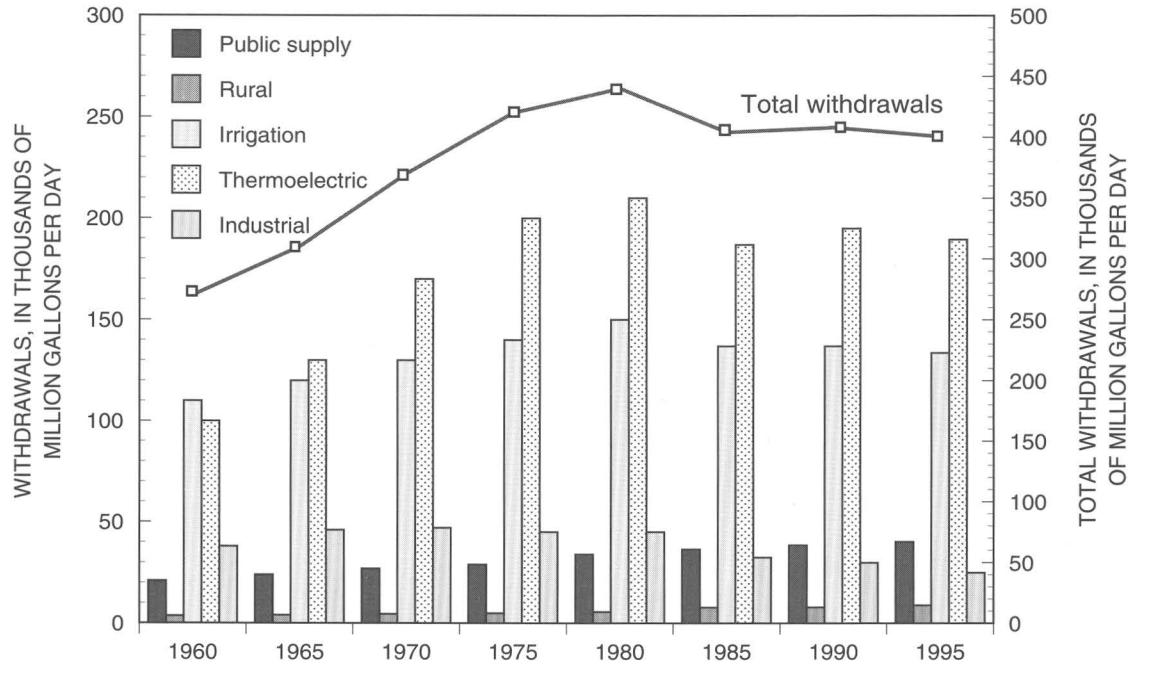


Figure 34. Trends in water withdrawals (fresh and saline) by water-use category and total (fresh and saline) withdrawals, 1960-95.

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