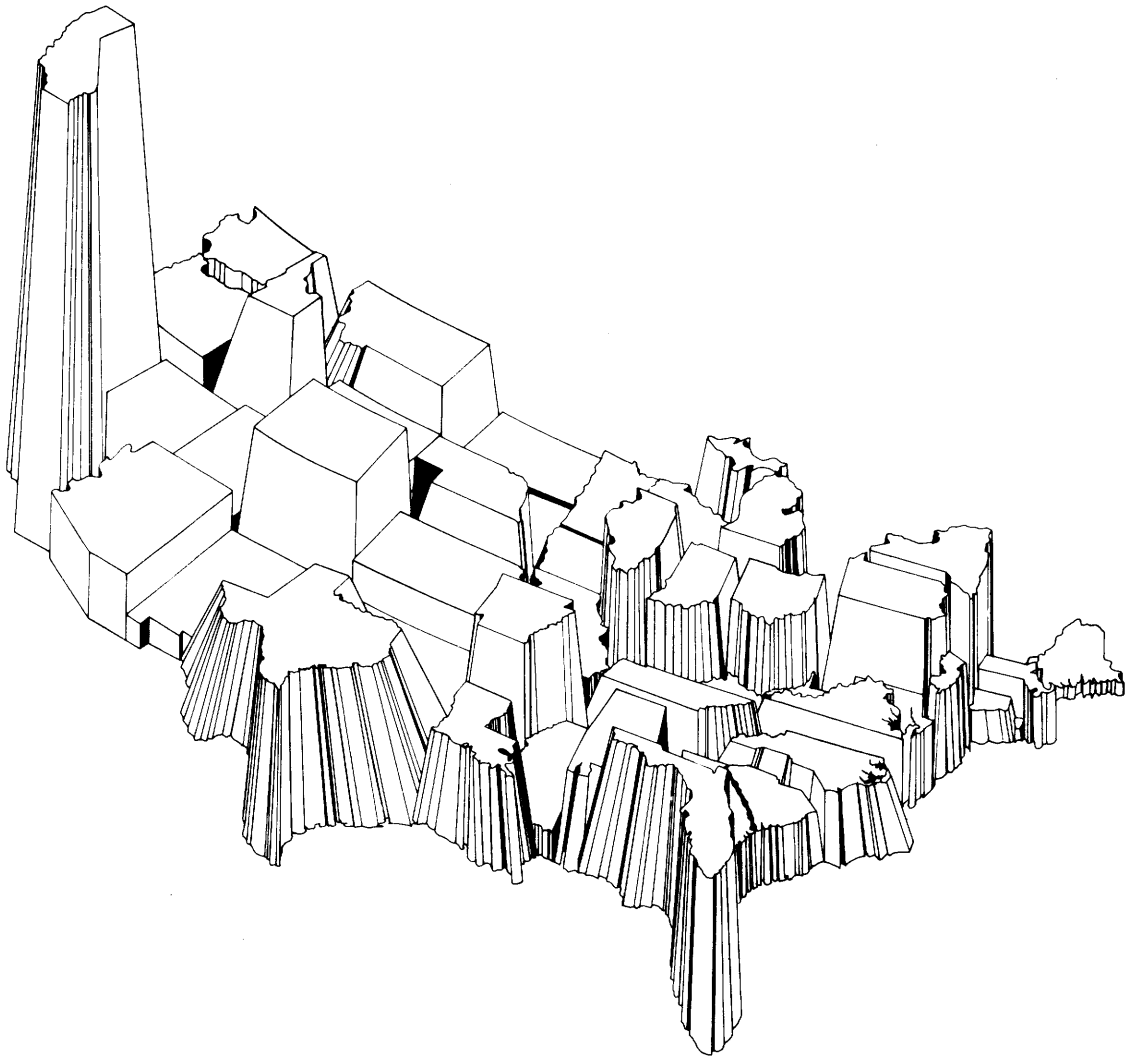
ESTIMATED USE OF WATER IN THE UNITED STATES IN 1980



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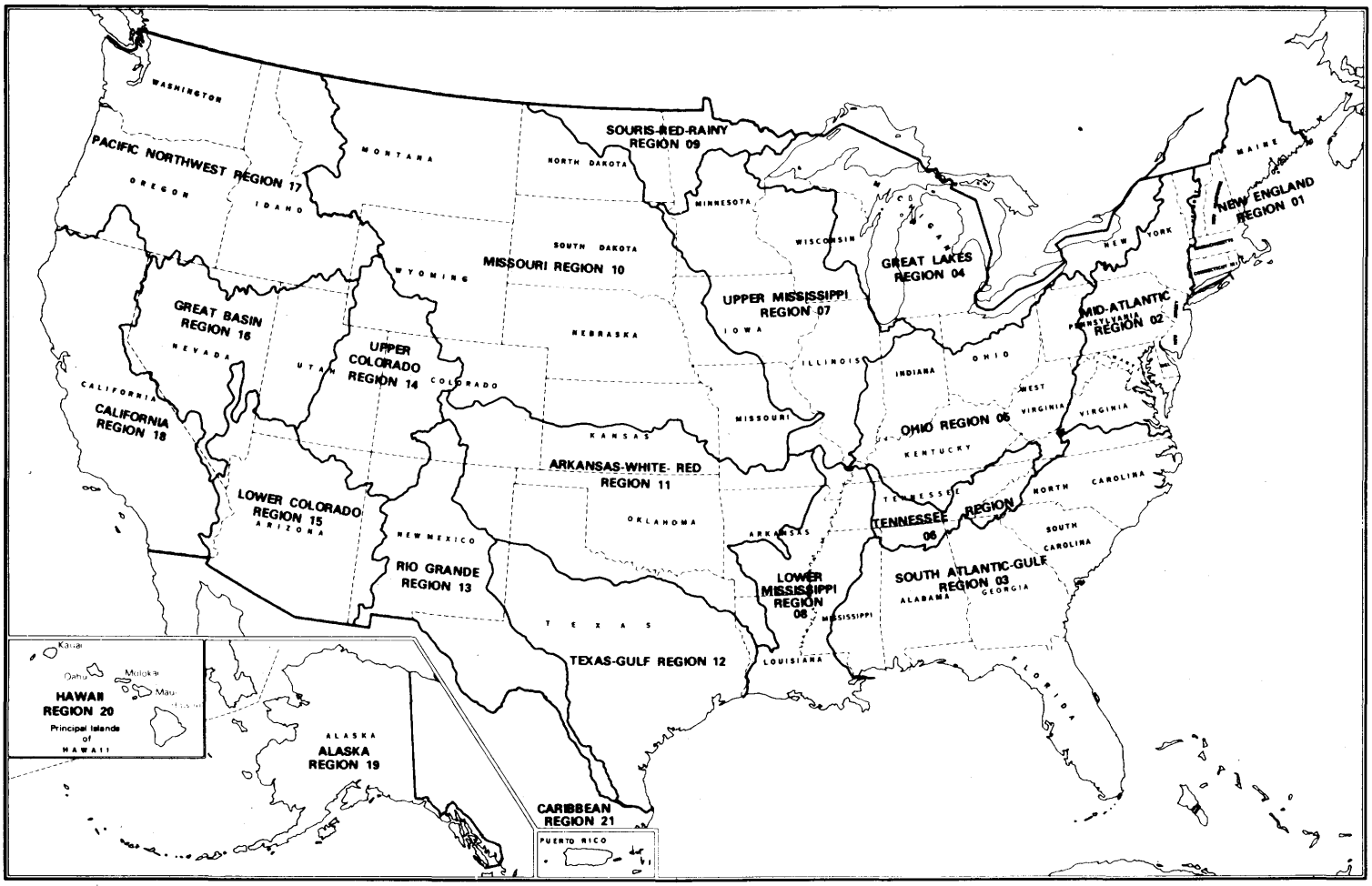


Water-resources regions of the United States as established by the U.S. Water Resources Council in 1970. This map shows the relationship of the regions to the States. (See glossary in this report for definition of water-resources region.)

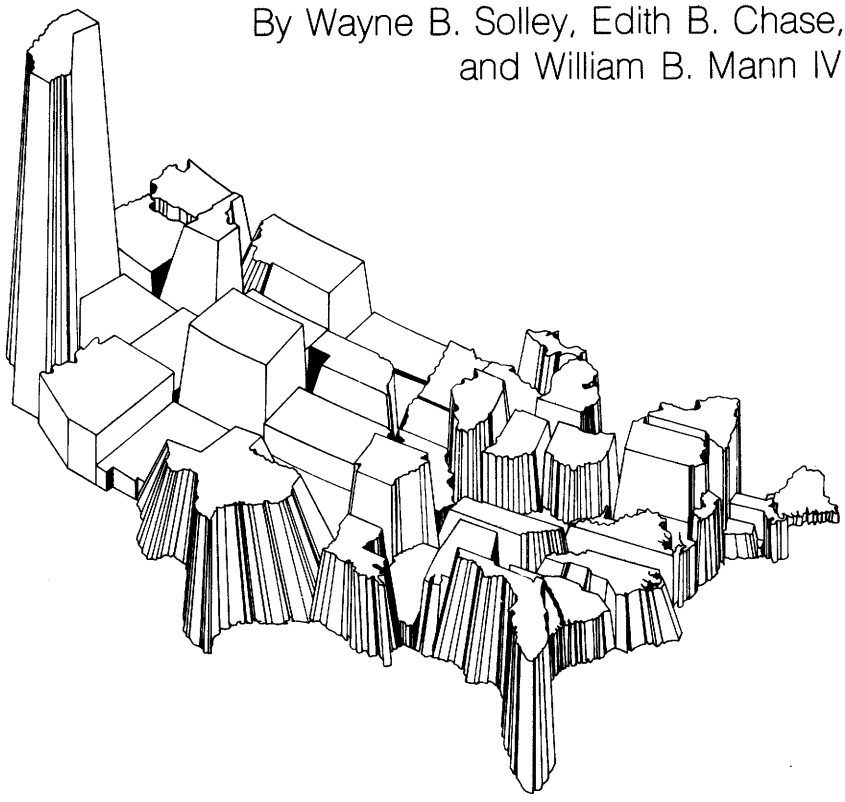
ABOUT THE COVER

Comparison of water withdrawals, by States, in 1980.

The total national rate of withdrawal of ground and surface water was 450 billion gallons per day. See table 14 for each State total.

ESTIMATED USE OF WATER IN THE UNITED STATES IN 1980

By Wayne B. Solley, Edith B. Chase,
and William B. Mann IV



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GLOSSARY

Water-use terminology is continuing to expand. The term "water use" as initially used in the U.S. Geological Survey's water-use circulars meant withdrawals of water; in time, the term was redefined to include consumptive use of water as well as withdrawals. With the beginning of the Survey's National Water-Use Information Program (see page 2) the term was further defined as meaning offstream use and instream use.

In an attempt to blend past water-use terminology with the present, this glossary consists of two parts—(A) terms used in this report that are consistent with the terms used in past reports in this circular series, and (B) related terms as used in the National Water-Use Information Program. A chart on page 4 shows the relationship between the categories of water use as used in the circular series and the categories of water use that are being documented by the National Water-Use Information Program.

A. TERMS USED IN THIS REPORT

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

billion gallons per day (bgd)—a rate of flow of water.

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

consumptive use—water that is no longer available because it has been evaporated, transpired, incorporated into products or crops, consumed by man or livestock, or otherwise removed from the water environment. Also referred to as water consumption and 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.

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

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

evapotranspiration—water lost through evaporation from the soil and surface-water bodies and transpiration from plants. *See also* evaporation *and* transpiration.

fresh water—water that contains less than 1,000 milligrams per liter (mg/L) of dissolved solids; generally, more than 500 mg/L 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, large and small, ideally are filled with water under pressure greater than atmospheric).

hydroelectric power water use—the use of water to drive turbines and generate electric power.

in-channel use—*see* instream use.

industrial water use—water used for thermoelectric power (electric utility generation) and other industrial uses such as steel, chemical and allied products, paper and allied products, mining, and petroleum refining. The water may be obtained from a public supply or may be self-supplied. *See also* public supply *and* self-supplied water.

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

irrigation water use—artifical application of water on lands to assist in the growing of crops and pastures or maintaining recreational lands such as parks and golf courses.

livestock water use—water used by livestock. Livestock as used here includes cattle, sheep, goats, hogs, and poultry. Also included are animal specialities such as horses, rabbits, bees, pets, fur-bearing animals in captivity, and fish in captivity. *See also* rural water use.

million gallons per day (mgd)—a rate of flow of water.

nonwithdrawal use—*see* instream use.

off-channel use—*see* offstream use.

offstream use—water withdrawn or diverted from a ground- or surface-water source for public supply, industry, irrigation, and rural uses. Sometimes called off-channel use or withdrawal use.

per capita use—the average amount of water used per person per day.

public supply—water withdrawn for all uses by public and private water suppliers and delivered to users that do not supply their own water. Water suppliers provide water for a variety of uses such as domestic, commercial, industrial, and public water use. *See also* commercial water use,

domestic water use, industrial water use, *and* public water use.

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

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

recycled water—water that is used more than one time.

residential water use—*see* domestic water use.

reuse—*see* recycled water.

rural water use—water used in suburban or farm areas for domestic and livestock needs. The water generally is self-supplied, and includes domestic use, drinking water for livestock, and other uses such as dairy sanitation, evaporation from stock-watering ponds, and cleaning and waste disposal. *See also* domestic water use, livestock water use, self-supplied water, *and* agricultural nonirrigation water use (part B of glossary).

saline water—water that contains more than 1,000 milligrams per liter (mg/L) of dissolved solids.

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

self-supplied water—water withdrawn from a surface- or ground-water source by a user and not obtained from a public supply. *See* also industrial water use *and* rural water use.

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

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

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

water consumed—*see* consumptive use.

water consumption—*see* consumptive use.

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

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

water utility—*see* public supply.

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

withdrawal use—*see* offstream use.

B. RELATED TERMS

agricultural nonirrigation water use—water used for stock watering, feed lots, dairy operations, and other on-farm needs. Does not include rural domestic water use nor irrigation water use. *See also* livestock water use (part A of glossary).

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.

delivery/release—the amount of water delivered to the point of use and the amount released after use; the difference between these amounts can be the consumptive use. *See also* consumptive use (part A of glossary).

injection water—water that is injected into an aquifer or an unsaturated porous formation for storage, disposal, or displacement.

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

mining water use—water used in the extraction of minerals occurring naturally: solids, such as coal and ores; liquids, such as crude petroleum; and gases, such as natural gas. Also includes quarrying, well operation, milling (crushing, screening, washing, flotation, etc.) and other preparation customarily done at the mine site, or as part of a mining activity. Does not include the processing of raw materials, such as smelting ores, refining petroleum, and slurry pipeline operations. *See also* industrial water use (part A of glossary).

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

standard industrial classification codes (SIC)—four digit codes established by the U.S. Bureau of Census and used in the classification of establishments by type of activity in which they are engaged.

CONVERSION FACTORS

Multiply	*By*	*To obtain*
	AREA	
acres	43,560	square feet (ft^2)
	4,047	square meters (m^2)
	0.001562	square miles (m^2)
	FLOW	
billion gallons per day (bgd)	1,000	million gallons per day
	1,121	thousand acre-feet per year
	1.547	thousand cubic feet per second
	694.4	thousand gallons per minute
	3.785	million cubic meters per day
million gallons per day (mgd)	0.001	billion gallons per day
	1.121	thousand acre-feet per year
	0.001547	thousand cubic feet per second
	0.6944	thousand gallons per minute
	0.003785	million cubic meters per day
thousand acre-feet per year	0.0008921	billion gallons per day
	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

SELECTED WATER RELATIONSHIPS (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	=	325,851 gallons
(1 acre covered by 1 foot of water)	=	43,560 cubic feet
1 cubic mile	=	1.1 trillion gallons
	=	3,379,200 acre-feet
1 inch of rain	=	17.4 million gallons per square mile
	=	27,200 gallons per acre
	=	100 tons per acre

ESTIMATED USE OF WATER IN THE UNITED STATES IN 1980

By Wayne B. Solley, Edith B. Chase, and William B. Mann IV

ABSTRACT

Water use in the United States in 1980 was estimated to be an average of 450 bgd (billion gallons per day) of fresh and saline water for offstream uses—an 8-percent increase from the 1975 estimate and a 22-percent increase from the 1970 estimate. Average per capita use for all offstream uses was 2,000 gpd (gallons per day) of fresh and saline water, and 1,600 gpd of fresh water; this represents a slight increase since 1975.

Offstream uses include (1) public supply (domestic, public, commercial, and industrial uses), (2) rural (domestic and livestock uses), (3) irrigation, and (4) self-supplied industrial uses (including thermoelectric power). From 1975 to 1980, public-supply use increased 15 percent to 34 bgd, rural use increased 14 percent to 5.6 bgd, irrigation use increased 7 percent to 150 bgd, and self-supplied industrial use increased 8 percent to 260 bgd. Within the industrial category, thermoelectric power generation increased 9 percent to 210 bgd, whereas other self-supplied industrial uses remained approximately constant at 45 bgd.

Total fresh water consumed—that part of water withdrawn that is no longer available for subsequent use—by these offstream uses increased 7 percent to 100 bgd, with irrigation accounting for the largest part of water consumed, estimated at 83 bgd.

Estimates of withdrawals by source indicate that from 1975 to 1980, total groundwater withdrawals increased 7 percent to 89 bgd, and total surface-water withdrawals increased 9 percent to 360 bgd. Total saline-water withdrawals increased by about 2 bgd to 72 bgd, of which 71 bgd was saline surface water. Reclaimed sewage amounted to about 0.5 bgd in 1980, an 11-percent decrease from 1975.

A comparison of withdrawals by States indicates that California withdrew the most water for offstream use, 54 bgd, more than double the amounts withdrawn by Florida and Texas, the next largest users. A similar comparison by water-resources regions indicates that the California and Mid-Atlantic regions accounted for nearly one quarter of the total water withdrawn in the United States. Total withdrawals for offstream use in the eastern water-resources regions, which include the Mississippi and Souris Rivers, accounted for 55 percent of the Nation's total withdrawals. Fresh-water consumptive use in the East was 8 percent of the total eastern withdrawals and accounted for only 19 percent of the national total consumptive use of 100 bgd. By comparison, consumptive use in the western water-resources regions accounted for 41 percent of the withdrawals in the West. The higher consumptive use in the West can be attributed to the fact that 91 percent of the total water withdrawn for irrigation occurred in the West and irrigation accounts for the largest part of water consumed.

Water used for hydroelectric power generation, an instream use, remained unchanged from 1975 at 3,300 bgd. This is in contrast to the increasing trend from 1950 to 1975.

Although 1980 estimates of water use were higher than the 1975 estimates for all offstream categories, trends established during the periods 1970 to 1975 and 1975 to 1980 indicate a general slackening in the rate of increase of total withdrawals in comparison to the period 1965 to 1970.

INTRODUCTION

Purpose and Scope

Estimated amounts of water withdrawn from ground- and surface-water sources for use in the United States during 1980 are presented in this report. The U.S. Geological Survey has compiled similar national-estimate summaries every 5 years since 1950 (MacKichan, 1951, 1957; MacKichan and Kammerer, 1961; Murray, 1968; and Murray and Reeves, 1972, 1977). Quantitative assessments derived from this series of reports can be used to appraise present use and to plan for future use of the Nation's water resources.

Two major subdivisions of water use are offstream use and instream use. In the section "Offstream Use," four categories of water use are discussed: public supply, which includes water delivered to domestic, public, commercial, and industrial users from public supply systems; rural use, which includes self-supplied domestic and livestock use; irrigation use; and self-supplied industrial use. In the section "Instream Use," only hydroelectric power is discussed; other instream uses, such as navigation and recreation, are beyond the scope of this report.

The water-use categories used in this report are the same as those used in the previous U.S. Geological Survey water-use circulars. Thus, the user of these reports can aggregate or disaggregate the information to obtain comparative figures for each category of water use. Although the categories of water use are the same, the organization and presentation of the data differ from the previous reports. For each category of water use, there is a discussion of the 1980 use and a comparison of those data with the 1975 data. The text is supplemented with tables and illustrations showing data for each State, Puerto Rico, the Virgin Islands, and the District of Columbia and for each of the 21 water-resources regions. (See map on inside of front cover for boundaries of the water-resources regions and the relationship of the regions to the States.) At the end of the report is a summary section of 1980 water use by categories and source, and a section on trends in water use for the period 1950–80.

National Water-Use Information Program

Numerous reports on the subject of water use have been published in the past 30 years. Generally these reports pertain either to a specific category of use or cover a particular geographical area for which data on the various categories of water use are given. Although the U.S. Geological Survey has published national estimates of water use in the United States since 1950 at 5-year intervals, these estimates were derived from a variety of sources having a wide range of accuracy.

In 1977, the Congress of the United States recognized the need for uniform, current, and reliable information on water use and directed the U.S. Geological Survey to establish a National Water-Use Information Program to complement the Survey's data on the availability and quality of the Nation's water resources.

Thus, the National Water-Use Information Program became part of the U.S. Geological Survey's Federal-State Cooperative Program (Mann and others, 1982). As of 1981, when this report was being compiled, 47 States were participating in the program at various levels of involvement.

As stated by Viessman and DeMoncada (1980, p.1) "There are many inconsistencies in the ways in which data are reported. The major State and Federal agencies involved in reporting current water use patterns and in projecting future water use are not always in agreement on definitions of terms, units of measurement, or methods of estimating water use. This makes it difficult, at times, to reconcile State and Federal figures and to use efficiently the information that is available." The National Water-Use Information Program is designed to overcome these problems and to be the source for accurate, consistent, timely, and accessible water-use information. The goals of the program are to collect and compile reliable water-use information, to develop and refine computerized water-use information systems at both the State and national levels, to devise new methods and techniques to improve the collection and analysis of water-use information, and to disseminate the information in ways that adapt to the needs of a variety of users.

The National Water-Use Information Program helped increase the accuracy of the information collected and compiled for this report by providing funds to support more comprehensive field data collection and more detailed evaluations of existing water-use data. As more State water-use information systems are developed and refined, the timeliness and accuracy of water-use data at both State and national levels will continue to improve.

Terminology

The terms and units used in this report are similar to those used in previous reports in this series. A few changes have been made, and these changes are explained below. Significant terms also are defined in the glossary.

The term "off-channel use" previously was used to represent all water withdrawn or diverted from a ground- or surface-water source, including the water used for hydroelectric power generation. In this report, the term "offstream use" replaces the term "off-channel use." Note, however, as explained below, that water for hydroelectric power generation is now discussed as an instream use.

"In-channel use" has been replaced by the term "instream use," which is defined as water use taking place within the stream channel for purposes such as hydroelectric power generation, navigation, water-quality improvement, fish propagation, and recreation. The term "nonwithdrawal use" frequently has been used interchangeably with instream use. In previous reports of this series, water used to generate hydroelectric power was included with "off-channel" or "withdrawal" use because the water is passed through the power plant and thus was considered a "withdrawal" of water. In this report, hydroelectric power generation is discussed specifically as an instream use.

The terms "fresh water," "saline water," and "reclaimed sewage," as types of water used in various categories, are defined in the glossary. Ground water and surface water, as sources of water, also are defined in the glossary.

The five categories of water use discussed in this report are the same as those discussed in the previous reports in this series. These categories have been subdivided and, in some instances, reclassified for use in the National Water-Use Information Program. The chart below is designed to be used as a cross reference to the two classification schemes. For example, if the reader looks at the category "rural use" as used to date in the water-use circular series, the X's show that nonirrigation and domestic are the categories used in the National Water-Use Information Program. Conversely, if the reader looks at the category "nonirrigation" as used in the National Water-Use Information Program, the X's show that rural use is the category that has been used in the water-use circular series.

Relationship of categories of water use as identified in the—					
National Water-Use Information Program	Water-use circular series (1950–1980)				
	Public supply	Rural	Irrigation	Self-supplied industrial	Hydro-electric power
As of 1980					
Agriculture:					
Nonirrigation	...	X	...	...	...
Irrigation	...	...	X	...	...
Commercial	X	...	...	...	...
Domestic	X	X	...	...	...
Industrial	X	...	...	X	...
Mining	...	...	...	X	...
Power:					
Fossil fuel	...	...	...	X	...
Geothermal	...	...	...	X	...
Hydroelectric	...	...	...	...	X
Nuclear	...	...	...	X	...
Public:					
Water supply	X	...	...	...	...
Sewage treatment	...	...	...	...	...
Planned for future					
Aquaculture	...	...	...	X	...
Navigation	...	...	...	...	...
Preservation	...	...	...	...	...
Quality improvement	...	...	...	...	...
Recreation	...	...	...	...	...
Treaties	...	...	...	...	...

Methodology

The U.S. Geological Survey's District Offices, in cooperation with State and local agencies, compiled water-use estimates based on information for 222 water-resources subregions (for explanation of subregions see References Cited, U.S. Geological Survey, 1980). These estimates were submitted to the

Survey Headquarters in Reston, Va. The information was then aggregated by States (including Puerto Rico, the Virgin Islands, and the District of Columbia) and by the 21 water-resources regions for the five categories of water use. Accuracy of the data varies and is discussed for each category of water use in subsequent parts of this report.

Numerical data in this report were derived from several sources, and each type of data and the rounding method used is explained below. The reader is cautioned that all numbers were rounded independently; thus, the individual rounded numbers may not add to the totals.

Water-use numerical data are the average daily quantities used, as derived from annual-use data, and generally are rounded to two significant figures. Most tables in this report show these data in million gallons per day (mgd). For ease of reference, data in the text and illustrations are given in billion gallons per day (bgd). Selected tables also show per-capita-use data in gallons per day (gpcd) rounded to three significant figures, and irrigation-use data in thousand-acre feet per year.

Population data, which are from the U.S. Bureau of Census advance survey of 1980 (U.S. Bureau of the Census, 1982), generally are shown to the nearest thousand. Data on population served by public supply were compiled in cooperation with State and local agencies and these data are rounded to three significant figures. The number of people served by self-supplied systems was determined by subtracting the number of people served by public supply from the total population.

The percentage changes discussed in the text are calculated from the unrounded "raw" numbers rather than from the rounded numbers described above.

A conversion table is given at the end of the glossary to assist those readers who may wish to convert the data to other units of measurement.

Acknowledgments

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

The authors also wish to thank Dr. Warren Viessman, Jr., Congressional Research Service, The Library of Congress, for his critical review of this report.

Special acknowledgment is given to C. Richard Murray, recently retired from the U.S. Geological Survey, for his dedicated efforts in compiling data for this report and for his outstanding contributions as primary or sole author of the three previous reports of this circular series.

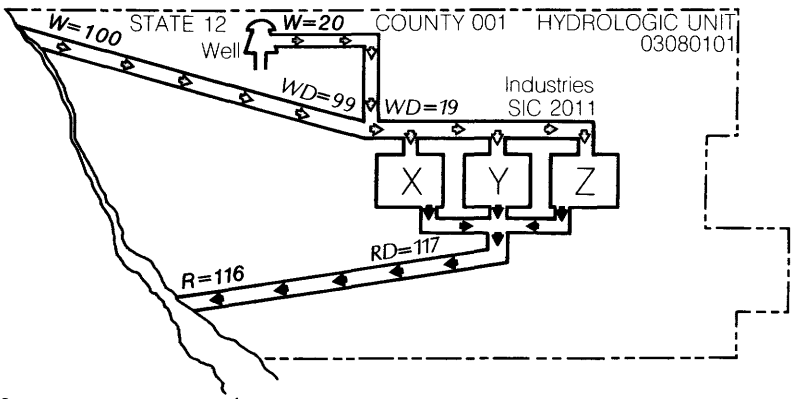
WATER USE

Water use in this report is considered as offstream use and instream use. The difference between these two types of use is explained below.

Offstream use.—Offstream use is a water use that depends on water being withdrawn or diverted from a ground- or surface-water source. To determine the amount of water used, three factors are involved.

1. Withdrawals—the amount of water withdrawn or diverted from a ground- or surface-water source.
2. Delivery/release—the amount of water delivered at the point of use and the amount released after use. The difference between these volumes will in some instances be the consumptive use, the amount of water that is no longer available for subsequent use.
3. Return flow—the amount of water that reaches a ground- or surface-water source after release from the point of use and becomes available for further use.

The illustration below explains how these factors are aggregated for three industries (x, y, z) in the same SIC class.



SOURCE DATA FILE + *USAGE DATA FILE* = WATER-USE INFORMATION

	mgd
W- Withdrawn from:	
Surface water	*100*
Ground water	*20*
R- Returned to Surface water	*116*

	mgd
WD- Delivered to industries:	
Surface water	*99*
Ground water	*19*
RD- Released from industries	*117*

	mgd
Withdrawals	*120*
Usage	*118*
Return flow	*116*
Consumptive use	1
Conveyance losses	3

Withdrawals (W), Usage (WD), Return flow (R), Consumptive use (WD—RD), Conveyance losses [(W—WD)+(RD—R)]

HYPOTHETICAL AGGREGATED WATER-USE INFORMATION FOR INDUSTRIES X,Y, and Z DERIVED FROM SOURCE AND USAGE DATA FILES.

In this report, withdrawal data and estimates of consumptive use are given for four categories of offstream use: public supply (water delivered to domestic, commercial and industrial users), rural use (self-supplied domestic and livestock use), irrigation use, and self-supplied industrial use. Data on delivery/releases and return flows were not adequate for detailed discussions; however, generalized return-flow information is presented graphically for each category of use.

It should be noted that each category of use has characteristically different effects on the usability or reuse potential of return flows. Reuse potential is a measure of the quality and quantity of water available for subsequent use. For example, irrigation return flow may be contaminated by pesticides and fertilizers, and, because of the high consumptive use in irrigation, the mineral content of the return flow often is increased substantially. Consequently, irrigation return flow frequently has little reuse potential. This reuse potential is a significant contrast to that of water discharged from thermoelectric plants, where the principal change in the water is an increase in temperature, and the return flow has maximum potential for further use. The National Water-Use Information Program is now documenting return flows, and future reports will contain such data. Future plans also include obtaining information on water-quality changes associated with the various uses of water.

Instream use.—Instream use is a water use not dependent on withdrawal or diversion from ground- or surface-water sources, and it usually is classified as flow uses or onsite uses. Examples of flow uses, which depend on water running freely in a channel, are hydroelectric power generation, fresh-water sweetening of saline estuaries, maintenance of minimum streamflow to support fish propagation, and the disposition and dilution of waste water. Onsite uses may occur when water is used directly in a water course, lake, reservoir, or other body of water—an example is evaporation from a lake or reservoir associated with hydroelectric power generation.

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

The only instream use discussed in this report is hydroelectric power generation. Unlike other instream uses, the water used for hydroelectric power generation is a measurable quantity, because the water is passed through the plant and can be documented. Consumptive use in hydroelectric power generation generally is negligible and is not discussed.

Public Supply

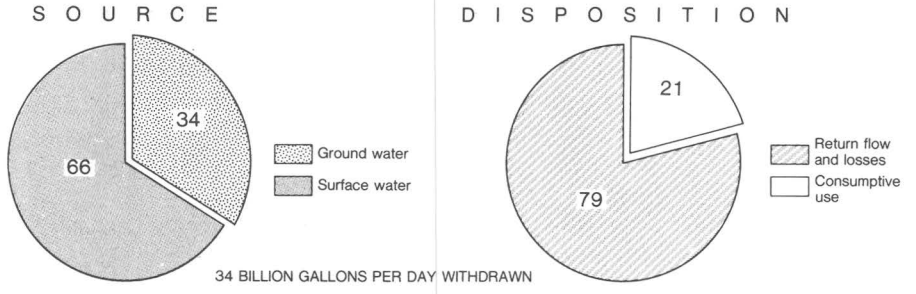
Public supply refers to water withdrawn by public and private water suppliers and delivered to a variety of users for domestic or household use, public use, industrial use, and commercial use. Public suppliers served about 186 million people in 1980, about 81 percent of the total population, a slight increase in percentage since 1975. Domestic use includes such activities as drinking, food preparation, bathing, washing clothes and dishes, flushing toilets, and watering lawns and gardens. Public use includes water for firefighting, street washing, and municipal parks and swimming pools. Many industrial and commercial establishments use public supplies, especially where the volume of water required is small and the quality of water must be high. However, some industries that require large amounts of water also use public supply for principal or auxiliary water. Among commercial users are hotels, restaurants, laundry services, office facilities, and institutions, both civilian and military. Data on population served by public supply and public-supply withdrawals and deliveries usually are reliable because local government agencies generally maintain relatively complete files.

Total water withdrawn for public supply in 1980 was estimated as 34 bgd, or an average of 183 gpd for each individual served (see tables 1 and 2). This amount represents a 15-percent increase from 1975 when 29 bgd of water was withdrawn for public supply or a per capita use of 168 gpd. (See "Methodology" section for how percentages were derived.) Part of this increase is due to the fact that nearly 2 bgd of water erroneously identified in previous reports as self-supplied industrial withdrawals is now included in the public-supply category. Another factor in the increase in this category is a 6-percent increase from 1975 in population served by public supplies along with higher per capita use. Combined daily average for domestic and public uses accounted for almost two-thirds of the public-supply withdrawals and was estimated at 22 bgd, or an average of 120 gpd for each individual served, compared to a per capita use of 117 gpd in 1975. Included in the 22 bgd is water lost in the distribution system. Industrial and commercial users received the other third of the public-supply withdrawals, about the same distribution as in 1975.

Water consumed by public-supply users increased 6 percent to 7.1 bgd in 1980, and accounted for about 21 percent of the public-supply withdrawals, approximately the same proportion as in 1965, 1970, and 1975. The larger cities were supplied principally by surface-water sources, which furnished about two-thirds of the public-supplied water.

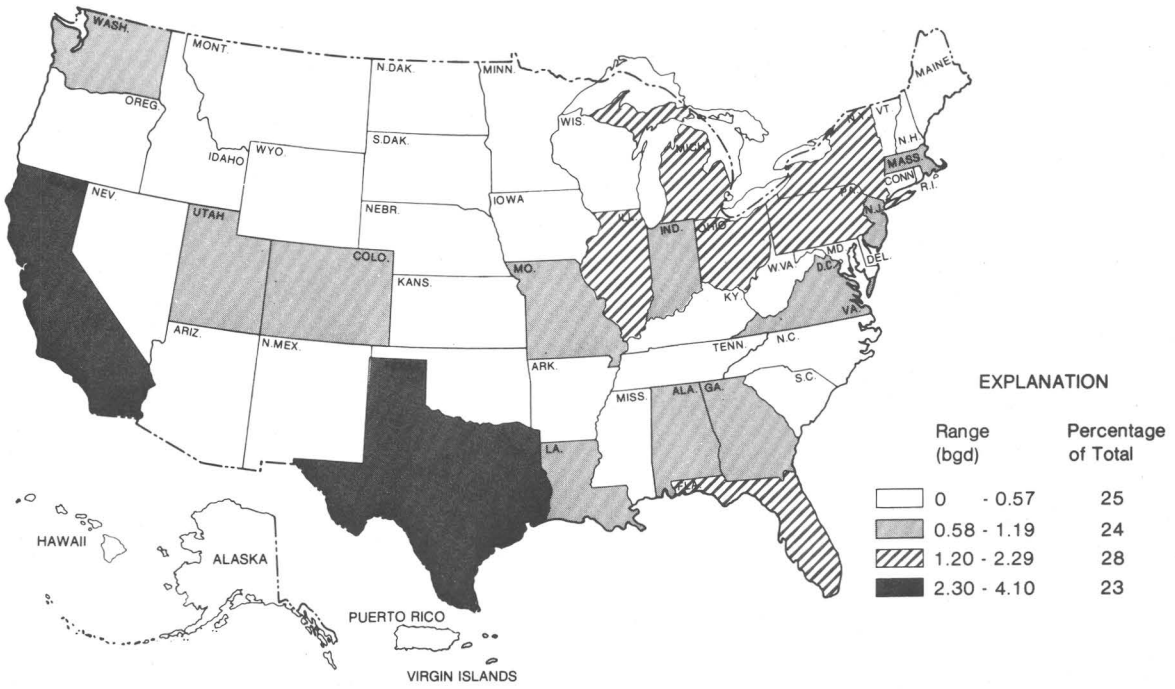
California, New York, and Texas, the three most populated States, withdrew the most water for public supplies, and accounted for about 30 percent of the Nation's total withdrawal by public suppliers. Per capita domestic use from public supplies averaged 100 gpd for the Eastern States and 150 gpd for the western States (see table 13). The two most populated water-resources regions, California and Mid-Atlantic, withdrew the most water for public supplies, and accounted for about 28 percent of the total withdrawal by public suppliers.

The range in public-supply fresh-water withdrawals by States and water-resources regions is shown in figure 1. Public-supply water-use data by States are given in table 1, and the same data by water-resources regions are given in table 2. The source of and disposition of withdrawals for public supply are shown in the chart below.



WATER WITHDRAWN FOR PUBLIC SUPPLY BY SOURCE AND DISPOSITION, 1980, IN PERCENT.

A. States



B. Water-resources regions

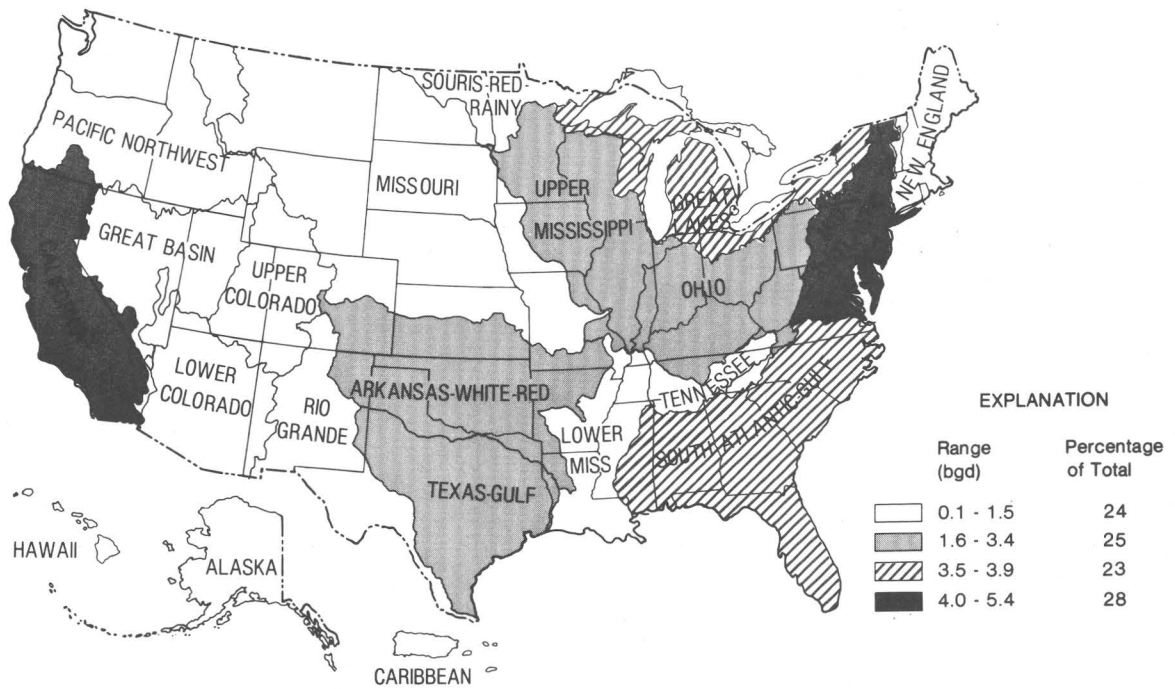


Figure 1. Public supply fresh-water withdrawals, by States and water-resources regions, 1980.

Table 1.—*PUBLIC SUPPLIED FRESH-WATER USE, BY STATES, 1980*

[Water-use data generally are rounded to two significant figures, population data and per capita data are rounded to three significant figures; figures may not add to totals because of independent rounding. mgd = million gallons per day; gpd = gallons per day]

STATE	POPULATION SERVED, in thousands			PER CAPITA USE, in gpd	WATER WITHDRAWALS, in mgd			WATER DELIVERED, BY TYPE OF USE, in mgd		CONSUMPTIVE USE, in mgd
	Source		Total		Source		Total	Industrial and commercial	Domestic and public[1]	
	Ground water	Surface water			Ground water	Surface water				
Alabama	1200	1740	2950	210	160	460	620	230	390	44
Alaska	172	113	286	187	23	30	53	14	40	33
Arizona	1490	945	2440	230	300	260	560	180	380	340
Arkansas	880	816	1700	155	110	150	260	77	190	64
California	9580	12700	22300	183	1900	2200	4100	800	3300	1700
Colorado	320	2220	2540	233	48	540	590	80	510	160
Connecticut	521	1980	2500	143	55	300	360	140	220	89
Delaware	254	240	494	158	30	48	78	8.6	69	0
D.C.	0	638	638	326	0	210	210	62	150	21
Florida	6800	991	7790	175	1200	180	1400	240	1100	330
Georgia	1320	2860	4180	185	230	540	770	360	410	180
Hawaii	914	51	965	207	180	15	200	64	140	60
Idaho	592	117	709	231	150	16	160	15	150	51
Illinois	4050	6690	10700	170	480	1300	1800	1000	790	18
Indiana	1920	1430	3350	172	300	280	580	270	300	79
Iowa	1600	528	2120	146	230	84	310	92	220	47
Kansas	903	832	1740	168	140	150	290	71	220	83
Kentucky	375	2080	2450	145	47	310	350	72	280	23
Louisiana	1850	1310	3160	192	270	340	610	91	510	350
Maine	101	372	473	221	20	85	100	34	70	10
Maryland	417	3040	3460	141	48	440	490	87	400	24
Massachusetts	1550	3850	5400	149	190	610	800	240	560	41
Michigan	1310	5280	6590	190	220	1000	1300	670	580	100
Minnesota	1910	1010	2920	150	230	210	440	130	300	44
Mississippi	1800	182	1980	147	250	42	290	80	210	100
Missouri	1520	3160	4690	156	160	570	730	300	440	150
Montana	184	339	524	273	50	93	140	54	89	53
Nebraska	961	276	1240	213	210	56	260	69	190	53
Nevada	329	392	721	322	93	140	230	80	150	69
New Hampshire	392	366	758	117	43	46	89	25	64	4.9
New Jersey	3420	3940	7360	145	450	620	1100	250	820	200
New Mexico	798	82	880	240	190	21	210	12	200	99
New York	3510	12100	15700	143	350	1900	2200	950	1300	380
North Carolina	474	2640	3110	184	70	500	570	230	340	110
North Dakota	258	247	505	116	26	33	59	5.6	53	34
Ohio	2950	6040	8990	160	380	1100	1400	630	800	180
Oklahoma	662	1670	2330	130	86	220	300	100	200	120
Oregon	344	851	1200	193	66	160	230	90	140	47
Pennsylvania	2180	6620	8800	172	240	1300	1500	350	1200	160
Rhode Island	142	723	864	147	19	110	130	50	77	6.3
South Carolina	541	1780	2320	152	78	270	350	130	230	53
South Dakota	321	134	455	167	52	24	76	21	55	15
Tennessee	1450	2270	3720	137	200	310	510	140	370	55
Texas	5030	6360	11400	335	930	2900	3800	2000	1800	640
Utah	662	634	1300	575	380	370	750	140	610	300
Vermont	113	207	320	149	17	31	48	15	33	5.8
Virginia	707	3160	3860	154	120	480	600	150	450	32
Washington	2100	1200	3300	246	300	510	810	370	440	170
West Virginia	411	921	1330	134	49	130	180	61	120	0.6
Wisconsin	1620	1420	3040	188	290	280	570	250	320	57
Wyoming	122	200	322	256	27	55	82	15	68	48
Puerto Rico	669	2530	3200	109	73	280	350	88	260	74
Virgin Islands	32	32	64	63	2.0	2.0	4.0	0.2	3.8	0.8
Total	73,700	112,000	186,000	183	12,000	22,000	34,000	12,000	22,000	7,100

[1]Includes losses in the distribution system.

Table 2.—*PUBLIC SUPPLIED FRESH-WATER USE, BY REGIONS, 1980*

[Water-use data generally are rounded to two significant figures, population data and per capita data are rounded to three significant figures; figures may not add to totals because of independent rounding. mgd = million gallons per day; gpd = gallons per day]

WATER-RESOURCES REGION	POPULATION SERVED, in thousands			PER CAPITA USE, in gpd	WATER WITHDRAWALS, in mgd			WATER DELIVERED, BY TYPE OF USE, in mgd		CONSUMPTIVE USE, in mgd
	Source		Total		Source		Total	Industrial and commercial	Domestic and public[1]	
	Ground water	Surface water			Ground water	Surface water				
New England	2730	7310	10000	148	330	1200	1500	490	1000	150
Mid-Atlantic	9440	24600	34100	159	1100	4300	5400	1500	3900	710
South Atlantic-Gulf	11400	10000	21400	177	1900	1900	3800	1200	2600	780
Great Lakes	2970	18600	21500	182	440	3500	3900	2100	1800	310
Ohio	5600	9710	15300	144	730	1500	2200	790	1400	240
Tennessee	727	1950	2680	153	89	320	410	95	310	44
Upper Mississippi	8330	4240	12600	155	1100	820	1900	860	1100	180
Lower Mississippi	4170	1170	5330	172	610	310	920	210	710	400
Souris-Red-Rainy	253	241	494	116	27	30	57	11	46	22
Missouri Basin	3360	4730	8090	171	530	850	1400	320	1100	360
Arkansas-White-Red	2280	3810	6090	255	320	1200	1600	790	760	310
Texas-Gulf	4330	5810	10100	298	800	2200	3000	1400	1600	550
Rio Grande	1100	268	1370	232	240	74	320	21	300	140
Upper Colorado	91	266	357	347	23	100	120	18	110	41
Lower Colorado	1710	1200	2910	248	370	350	720	230	490	390
Great Basin	800	769	1570	514	400	410	810	160	650	310
Pacific Northwest	3050	2260	5320	237	530	730	1300	500	770	290
California	9610	12700	22300	183	1900	2200	4100	800	3300	1700
Alaska	172	113	286	187	23	30	53	14	40	33
Hawaii	914	51	965	207	180	15	200	64	140	60
Caribbean	701	2560	3260	108	75	280	350	88	270	75
Total	73,700	112,000	186,000	183	12,000	22,000	34,000	12,000	22,000	7,100

[1]Includes losses in the distribution system.

Rural Use

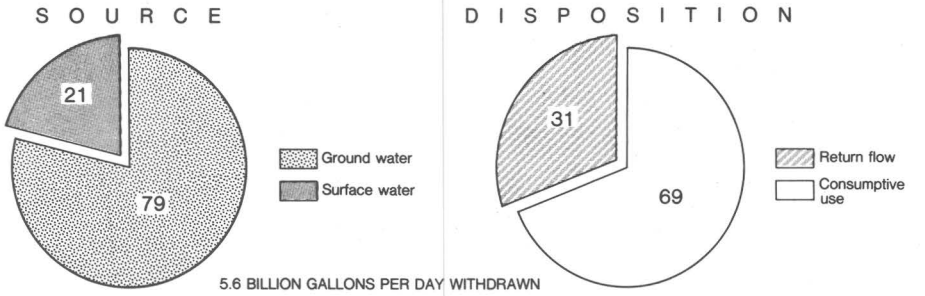
Water for rural use includes self-supplied domestic use, drinking water for livestock, and other uses such as dairy sanitation, evaporation from stock-watering ponds, and cleaning and waste disposal. The number of people served by self-supplied systems was determined by subtracting the total number of people served by public-supply systems from the total population, as derived from the U.S. Bureau of Census advance population data for 1980. The difference between these totals showed that 44 million people were served by their own water-supply systems in 1980, compared to 41 million people in 1975. Rural self-supplied systems rarely are metered and few "hard" data exist. Therefore, water for rural use can only be estimated.

The quantity of fresh water withdrawn for rural domestic and livestock use in 1980 was 5.6 bgd, a 14-percent increase from 1975. Rural domestic withdrawals were 3.4 bgd, a 23-percent increase from 1975. This large increase is the result of the increased population being served by self-supplied systems and an increase in the per capita use, which was about 79 gpd compared to about 68 gpd in 1975. The increase in per capita use reflects the application of more realistic estimating techniques, which also indicate that previous estimates were probably too low. The quantity of water used by livestock increased slightly from 2.1 bgd in 1975 to nearly 2.2 bgd in 1980.

The consumptive use of fresh water for rural domestic use and livestock use in 1980 was about 2.0 bgd and 1.9 bgd, or 57 and 88 percent of withdrawals, respectively. Total consumptive use was 69 percent of total rural withdrawals. Only about 5 percent of the rural domestic water was surface water, but some 45 percent of the water used for livestock was surface water.

Rural domestic and livestock water use is fairly evenly distributed among the States with Texas and Florida the major users accounting for 7 percent and 6 percent, respectively. The South Atlantic-Gulf water-resources region withdrew the most water for total rural use, and it also experienced the largest volume increase in rural domestic withdrawals. The Missouri Basin region withdrew the most water for rural livestock use and accounted for about 18 percent of the total withdrawals for livestock use.

The range in rural fresh-water withdrawals by States and water-resources regions is shown in figure 2. Rural water-use data by States are given in table 3, and the same data by water-resources regions are given in table 4. The source of and disposition of withdrawals for rural use are shown in the chart below.



WATER WITHDRAWN FOR RURAL DOMESTIC AND LIVESTOCK USE BY SOURCE AND DISPOSITION, 1980, IN PERCENT.

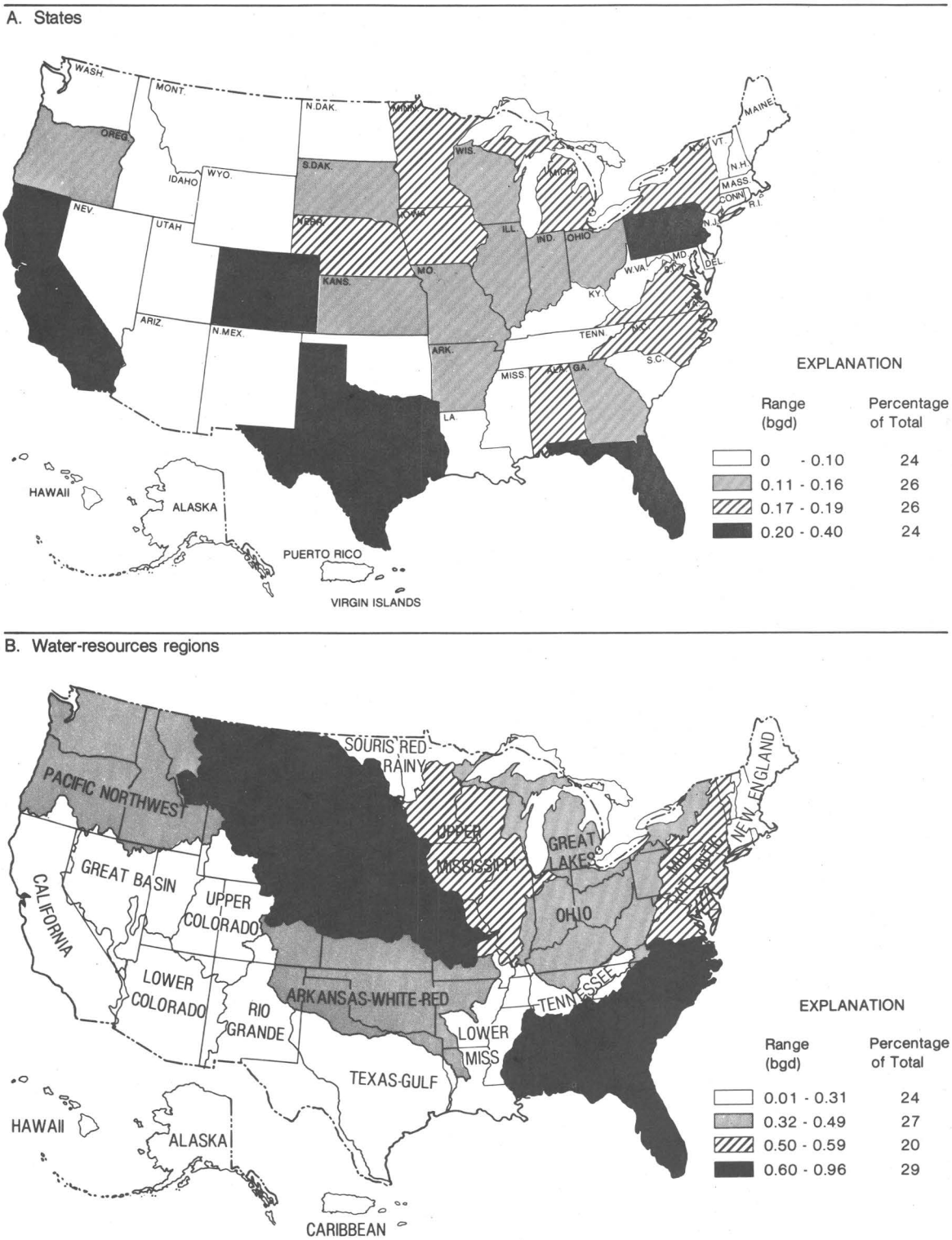


Figure 2. Rural fresh-water withdrawals, by States and water-resources regions, 1980.

Table 3.—*RURAL FRESH-WATER USE, BY STATES, IN MILLION GALLONS PER DAY, 1980*

[Data generally are rounded to two significant figures; figures may not add to totals because of independent rounding]

STATE	DOMESTIC USE				LIVESTOCK USE				TOTAL DOMESTIC AND LIVESTOCK USE			
	Withdrawals			Consumptive use	Withdrawals			Consumptive use	Withdrawals			Consumptive use
	By source		Total		By source		Total		By source		Total	
	Ground water	Surface water			Ground water	Surface water			Ground water	Surface water		
Alabama	100	0	100	100	25	63	88	88	130	63	190	190
Alaska	11	0.1	11	0.1	0	0.1	0.2	0.2	11	0.3	11	0.3
Arizona	32	0	32	24	9.8	1.8	12	8.1	42	1.8	43	32
Arkansas	57	0	57	51	22	39	61	61	78	39	120	110
California	130	9.5	140	82	36	51	87	46	160	60	220	130
Colorado	35	62	98	24	19	86	110	35	54	150	200	59
Connecticut	53	0	53	32	0.4	1.8	2.2	2.2	54	1.8	56	34
Delaware	25	0	25	0	2.0	0	2.0	2.0	27	0	27	2.0
D.C.	0	0	0	0	0	0	0	0	0	0	0	0
Florida	250	0.1	250	42	39	20	59	59	290	20	310	100
Georgia	140	0	140	85	17	11	28	28	150	11	160	110
Hawaii	3.5	0.4	3.9	3.4	5.3	0.2	5.5	4.8	8.8	0.6	9.4	8.2
Idaho	44	2.0	46	11	9.3	13	22	19	53	15	68	30
Illinois	79	3.6	82	58	49	16	65	65	130	20	150	120
Indiana	110	5.6	120	120	24	19	42	42	130	24	160	160
Iowa	55	0.2	55	22	100	25	130	130	160	25	180	150
Kansas	58	4.3	63	59	35	46	81	79	93	50	140	140
Kentucky	54	6.3	61	48	1.9	37	39	39	56	43	99	87
Louisiana	54	0	54	39	12	5.2	18	18	67	5.2	72	57
Maine	26	0.5	26	26	1.0	0.7	1.7	1.7	27	1.2	28	28
Maryland	49	0	49	32	10	0.5	11	11	59	0.5	60	43
Massachusetts	32	0	32	3.9	0.7	0.5	1.2	1.2	32	0.5	33	5.1
Michigan	160	0	160	27	17	5.0	22	19	180	5.0	180	46
Minnesota	120	0	120	120	58	10	68	68	180	10	190	190
Mississippi	27	0	27	24	9.7	12	21	21	37	12	49	45
Missouri	68	24	92	39	17	48	65	58	85	72	160	98
Montana	60	0	60	60	14	14	28	28	74	14	88	88
Nebraska	49	0	49	49	93	23	120	110	140	23	170	160
Nevada	11	0.7	11	6.6	3.7	8.5	12	8.9	14	9.2	24	15
New Hampshire	9.1	0.2	9.3	0.5	0.2	0.5	0.8	0.7	9.3	0.8	10	1.2
New Jersey	75	0	75	15	2.0	1.0	3.0	2.5	77	1.0	78	17
New Mexico	32	1.1	33	15	9.6	9.6	19	9.6	42	11	52	25
New York	130	0	130	13	37	20	58	52	170	20	190	65
North Carolina	140	0	140	140	33	5.6	39	39	170	5.6	170	170
North Dakota	11	0.2	11	11	13	8.2	21	21	24	8.4	32	32
Ohio	80	8.8	89	62	24	16	40	36	100	25	130	98
Oklahoma	29	5.2	35	31	8.2	50	58	58	38	55	93	89
Oregon	130	19	150	150	7.1	19	26	26	140	38	170	170
Pennsylvania	150	0	150	15	54	7.0	61	41	200	7.0	210	56
Rhode Island	4.9	0	4.9	0.8	0.1	0.1	0.2	0.2	5.0	0.1	5.1	1.0
South Carolina	65	0.2	65	65	12	10	22	22	77	10	87	87
South Dakota	21	1.4	22	16	81	11	92	85	100	12	110	100
Tennessee	43	0	43	12	7.0	35	42	42	50	35	85	54
Texas	130	0	130	130	120	150	270	270	250	150	400	400
Utah	26	3.3	29	10	31	9.0	40	11	57	12	69	21
Vermont	17	2.6	20	1.0	5.7	3.5	9.2	9.2	23	6.1	29	10
Virginia	150	0.1	150	74	2.3	26	28	17	150	26	180	91
Washington	40	11	52	18	4.1	2.0	6.1	3.0	44	13	58	21
West Virginia	18	1.3	19	0.2	1.0	6.6	7.6	6.7	19	7.9	27	6.9
Wisconsin	72	0	72	7.0	72	3.0	75	75	140	3.0	150	82
Wyoming	8.8	0.8	9.6	6.7	3.1	12	15	15	12	13	25	21
Puerto Rico	3.0	3.0	6.0	1.0	15	15	30	7.0	18	18	36	8.0
Virgin Islands	2.0	0.1	2.1	1.0	0	0.1	0.1	0.1	2.0	0.2	2.2	1.1
Total	3,300	180	3,400	2,000	1,200	980	2,200	1,900	4,400	1,200	5,600	3,900

Table 4.—*RURAL FRESH-WATER USE, BY REGIONS, IN MILLION GALLONS PER DAY, 1980*

[Data generally are rounded to two significant figures; figures may not add to totals because of independent rounding]

WATER-RESOURCES REGION	DOMESTIC USE				LIVESTOCK USE				TOTAL DOMESTIC AND LIVESTOCK USE			
	Withdrawals			Consumptive use	Withdrawals			Consumptive use	Withdrawals			Consumptive use
	By source		Total		By source		Total		By source		Total	
	Ground water	Surface water			Ground water	Surface water			Ground water	Surface water		
New England	130	1.1	130	63	4.5	4.7	9.2	9.2	140	5.8	140	73
Mid-Atlantic	430	2.4	430	110	79	32	110	86	510	35	550	190
South Atlantic-Gulf	720	0.4	720	440	130	110	240	240	850	110	960	670
Great Lakes	270	2.9	270	74	64	20	84	77	330	23	350	150
Ohio	290	21	310	200	63	90	150	140	360	110	470	350
Tennessee	61	0	61	39	12	29	41	40	73	29	100	79
Upper Mississippi	290	10	300	190	220	51	270	270	510	61	570	460
Lower Mississippi	94	0.5	94	67	17	25	42	41	110	25	140	110
Souris-Red-Rainy	23	0	23	23	9.8	3.8	14	14	33	3.8	37	37
Missouri Basin	210	22	230	170	270	120	390	380	480	150	630	550
Arkansas-White-Red	130	25	160	120	85	150	240	230	210	180	390	350
Texas-Gulf	120	0	120	120	78	120	190	190	200	120	310	310
Rio Grande	33	0.7	33	18	26	6.0	32	26	58	6.7	65	44
Upper Colorado	15	43	58	17	2.4	91	94	22	18	130	150	39
Lower Colorado	37	0.1	37	27	12	5.2	17	11	48	5.4	54	38
Great Basin	32	3.8	36	14	34	12	46	17	66	16	82	30
Pacific Northwest	230	32	270	200	21	34	55	49	250	66	320	250
California	130	9.4	140	84	36	50	86	47	170	60	220	130
Alaska	11	0.1	11	0.1	0	0.1	0.2	0.2	11	0.3	11	0.3
Hawaii	3.5	0.4	3.9	3.4	5.3	0.2	5.5	4.8	8.8	0.6	9.4	8.2
Caribbean	5.0	3.1	8.1	2.0	15	15	30	7.1	20	18	38	9.1
Total	3,300	180	3,400	2,000	1,200	980	2,200	1,900	4,400	1,200	5,600	3,900

Irrigation

Irrigation of crops developed along with the settlement of the arid West because most years farmers needed to irrigate to raise any crops. In the humid eastern States, irrigation has been used to supplement natural rainfall in order to increase the number of plantings per year and yield of crops per acre, and to reduce the risk of crop failures during drought periods. Irrigation also is used to maintain recreational lands such as parks and golf courses. Estimates of withdrawals for irrigation vary greatly. In some instances, they are based on subjective amounts of water required to raise an acre of a given crop. In other instances, accurate records of water application rates are available. Reliable estimates of water withdrawn for irrigation can be made if the number of acres irrigated and the water application rates 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. Nevertheless, it is likely that better estimates were made of water used per acre in 1980 than in 1975, and in particular, the values given for conveyance loss for 1980 are more realistic because of progressively better records being kept by the water users.

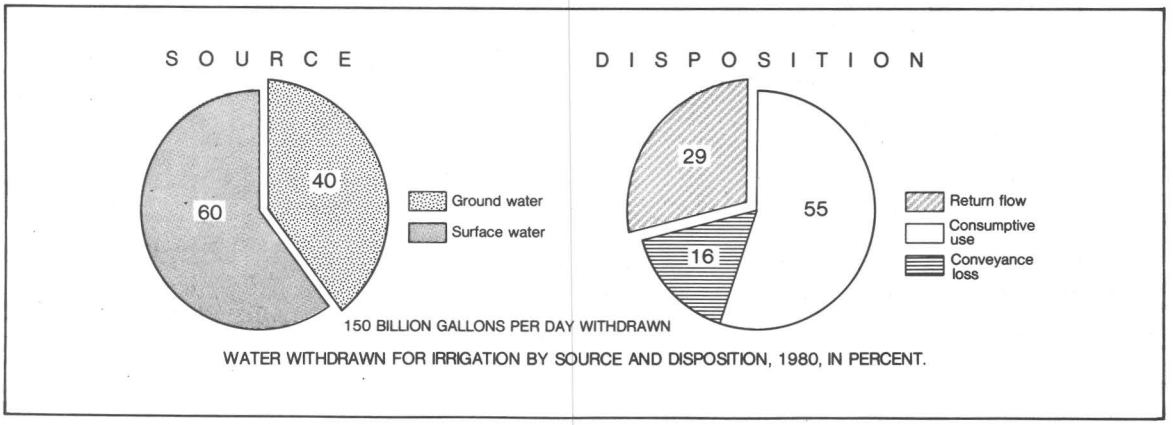
The quantity of water withdrawn for irrigation in 1980 was estimated at about 170 million acre-feet or 150 bgd. (See tables 5 and 6.) The water was used on approximately 58 million acres of farmland. This represents an increase in both water use and irrigated acreage of about 7 percent from the 1975 estimate. Where irrigation is used primarily to supplement natural rainfall, it is to be expected that there normally will be large differences in irrigation withdrawals from year to year.

The consumptive use of irrigation water was estimated to be 93 million acre-feet or 83 bgd in 1980. This was 55 percent of the irrigation water withdrawn, and accounted for about 81 percent of the total consumptive use by the Nation. Conveyance loss was estimated at about 26 million acre-feet (24 bgd) or 16 percent of 1980 irrigation withdrawals. Consumptive use and conveyance losses in 1980 were slightly higher than in 1975 but were essentially in the same proportion to irrigation water withdrawn as they were in 1975.

Surface water was the source of about 60 percent of the irrigation water (the same as 1975) and, except for a small fraction of 1 percent that was reclaimed sewage, ground water furnished the remainder.

The nine western water-resources regions (regions 10–18), led by the California region, accounted for 91 percent of the total water withdrawn for irrigation in 1980, compared to 93 percent in 1975. In the eastern regions, most of the water used for irrigation was in the South Atlantic-Gulf and Lower Mississippi regions, which together withdrew over 3 bgd more water in 1980 than in 1975. The State of California was by far the largest user of irrigation water, withdrawing about 37 bgd, 25 percent of the national total, which is more than the next two largest users, Idaho and Colorado, combined. Nebraska and Georgia showed the largest increase in number of acres irrigated from 1975 to 1980.

The range in irrigation water withdrawals, by States and water-resources regions is shown in figure 3. A comparison of withdrawals for self-supplied industrial use and irrigation use by both States and water-resources regions is shown in figure 10. Irrigation water-use data by States are given in table 5 and the same data by water-resources regions are given in table 6. The source of and disposition of withdrawals for irrigation use are shown in the chart below.



WATER WITHDRAWN FOR IRRIGATION BY SOURCE AND DISPOSITION, 1980, IN PERCENT.

A. States

B. Water-resources regions

Figure 3. Irrigation water withdrawals, by States and water-resources regions, 1980.

Table 5.—*IRRIGATION WATER USE, BY STATES, IN THOUSAND ACRE-FEET PER YEAR AND MILLION GALLONS PER DAY, 1980*

[Data generally are rounded to two significant figures; figures may not add to totals because of independent rounding]

STATE	IRRIGATED LAND, in thousand acres	THOUSAND ACRE-FEET PER YEAR						MILLION GALLONS PER DAY					
		Withdrawals				Conveyance losses	Consumptive use, fresh water	Withdrawals				Conveyance losses	Consumptive use, fresh water
		By source						By source					
		Fresh water		Reclaimed sewage	Total			Fresh water		Reclaimed sewage	Total		
		Ground	Surface					Ground	Surface				
Alabama	75	11	27	0	37	0	37	9.4	24	0	33	0	33
Alaska	0	0	0	0	0	0	0	0	0	0	0	0	0
Arizona	1300	4100	3800	3.9	8000	1000	4400	3700	3400	3.4	7100	900	4000
Arkansas	1800	3900	1800	0	5700	310	3500	3500	1600	0	5100	270	3100
California	9700	20000	22000	170	42000	6300	25000	18000	19000	150	37000	5600	23000
Colorado	2700	3000	12000	0	16000	1800	4100	2700	11000	0	14000	1600	3600
Connecticut	17	1.8	21	0	23	0	23	1.6	19	0	21	0	21
Delaware	10	4.6	2.7	0	7.3	0	7.3	4.1	2.4	0	6.5	0	6.5
D.C.	0	0	0	0	0	0	0	0	0	0	0	0	0
Florida	2000	1800	1600	0	3400	40	1700	1600	1400	0	3000	35	1500
Georgia	1000	420	230	0	650	0	650	380	200	0	580	0	580
Hawaii	140	520	500	0	1000	340	680	460	450	0	910	300	610
Idaho	4000	4500	13000	15	18000	4000	6300	4100	12000	13	16000	3600	5600
Illinois	150	110	5.9	0	120	0	120	100	5.3	0	110	0	110
Indiana	65	240	24	0	260	0	260	210	21	0	230	0	230
Iowa	150	55	7.5	0	62	0	62	49	6.7	0	56	0	56
Kansas	3400	5800	490	0	6300	160	4900	5200	440	0	5600	150	4300
Kentucky	14	0.3	5.2	0	5.5	0	5.5	0.2	4.7	0	4.9	0	4.9
Louisiana	740	1100	1400	0	2500	690	1800	990	1300	0	2200	610	1600
Maine	11	0.2	6.6	0	6.8	0	6.5	0.2	5.9	0	6.1	0	5.8
Maryland	33	11	11	0.1	22	0	22	10	9.4	0.1	20	0	19
Massachusetts	45	6.1	15	0	21	0	21	5.4	14	0	19	0	19
Michigan	320	86	120	33	240	0	240	77	110	30	210	0	210
Minnesota	460	160	20	0	180	0	180	140	18	0	160	0	160
Mississippi	480	950	150	0	1100	110	560	840	130	0	980	99	500
Missouri	240	110	33	0	140	0	120	98	30	0	130	0	100
Montana	2600	120	12000	0	12000	2700	2900	110	10000	0	11000	2400	2600
Nebraska	7100	7500	2900	0	10000	2100	8300	6700	2600	0	9300	1900	7400
Nevada	850	590	2900	3.7	3500	800	1700	530	2600	3.3	3100	720	1500
New Hampshire	1.8	0	1.8	0	1.8	0	1.5	0	1.6	0	1.6	0	1.3
New Jersey	75	45	17	0	62	0	50	40	15	0	55	0	45
New Mexico	1400	1800	2200	0	4000	35	1900	1600	2000	0	3600	31	1700
New York	56	24	28	0	51	0	51	21	25	0	46	0	46
North Carolina	150	44	100	0	150	0	150	39	93	0	130	0	130
North Dakota	180	73	240	0.4	310	34	280	65	210	0.4	280	30	250
Ohio	48	2.1	3.8	0	5.9	0	5.4	1.9	3.4	0	5.3	0	4.8
Oklahoma	900	820	160	0	980	59	690	730	140	0	870	53	610
Oregon	2100	950	5700	4.0	6600	1900	3300	850	5000	3.6	5900	1700	3000
Pennsylvania	63	25	160	0	180	0	180	22	140	0	160	0	160
Rhode Island	4.0	0.6	5.1	0	5.6	0.6	5.0	0.5	4.5	0	5.0	0.5	4.5
South Carolina	73	19	42	0	61	0	61	17	37	0	54	0	54
South Dakota	390	170	340	1.7	510	47	380	150	310	1.5	460	42	340
Tennessee	21	7.2	6.8	0	14	0.7	10	6.4	6.1	0	12	0.6	9.2
Texas	7700	7300	2100	78	9500	230	9000	6500	1900	70	8400	200	8000
Utah	1200	600	3000	0	3600	360	2700	530	2700	0	3200	320	2400
Vermont	1.6	0.3	1.3	0	1.6	0	1.2	0.3	1.2	0	1.4	0	1.0
Virginia	41	9.4	22	0	31	4.3	19	8.4	19	0	28	3.9	17
Washington	1600	300	6900	0	7200	1300	2900	260	6100	0	6400	1200	2600
West Virginia	2.4	0.1	1.4	0	1.5	0	1.5	0.1	1.2	0	1.3	0	1.3
Wisconsin	240	92	3.4	0	95	0	86	82	3.0	0	85	0	77
Wyoming	1800	420	5000	0	5400	1800	2800	370	4500	0	4900	1600	2500
Puerto Rico	75	150	200	0	350	34	220	140	180	0	310	30	200
Virgin Islands	0.5	0	0	0	0	0	0	0	0	0	0	0	0
Total	58,000	68,000	100,000	310	170,000	26,000	93,000	60,000	90,000	280	150,000	24,000	83,000

Table 6.—*IRRIGATION WATER USE, BY REGIONS, IN THOUSAND ACRE-FEET PER YEAR AND MILLION GALLONS PER DAY, 1980*

[Data generally are rounded to two significant figures; figures may not add to totals because of independent rounding]

WATER-RESOURCES REGION	IRRIGATED LAND, in thousand acres	THOUSAND ACRE-FEET PER YEAR						MILLION GALLONS PER DAY					
		Withdrawals				Conveyance losses	Consumptive use, fresh water	Withdrawals				Conveyance losses	Consumptive use, fresh water
		By source			Total			By source			Total		
		Fresh water		Reclaimed sewage				Fresh water		Reclaimed sewage			
		Ground	Surface					Ground	Surface				
New England	79	8.7	50	0	59	0.6	58	7.8	45	0	53	0.5	52
Mid-Atlantic	230	110	170	0.1	280	1.9	260	97	150	0.1	250	1.7	240
South Atlantic-Gulf	3400	2300	2000	0	4300	42	2600	2000	1800	0	3800	38	2300
Great Lakes	450	200	140	33	380	0	370	180	120	30	340	0	330
Ohio	84	99	68	0	170	0.1	160	88	60	0	150	0.1	150
Tennessee	14	3.0	4.7	0	7.6	0.2	7.4	2.7	4.1	0	6.8	0.2	6.6
Upper Mississippi	820	390	32	0	420	0	410	350	29	0	380	0	370
Lower Mississippi	2900	5400	3200	0	8700	1100	5400	4800	2900	0	7700	960	4800
Souris-Red-Rainy	120	52	20	0.2	72	4.4	67	46	18	0.2	64	3.9	60
Missouri Basin	14000	12000	20000	1.9	32000	6600	16000	11000	18000	1.7	28000	5900	15000
Arkansas-White-Red	7000	9500	2700	17	12000	400	9100	8400	2400	15	11000	360	8200
Texas-Gulf	5200	4300	1800	62	6200	160	5500	3900	1600	55	5500	140	4900
Rio Grande	1400	1800	3000	0	4800	330	2400	1600	2700	0	4300	290	2100
Upper Colorado	1300	90	8300	0.1	8400	930	2200	81	7400	0.1	7500	830	2000
Lower Colorado	1400	4400	4200	7.0	8500	1100	4800	3900	3700	6.2	7600	950	4300
Great Basin	1900	1100	5500	4.1	6600	1100	3900	1000	4900	3.7	5900	1000	3500
Pacific Northwest	7700	5700	27000	19	33000	7600	12000	5100	24000	17	29000	6800	11000
California	10000	20000	22000	170	42000	6500	26000	18000	20000	150	38000	5800	23000
Alaska	0	0	0	0	0	0	0	0	0	0	0	0	0
Hawaii	140	520	500	0	1000	340	680	460	450	0	910	300	610
Caribbean	76	150	200	0	350	34	220	140	180	0	310	30	200
Total	58,000	68,000	100,000	310	170,000	26,000	93,000	60,000	90,000	280	150,000	24,000	83,000

Self-Supplied Industrial

All Self-Supplied Industrial Use (Thermoelectric Power and Other Industries)

Self-supplied industrial water use is categorized in this report as thermoelectric power (electric utility) and "other" self-supplied water-using industries (see tables 7 and 8). "Other" self-supplied water-using industries include, but are not limited to, steel, chemical and allied products, paper and allied products, mining, and petroleum refining. Thermoelectric power plants can be powered by fossil-fuel, geothermal, or nuclear energy, and account for the largest quantity of water withdrawn for offstream use. (See table 22.) Because of the magnitude of water required for thermoelectric power generation, the estimates of use are discussed here as part of the total self-supplied industrial use and in more detail in a separate section (see page 25 and tables 9 and 10). Self-supplied industrial water systems often are metered and estimates of water withdrawn and consumed generally are reliable. It is likely that better estimates were made in 1980 than in 1975 because more comprehensive inventories were obtained and more accurate and complete records were available from the users.

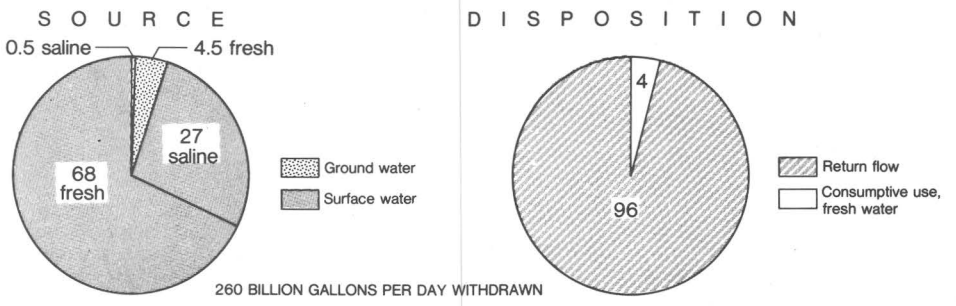
More water continues to be withdrawn for industrial use than for any other category. In 1980, the amount of self-supplied industrial water withdrawn was estimated at 260 bgd of which about 72 bgd was saline (see tables 7 and 8), this is an increase of 8 percent from the 1975 estimate. Of the 260 bgd, about 210 bgd or 83 percent of all industrial withdrawals was withdrawn by thermoelectric power plants (see tables 9 and 10). Withdrawals for thermoelectric power plants showed a 9-percent increase from 1975, and withdrawals for "other" industrial uses (about 45 bgd) remained about the same as in 1975. Saline water constituted about 28 percent of the total self-supplied industrial withdrawals, approximately the same proportion as in 1965, 1970, and 1975. Public-supply systems delivered about 2 bgd for thermoelectric power generation and about 10 bgd for other industrial and commercial uses. The withdrawal estimates for thermoelectric power plants (see tables 9 and 10) include the water from public supplies; however, public supplies are not included in the estimate for total self-supplied industrial use (tables 7 and 8) but are summarized in the public-supply category (see tables 1 and 2).

Consumptive use of fresh water by thermoelectric plants was about 2 percent and for other self-supplied industrial uses about 13 percent, giving a combined consumptive use of about 4 percent for all types of self-supplied industries. Saline water consumed by thermoelectric plants also was about 2 percent of the saline withdrawals, and about 15 percent for other industrial uses. These consumptive use figures are higher than in previous years and indicate an increased reuse of water.

The relative proportion of source of supply has remained constant since 1965—ground water still supplied nearly 5 percent, surface water about 95 percent, and reclaimed sewage only a fraction of 1 percent.

The Mid-Atlantic water-resources region withdrew slightly more water for industrial use in 1980 than in 1975 and withdrew the most saline water and total water (fresh and saline). The Ohio region withdrew about 6 percent more water for industrial use in 1980 than in 1975 and accounted for the most fresh-water withdrawals. Withdrawals in the State of Illinois for self-supplied industrial use increased 50 percent from 1975 to 1980, based on a more complete inventory of industrial users, making Illinois the second largest user of self-supplied industrial water behind Florida.

The range in self-supplied industrial water withdrawals by States and water-resources regions is shown in figure 4. A comparison of withdrawals for self-supplied industrial use and irrigation use by both States and water-resources regions is shown in figure 10. Self-supplied industrial water-use data by States are given in table 7, and the same data by water-resources regions are given in table 8. The source of and disposition of withdrawals for self-supplied industrial use are shown in the chart below.



WATER WITHDRAWN FOR ALL SELF-SUPPLIED INDUSTRIAL USE BY SOURCE AND DISPOSITION, 1980, IN PERCENT.

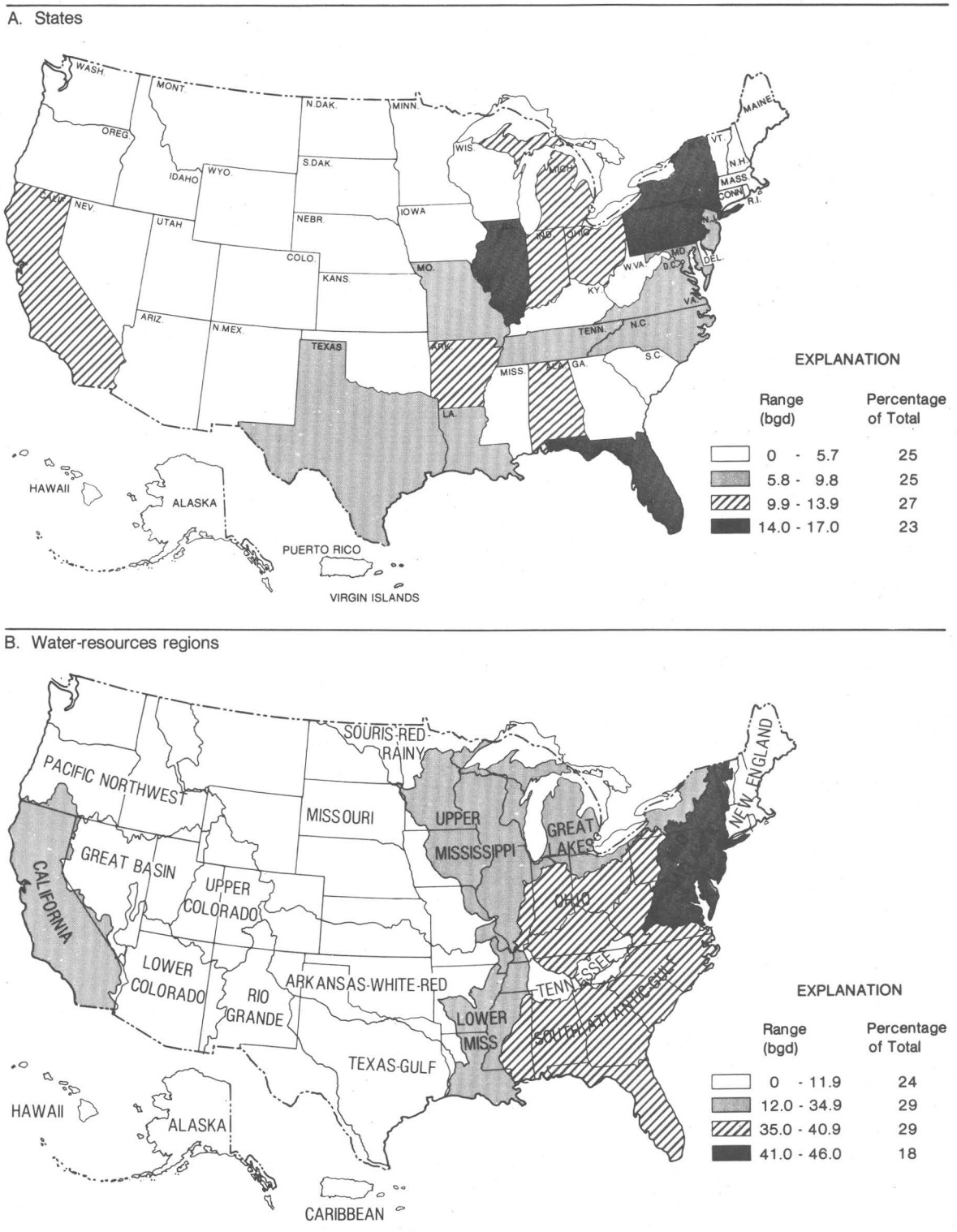


Figure 4. Self-supplied industrial water withdrawals, by States and water-resources regions, 1980.

Table 7.—*SELF-SUPPLIED INDUSTRIAL WATER USE, BY STATES, IN MILLION GALLONS PER DAY, 1980*

[Data generally are rounded to two significant figures; figures may not add to totals because of independent rounding]

STATE	ALL SELF-SUPPLIED INDUSTRIAL USE												
	Withdrawals										Consumptive use		
	By source and type							Total, excluding reclaimed sewage					
	Ground water			Surface water			Reclaimed sewage						
	Fresh	Saline	Total	Fresh	Saline	Total		Fresh	Saline	Total	Fresh	Saline	Total
Alabama	53	1.4	54	9700	73	9800	0	9800	75	9900	300	1.3	300
Alaska	14	0	14	140	0	140	0	160	0	160	1.5	0	1.5
Arizona	180	0	180	69	0	69	1.8	250	0	250	170	.8	170
Arkansas	320	0	320	9900	0	9900	0	10000	0	10000	300	0	300
California	1300	250	1600	1100	9800	11000	8.9	2400	10000	12000	230	100	330
Colorado	16	0	16	890	0	890	0	910	0	910	170	0	170
Connecticut	27	1.0	28	860	2400	3200	0	880	2400	3300	21	0	21
Delaware	21	.3	21	6.2	1100	1100	0	27	1100	1100	2.6	110	110
D.C.	0.8	0	0.8	130	0	130	0	130	0	130	2.3	0	2.3
Florida	710	42	750	1900	14000	16000	0	2600	14000	17000	500	55	550
Georgia	400	0	400	4700	200	4900	0	5100	200	5300	180	2.0	180
Hawaii	140	0	140	45	1200	1300	10	190	1200	1400	0	0	0
Idaho	2100	0	2100	120	0	120	0	2200	0	2200	180	0	180
Illinois	220	38	260	16000	0	16000	0	16000	38	16000	350	0	350
Indiana	640	0	640	12000	0	12000	0	13000	0	13000	220	0	220
Iowa	320	0	320	3400	0	3400	0	3800	0	3800	31	0	31
Kansas	190	0	190	340	0	340	0	530	0	530	110	0	110
Kentucky	150	0	150	4200	0	4200	0	4400	0	4400	180	0	180
Louisiana	440	19	460	8900	390	9300	0	9400	410	9800	870	38	910
Maine	34	0	34	670	710	1400	0	710	710	1400	8.9	0	8.9
Maryland	37	0	37	520	6600	7100	160	560	6600	7100	17	22	39
Massachusetts	93	0	93	1500	3500	5000	0	1600	3500	5100	25	5	30
Michigan	62	420	480	13000	0	13000	0	13000	420	14000	99	120	220
Minnesota	120	0	120	2200	0	2200	0	2300	0	2300	65	0	65
Mississippi	370	0	370	1200	660	1900	0	1600	660	2200	69	20	89
Missouri	130	0	130	5700	0	5700	0	5800	0	5800	320	0	320
Montana	32	2.1	34	250	0	250	0	280	2.1	280	28	.8	29
Nebraska	89	0	89	2200	0	2200	0	2300	0	2300	25	0	25
Nevada	71	9.0	80	160	0	160	11	230	9.0	240	79	7.6	86
New Hampshire	13	0	13	270	620	900	0	280	620	910	10	0	10
New Jersey	160	0	160	1500	7500	9000	0	1700	7500	9200	120	570	690
New Mexico	18	.9	18	54	0	54	0	71	.9	72	59	.4	59
New York	250	12	260	5300	8600	14000	0	5500	8600	14000	100	46	150
North Carolina	490	0	490	6700	42	6700	0	7200	42	7200	340	11	350
North Dakota	3.4	.2	3.6	930	0	930	0	930	.2	930	18	.1	18
Ohio	500	0	500	11000	0	11000	0	12000	0	12000	270	0	270
Oklahoma	100	95	200	350	0	350	0	450	95	540	220	95	320
Oregon	80	0	80	440	0	440	0	520	0	520	20	0	20
Pennsylvania	560	0	560	13000	93	13000	0	14000	93	14000	550	1.0	550
Rhode Island	13	0	13	23	330	350	0	35	330	360	2.9	0	2.9
South Carolina	58	0	58	5600	38	5700	0	5700	38	5700	83	.1	83
South Dakota	26	3.4	29	21	0	21	0	47	3.4	50	5.5	3.4	8.9
Tennessee	190	0	190	9300	0	9300	0	9500	0	9500	150	0	150
Texas	360	0	360	1400	6600	8000	0	1700	6600	8300	980	920	1900
Utah	68	4.0	72	460	56	510	0	520	60	580	90	45	130
Vermont	5.2	0	5.2	260	0	260	0	260	0	260	24	0	24
Virginia	110	.2	110	4700	4100	8800	0	4800	4100	8900	90	48	140
Washington	150	0	150	830	42	880	0	990	42	1000	150	6.3	150
West Virginia	150	0	150	5300	0	5300	0	5400	0	5400	190	0	190
Wisconsin	97	0	97	4900	0	4900	0	5000	0	5000	91	0	91
Wyoming	130	24	150	270	0	270	0	390	24	420	71	0	71
Puerto Rico	88	5.0	93	30	2400	2400	0	120	2400	2500	26	0	26
Virgin Islands	0	0	0	0	32	32	0	0	32	32	.2	4.0	4.2
Total	12,000	930	13,000	180,000	71,000	250,000	190	190,000	72,000	260,000	8,200	2,200	10,000

Table 7.—*SELF-SUPPLIED INDUSTRIAL WATER USE, BY STATES, IN MILLION GALLONS PER DAY, 1980*—Continued

[Data generally are rounded to two significant figures; figures may not add to totals because of independent rounding]

STATE	TYPE OF SELF-SUPPLIED INDUSTRIAL USE														
	Thermoelectric power (electric utility)[1]						Other industries								
	Withdrawals, by source			Total fresh water	Consumptive use		Withdrawals, by source					Total, excluding reclaimed sewage		Consumptive use	
	Fresh ground water	Surface water					Ground water		Surface water		Reclaimed sewage				
		Fresh	Saline		Fresh	Saline	Fresh	Saline	Fresh	Saline		Fresh	Saline	Fresh	Saline
Alabama	1.5	8500	73	8500	29	0.1	51	1.4	1200	0.2	0	1300	1.6	270	1.2
Alaska	8.4	22	0	30	0.3	0	6.1	0	120	0	0	130	0	1.2	0
Arizona	40	49	0	89	51	0.8	140	0	20	0	1.8	160	0	120	0
Arkansas	3.1	9700	0	9700	100	0	320	0	190	0	0	510	0	200	0
California	890	1100	9200	2000	41	60	420	250	45	560	8.9	470	820	190	41
Colorado	9.4	160	0	170	97	0	7.1	0	730	0	0	730	0	73	0
Connecticut	0.2	610	2400	610	1.9	0	26	1.0	250	1.0	0	270	2.0	19	0
Delaware	5.4	0	670	5.4	0.5	67	15	0.3	6.2	390	0	22	390	2.1	39
D.C.	0	130	0	130	2.0	0	0.8	0	0.6	0	0	1.4	0	0.3	0
Florida	70	1800	14000	1900	32	48	640	42	140	15	0	780	57	470	6.4
Georgia	4.1	4400	160	4400	120	0	400	0	380	42	0	780	42	59	2.0
Hawaii	130	9.0	1200	140	0	0	9.1	0	36	7.0	10	45	7.0	0	0
Idaho	5.3	0	0	5.3	1.3	0	2100	0	120	0	0	2200	0	170	0
Illinois	8.4	14000	0	14000	260	0	210	38	1600	0	0	1800	38	88	0
Indiana	5.0	9700	0	9700	65	0	640	0	2500	0	0	3100	0	160	0
Iowa	4.0	3200	0	3200	20	0	320	0	230	0	0	550	0	11	0
Kansas	46	300	0	350	39	0	140	0	41	0	0	180	0	66	0
Kentucky	15	4000	0	4100	140	0	130	0	190	0	0	320	0	33	0
Louisiana	46	5800	180	5900	320	9.1	390	19	3100	210	0	3500	230	550	29
Maine	1.0	55	700	56	0	0	33	0	620	11	0	650	11	8.9	0
Maryland	3.0	400	6100	410	2.0	17	34	0	120	500	160	150	500	15	5.0
Massachusetts	0	1300	3400	1300	0	0	93	0	220	64	0	310	64	25	5.1
Michigan	0	12000	0	12000	0	0	62	420	1600	0	0	1700	420	99	120
Minnesota	2.2	1700	0	1700	7.2	0	120	0	470	0	0	590	0	58	0
Mississippi	17	1100	500	1100	33	3.5	360	0	97	160	0	450	160	36	16
Missouri	16	5500	0	5500	300	0	120	0	190	0	0	300	0	24	0
Montana	0	180	0	180	12	0	32	2.1	76	0	0	110	2.1	15	0.8
Nebraska	31	2200	0	2200	22	0	58	0	6.3	0	0	64	0	3.1	0
Nevada	8.1	86	0	94	20	0	63	9.0	74	0	11	140	9.0	58	7.6
New Hampshire	0	74	620	74	0	0	13	0	200	0	0	210	0	10	0
New Jersey	5.0	910	6500	910	70	500	150	0	600	1000	0	750	1000	50	65
New Mexico	11	54	0	65	55	0	6.6	0.9	0.1	0	0	6.6	0.9	4.2	0.4
New York	130	4300	8500	4400	4.6	34	120	12	980	120	0	1100	130	96	11
North Carolina	0	4300	6.4	4300	67	7.8	490	0	2400	36	0	2900	36	270	3.5
North Dakota	1.2	920	0	930	14	0	2.2	0.2	4.7	0	0	7.0	0.2	4.3	0.1
Ohio	21	10000	0	10000	93	0	470	0	1500	0	0	2000	0	180	0
Oklahoma	7.7	170	0	180	110	0	95	95	170	0	0	270	95	120	95
Oregon	0	22	0	22	0	0	80	0	420	0	0	500	0	20	0
Pennsylvania	6.8	10000	93	10000	290	1.0	550	0	3100	0	0	3600	0	260	0
Rhode Island	0	0.1	330	0.1	0	0	13	0	23	0.6	0	35	0.6	2.9	0
South Carolina	0.5	5200	7.7	5200	35	0.1	57	0	400	30	0	460	30	47	0
South Dakota	2.4	2.5	0	4.9	3.2	0	23	3.4	19	0	0	42	3.4	2.3	3.4
Tennessee	0	7800	0	7800	1.0	0	190	0	1500	0	0	1700	0	150	0
Texas	38	960	5500	990	500	470	320	0	410	1100	0	730	1100	490	450
Utah	0.2	64	5.9	64	9.9	4.6	68	4.0	390	50	0	460	54	80	40
Vermont	0	250	0	250	22	0	5.2	0	9.6	0	0	15	0	2.3	0
Virginia	1.2	4300	4000	4300	43	40	110	0.2	360	81	0	470	81	47	8.1
Washington	0	1.3	0	1.3	1.1	0	150	0	830	42	0	990	42	150	6.3
West Virginia	0	4600	0	4600	110	0	150	0	680	0	0	830	0	82	0
Wisconsin	1.2	4500	0	4500	46	0	96	0	350	0	0	450	0	45	0
Wyoming	1.1	220	0	220	45	0	130	24	44	0	0	170	24	25	0
Puerto Rico	3.0	0	1500	3.0	6.0	0	85	5.0	30	920	0	120	930	20	0
Virgin Islands	0	0	32	0	0.2	4.0	0	0	0	0	0	0	0	0	0
Total	1,600	150,000	65,000	150,000	3,200	1,300	10,000	930	29,000	5,400	190	39,000	6,300	5,000	970

[1]See Table 9 for additional information.

Table 8.—*SELF-SUPPLIED INDUSTRIAL WATER USE, BY REGIONS, IN MILLION GALLONS PER DAY, 1980*

[Data generally are rounded to two significant figures; figures may not add to totals because of independent rounding]

WATER-RESOURCES REGION	ALL SELF-SUPPLIED INDUSTRIAL USE												
	Withdrawals										Consumptive use		
	By source and type							Total, excluding reclaimed sewage					
	Ground water			Surface water			Reclaimed sewage						
	Fresh	Saline	Total	Fresh	Saline	Total		Fresh	Saline	Total	Fresh	Saline	Total
New England	180	1.0	180	3600	7500	11000	0	3700	7500	11000	87	5.1	92
Mid-Atlantic	690	12	700	18000	28000	45000	160	18000	28000	46000	540	780	1300
South Atlantic-Gulf	1800	44	1900	23000	15000	38000	0	25000	15000	40000	1300	92	1400
Great Lakes	660	420	1100	32000	0	32000	0	33000	420	33000	470	120	590
Ohio	1300	24	1300	34000	0	34000	0	35000	24	35000	930	0	930
Tennessee	97	0	97	11000	0	11000	0	11000	0	11000	240	0	240
Upper Mississippi	660	15	670	19000	0	19000	0	20000	15	20000	470	0	470
Lower Mississippi	1100	19	1100	11000	390	11000	0	12000	410	12000	1100	38	1200
Souris-Red-Rainy	5.1	0	5.1	59	0	59	0	64	0	64	6.6	0	6.6
Missouri Basin	430	26	450	8400	0	8400	0	8800	26	8900	420	4.5	430
Arkansas-White-Red	390	95	480	10000	2.0	10000	0	11000	97	11000	740	96	840
Texas-Gulf	270	0	270	1200	6600	7800	0	1500	6600	8100	710	920	1600
Rio Grande	30	.9	31	3.0	0	3.0	0	33	.9	34	24	.4	25
Upper Colorado	23	3.5	26	700	.7	700	0	730	4.2	730	190	.1	190
Lower Colorado	200	.2	200	130	0	130	12	340	.2	340	200	.2	200
Great Basin	130	13	140	500	55	550	1.1	630	68	700	110	52	160
Pacific Northwest	2300	0	2300	1400	42	1500	0	3700	42	3800	350	6.3	360
California	1300	250	1600	1100	9800	11000	8.7	2500	10000	12000	230	100	330
Alaska	14	0	14	140	0	140	0	160	0	160	1.5	0	1.5
Hawaii	140	0	140	45	1200	1300	10	190	1200	1400	0	0	0
Caribbean	88	5.0	93	30	2500	2500	0	120	2500	2600	26	4.0	30
Total	12,000	930	13,000	180,000	71,000	250,000	190	190,000	72,000	260,000	8,200	2,200	10,000

Table 8.—*SELF-SUPPLIED INDUSTRIAL WATER USE, BY REGIONS, IN MILLION GALLONS PER DAY, 1980*—Continued

[Data generally are rounded to two significant figures; figures may not add to totals because of independent rounding]

WATER-RESOURCES REGION	TYPE OF SELF-SUPPLIED INDUSTRIAL USE														
	Thermoelectric power (electric utility)[1]						Other industries								
	Withdrawals, by source			Total fresh water	Consumptive use		Withdrawals, by source					Total, excluding reclaimed sewage		Consumptive use	
	Fresh ground water	Surface water					Ground water		Surface water		Reclaimed sewage				
		Fresh	Saline		Fresh	Saline	Fresh	Saline	Fresh	Saline		Fresh	Saline	Fresh	Saline
New England	1.2	2300	7400	2300	21	0	180	1.0	1300	77	0	1500	78	66	5.1
Mid-Atlantic	110	15000	25000	15000	260	660	580	12	2900	2100	160	3400	2100	280	130
South Atlantic-Gulf	88	19000	15000	19000	270	63	1800	44	4100	280	0	5900	330	1100	29
Great Lakes	30	27000	0	27000	93	0	630	420	5100	0	0	5700	420	370	120
Ohio	52	30000	0	30000	520	0	1300	24	3700	0	0	5000	24	420	0
Tennessee	0	9300	0	9300	20	0	97	0	2000	0	0	2000	0	220	0
Upper Mississippi	13	16000	0	16000	290	0	650	15	2600	0	0	3300	15	170	0
Lower Mississippi	54	7700	180	7700	400	9.1	1000	19	3200	210	0	4300	230	740	29
Souris-Red-Rainy	0.9	53	0	54	1.0	0	4.2	0	5.1	0	0	9.3	0	5.6	0
Missouri Basin	48	8100	0	8200	350	0	380	26	300	0	0	680	26	77	4.5
Arkansas-White-Red	70	9900	0	10000	410	0	320	95	530	2.0	0	840	97	330	96
Texas-Gulf	30	950	5500	980	360	470	240	0	280	1100	0	520	1100	350	450
Rio Grande	15	2.5	0	17	11	0	16	0.9	0.5	0	0	16	0.9	13	0.4
Upper Colorado	0	140	0.7	140	130	0.1	23	3.5	560	0	0	590	3.5	63	0
Lower Colorado	45	45	0	90	49	0.8	160	0.2	86	0	12	250	0.2	150	0
Great Basin	4.5	120	5.2	130	5.9	4.5	130	13	370	50	1.1	500	63	100	48
Pacific Northwest	5.3	23	0	29	2.4	0	2300	0	1400	42	0	3700	42	350	6.3
California	890	1100	9200	2000	41	60	430	250	58	560	8.7	480	820	190	41
Alaska	8.4	22	0	30	0.3	0	6.1	0	120	0	0	130	0	1.2	0
Hawaii	130	9.0	1200	140	0	0	9.1	0	36	7.0	10	45	7.0	0	0
Caribbean	3.0	0	1500	3.0	6.2	4.0	85	5.0	30	920	0	120	930	20	0
Total	1,600	150,000	65,000	150,000	3,200	1,300	10,000	930	29,000	5,400	190	39,000	6,300	5,000	970

[1]See Table 10 for additional information.

Self-Supplied Industrial

Thermoelectric Power

Thermoelectric power generation is categorized as a self-supplied industrial water use. However, because of the magnitude of water required, separate estimates were made of the source, use, and disposition of water for the thermoelectric power industry (tables 9 and 10). These estimates usually are reliable inasmuch as relatively complete data files are maintained by Federal and State agencies.

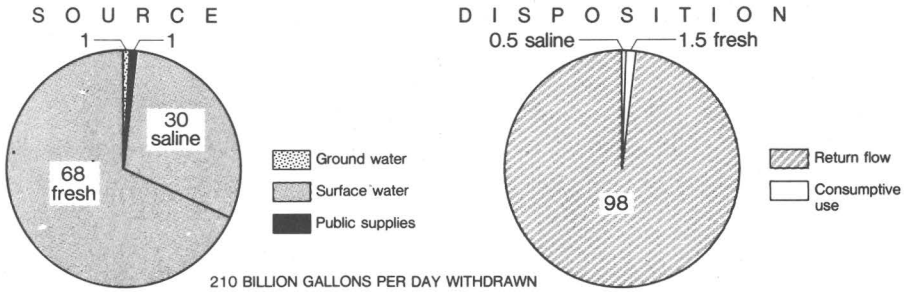
Thermoelectric power plants furnish practically all their own water; less than 1 percent is obtained from public supplies. In 1980, water withdrawn by thermoelectric power plants was about 210 bgd, an increase of about 9 percent from the 1975 estimate, and an increase of about 26 percent from the 1970 estimate. The thermoelectric power industry continues to withdraw the largest quantity of water for offstream use, more than 1.4 times the water withdrawn for irrigation, the next largest water-use category.

About 99 percent of the total water withdrawn by thermoelectric plants was used for condenser and reactor cooling of generators. Plants vary widely as to the techniques used in disposal of the cooling water after it has passed through the condensers. Where water is expensive or scarce, cooling towers or ponds (Federal Power Commission, 1969) are employed so that the same water can be used repeatedly in the condensers. Prevention of thermal pollution of the receiving water body is another factor that has caused some plants to resort to water-cooling devices. The quantity of water consumed by steamplants will increase as reuse of water becomes more prevalent. About 2 percent of the water withdrawn in 1980 was consumed, compared to 1 percent in 1975, and only one-half of 1 percent in 1970. Surface water constituted 98 percent of total thermoelectric withdrawals in 1980, and 30 percent was saline, compared to 33 percent in 1975 and 28 percent in 1970.

Public-supply systems delivered about 2 bgd for thermoelectric power generation. In previous reports in this series, a major part of this water was erroneously identified as self-supplied industrial withdrawals.

The amount of water withdrawn in the Mid-Atlantic water-resources region by thermoelectric power plants in 1980 was approximately the same as in 1975, and accounted for the most saline water and total water (fresh and saline) withdrawals. The Ohio region withdrew about 13 percent more water for thermoelectric power plants in 1980 than in 1975 and accounted for the most fresh-water withdrawals. Withdrawals in the State of Illinois for thermoelectric power generation increased 54 percent from 1975 to 1980, based on a more complete inventory of industrial users, making Illinois the second largest user of water for thermoelectric power after Florida. Arkansas withdrawals increased from about 2 bgd to nearly 10 bgd from 1975 to 1980, as the result of nuclear power plants coming online between 1975 and 1980.

Thermoelectric power water-use data by States, are given in table 9, and the same data by water-resources regions are given in table 10. The source of and disposition of withdrawals for thermoelectric power generation are shown in the chart below.



WATER WITHDRAWN FOR THE GENERATION OF THERMOELECTRIC POWER BY SOURCE AND DISPOSITION, 1980, IN PERCENT.

Table 9.—*THERMOELECTRIC POWER (ELECTRIC UTILITY GENERATION) WATER USE, BY STATES, IN MILLION GALLONS PER DAY, 1980*

[Data generally are rounded to two significant figures; figures may not add to totals because of independent rounding]

STATE	WITHDRAWALS, BY TYPE OF USE AND SOURCE OF WATER										CONSUMPTIVE USE	
	Cooling of condensers and reactors					Other thermoelectric uses						
	Self supplied			Public supplies	Total	Self supplied			Public supplies	Total		
	Fresh ground water	Surface water				Fresh ground water	Surface water					
		Fresh	Saline				Fresh	Saline			Fresh	Saline
Alabama	0	8100	72	0	8200	1.5	390	1.5	0.1	400	29	0.1
Alaska	8.4	22	0	0.5	31	0	0	0	0	0	0.3	0
Arizona	38	45	0	0.7	85	1.7	3.4	0	0	5.1	51	0.8
Arkansas	2.6	9700	0	0	9700	0.4	0.2	0	0	0.7	100	0
California	890	1100	9200	0	11000	0	0	0	0	0	41	60
Colorado	9.4	160	0	0.2	170	0	0	0	0	0	97	0
Connecticut	0	610	2400	0.3	3000	0.2	0.2	0	190	190	1.9	0
Delaware	5.4	0	670	0	680	0	0	0	0	0	0.5	67
D.C.	0	130	0	0	130	0	0	0	0	0	2.0	0
Florida	63	1800	14000	0.5	16000	7.1	0	0	2.3	9.4	32	48
Georgia	0	4400	160	0	4500	4.1	1.2	0	0	5.3	120	0
Hawaii	130	9.0	1200	0	1400	0	0	0	0	0	0	0
Idaho	5.2	0	0	0	5.2	0.1	0	0	0	0.1	1.3	0
Illinois	0	14000	0	0	14000	8.4	25	0	2.5	36	260	0
Indiana	5.0	9700	0	0	9700	0	0	0	0	0	65	0
Iowa	4.0	3100	0	18	3100	0	92	0	0.7	93	20	0
Kansas	46	300	0	0	350	0	0	0	0	0	39	0
Kentucky	12	3900	0	0	3900	3.2	150	0	0.6	150	140	0
Louisiana	44	5600	170	0	5800	2.3	280	9.1	0	290	320	9.1
Maine	0	55	700	0	750	1.0	0	0	1.0	2.0	0	0
Maryland	1.0	390	6100	0	6500	2.0	10	0	0	12	2.0	17
Massachusetts	0	1300	3400	0	4700	0	0	0	0	0	0	0
Michigan	0	12000	0	0	12000	0	58	0	0	58	0	0
Minnesota	1.5	1700	0	0.6	1700	0.7	4.5	0	0	5.2	7.2	0
Mississippi	12	1100	500	22	1600	4.7	0	0	0	4.7	33	3.5
Missouri	2.3	5500	0	0	5500	13	0	0	0	13	300	0
Montana	0	170	0	0	170	0	4.4	0	0	4.4	12	0
Nebraska	31	2200	0	18	2200	0	0	0	0	0	22	0
Nevada	6.1	86	0	0	92	2.0	0	0	0.4	2.4	20	0
New Hampshire	0	74	620	0	700	0	0	0	0	0	0	0
New Jersey	0	900	6500	0	7400	5.0	5.0	0	5.0	15	70	500
New Mexico	11	54	0	0	65	0	0	0	0	0	55	0
New York	0	4000	8500	0	12000	130	240	0	3.7	370	4.6	34
North Carolina	0	4200	6.4	0	4200	0	77	0	0	77	67	7.8
North Dakota	0.8	920	0	0	920	0.4	7.8	0	0	8.2	14	0
Ohio	17	10000	0	1.1	10000	4.1	79	0	3.0	86	93	0
Oklahoma	7.5	170	0	15	190	0.2	3.8	0	0.4	4.5	110	0
Oregon	0	22	0	0	22	0	0	0	0	0	0	0
Pennsylvania	0	10000	93	0	10000	6.8	35	0	0.4	42	290	1.0
Rhode Island	0	0.1	330	0	330	0	0	0	0	0	0	0
South Carolina	0	5200	7.7	0	5200	0.5	7.4	0	0	7.9	35	0.1
South Dakota	2.3	2.5	0	0	4.8	0.1	0	0	0	0.1	3.2	0
Tennessee	0	7500	0	0	7500	0	270	0	0.2	270	1.0	0
Texas	35	940	5500	1800	8200	3.6	12	0	11	27	500	470
Utah	0	64	5.9	0	70	0.2	0	0	0.1	0.3	9.9	4.6
Vermont	0	220	0	0	220	0	22	0	0	22	22	0
Virginia	0	4300	4000	0	8400	1.2	0	0	0.1	1.3	43	40
Washington	0	1.3	0	0	1.3	0	0	0	0	0	1.1	0
West Virginia	0	4500	0	0	4500	0	110	0	0	110	110	0
Wisconsin	0	4500	0	0	4500	1.2	0	0	0	1.2	46	0
Wyoming	0.4	220	0	2.9	220	0.7	5.9	0	0	6.6	45	0
Puerto Rico	0	0	1500	0	1500	3.0	0	0	3.0	6.0	6.0	0
Virgin Islands	0	0	32	0	32	0	0	0	0.2	0.2	0.2	4.0
Total	1,400	150,000	65,000	1,800	210,000	210	1,900	11	230	2,400	3,200	1,300

Table 10.—*THERMOELECTRIC POWER (ELECTRIC UTILITY GENERATION) WATER USE, BY REGIONS, IN MILLION GALLONS PER DAY, 1980*

[Data generally are rounded to two significant figures; figures may not add to totals because of independent rounding]

WATER-RESOURCES REGION	WITHDRAWALS, BY TYPE OF USE AND SOURCE OF WATER										CONSUMPTIVE USE	
	Cooling of condensers and reactors					Other thermoelectric uses						
	Self supplied			Public supplies	Total	Self supplied			Public supplies	Total		
	Fresh ground water	Surface water				Fresh ground water	Surface water					
		Fresh	Saline				Fresh	Saline			Fresh	Saline
New England	0	2200	7400	0.3	9700	1.2	19	0	190	210	21	0
Mid-Atlantic	6.4	14000	25000	0	40000	100	220	0	7.7	330	260	660
South Atlantic-Gulf	73	19000	15000	0.5	34000	15	210	1.5	2.4	230	270	63
Great Lakes	0	27000	0	0.3	27000	30	140	0	2.5	180	93	0
Ohio	34	30000	0	0.8	30000	18	450	0	2.9	470	520	0
Tennessee	0	8800	0	0	8800	0	420	0	0	420	20	0
Upper Mississippi	5.1	16000	0	19	16000	8.2	80	0	2.9	91	290	0
Lower Mississippi	46	7400	170	22	7600	8.6	280	9.1	0.2	300	400	9.1
Souris-Red-Rainy	0.8	53	0	0	54	0.1	0.2	0	0	0.3	1.0	0
Missouri Basin	38	8100	0	21	8100	9.2	39	0	0	49	350	0
Arkansas-White-Red	66	9900	0	540	10000	4.8	24	0	5.4	34	410	0
Texas-Gulf	29	940	5500	1200	7700	1.2	12	0	5.5	19	360	470
Rio Grande	14	2.3	0	4.7	21	0.3	0.2	0	0.1	0.6	11	0
Upper Colorado	0	130	0.7	0	130	0	4.9	0	0.1	5.0	130	0.1
Lower Colorado	41	44	0	0.7	85	3.7	1.5	0	0.4	5.6	49	0.8
Great Basin	4.3	120	5.2	0	130	0.2	0	0	0	0.2	5.9	4.5
Pacific Northwest	5.2	23	0	0	29	0.1	0	0	0	0.1	2.4	0
California	890	1100	9200	0	11000	0	0	0	0	0	41	60
Alaska	8.4	22	0	0.5	31	0	0	0	0	0	0.3	0
Hawaii	130	9.0	1200	0	1400	0	0	0	0	0	0	0
Caribbean	0	0	1500	0	1500	3.0	0	0	3.2	6.2	6.2	4.0
Total	1,400	150,000	65,000	1,800	210,000	210	1,900	11	230	2,400	3,200	1,300

Hydroelectric Power

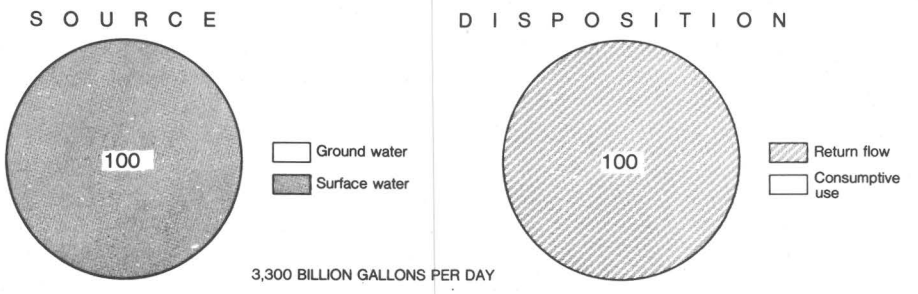
Estimated quantities of water used for hydroelectric power generation may differ because of the manner in which individual estimates are made of the amount of water passed through the plants. Where the water is passed through the plant only one time, good estimates of water use can be obtained. However, where hydroelectric plants have pumped storage facilities and recycle the same water through the plant a number of times, it is difficult to obtain net water use. The magnitude of the effect of pumped storage on water estimates for hydroelectric power generation is not known, but as pumped storage becomes more prevalent, it becomes an important factor in making accurate water-use estimates.

Water used for hydroelectric power generation showed an increasing trend from 1950 to 1975. The trend leveled off from 1975 to 1980, as the amount of water used remained approximately the same, an estimated 3,300 bgd or 3,700 million acre-feet, which is 2.75 times the average annual runoff in the conterminous United States (Langbein and others, 1949). (See tables 11 and 12.) From 1975 to 1980 there was about a 17-percent increase in developed hydroelectric capacity. But during this period utility hydroelectric production decreased 8 percent from 301 billion kWh (kilowatt-hours) to 277 billion kWh, primarily because less streamflow was available in 1980 than in 1975.

Although a very small quantity of water is evaporated (consumptive use) in the generation of hydroelectric power, some depletion of the available water supply will occur as a result of evaporation from reservoirs associated with hydroelectric power generation, repeated reuse of water within a pumped-storage power plant, and the cumulative use that now occurs in successive plants downstream (3,300 bgd used compared with a total surface-water supply of 1,200 bgd). This can be confirmed by the fact that evaporation from reservoirs and regulated lakes, which has been classified as an instream use, contributes to the reduction of available water for all uses. For example, the annual evaporation from the principal reservoirs and regulated lakes in the Western United States is estimated to be 11 bgd (Meyers, 1962, table 6). This amount is equivalent to about 11 percent of consumption by all offstream uses in 1980.

The Pacific Northwest water-resources region was by far the largest user of water for hydroelectric power generation in 1980, accounting for almost one-half the total water used for hydroelectric power in the Nation. Washington and Oregon used more water for hydroelectric power generation than the combined total of all water used for hydroelectric power in the eastern States.

The range in hydroelectric power water use by States and water-resources regions is shown in figure 5. Hydroelectric power water-use data by States are given in table 11, and the same data by water-resources regions are given in table 12. The source of and disposition of water used for hydroelectric power are shown in the chart below.



WATER USED FOR HYDROELECTRIC POWER GENERATION IN THE UNITED STATES, BY SOURCE AND DISPOSITION, 1980, IN PERCENT.

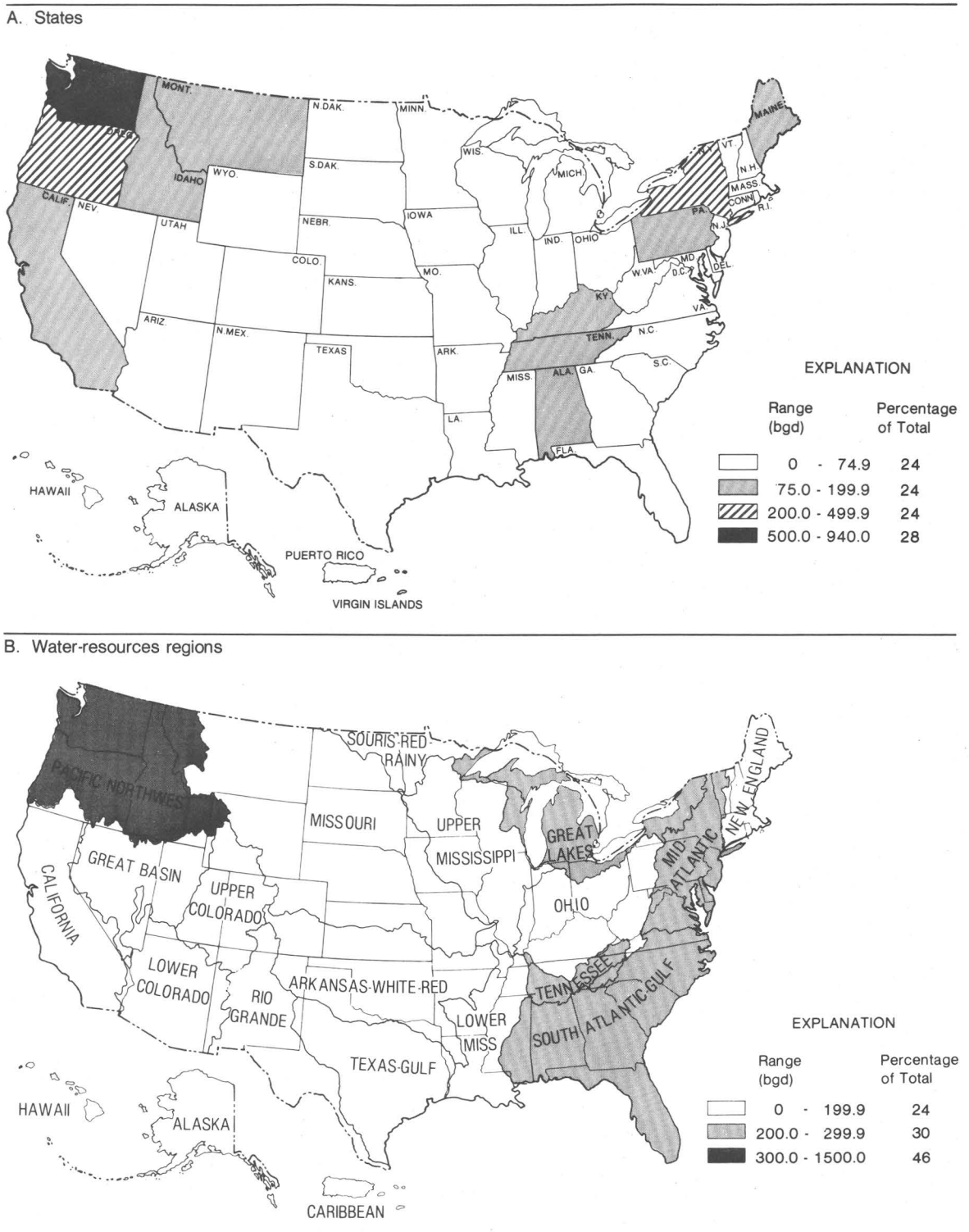


Figure 5. Hydroelectric power water use, by States and water-resources regions, 1980.

Table 11.—*HYDROELECTRIC POWER WATER USE, BY STATES, 1980*

[Data generally are rounded to two significant figures; figures may not add to totals because of independent rounding]

STATE	WATER USE		STATE	WATER USE	
	MGD	THOUSAND ACRE-FEET PER YEAR		MGD	THOUSAND ACRE-FEET PER YEAR
Alabama	170000	190000	Nevada	1200	1300
Alaska	770	860	New Hamshire	26000	29000
Arizona	41000	46000			
Arkansas	26000	29000	New Jersey	0	0
California	81000	91000	New Mexico	430	480
			New York	310000	340000
Colorado	5500	6200	North Carolina	40000	45000
Connecticut	4000	4500	North Dakota	15000	17000
Delaware	0	0			
D.C.	8.0	9.0	Ohio	380	420
Florida	15000	16000	Oklahoma	34000	39000
			Oregon	490000	550000
Georgia	52000	58000	Pennsylvania	81000	90000
Hawaii	180	200	Rhode Island	23	26
Idaho	76000	85000			
Illinois	26000	29000	South Carolina	41000	46000
Indiana	9500	11000	South Dakota	67000	76000
			Tennessee	150000	170000
Iowa	28000	31000	Texas	7000	7900
Kansas	570	640	Utah	3400	3800
Kentucky	98000	110000			
Louisiana	1400	1600	Vermont	14000	16000
Maine	75000	84000	Virginia	26000	29000
			Washington	940000	1100000
Maryland	15000	17000	West Virginia	21000	23000
Massachusetts	25000	29000	Wisconsin	71000	80000
Michigan	65000	73000			
Minnesota	20000	22000	Wyoming	7200	8100
Mississippi	0	0	Puerto Rico	270	300
			Virgin Islands	0	0
Missouri	13000	15000			
Montana	76000	85000			
Nebraska	5400	6100	Total	3,300,000	3,700,000

Table 12.—*HYDROELECTRIC POWER WATER USE, BY REGIONS, 1980*

[Data generally are rounded to two significant figures; figures may not add to totals because of independent rounding]

WATER-RESOURCES REGION	WATER USE	
	MGD	THOUSAND ACRE-FEET PER YEAR
New England	140000	150000
Mid-Atlantic	210000	240000
South Atlantic-Gulf	230000	250000
Great Lakes	300000	340000
Ohio	140000	150000
Tennessee	240000	270000
Upper Mississippi	120000	140000
Lower Mississippi	2700	3000
Souris-Red-Rainy	1100	1300
Missouri Basin	150000	160000
Arkansas-White-Red	62000	70000
Texas-Gulf	7700	8700
Rio Grande	1100	1200
Upper Colorado	16000	18000
Lower Colorado	39000	43000
Great Basin	5600	6200
Pacific Northwest	1500000	1700000
California	74000	83000
Alaska	770	860
Hawaii	180	200
Caribbean	270	300
Total	3,300,000	3,700,000

Summary of Offstream and Instream Uses

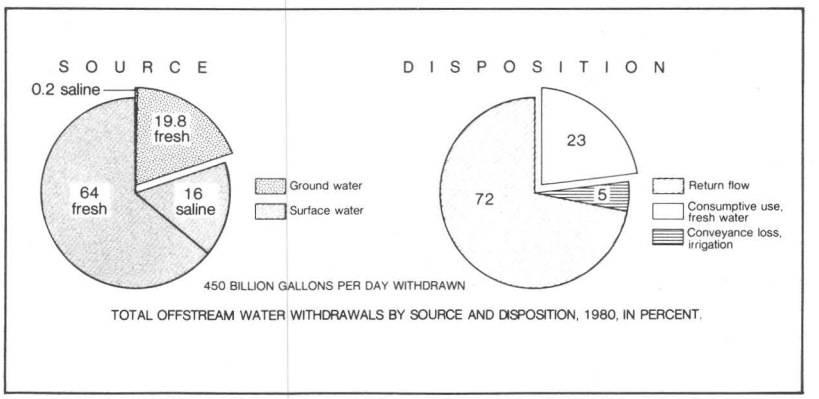
The estimated withdrawal of 450 bgd for all offstream uses (public supply, rural, irrigation, and self-supplied industrial use) in 1980 was about 8 percent greater than the withdrawals estimated for 1975. Ground-water withdrawals accounted for 89 bgd, a 7-percent increase over 1975; of this amount, 88 bgd was fresh water. Surface-water withdrawals accounted for 360 bgd, a 9-percent increase from 1975, of which 71 bgd was saline water. Reclaimed sewage amounted to 0.5 bgd in 1980, an 11-percent decrease from 1975.

Fresh-water consumptive use in 1980 was estimated at 100 bgd, a 7-percent increase from 1975. The percentages of water consumed by the various use categories were nearly the same as in 1970 and 1975. Irrigation water accounted for the largest amount of water consumed, 83 bgd. In addition, conveyance losses associated with irrigation were estimated at 24 bgd. Geographically, 80 percent of the consumptive use was in the Western States, a decrease of 4 percent since 1975 and 6 percent since 1970, whereas, the 20 percent consumed in the Eastern States reflects an increase of 6 percent since 1970. The range in fresh-water consumptive use by States and water-resources regions is shown in figure 8.

Several tables and illustrations are included in this section to summarize the vast amount of data given in this report. The percentages of water withdrawn and consumed by the four offstream water-use categories are shown in figure 6. The ranges in total offstream withdrawals by States and water-resources regions are shown in figure 7, and the ranges in comsumptive use are shown in figure 8. A comparison of withdrawals from ground- and surface-water sources for both States and water-resources regions is shown in figure 9. The withdrawals of the two largest offstream users, self-supplied industrial and irrigation use, are compared in figure 10.

The per capita withdrawals and consumptive use for the United States and for the eastern and western water-resources regions are given in table 13. The total offstream water use (withdrawals, conveyance losses, and consumptive use) is given by States in table 14 and by water-resources regions in table 15. A summary of withdrawals for the offstream water-use categories is given by States in table 16 and by water-resources regions in table 17. Ground- and surface-water withdrawals are summarized in tables 18 through 21 and also in figure 9.

Total offstream withdrawals by source and disposition are shown in the chart below.



TOTAL OFFSTREAM WATER WITHDRAWALS BY SOURCE AND DISPOSITION, 1980, IN PERCENT.

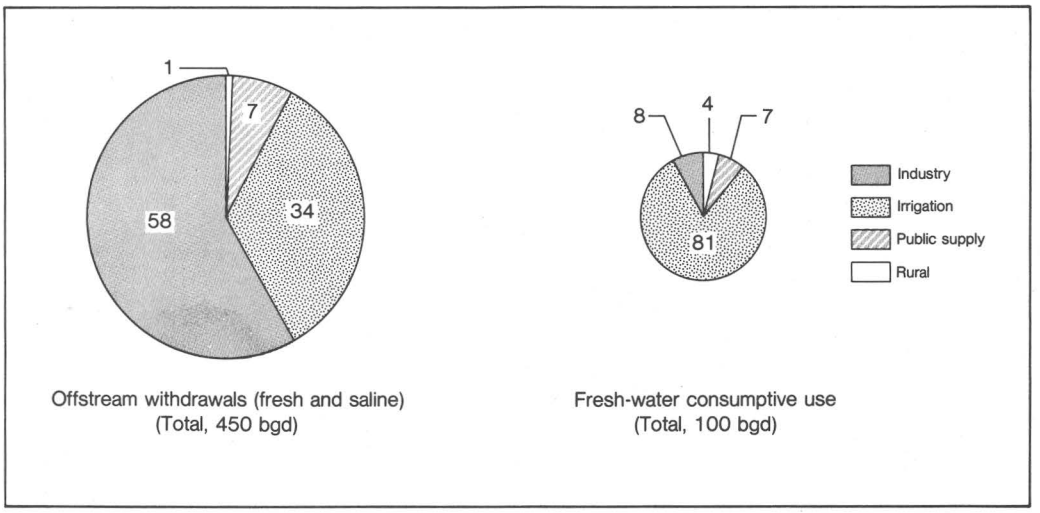


Figure 6. Percentage of total offstream withdrawals and fresh-water consumptive use, by categories of use, 1980.

Table 13.—*PER CAPITA WATER WITHDRAWALS AND CONSUMPTIVE USE*
Eastern and western water-resources regions and United States, 1980

[Note: All per capita data calculated from unrounded figures and rounded to two significant figures]

	Conterminous United States water-resources regions		United States (50 States, District of Columbia, Puerto Rico, and Virgin Islands)
	Eastern (9 regions = 31 States)[1]	Western (9 regions = 17 States)[1]	
Population, in millions:			
Total	155.7	69.1	229.6
Served by public supplies	123.5	58.1	186.1
Self supplied (rural)	32.2	11.0	43.5
Per capita water use, in gallons per day:			
Offstream use:			
Total withdrawals[2]	1,600	2,900	2,000
Public supplies:			
All uses[3]	160	230	180
Domestic and public uses and losses[3]	100	150	120
Rural domestic use[4]	73	98	79
Irrigation[2]	82	2,000	660
Self-supplied industrial[2]	1,300	660	1,100
Consumptive fresh-water use[2]	120	1,200	450
Instream use:			
Hydroelectric power[2]	8,900	27,000	14,000
Total offstream and instream use[2]	10,000	30,000	16,000

[1] Approximate boundaries.
[2] Based on total population.
[3] Based on population served by public supplies.
[4] Based on rural population.

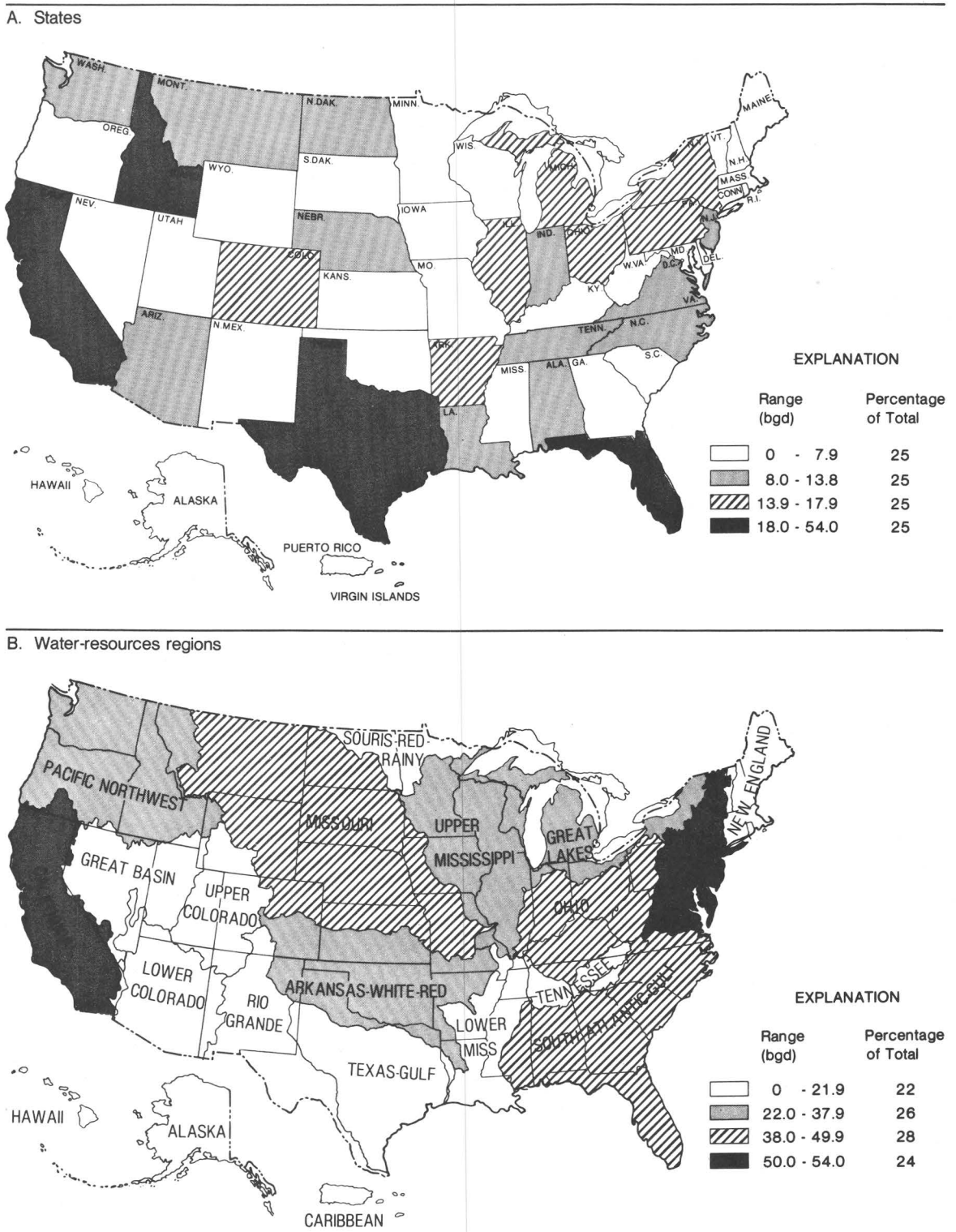


Figure 7. Total offstream water withdrawals, by States and water-resources regions, 1980.

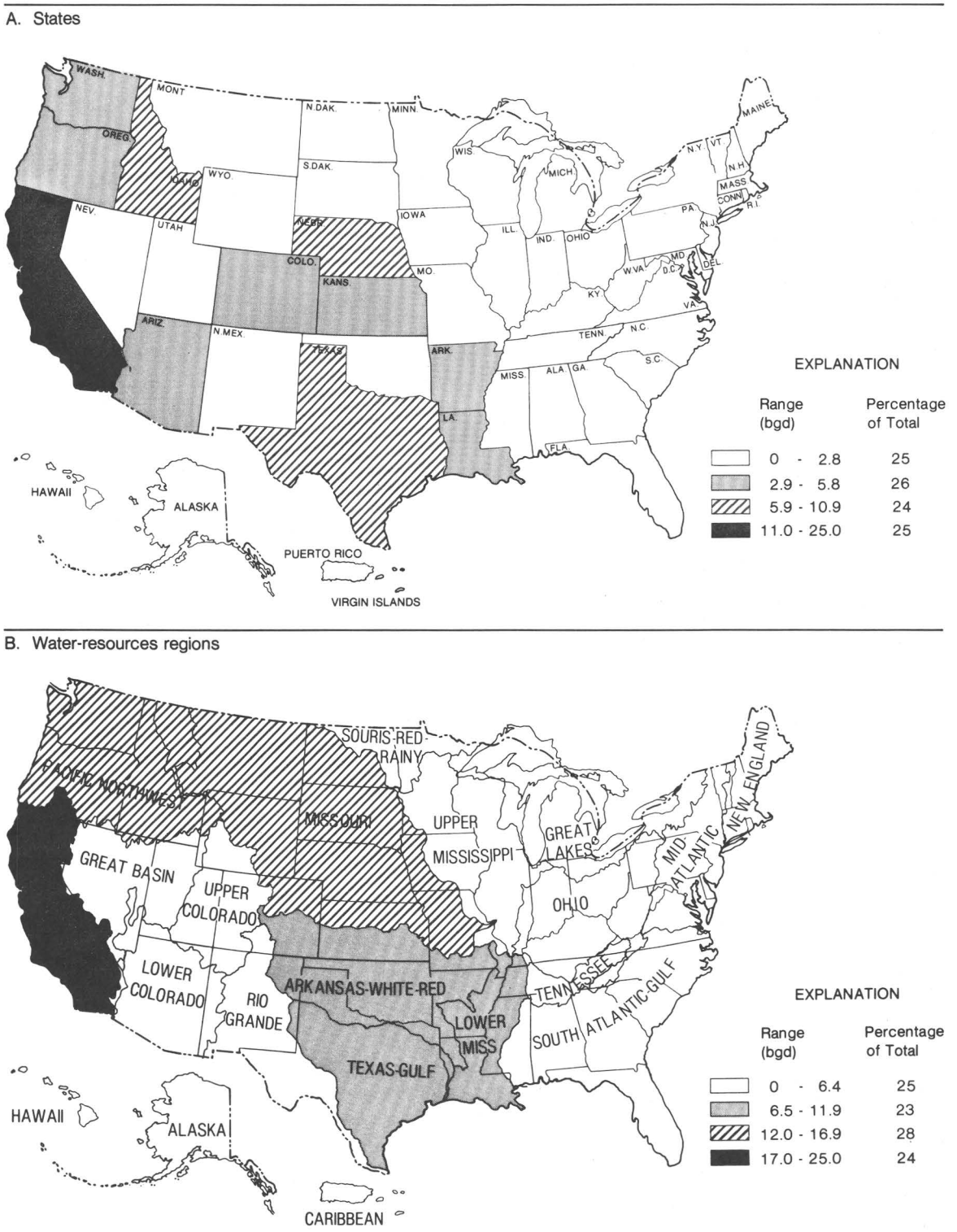


Figure 8. Fresh-water consumptive use, by State and water-resources regions, 1980.

Table 14.—*TOTAL OFFSTREAM WATER USE, BY STATES, IN MILLION GALLONS PER DAY (except as noted), 1980*

[Water-use data generally are rounded to two significant figures; figures may not add to totals because of independent rounding]

STATE	POPULATION, in thousands	PER CAPITA USE, fresh water in gpd	WITHDRAWALS (includes irrigation conveyance losses)										CONVEYANCE LOSSES	CONSUMPTIVE USE, fresh water
			By source and type							Total, excluding reclaimed sewage				
			Ground water			Surface water			Reclaimed sewage					
			Fresh	Saline	Total	Fresh	Saline	Total		Fresh	Saline	Total		
Alabama	3890	2700	350	1.4	350	10000	73	10000	0	11000	75	11000	0	570
Alaska	403	550	49	0	49	170	0	170	0	220	0	220	0	35
Arizona	2718	2900	4200	0	4200	3700	0	3700	5.3	8000	0	8000	900	4500
Arkansas	2290	6800	4000	0	4000	12000	0	12000	0	16000	0	16000	270	3600
California	23669	1900	21000	250	21000	23000	9800	33000	160	44000	10000	54000	5600	25000
Colorado	2889	5400	2800	0	2800	13000	0	13000	0	16000	0	16000	1600	4000
Connecticut	3108	420	140	1.0	140	1200	2400	3600	0	1300	2400	3700	0	160
Delaware	595	230	82	0.3	82	57	1100	1100	0	140	1100	1200	0	11
D.C.	638	530	0.8	0	0.8	340	0	340	0	340	0	340	0	23
Florida	9740	750	3800	42	3800	3600	14000	17000	0	7300	14000	21000	35	2400
Georgia	5464	1200	1200	0	1200	5500	200	5700	0	6700	200	6900	0	1000
Hawaii	965	1400	800	0	800	510	1200	1700	10	1300	1200	2500	300	680
Idaho	944	19000	6300	0	6300	12000	0	12000	13	18000	0	18000	3600	5900
Illinois	11418	1600	930	38	970	17000	0	17000	0	18000	38	18000	0	590
Indiana	5396	2600	1300	0	1300	13000	0	13000	0	14000	0	14000	0	690
Iowa	2913	1500	760	0	760	3500	0	3500	0	4300	0	4300	0	290
Kansas	2363	2800	5600	0	5600	980	0	980	0	6600	0	6600	150	4700
Kentucky	3661	1300	250	0	250	4600	0	4600	0	4800	0	4800	0	290
Louisiana	4199	2900	1800	19	1800	11000	390	11000	0	12000	410	13000	610	3500
Maine	1125	750	80	0	80	770	710	1500	0	850	710	1600	0	53
Maryland	4216	270	150	0	150	970	6600	7600	160	1100	6600	7700	0	100
Massachusetts	5737	430	320	0	320	2100	3500	5600	0	2500	3500	5900	0	90
Michigan	9258	1600	530	420	950	14000	0	14000	30	15000	420	15000	0	460
Minnesota	4061	760	670	0	670	2400	0	2400	0	3100	0	3100	0	450
Mississippi	2521	1100	1500	0	1500	1400	660	2000	0	2900	660	3500	99	710
Missouri	4888	1400	470	0	470	6400	0	6400	0	6900	0	6900	0	670
Montana	786	14000	260	2.1	260	11000	0	11000	0	11000	2.1	11000	2400	2700
Nebraska	1570	7700	7200	0	7200	4900	0	4900	0	12000	0	12000	1900	7600
Nevada	799	4500	710	9.0	720	2900	0	2900	14	3600	9.0	3600	720	1700
New Hampshire	921	420	65	0	65	320	620	940	0	380	620	1000	0	17
New Jersey	7360	390	730	0	730	2100	7500	9600	0	2900	7500	10000	0	380
New Mexico	1300	3000	1800	0.9	1800	2100	0	2100	0	3900	0.9	3900	31	1900
New York	17557	450	780	12	800	7200	8600	16000	0	8000	8600	17000	0	590
North Carolina	5874	1400	770	0	770	7300	42	7300	0	8100	42	8100	0	760
North Dakota	652	2000	120	0.2	120	1200	0	1200	0.4	1300	0.2	1300	120	330
Ohio	10797	1300	980	0	980	13000	0	13000	0	14000	0	14000	0	550
Oklahoma	3025	570	960	95	1100	760	0	760	0	1700	95	1800	53	1000
Oregon	2614	2600	1100	0	1100	5700	0	5700	3.6	6800	0	6800	1700	3200
Pennsylvania	11824	1300	1000	0	1000	15000	93	15000	0	16000	93	16000	0	920
Rhode Island	947	180	37	0	37	140	330	460	0	170	330	500	0.5	15
South Carolina	3119	2000	230	0	230	5900	38	6000	0	6200	38	6200	0	280
South Dakota	695	990	330	3.4	330	360	0	360	1.5	690	3.4	690	42	460
Tennessee	4591	2200	450	0	450	9600	0	9600	0	10000	0	10000	0.6	270
Texas	14013	1000	8000	0	8000	6300	6600	13000	70	14000	6600	21000	200	10000
Utah	1462	3100	1000	4.0	1000	3500	56	3600	0	4500	60	4600	320	2900
Vermont	511	660	45	0	45	290	0	290	0	340	0	340	0	41
Virginia	5346	1000	390	0.2	390	5200	4100	9300	0	5600	4100	9700	3.9	230
Washington	4127	2000	770	0	770	7500	42	7500	0	8200	42	8300	1200	2900
West Virginia	1950	2900	220	0	220	5400	0	5400	0	5600	0	5600	0	200
Wisconsin	4710	1200	610	0	610	5200	0	5200	0	5800	0	5800	0	310
Wyoming	471	11000	540	24	560	4800	0	4800	0	5300	24	5400	1600	2600
Puerto Rico	3400	240	310	5.0	320	500	2400	2900	0	810	2400	3200	30	300
Virgin Islands	100	63	4.0	0	4.0	2.2	32	34	0	6.3	32	38	0	2.1
Total	229,592	1,600	88,000	930	89,000	290,000	71,000	360,000	470	380,000	72,000	450,000	24,000	100,000

Table 15.—*TOTAL OFFSTREAM WATER USE, BY REGIONS, IN MILLION GALLONS PER DAY (except as noted) 1980*

[Water-use data generally are rounded to two significant figures; figures may not add to totals because of independent rounding]

WATER-RESOURCES REGION	POPULATION, in thousands	PER CAPITA USE, fresh water in gpd	WITHDRAWALS (includes irrigation conveyance losses)										CONVEYANCE LOSSES	CONSUMPTIVE USE, fresh water
			By source and type							Total, excluding reclaimed sewage				
			Ground water			Surface water			Reclaimed sewage					
			Fresh	Saline	Total	Fresh	Saline	Total		Fresh	Saline	Total		
New England	11941	450	650	1.0	650	4800	7500	12000	0	5400	7500	13000	0.5	360
Mid-Atlantic	38881	630	2400	12	2400	22000	28000	50000	160	24000	28000	52000	1.7	1700
South Atlantic-Gulf	29449	1100	6600	44	6600	27000	15000	42000	0	34000	15000	49000	38	5100
Great Lakes	21489	1700	1600	420	2000	36000	0	36000	30	37000	420	38000	0	1300
Ohio	21461	1800	2500	24	2500	35000	0	35000	0	38000	24	38000	0.1	1700
Tennessee	3677	3200	260	0	260	12000	0	12000	0	12000	0	12000	0.2	370
Upper Mississippi	21083	1100	2600	15	2600	20000	0	20000	0	23000	15	23000	0	1500
Lower Mississippi	6874	3000	6700	19	6700	14000	390	15000	0	21000	410	21000	960	7100
Souris-Red-Rainy	796	280	110	0	110	110	0	110	0.2	220	0	220	5.9	130
Missouri Basin	9761	4000	12000	26	12000	27000	0	27000	1.7	39000	26	39000	6000	16000
Arkansas-White-Red	7900	3000	9400	95	9500	14000	2.0	14000	15	24000	97	24000	360	9600
Texas-Gulf	12524	820	5100	0	5100	5200	6600	12000	55	10000	6600	17000	140	6500
Rio Grande	1775	2700	1900	0.9	1900	2800	0	2800	0	4700	0.9	4700	290	2400
Upper Colorado	548	16000	140	3.5	150	8400	0.7	8400	0.1	8500	4.2	8500	830	2300
Lower Colorado	3241	2700	4500	0.2	4500	4200	0	4200	18	8700	0.2	8700	950	4900
Great Basin	1782	4200	1600	13	1600	5800	55	5900	4.8	7400	68	7500	1000	3900
Pacific Northwest	7870	4400	8200	0	8200	26000	42	26000	17	34000	42	34000	6800	12000
California	23671	1900	21000	250	21000	23000	9800	33000	160	44000	10000	54000	5800	25000
Alaska	403	550	49	0	49	170	0	170	0	220	0	220	0	35
Hawaii	965	1400	800	0	800	510	1200	1700	10	1300	1200	2500	300	680
Caribbean	3500	230	320	5.0	320	500	2500	3000	0	820	2500	3300	30	310
Total	229,592	1,600	88,000	930	89,000	290,000	71,000	360,000	470	380,000	72,000	450,000	24,000	100,000

Table 16.—*SUMMARY OF WATER WITHDRAWALS FOR OFFSTREAM WATER-USE CATEGORIES, BY STATES, IN MILLION GALLONS PER DAY (except as noted), 1980*

[Water-use data generally are rounded to two significant figures, population data are rounded to three significant figures; figures may not add to totals because of independent rounding]

STATE	PUBLIC SUPPLY		RURAL USE			IRRIGATION			SELF-SUPPLIED INDUSTRIAL				TOTAL, excluding reclaimed sewage	
									Thermoelectric power		Other uses			
	Population served, in thousands	Withdrawals (mgd)	Domestic use	Livestock use	Domestic and Livestock	Irrigated land, in thousand acres	Thousand acre-feet per year	Million gallons per day	Fresh	Saline	Fresh	Saline	Fresh	Saline
Alabama	2950	620	100	88	190	75	37	33	8500	73	1300	1.6	11000	75
Alaska	286	53	11	0.2	11	0	0	0	30	0	130	0	220	0
Arizona	2440	560	32	12	43	1300	8000	7100	89	0	160	0	8000	0
Arkansas	1700	260	57	61	120	1800	5700	5100	9700	0	510	0	16000	0
California	22300	4100	140	87	220	9700	42000	37000	2000	9200	470	820	44000	10000
Colorado	2540	590	98	110	200	2700	16000	14000	170	0	730	0	16000	0
Connecticut	2500	360	53	2.2	56	17	23	21	610	2400	270	2.0	1300	2400
Delaware	494	78	25	2.0	27	10	7.3	6.5	5.4	670	22	390	140	1100
D.C.	638	210	0	0	0	0	0	0	130	0	1.4	0	340	0
Florida	7790	1400	250	59	310	2000	3400	3000	1900	14000	780	57	7300	14000
Georgia	4180	770	140	28	160	1000	650	580	4400	160	780	42	6700	200
Hawaii	965	200	3.9	5.5	9.4	140	1000	910	140	1200	45	7.0	1300	1200
Idaho	709	160	46	22	68	4000	18000	16000	5.3	0	2200	0	18000	0
Illinois	10700	1800	82	65	150	150	120	110	14000	0	1800	38	18000	38
Indiana	3350	580	120	42	160	65	260	230	9700	0	3100	0	14000	0
Iowa	2120	310	55	130	180	150	62	56	3200	0	550	0	4300	0
Kansas	1740	290	63	81	140	3400	6300	5600	350	0	180	0	6600	0
Kentucky	2450	350	61	39	99	14	5.5	4.9	4100	0	320	0	4800	0
Louisiana	3160	610	54	18	72	740	2500	2200	5900	180	3500	230	12000	410
Maine	473	100	26	1.7	28	11	6.8	6.1	56	700	650	11	850	710
Maryland	3460	490	49	11	60	33	22	20	410	6100	150	500	1100	6600
Massachusetts	5400	800	32	1.2	33	45	21	19	1300	3400	310	64	2500	3500
Michigan	6590	1300	160	22	180	320	240	210	12000	0	1700	420	15000	420
Minnesota	2920	440	120	68	190	460	180	160	1700	0	590	0	3100	0
Mississippi	1980	290	27	21	49	480	1100	980	1100	500	450	160	2900	660
Missouri	4690	730	92	65	160	240	140	130	5500	0	300	0	6900	0
Montana	524	140	60	28	88	2600	12000	11000	180	0	110	2.1	11000	2.1
Nebraska	1240	260	49	120	170	7100	10000	9300	2200	0	64	0	12000	0
Nevada	721	230	11	12	24	850	3500	3100	94	0	140	9.0	3600	9.0
New Hampshire	758	89	9.3	0.8	10	1.8	1.8	1.6	74	620	210	0	380	620
New Jersey	7360	1100	75	3.0	78	75	62	55	910	6500	750	1000	2900	7500
New Mexico	880	210	33	19	52	1400	4000	3600	65	0	6.6	0.9	3900	0.9
New York	15700	2200	130	58	190	56	51	46	4400	8500	1100	130	8000	8600
North Carolina	3110	570	140	39	170	150	150	130	4300	6.4	2900	36	8100	42
North Dakota	505	59	11	21	32	180	310	280	930	0	7.0	0.2	1300	0.2
Ohio	8990	1400	89	40	130	48	5.9	5.3	10000	0	2000	0	14000	0
Oklahoma	2330	300	35	58	93	900	980	870	180	0	270	95	1700	95
Oregon	1200	230	150	26	170	2100	6600	5900	22	0	500	0	6800	0
Pennsylvania	8800	1500	150	61	210	63	180	160	10000	93	3600	0	16000	93
Rhode Island	864	130	4.9	0.2	5.1	4.0	5.6	5.0	0.1	330	35	0.6	170	330
South Carolina	2320	350	65	22	87	73	61	54	5200	7.7	460	30	6200	38
South Dakota	455	76	22	92	110	390	510	460	4.9	0	42	3.4	690	3.4
Tennessee	3720	510	43	42	85	21	14	12	7800	0	1700	0	10000	0
Texas	11400	3800	130	270	400	7700	9500	8400	990	5500	730	1100	14000	6600
Utah	1300	750	29	40	69	1200	3600	3200	64	5.9	460	54	4500	60
Vermont	320	48	20	9.2	29	1.6	1.6	1.4	250	0	15	0	340	0
Virginia	3860	600	150	28	180	41	31	28	4300	4000	470	81	5600	4100
Washington	3300	810	52	6.1	58	1600	7200	6400	1.3	0	990	42	8200	42
West Virginia	1330	180	19	7.6	27	2.4	1.5	1.3	4600	0	830	0	5600	0
Wisconsin	3040	570	72	75	150	240	95	85	4500	0	450	0	5800	0
Wyoming	322	82	9.6	15	25	1800	5400	4900	220	0	170	24	5300	24
Puerto Rico	3200	350	6.0	30	36	75	350	310	3.0	1500	120	930	810	2400
Virgin Islands	64	4.0	2.1	0.1	2.2	0.5	0	0	0	32	0	0	6.3	32
Total	186,000	34,000	3,400	2,200	5,600	58,000	170,000	150,000	150,000	65,000	39,000	6,300	380,000	72,000

Table 17.—*SUMMARY OF WATER WITHDRAWALS FOR OFFSTREAM WATER-USE CATEGORIES, BY REGIONS, IN MILLION GALLONS PER DAY (except as noted), 1980*

[Water-use data generally are rounded to two significant figures, population data are rounded to three significant figures; figures may not add to totals because of independent rounding]

WATER-RESOURCES REGION	PUBLIC SUPPLY		RURAL USE			IRRIGATION			SELF-SUPPLIED INDUSTRIAL				TOTAL, excluding reclaimed sewage	
									Thermoelectric power		Other uses			
	Population served, in thousands	Withdrawals (mgd)	Domestic use	Livestock use	Domestic and Livestock	Irrigated land, in thousand acres	Thousand acre-feet per year	Million gallons per day	Fresh	Saline	Fresh	Saline	Fresh	Saline
New England	10000	1500	130	9.2	140	79	59	53	2300	7400	1500	78	5400	7500
Mid-Atlantic	34100	5400	430	110	550	230	280	250	15000	25000	3400	2100	24000	28000
South Atlantic-Gulf	21400	3800	720	240	960	3400	4300	3800	19000	15000	5900	330	34000	15000
Great Lakes	21500	3900	270	84	350	450	380	340	27000	0	5700	420	37000	420
Ohio	15300	2200	310	150	470	84	170	150	30000	0	5000	24	38000	24
Tennessee	2680	410	61	41	100	14	7.6	6.8	9300	0	2000	0	12000	0
Upper Mississippi	12600	1900	300	270	570	820	420	380	16000	0	3300	15	23000	15
Lower Mississippi	5330	920	94	42	140	2900	8700	7700	7700	180	4300	230	21000	410
Souris-Red-Basin	494	57	23	14	37	120	72	64	54	0	9.3	0	220	0
Missouri Basin	8090	1400	230	390	630	14000	32000	28000	8200	0	680	26	39000	26
Arkansas-White-Red	6090	1600	160	240	390	7000	12000	11000	10000	0	840	97	24000	97
Texas-Gulf	10100	3000	120	190	310	5200	6200	5500	980	5500	520	1100	10000	6600
Rio Grande	1370	320	33	32	65	1400	4800	4300	17	0	16	0.9	4700	0.9
Upper Colorado	357	120	58	94	150	1300	8400	7500	140	0.7	590	3.5	8500	4.2
Lower Colorado	2910	720	37	17	54	1400	8500	7600	90	0	250	0.2	8700	0.2
Great Basin	1570	810	36	46	82	1900	6600	5900	130	5.2	500	63	7400	68
Pacific Northwest	5320	1300	270	55	320	7700	33000	29000	29	0	3700	42	34000	42
California	22300	4100	140	86	220	10000	42000	38000	2000	9200	480	820	44000	10000
Alaska	286	53	11	0.2	11	0	0	0	30	0	130	0	220	0
Hawaii	965	200	3.9	5.5	9.4	140	1000	910	140	1200	45	7.0	1300	1200
Caribbean	3260	350	8.1	30	38	76	350	310	3.0	1500	120	930	820	2500
Total	186,000	34,000	3,400	2,200	5,600	58,000	170,000	150,000	150,000	65,000	39,000	6,300	380,000	72,000

Table 18.—*GROUND-WATER WITHDRAWALS FOR OFFSTREAM WATER-USE CATEGORIES, BY STATES, IN MILLION GALLONS PER DAY (except as noted), 1980*

[Water-use data generally are rounded to two significant figures, population data are rounded to three significant figures; figures may not add to totals because of independent rounding]

STATE	PUBLIC SUPPLY		RURAL USE			IRRIGATION			SELF-SUPPLIED INDUSTRIAL				
									Thermo-electric power	Other uses		TOTAL, excluding reclaimed sewage	
	Population served, in thousands	Withdrawals (mgd)	Domestic use	Livestock use	Domestic and Livestock	Irrigated land, in thousand acres	Thousand acre-feet per year	Million gallons per day	Fresh	Fresh	Saline	Fresh	Saline
Alabama	1200	160	100	25	130	75	11	9.4	1.5	51	1.4	350	1.4
Alaska	172	23	11	0	11	0	0	0	8.4	6.1	0	49	0
Arizona	1490	300	32	9.8	42	1300	4100	3700	40	140	0	4200	0
Arkansas	880	110	57	22	78	1800	3900	3500	3.1	320	0	4000	0
California	9580	1900	130	36	160	9700	20000	18000	890	420	250	21000	250
Colorado	320	48	35	19	54	2700	3000	2700	9.4	7.1	0	2800	0
Connecticut	521	55	53	0.4	54	17	1.8	1.6	0.2	26	1.0	140	1.0
Delaware	254	30	25	2.0	27	10	4.6	4.1	5.4	15	0.3	82	0.3
D.C.	0	0	0	0	0	0	0	0	0	0.8	0	0.8	0
Florida	6800	1200	250	39	290	2000	1800	1600	70	640	42	3800	42
Georgia	1320	230	140	17	150	1000	420	380	4.1	400	0	1200	0
Hawaii	914	180	3.5	5.3	8.8	140	520	460	130	9.1	0	800	0
Idaho	592	150	44	9.3	53	4000	4500	4100	5.3	2100	0	6300	0
Illinois	4050	480	79	49	130	150	110	100	8.4	210	38	930	38
Indiana	1920	300	110	24	130	65	240	210	5.0	640	0	1300	0
Iowa	1600	230	55	100	160	150	55	49	4.0	320	0	760	0
Kansas	903	140	58	35	93	3400	5800	5200	46	140	0	5600	0
Kentucky	375	47	54	1.9	56	14	0.3	0.2	15	130	0	250	0
Louisiana	1850	270	54	12	67	740	1100	990	46	390	19	1800	19
Maine	101	20	26	1.0	27	11	0.2	0.2	1.0	33	0	80	0
Maryland	417	48	49	10	59	33	11	10	3.0	34	0	150	0
Massachusetts	1550	190	32	0.7	32	45	6.1	5.4	0	93	0	320	0
Michigan	1310	220	160	17	180	320	86	77	0	62	420	530	420
Minnesota	1910	230	120	58	180	460	160	140	2.2	120	0	670	0
Mississippi	1800	250	27	9.7	37	480	950	840	17	360	0	1500	0
Missouri	1520	160	68	17	85	240	110	98	16	120	0	470	0
Montana	184	50	60	14	74	2600	120	110	0	32	2.1	260	2.1
Nebraska	961	210	49	93	140	7100	7500	6700	31	58	0	7200	0
Nevada	329	93	11	3.7	14	850	590	530	8.1	63	9.0	710	9.0
New Hampshire	392	43	9.1	0.2	9.3	1.8	0	0	0	13	0	65	0
New Jersey	3420	450	75	2.0	77	75	45	40	5.0	150	0	730	0
New Mexico	798	190	32	9.6	42	1400	1800	1600	11	6.6	0.9	1800	0.9
New York	3510	350	130	37	170	56	24	21	130	120	12	780	12
North Carolina	474	70	140	33	170	150	44	39	0	490	0	770	0
North Dakota	258	26	11	13	24	180	73	65	1.2	2.2	0.2	120	0.2
Ohio	2950	380	80	24	100	48	2.1	1.9	21	470	0	980	0
Oklahoma	662	86	29	8.2	38	900	820	730	7.7	95	95	960	95
Oregon	344	66	130	7.1	140	2100	950	850	0	80	0	1100	0
Pennsylvania	2180	240	150	54	200	63	25	22	6.8	550	0	1000	0
Rhode Island	142	19	4.9	0.1	5.0	4.0	0.6	0.5	0	13	0	37	0
South Carolina	541	78	65	12	77	73	19	17	0.5	57	0	230	0
South Dakota	321	52	21	81	100	390	170	150	2.4	23	3.4	330	3.4
Tennessee	1450	200	43	7.0	50	21	7.2	6.4	0	190	0	450	0
Texas	5030	930	130	120	250	7700	7300	6500	38	320	0	8000	0
Utah	662	380	26	31	57	1200	600	530	0.2	68	4.0	1000	4.0
Vermont	113	17	17	5.7	23	1.6	0.3	0.3	0	5.2	0	45	0
Virginia	707	120	150	2.3	150	41	9.4	8.4	1.2	110	0.2	390	0.2
Washington	2100	300	40	4.1	44	1600	300	260	0	150	0	770	0
West Virginia	411	49	18	1.0	19	2.4	0.1	0.1	0	150	0	220	0
Wisconsin	1620	290	72	72	140	240	92	82	1.2	96	0	610	0
Wyoming	122	27	8.8	3.1	12	1800	420	370	1.1	130	24	540	24
Puerto Rico	669	73	3.0	15	18	75	150	140	3.0	85	5.0	310	5.0
Virgin Islands	32	2.0	2.0	0	2.0	0.5	0	0	0	0	0	4.0	0
Total	73,700	12,000	3,300	1,200	4,400	58,000	68,000	60,000	1,600	10,000	930	88,000	930

Table 19.—*GROUND-WATER WITHDRAWALS FOR OFFSTREAM WATER-USE CATEGORIES, BY REGIONS, IN MILLION GALLONS PER DAY (except as noted), 1980*

[Water-use data generally are rounded to two significant figures, population data are rounded to three significant figures; figures may not add to totals because of independent rounding]

WATER-RESOURCES REGION	PUBLIC SUPPLY		RURAL USE			IRRIGATION			SELF-SUPPLIED INDUSTRIAL				
									Thermo-electric power	Other uses		TOTAL, excluding reclaimed sewage	
	Population served, in thousands	Withdrawals (mgd)	Domestic use	Livestock use	Domestic and Livestock	Irrigated land, in thousand acres	Thousand acre-feet per year	Million gallons per day	Fresh	Fresh	Saline	Fresh	Saline
New England	2730	330	130	4.5	140	79	8.7	7.8	1.2	180	1.0	650	1.0
Mid-Atlantic	9440	1100	430	79	510	230	110	97	110	580	12	2400	12
South Atlantic-Gulf	11400	1900	720	130	850	3400	2300	2000	88	1800	44	6600	44
Great Lakes	2970	440	270	64	330	450	200	180	30	630	420	1600	420
Ohio	5600	730	290	63	360	84	99	88	52	1300	24	2500	24
Tennessee	727	89	61	12	73	14	3.0	2.7	0	97	0	260	0
Upper Mississippi	8330	1100	290	220	510	820	390	350	13	650	15	2600	15
Lower Mississippi	4170	610	94	17	110	2900	5400	4800	54	1000	19	6700	19
Souris-Red-Basin	253	27	23	9.8	33	120	52	46	0.9	4.2	0	110	0
Missouri Basin	3360	530	210	270	480	14000	12000	11000	48	380	26	12000	26
Arkansas-White-Red	2280	320	130	85	210	7000	9500	8400	70	320	95	9400	95
Texas-Gulf	4330	800	120	78	200	5200	4300	3900	30	240	0	5100	0
Rio Grande	1100	240	33	26	58	1400	1800	1600	15	16	0.9	1900	0.9
Upper Colorado	91	23	15	2.4	18	1300	90	81	0	23	3.5	140	3.5
Lower Colorado	1710	370	37	12	48	1400	4400	3900	45	160	0.2	4500	0.2
Great Basin	800	400	32	34	66	1900	1100	1000	4.5	130	13	1600	13
Pacific Northwest	3050	530	230	21	250	7700	5700	5100	5.3	2300	0	8200	0
California	9610	1900	130	36	170	10000	20000	18000	890	430	250	21000	250
Alaska	172	23	11	0	11	0	0	0	8.4	6.1	0	49	0
Hawaii	914	180	3.5	5.3	8.8	140	520	460	130	9.1	0	800	0
Caribbean	701	75	5.0	15	20	76	150	140	3.0	85	5.0	320	5.0
Total	73,700	12,000	3,300	1,200	4,400	58,000	68,000	60,000	1,600	10,000	930	88,000	930

Table 20.—*SURFACE-WATER WITHDRAWALS FOR OFFSTREAM WATER-USE CATEGORIES, BY STATES, IN MILLION GALLONS PER DAY (except as noted), 1980*

[Water-use data generally are rounded to two significant figures, population data are rounded to three significant figures; figures may not add to totals because of independent rounding]

STATE	PUBLIC SUPPLY		RURAL USE			IRRIGATION			SELF-SUPPLIED INDUSTRIAL				TOTAL, excluding reclaimed sewage	
									Thermoelectric power		Other uses			
	Population served, in thousands	Withdrawals (mgd)	Domestic use	Livestock use	Domestic and Livestock	Irrigated land, in thousand acres	Thousand acre-feet per year	Million gallons per day	Fresh	Saline	Fresh	Saline	Fresh	Saline
Alabama	1740	460	0	63	63	75	27	24	8500	73	1200	0.2	10000	73
Alaska	113	30	0.1	0.1	0.3	0	0	0	22	0	120	0	170	0
Arizona	945	260	0	1.8	1.8	1300	3800	3400	49	0	20	0	3700	0
Arkansas	816	150	0	39	39	1800	1800	1600	9700	0	190	0	12000	0
California	12700	2200	9.5	51	60	9700	22000	19000	1100	9200	45	560	23000	9800
Colorado	2220	540	62	86	150	2700	12000	11000	160	0	730	0	13000	0
Connecticut	1980	300	0	1.8	1.8	17	21	19	610	2400	250	1.0	1200	2400
Delaware	240	48	0	0	0	10	2.7	2.4	0	670	6.2	390	57	1100
D.C.	638	210	0	0	0	0	0	0	130	0	0.6	0	340	0
Florida	991	180	0.1	20	20	2000	1600	1400	1800	14000	140	15	3600	14000
Georgia	2860	540	0	11	11	1000	230	200	4400	160	380	42	5500	200
Hawaii	51	15	0.4	0.2	0.6	140	500	450	9.0	1200	36	7.0	510	1200
Idaho	117	16	2.0	13	15	4000	13000	12000	0	0	120	0	12000	0
Illinois	6690	1300	3.6	16	20	150	5.9	5.3	14000	0	1600	0	17000	0
Indiana	1430	280	5.6	19	24	65	24	21	9700	0	2500	0	13000	0
Iowa	528	84	0.2	25	25	150	7.5	6.7	3200	0	230	0	3500	0
Kansas	832	150	4.3	46	50	3400	490	440	300	0	41	0	980	0
Kentucky	2080	310	6.3	37	43	14	5.2	4.7	4000	0	190	0	4600	0
Louisiana	1310	340	0	5.2	5.2	740	1400	1300	5800	180	3100	210	11000	390
Maine	372	85	0.5	0.7	1.2	11	6.6	5.9	55	700	620	11	770	710
Maryland	3040	440	0	0.5	0.5	33	11	9.4	400	6100	120	500	970	6600
Massachusetts	3850	610	0	0.5	0.5	45	15	14	1300	3400	220	64	2100	3500
Michigan	5280	1000	0	5.0	5.0	320	120	110	12000	0	1600	0	14000	0
Minnesota	1010	210	0	10	10	460	20	18	1700	0	470	0	2400	0
Mississippi	182	42	0	12	12	480	150	130	1100	500	97	160	1400	660
Missouri	3160	570	24	48	72	240	33	30	5500	0	190	0	6400	0
Montana	339	93	0	14	14	2600	12000	10000	180	0	76	0	11000	0
Nebraska	276	56	0	23	23	7100	2900	2600	2200	0	6.3	0	4900	0
Nevada	392	140	0.7	8.5	9.2	850	2900	2600	86	0	74	0	2900	0
New Hampshire	366	46	0.2	0.5	0.8	1.8	1.8	1.6	74	620	200	0	320	620
New Jersey	3940	620	0	1.0	1.0	75	17	15	910	6500	600	1000	2100	7500
New Mexico	82	21	1.1	9.6	11	1400	2200	2000	54	0	0.1	0	2100	0
New York	12100	1900	0	20	20	56	28	25	4300	8500	980	120	7200	8600
North Carolina	2640	500	0	5.6	5.6	150	100	93	4300	6.4	2400	36	7300	42
North Dakota	247	33	0.2	8.2	8.4	180	240	210	920	0	4.7	0	1200	0
Ohio	6040	1100	8.8	16	25	48	3.8	3.4	10000	0	1500	0	13000	0
Oklahoma	1670	220	5.2	50	55	900	160	140	170	0	170	0	760	0
Oregon	851	160	19	19	38	2100	5700	5000	22	0	420	0	5700	0
Pennsylvania	6620	1300	0	7.0	7.0	63	160	140	10000	93	3100	0	15000	93
Rhode Island	723	110	0	0.1	0.1	4.0	5.1	4.5	0.1	330	23	0.6	140	330
South Carolina	1780	270	0.2	10	10	73	42	37	5200	7.7	400	30	5900	38
South Dakota	134	24	1.4	11	12	390	340	310	2.5	0	19	0	360	0
Tennessee	2270	310	0	35	35	21	6.8	6.1	7800	0	1500	0	9600	0
Texas	6360	2900	0	150	150	7700	2100	1900	960	5500	410	1100	6300	6600
Utah	634	370	3.3	9.0	12	1200	3000	2700	64	5.9	390	50	3500	56
Vermont	207	31	2.6	3.5	6.1	1.6	1.3	1.2	250	0	9.6	0	290	0
Virginia	3160	480	0.1	26	26	41	22	19	4300	4000	360	81	5200	4100
Washington	1200	510	11	2.0	13	1600	6900	6100	1.3	0	830	42	7500	42
West Virginia	921	130	1.3	6.6	7.9	2.4	1.4	1.2	4600	0	680	0	5400	0
Wisconsin	1420	280	0	3.0	3.0	240	3.4	3.0	4500	0	350	0	5200	0
Wyoming	200	55	0.8	12	13	1800	5000	4500	220	0	44	0	4800	0
Puerto Rico	2530	280	3.0	15	18	75	200	180	0	1500	30	920	500	2400
Virgin Islands	32	2.0	0.1	0.1	0.2	0.5	0	0	0	32	0	0	2.2	32
Total	112,000	22,000	180	980	1,200	58,000	100,000	90,000	150,000	65,000	29,000	5,400	290,000	71,000

Table 21.—*SURFACE-WATER WITHDRAWALS FOR OFFSTREAM WATER-USE CATEGORIES, BY REGIONS, IN MILLION GALLONS PER DAY (except as noted), 1980*

[Water-use data generally are rounded to two significant figures, population data are rounded to three significant figures; figures may not add to totals because of independent rounding]

WATER-RESOURCES REGION	PUBLIC SUPPLY		RURAL USE			IRRIGATION			SELF-SUPPLIED INDUSTRIAL				TOTAL, excluding reclaimed sewage	
									Thermoelectric power		Other uses			
	Population served, in thousands	Withdrawals (mgd)	Domestic use	Livestock use	Domestic and Livestock	Irrigated land, in thousand acres	Thousand acre-feet per year	Million gallons per day	Fresh	Saline	Fresh	Saline	Fresh	Saline
New England	7310	1200	1.1	4.7	5.8	79	50	45	2300	7400	1300	77	4800	7500
Mid-Atlantic	24600	4300	2.4	32	35	230	170	150	15000	25000	2900	2100	22000	28000
South Atlantic-Gulf	10000	1900	0.4	110	110	3400	2000	1800	19000	15000	4100	280	27000	15000
Great Lakes	18600	3500	2.9	20	23	450	140	120	27000	0	5100	0	36000	0
Ohio	9710	1500	21	90	110	84	68	60	30000	0	3700	0	35000	0
Tennessee	1950	320	0	29	29	14	4.7	4.1	9300	0	2000	0	12000	0
Upper Mississippi	4240	820	10	51	61	820	32	29	16000	0	2600	0	20000	0
Lower Mississippi	1170	310	0.5	25	25	2900	3200	2900	7700	180	3200	210	14000	390
Souris-Red-Basin	241	30	0	3.8	3.8	120	20	18	53	0	5.1	0	110	0
Missouri Basin	4730	850	22	120	150	14000	20000	18000	8100	0	300	0	27000	0
Arkansas-White-Red	3810	1200	25	150	180	7000	2700	2400	9900	0	530	2.0	14000	2.0
Texas-Gulf	5810	2200	0	120	120	5200	1800	1600	950	5500	280	1100	5200	6600
Rio Grande	268	74	0.7	6.0	6.7	1400	3000	2700	2.5	0	0.5	0	2800	0
Upper Colorado	266	100	43	91	130	1300	8300	7400	140	0.7	560	0	8400	0.7
Lower Colorado	1200	350	0.1	5.2	5.4	1400	4200	3700	45	0	86	0	4200	0
Great Basin	769	410	3.8	12	16	1900	5500	4900	120	5.2	370	50	5800	55
Pacific Northwest	2260	730	32	34	66	7700	27000	24000	23	0	1400	42	26000	42
California	12700	2200	9.4	50	60	10000	22000	20000	1100	9200	58	560	23000	9800
Alaska	113	30	0.1	0.1	0.3	0	0	0	22	0	120	0	170	0
Hawaii	51	15	0.4	0.2	0.6	140	500	450	9.0	1200	36	7.0	510	1200
Caribbean	2560	280	3.1	15	18	76	200	180	0	1500	30	920	500	2500
Total	112,000	22,000	180	980	1,200	58,000	100,000	90,000	150,000	65,000	29,000	5,400	290,000	71,000

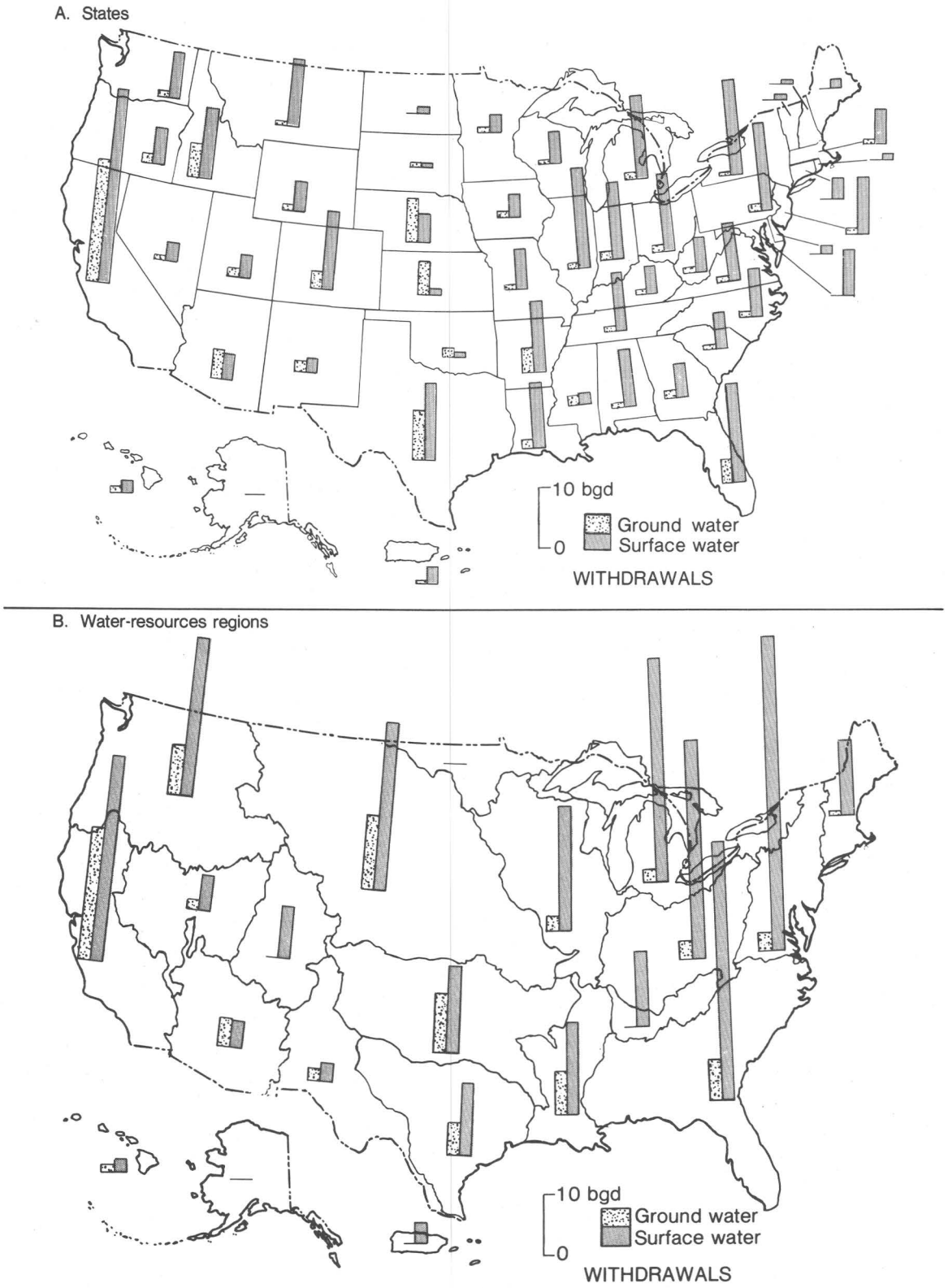


Figure 9. Withdrawals for offstream use from ground- and surface-water sources, by States and water-resources regions, 1980.

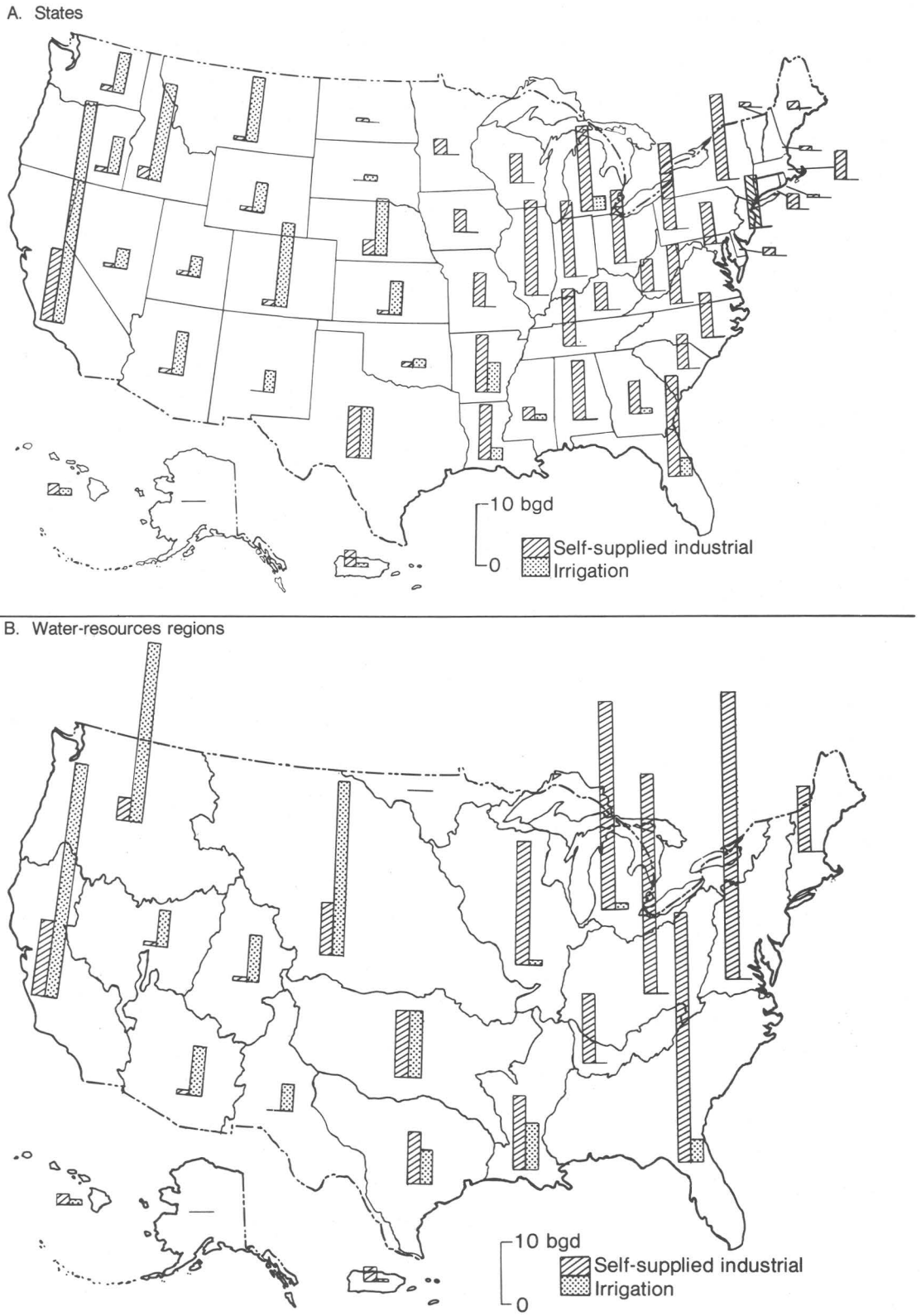


Figure 10. Comparison of withdrawals for self-supplied industrial use and irrigation use, by States and water-resources regions, 1980.

TRENDS IN WATER USE, 1950-1980

Water use for public supply, rural needs, irrigation, industry, and hydroelectric power generation has increased steadily from 1950 to 1980. This trend is shown graphically in figures 11 through 13. Data in table 22, which is a summary of estimated water use—offstream withdrawals, source of withdrawals, consumptive use, and instream use (hydroelectric power)—at 5-year intervals for the period 1950–1980, also confirm this trend. Table 22 also shows the percentage increase or decrease for the various categories of water use and sources of supply for the periods 1970–1975 and 1975–1980.

Trends established over the period 1950 to 1975 did not change significantly during the 1975–1980 period. For most categories of use, the general slackening in the rate of increase that was observed from 1970 to 1975 is again detectable for the 1975 to 1980 period. There are two exception to this trend: public supply and rural withdrawals increased 15 and 14 percent, respectively, compared to corresponding increases of 8 and 10 percent from 1970 to 1975. Part of the increase for public supply is due to the fact that nearly 2 bgd of water previously identified as self-supplied industrial withdrawals was actually public-supplied water, and it is now identified in the public-supply category. The increase in rural withdrawals resulted from an increase in the population being served by self-supplied systems and an increase in per capita use. This per-capita-use increase reflects the application of more realistic estimating techniques, which indicate that previous estimates were probably too low.

Irrigation water use declined from 1955 to 1960, when there was a decrease in the amount of surface water used, but irrigation water use has continued to increase since 1960. The amount of surface water used for irrigation increased 7.1 percent from 1975 to 1980—nearly double the 3.7 percent increase from 1970 to 1975. In contrast, the amount of ground water used for irrigation has increased steadily since 1950; however, the increase from 1975 to 1980 was only 5 percent compared to 27 percent from 1970 to 1975. The average amount of water required per acre for irrigation in 1980 (2.9 acre-ft per acre) was the same as in 1975. Although the acreage irrigated in 1980 was about 7 percent greater than in 1975, it was less than the 9-percent increase that took place from 1970 to 1975 and the 13-percent increase that took place from 1960 to 1965 and from 1965 to 1970.

More water continues to be withdrawn for industrial use than for any other category even though the rate of increase in water withdrawals for thermoelectric power continued to decline—a 33-percent increase from 1965 to 1970, an 18-percent increase from 1970 to 1975, and a 9-percent increase from 1975 to 1980. Withdrawals for other industrial uses remained about the same in 1970, 1975, and 1980.

Water used for hydroelectric power generation had been increasing steadily from 1950 to 1975, but in 1980 hydroelectric power water use was approximately the same as in 1975, compared to a 21-percent increase between 1970 and 1975.

A shift in the source of total withdrawals also is shown by table 22, which indicates that the withdrawal of fresh surface water increased by 10 percent between 1975 and 1980, compared to a 5-percent increase between 1970 and 1975. Fresh ground water and saline surface water, which showed substantial increases from 1970 to 1975 (22 and 31 percent respectively) only increased 7 and 2 percent, respectively, from 1975 to 1980. The slowdown in the rate of increase in total withdrawals, 8-percent increase between 1975 and 1980, more closely follows the rate of increase in total population of 6 percent during the same period. This is in contrast to the rate of increase in total withdrawals during the period 1970–1975, which was more than double the rate of population

Table 22.—*SUMMARY OF ESTIMATED WATER USE IN THE UNITED STATES, IN BILLION GALLONS PER DAY, AT 5-YEAR INTERVALS, 1950–80*

[Data for 1950–75 adapted from MacKichan (1951, 1957), MacKichan and Kammerer (1961), Murray (1968), and Murray and Reeves (1972, 1977). The data generally are rounded to two significant figures; however, the percentage changes are calculated from unrounded numbers]

	Estimated water use in billion gallons per day							Percentage increase (+) or decrease (–)	
	1950[1]	1955[1]	1960[2]	1965[2]	1970[3]	1975[4]	1980[4]	1970–75	1975–80
Population, in millions	150.7	164.0	179.3	193.8	205.9	[5]216.4	229.6	+5	+6
Offstream use:									
Total withdrawals	[5]180	240	270	310	370	420	450	+12	+8
Public supply	14	17	21	24	27	29	34	+8	+15
Rural domestic and livestock	3.6	3.6	3.6	4.0	4.5	4.9	5.6	+10	+14
Irrigation	[5]89	110	110	120	130	140	150	+11	+7
Self-supplied industrial:									
Thermoelectric power use	40	72	100	130	170	200	210	+18	+9
Other industrial uses	37	39	38	46	47	45	45	–6	+1
Source of withdrawals:									
Ground water:									
Fresh	34	47	50	60	68	82	88	+22	+7
Saline	([6])	.6	.4	.5	1	1	.9	–6	–5
Surface water:									
Fresh	[5]140	180	190	210	250	260	290	+5	+10
Saline	10	18	31	43	53	69	71	+31	+2
Reclaimed sewage	([6])	.2	[5].6	.7	.5	.5	.5	+2	–11
Consumptive use	([6])	([6])	61	77	[7]87	[7]96	[7]100	+10	+7
Instream use:									
Hydroelectric power	1,100	1,500	2,000	2,300	2,800	3,300	3,300	+21	–2

[1] 48 States and District of Columbia.
[2] 50 States and District of Columbia.
[3] 50 States, District of Columbia, and Puerto Rico.
[4] 50 States, District of Columbia, Puerto Rico, and Virgin Islands.
[5] Corrected from published report.
[6] Data not available.
[7] Fresh water only.

growth. The rate of increase in consumptive use of fresh water has steadily decreased from 13 percent for the period 1965–1970 to 7 percent for the period 1975–1980. The changes shown in table 22 and figures 11–13 can be attributed to several important factors:

1. Demands on the ground-water system influence the pumping lift, flow rate, or quality of the water supply. Each of these factors also influences the cost of water, and make users, especially irrigators, more selective and efficient with their use of ground water.
2. The price of water influences the volume used and encourages efficient use and may determine when the use of reclaimed water and increased reuse are viable alternatives.
3. Availability of water in a particular year, especially streamflow, strongly affects the quantity of water used for irrigation and hydroelectric power development.

Although 1980 estimates of water use were higher than the 1975 estimates for all offstream categories, trends established during the periods 1970 to 1975 and 1975 to 1980 indicate a general slackening in the rate of total withdrawals in comparison to the period 1965 to 1970. Even with the slackening of the rates of water withdrawal and consumptive use, major attention must be given to water-management problems, because in addition to the need for an adequate water supply, water-quality conditions must be suitable if supply and demand are to be in balance. The degree to which the different uses of water degrade the supply vary widely and affect the potential reuse of the return flows.

Projections of future water use are beyond the scope of this report, although the trends established over the past 30 years provide some basis for estimating future water demands. Many other agencies and commissions have made projections of national water use to the year 2000. Notable examples are studies by the Senate Select Committee on National Water Resources (U.S. Congress, 1961), Resources for the Future, Inc. (Wollman and Bonem, 1971), the National Water Commission (1973), and the U.S. Water Resources Council (1968 and 1978). Summaries of these national projections and projections for individual States to the year 2000 are included in a report prepared by the Congressional Research Service (Viessman and DeMoncoda, 1980). The projections vary greatly based on availability of reliable data and different assumptions of future population growth, economic conditions, environmental regulations and energy-resources development. Regardless of which projection proves correct, major attention must be given to water-management problems to ensure that maximum benefits will be obtained from use of the Nation's water resources.

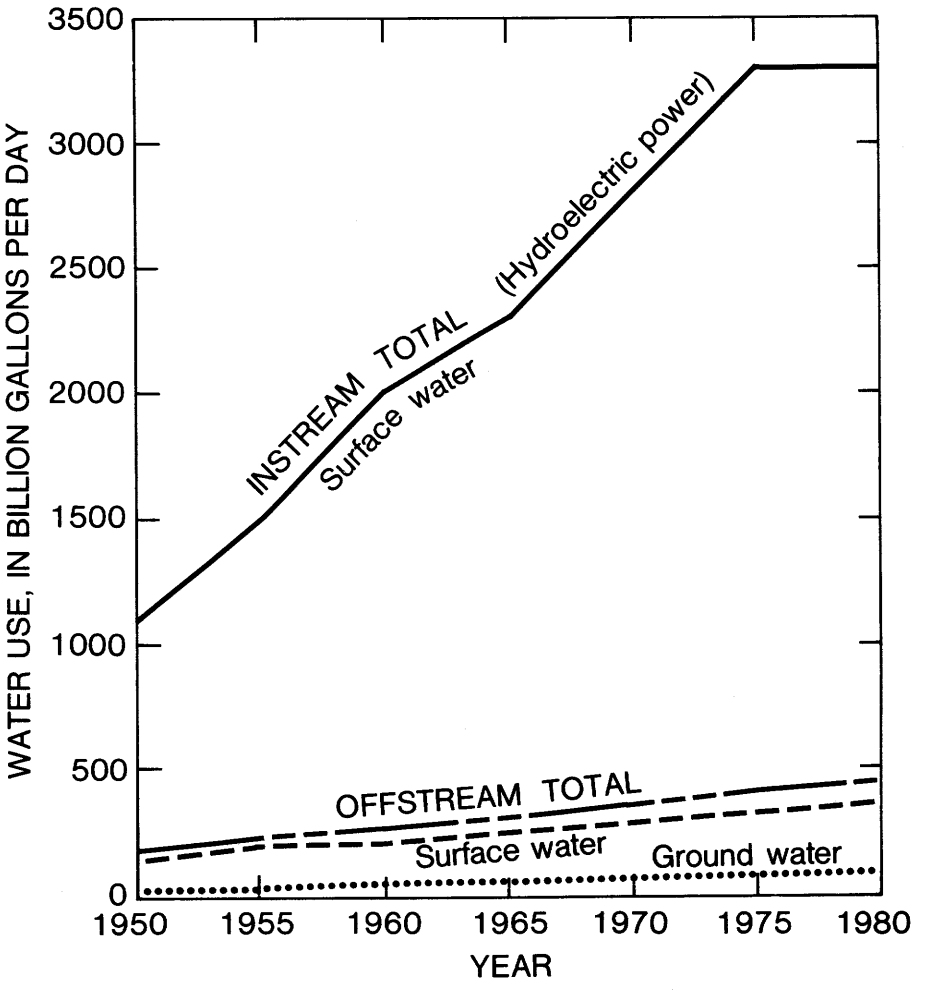


Figure 11. Trends in offstream and instream water use, 1950–80.

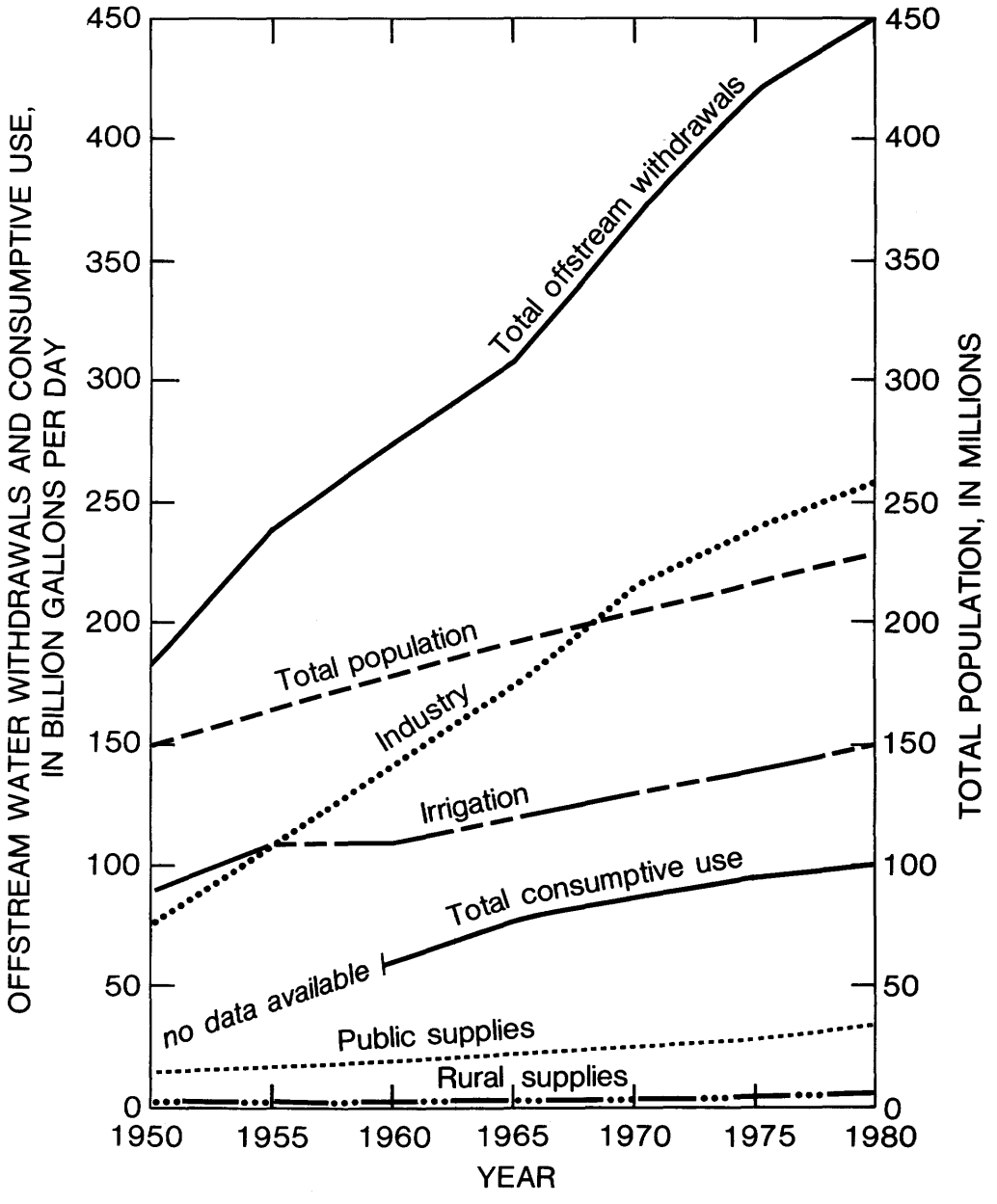


Figure 12. Trends in withdrawals, consumptive use, and population, 1950–80.

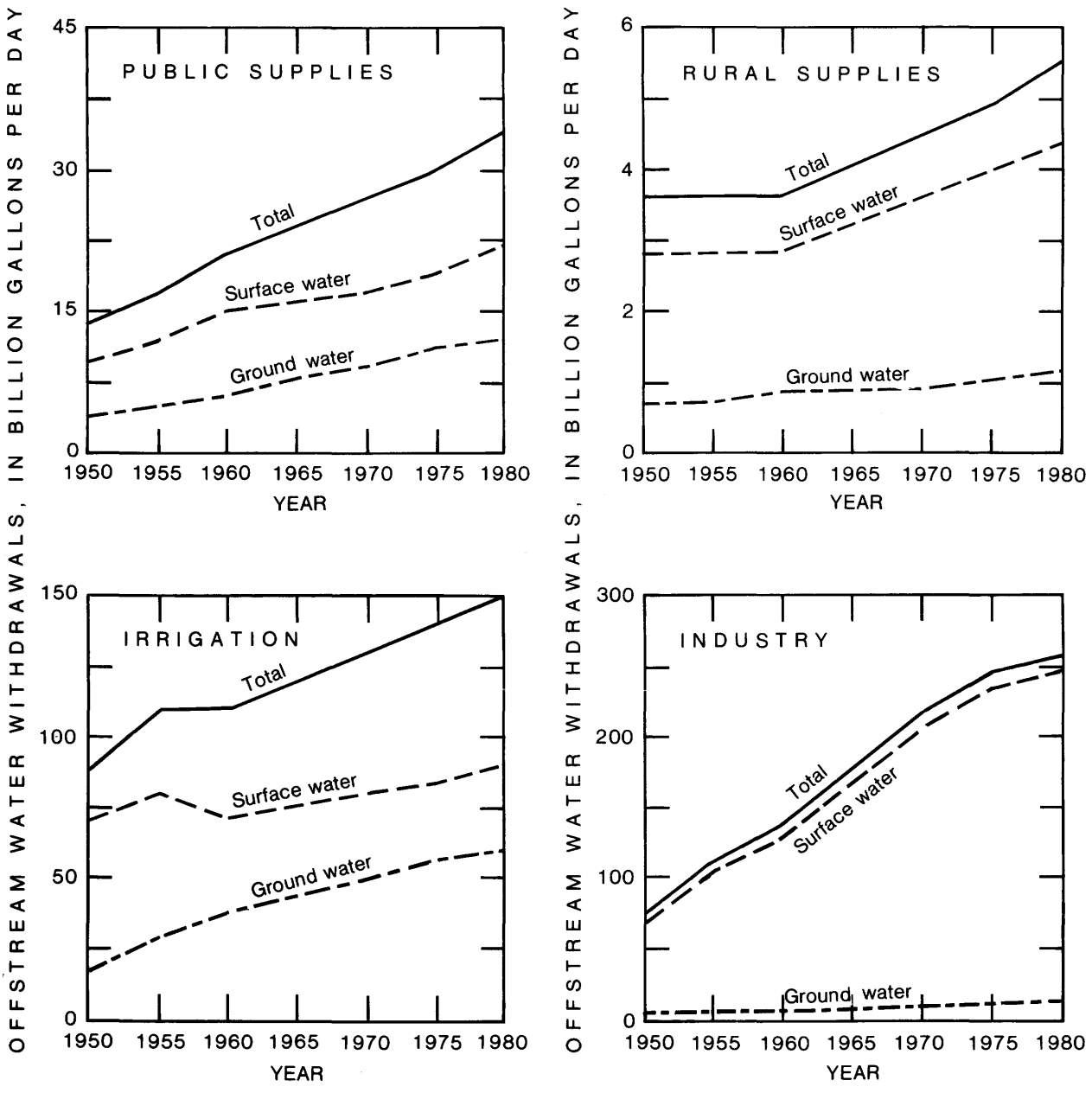


Figure 13. Trends in water withdrawals for public supplies, rural supplies, irrigation, and self-supplied industry, 1950–80.

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