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Estimated Use of Water in the United States in 2010









Circular 1405

U.S. Department of the Interior
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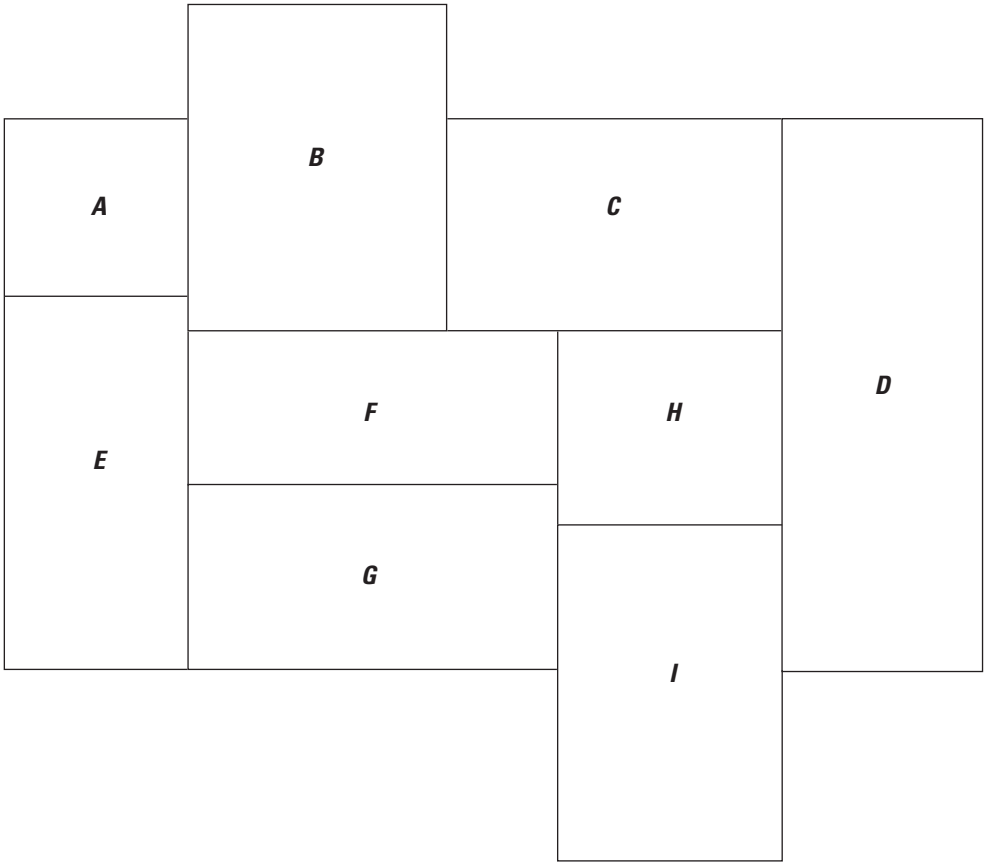

Front cover. Photo collage of water use and supply. ***A,*** Watts Bar Nuclear Powerplant, Rhea County, Tennessee (photo by Alan Cressler, USGS). ***B,*** Student with trout at the Aquaculture Research Institute, Hagerman, Idaho (photo from University of Idaho, used with permission). ***C,*** Center-pivot irrigation, Mitchell County, Georgia (photo by Alan Cressler, USGS). ***D,*** Windmill on Pawnee Butte Grasslands (photo by Ray Klocek, used with permission). ***E,*** Water tower in Council, Idaho, Adams County (photo by Justin Woody, used with permission). ***F,*** Pulp mill, Wayne County, Georiga (photo by Alan Cressler, USGS). ***G,*** Sheep at water trough on the open range (photo by Saeid Tadayon, USGS). ***H,*** Bingham Canyon Mine, Salt Lake County, Utah (photo by Alan Cressler, USGS). ***I,*** Domestic water use in the kitchen (photo from Wikimedia Commons).

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Conversion Factors

Multiply	By	To obtain
	Area	
acre	4,047	square meter (m^2)
acre	0.4047	hectare (ha)
acre	0.001562	square mile (mi^2)
	Volume	
acre-foot (acre-ft)	1,233	cubic meter (m^3)
acre-foot (acre-ft)	325,851	gallon (gal)
acre-foot (acre-ft)	43,560	cubic foot (ft^3)
cubic foot (ft^3)	7.48	gallon (gal)
gallon (gal)	3.785	liter (L)
gallon (gal)	3.785	cubic decimeter (dm^3)
million gallons (Mgal)	3,785	cubic meter (m^3)
million gallons (Mgal)	3.07	acre-foot (acre-ft)
	Flow rate	
acre-foot per year (acre-ft/yr)	1,233	cubic meter per year (m^3/yr)
billion gallons per day (Bgal/d)	1.3815	billion cubic meters per year
gallon per day (gal/d)	3.785	liter per day (L/d)
million gallons per day (Mgal/d)	0.04381	cubic meter per second (m^3/s)
million gallons per day (Mgal/d)	1.547	cubic foot per second (ft^3/sec)
million gallons per day (Mgal/d)	1.121	thousand acre-feet per year (acre-ft/yr)
million gallons per day (Mgal/d)	1.3815	million cubic meters per year
thousand acre-feet per year (acre-ft/yr)	0.8921	million gallons per day (Mgal/d)
	Energy	
gigawatt-hour (gWh)	3,600,000	Megajoule (MJ)
kilowatt-hour (kWh)	3,600,000	joule (J)

Abbreviations

EPA	U.S. Environmental Protection Agency
NWC	National Water Census
NWUIP	National Water Use Information Program
SDWIS	Safe Drinking Water Information System
SECURE	Science and Engineering to Comprehensively Understand and Responsibly Enhance
USDA ARS	U.S. Department of Agriculture, Agricultural Research Service
USDA NASS	U.S. Department of Agriculture, National Agricultural Statistics Service
USDA NRCS	U.S. Department of Agriculture, Natural Resources Conservation Service
USDOE EIA	U.S. Department of Energy, Energy Information Administration
USGS	U.S. Geological Survey

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

Abstract

Water use in the United States in 2010 was estimated to be about 355 billion gallons per day (Bgal/d), which was 13 percent less than in 2005. The 2010 estimates put total withdrawals at the lowest level since before 1970. Freshwater withdrawals were 306 Bgal/d, or 86 percent of total withdrawals, and saline-water withdrawals were 48.3 Bgal/d, or 14 percent of total withdrawals. Fresh surface-water withdrawals (230 Bgal/d) were almost 15 percent less than in 2005, and fresh groundwater withdrawals (76.0 Bgal/d) were about 4 percent less than in 2005. Saline surface-water withdrawals were 45.0 Bgal/d, or 24 percent less than in 2005. Updates to the 2005 saline groundwater withdrawals, mostly for thermoelectric power, reduced total saline groundwater withdrawals to 1.51 Bgal/d, down from the originally reported 3.02 Bgal/d. Total saline groundwater withdrawals in 2010 were 3.29 Bgal/d, mostly for mining use.

Thermoelectric power and irrigation remained the two largest uses of water in 2010, and total withdrawals for both were notably less than in 2005. Withdrawals in 2010 for thermoelectric power were 20 percent less and withdrawals for irrigation were 9 percent less than in 2005. Similarly, other uses showed reductions compared to 2005, specifically public supply (–5 percent), self-supplied domestic (–3 percent), self-supplied industrial (–12 percent), and livestock (–7 percent). Only mining (39 percent) and aquaculture (7 percent) reported larger withdrawals in 2010 compared to 2005. Thermoelectric power, irrigation, and public-supply withdrawals accounted for 90 percent of total withdrawals in 2010.

Withdrawals for thermoelectric power were 161 Bgal/d in 2010 and represented the lowest levels since before 1970. Surface-water withdrawals accounted for more than 99 percent of total thermoelectric-power withdrawals, and 73 percent of those surface-water withdrawals were from freshwater sources. Saline surface-water withdrawals for thermoelectric power accounted for 97 percent of total saline surface-water withdrawals for all uses. Thermoelectric-power withdrawals accounted for 45 percent of total withdrawals for all uses, and freshwater withdrawals for thermoelectric power accounted for 38 percent of the total freshwater withdrawals for all uses.

Irrigation withdrawals were 115 Bgal/d in 2010 and represented the lowest levels since before 1965. Irrigation withdrawals, all freshwater, accounted for 38 percent of total freshwater withdrawals for all uses, or 61 percent of total freshwater withdrawals for all uses excluding thermoelectric power. Surface-water withdrawals (65.9 Bgal/d) accounted for 57 percent of the total irrigation withdrawals, or about 12 percent less than in 2005. Groundwater withdrawals were 49.5 Bgal/d in 2010, about 6 percent less than in 2005. About 62,400 thousand acres were irrigated in 2010, an increase from 2005 of about 950 thousand acres (1.5 percent). The number of acres irrigated using sprinkler and microirrigation systems continued to increase and accounted for 58 percent of the total irrigated lands in 2010.

Public-supply withdrawals in 2010 were 42.0 Bgal/d, or 5 percent less than in 2005, and represented the first declines in public-supply withdrawals since the 5-year reporting began in 1950. Total population in the United States increased from 300.7 million people in 2005 to 313.0 million people in 2010, an increase of 4 percent. Public-supply withdrawals accounted for 14 percent of the total freshwater withdrawals for all uses and 22 percent of freshwater withdrawals for all uses excluding thermoelectric power. The number of people that received potable water from public-supply facilities in 2010 was 268 million, or about 86 percent of the total U.S. population. This percentage was unchanged from 2005. Self-supplied domestic withdrawals were 3.60 Bgal/d, or 3 percent less than in 2005. More than 98 percent of the self-supplied domestic withdrawals were from groundwater sources.

Self-supplied industrial withdrawals were 15.9 Bgal/d in 2010, a 12 percent decline from 2005, and continued the downward trend since the peak of 47 Bgal/d in 1970. Total self-supplied industrial withdrawals were 4 percent of total withdrawals for all uses and 8 percent of total withdrawals for all uses excluding thermoelectric power. Most of the total

self-supplied industrial withdrawals were from surface-water sources (82 percent), and nearly all (93 percent) of those surface-water withdrawals were from freshwater sources. Nearly all of the groundwater withdrawals for self-supplied industrial use (98 percent) were from freshwater sources.

Total aquaculture withdrawals were 9.42 Bgal/d in 2010, or 7 percent more than in 2005, and surface water was the primary source (81 percent). Most of the surface-water withdrawals occurred at facilities that operated flowthrough raceways, which returned the water to the source directly after use. Aquaculture withdrawals accounted for 3 percent of the total withdrawals for all uses and 5 percent of the total withdrawals for all uses excluding thermoelectric.

Total mining withdrawals in 2010 were 5.32 Bgal/d, or about 1 percent of total withdrawals from all uses and 3 percent of total withdrawals from all uses excluding thermoelectric. Mining withdrawals accounted for the largest percentage increase (39 percent) in water use between 2005 and 2010 among all the categories. Groundwater withdrawals accounted for 73 percent of the total mining withdrawals, and the majority of the groundwater was saline (71 percent). The majority (80 percent) of surface-water withdrawals for mining was freshwater.

Livestock withdrawals in 2010 were 2.00 Bgal/d, or 7 percent less than in 2005. All livestock withdrawals were from freshwater sources, mostly from groundwater (60 percent). Livestock withdrawals accounted for about 1 percent of total freshwater withdrawals for all uses excluding thermoelectric power.

In 2010, more than 50 percent of the total withdrawals in the United States were accounted for by 12 States. California accounted for about 11 percent of the total withdrawals and 10 percent of freshwater withdrawals in the United States, predominantly for irrigation. Texas accounted for about 7 percent of total withdrawals, predominantly for thermoelectric power, irrigation, and public supply. Florida accounted for 18 percent of the total saline-water withdrawals in the United States, mostly from surface-water sources for thermoelectric power. Oklahoma and Texas accounted for about 70 percent of the total saline groundwater withdrawals in the United States, mostly for mining.

Introduction

This report, "Estimated use of water in the United States in 2010," is the 13th in a series of U.S. Geological Survey (USGS) Circular reports that have been published every 5 years since 1950. The 60-year span of national reports represents the longest compilation record of water-use data by a Federal agency in the United States. Estimates of withdrawals enable the depiction of trends in total water use for the Nation among different geographic areas, categories of use, and sources over time. The USGS is dedicated to providing reliable scientific information that accurately describes current and historic conditions and enables a better understanding of the Earth's precious water resources. Water-use information complements and supports surface-water and groundwater availability studies and water budgets that are critical to these studies. This information is also essential to accurately understand how future water demands will be met while maintaining adequate water quality and quantities for human and ecosystem needs.

The National Water Use Information Program (NWUIP) is the USGS program (*http://water.usgs.gov/watuse/*) that facilitates the 5-year compilation of water use and over time has met various challenges in estimating water use in the United States. The program, however, has reduced some data collections over time to address limitations of available resources for analysis and limitations of capabilities for accurate interpolations. The National Water Census (NWC) is a recent USGS program, implemented as part of the SECURE (Science and Engineering to Comprehensively Understand and Responsibly Enhance) Water Act (Subtitle F of Public Law 111–11, the Omnibus Public Land Management Act) to study national water availability and use by integrating diverse research and building new water accounting tools, such as decision support capacity. These tools and research are designed to enable water managers to accurately assess water availability at regional and national scales (*http://water.usgs.gov/watercensus/*). To meet NWC goals of building water budget assessments at regional and national scales, accurate and complete water-use estimates are necessary. The NWUIP is working closely with the NWC to provide water-use data for accurate water budget assessments in the NWC study areas. To meet these goals, several water-use specific research studies supported by the NWC were begun, some are completed, and some are ongoing. Each study specifically addresses a water-use data collection challenge, such as improvement in the dissemination of information on data inventories, collection of more accurate information, use of better methods for analysis, and upgrade of data dissemination tools.

NWC-supported projects with direct relevance to water use were conducted concurrently with the NWUIP 2010 compilation efforts and focused on the three largest categories of water use, irrigation, thermoelectric power, and public supply. For irrigation water use, methods and documentation were synthesized into a national report using the 2000 and 2005 compilation data and suggested improved estimation methods (Dickens and others, 2011). Additionally, methods were developed to assist in estimating irrigation water use in humid Eastern States, using two predictive models that use climate, soils, and crop data to explain the potential for irrigation (Levin and Zarriello, 2013). For thermoelectric power, linked heat and water budget models were developed for 1,290 thermoelectric powerplants in the United States (Diehl and others, 2013). This project entailed a indepth inventory of powerplants and associated information. Data from this project considerably improved

The Boise River Diversion Dam in Ada County, Idaho, was completed in 1909 and diverts water into the New York Canal, the primary irrigation canal for Ada and Canyon Counties. Photo by Jeff Woody, used with permission.

the NWUIP understanding of the cooling systems used at individual powerplants as well as provided a more complete inventory of powerplant locations and net power generation. On the basis of the water budget models, Diehl and Harris (2014) reported powerplant-specific estimates of withdrawals and consumptive use. For public supply, the U.S. Environmental Protection Agency (EPA) provided a public-supply dataset from the Safe Drinking Water Information System (SDWIS). These data included site-specific well, surface-water intake, and distribution-system information, which was filtered through a USGS database (Price and Maupin, 2014) and enhanced for quality control using associated USGS data. These data were disseminated as State datasets to each USGS Water Science Center to help construct a site-specific database capable of storing public-supply withdrawal, distribution, use, and return data for each State.

Data dissemination capabilities and data-collection efforts have improved over the course of each 5-year compilation. The online resource, "USGS Water Use Data for the Nation" (*http://waterdata.usgs.gov/nwis/wu*), provides the best available county water-use data (1985–2010). These county-level estimates are the foundation for the statewide totals presented in each 5-year compilation report and are stored, updated, and disseminated using the USGS National Water Information System (NWIS) database. Data are retrievable as county, State, and national totals for each category of use as reported in the 5-year compilation reports. Because data are updated periodically and revised during interim years, the Web site will enable quick and easy access to the most current water-use data.

Factors such as demographics, new manufacturing and cooling-system technologies, economic trends, legal decisions, and climatic fluctuations have varying effects on water use. Between 2000 and 2010, population growth in the U.S. was 9.7 percent, lower than the 13.2 percent growth for the 1990–2000 period (U.S. Census Bureau, 2011). More population growth was recorded in Southern and Western States (14.3 and 13.8 percent, respectively) between 2000 and 2010 compared to Midwestern States (3.9 percent) and Northeastern States (3.2 percent). Southern and Western States accounted for more than 84 percent of the total U.S. population growth from 2000 to 2010. Population growth puts additional pressure on existing public utilities and increases demand on sometimes already limited water supplies. In parts of the United States, communities have sought additional water sources or instituted water-conservation measures to meet increasing demands. New cooling-system technologies and wastewater management practices at thermoelectric powerplants and industrial facilities are examples of water-saving practices that are being implemented. Powerplants have reduced the demand for cooling water by implementing more efficient cooling systems, such as changing to recirculating systems or building new plants with dry-cooling systems. Industrial facilities are

using more efficient water-conserving manufacturing technologies, driven by higher costs for water and energy. Industrial manufacturing has declined with more goods being produced outside of the United States. Increases in industrial reuse and recycling of wastewater help to reduce withdrawals from the available resources and treated discharges to surface waters over time.

Climate fluctuations affect water use, particularly for irrigation, power generation, and public supply. In 2010, the contiguous United States (CONUS) experienced average annual air temperatures slightly above normal and precipitation above the long-term average. An abnormally cold winter with abundant moisture resulted in record-breaking precipitation in the East and Northeast for December–February. While the East enjoyed an abnormally warm spring, the Western United States experienced below normal temperatures. The summer of 2010 was the fourth warmest on record for the CONUS, but was the ninth wettest in 116 years in the Upper Midwest and Great Lakes. The West and Southeast had below-normal precipitation during the summer. The fall of 2010 was warmer than normal, but the Upper Midwest and Northeast continued to receive above-average precipitation, while Florida suffered through the second driest September–November period on record (National Oceanic and Atmospheric Administration National Climatic Data Center, 2010).

Cooling-system technology in thermoelectric powerplants has dramatically improved in recent years, causing large changes in withdrawals between 2005 and 2010. Improvements driven by the Clean Water Act and other economic factors have changed the way industrial facilities use, reuse, and recycle water, resulting in reduced discharges to wastewater-treatment plants or surface-water bodies. Cooling water is essential for producing most of the thermoelectric power in the United States, and an increase in electric energy use has resulted in additional demands for water. Limitations on water supplies have led to the use of less water-intensive cooling technologies for producing thermoelectric power in newer powerplants.

Purpose and Scope

This report presents average daily withdrawals (in millions of gallons per day) for calendar year 2010, by source (groundwater and surface water) and quality (fresh and saline) for the 50 States, the District of Columbia, Puerto Rico, and the U.S. Virgin Islands (hereafter referred to as "States" for brevity). Withdrawals are reported by category of use: public supply, domestic (including self-supplied domestic and deliveries from public supply), irrigation, livestock, aquaculture, self-supplied industrial (referred to as "industrial" for brevity), mining, and self-supplied thermoelectric power (referred to as "thermoelectric power" for brevity). Saline water is defined as water containing dissolved solids of 1,000 milligrams per liter or more. All withdrawals for the public supply, domestic, irrigation, and livestock categories are reported as totals, although in some areas water is treated to reduce salinity for these uses. Aquaculture totals include a small amount of saline surface-water withdrawals for two States. Both freshwater and saline-water withdrawals are reported for industrial, mining, and thermoelectric-power uses.

The series of 5-year national water-use estimates compiled by the USGS serves as one of the few sources of information about regional and national trends in water withdrawals. These historical reports (MacKichan, 1951, 1957; MacKichan and Kammerer, 1961; Murray, 1968; Murray and Reeves, 1972, 1977; Solley and others, 1983, 1988, 1993, 1998; Hutson and others, 2004, Kenny and others, 2009) are available online at *http://water.usgs.gov/watuse/50years.html*. Statewide data between 1950 and 2010 produced for the 5-year national water-use estimates are available online at *http://waterdata.usgs.gov/nwis/wu/*. County-level data are available only for 1985–2010 from the same Web site

Terminology Used in This Report

A glossary of the terms and units used in this report is located at the end of the report and is available online at *http://water.usgs.gov/watuse/wuglossary.html*. Terms and units depicting withdrawals and ancillary data for the 5-year compilations have not changed since 2000. Withdrawal for each category of use represents the total amount of water removed from the water source for a particular use, regardless of how much of that total is consumptively used or returned to the hydrologic system for future use. In most cases, some fraction of the total withdrawal will be returned to a water source after use and will be available for other subsequent uses. Consumptive use, however, precludes the subsequent withdrawal for another use, at least temporarily, because it represents that fraction of water that is removed from availability due to evaporation, transpiration, or incorporation into products or crop, or consumed by livestock or human. Estimates of return flows and consumptive use were discontinued after 1995, primarily because of resource and data constraints on the USGS National Water Use Information Program (NWUIP). Recent efforts by other programs in coordination with NWUIP have been implemented to reinstate the consumptive-use estimates for thermoelectric power and irrigation, but those data are not included in this report. Estimates of wastewater reuse were compiled by some States for the industrial, thermoelectric power, and irrigation categories, but these estimates were not included in the totals reported in tables in this report because of the small volumes of water compared to the totals and the incomplete reporting across the Nation.

Withdrawals are expressed in terms of millions of gallons per day and thousands of acre-feet per year. The term billions

of gallons per day is used in the Abstract and Trends in Water Use sections of this report to more simply express large numbers for total uses. Units of millions or billions of gallons per day do not represent actual daily rates, but rather are used to express total amounts as an average daily rate over a single year. Water demands fluctuate seasonally and may be very different between hot summer months and cold winter months. Therefore, withdrawal estimates in this report represent the total annual withdrawals averaged over 365 days.

Withdrawals are rounded to three significant figures. All values are rounded independently, so the sums of individual rounded numbers may not equal the totals. The percentage of changes discussed in the text are calculated from the unrounded data and are expressed as integers. All population data are rounded to three significant figures. In discussions of States that compose the majority of withdrawals for a given category, the State names are listed in order of decreasing magnitude of withdrawals.

Fountain water display, Meridian, Idaho. Photo by Molly Maupin, USGS.

by Energy Information Administration (EIA) were used to estimate thermoelectric-power withdrawals. As in 2005, deliveries from public supply for domestic use were again compiled in 2010, but public-supply deliveries for commercial, industrial, and thermoelectric-power uses were not. Data were not compiled for hydrologic units (watersheds). Data were not compiled for commercial water use, hydroelectric-power generation, wastewater treatment (returns), consumptive use by category of use, and conveyance losses. Some of these additional data may have been collected by individual States but are not compiled as a national dataset or included in this report.

The Trends in Water Use section of this report includes national totals for withdrawals by category of use and source of water from 1950 to 2010. Totals have changed for some categories and years because of revisions to individual State data during interim years. Because of these revisions, some of the percentage changes in this report will be slightly different from data published previously by Kenny and others (2009).

Changes for the 2010 Report

A matrix showing the different categories of use and how the terminology has changed over time is available online at *http://water.usgs.gov/watuse/WU-Category-Changes.html*. Links to definitions of water-use categories are included in the matrix. This report includes the same categories of use that were reported in 2005, and every category of use includes data from every State. Some States may have compiled their estimates for livestock, aquaculture, or mining categories by using methods described by Lovelace (2009a, b). Similarly, some States may have compiled their estimates for thermoelectric power by using methods derived from Diehl and others (2013). Data from the NWC-supported thermoelectric-power study represent a substantial change in how data reported

Sources of Data and Methods of Analysis

Data presented in this report were compiled from various sources, depending on the category of use and the information available for each State. USGS personnel in each State determined the best sources of information available, then compiled or estimated the data and prepared documentation of the sources and methods used to determine the water use totals. Data in this report may have been derived from reported, estimated, or calculated means using different sources and methods and, therefore, will have varying levels of accuracy. Because the largest users and the most prominent categories of use within each State have the greatest effect on the totals, obtaining reliable information for these large users and categories was the primary focus of the compilation effort.

Sources of information used in the compilation include national datasets, State agency data, individual questionnaires, and local contacts. National datasets available to each State include the EPA SDWIS data (U.S. Environmental Protection Agency, 2014), U.S. Census Bureau population estimates (U.S. Census Bureau, 2011), U.S. Department of Agriculture (USDA) Farm and Ranch Irrigation Survey, USDA Census of Agriculture, USDA National Agricultural Statistics Service (NASS) crop and livestock estimates, including digital datasets derived from satellite imagery (Cropland Data Layer) for 2010, with associated confidence interval datasets, and U.S. Department of Energy (USDOE) EIA facility reports. Additional data for thermoelectric power, specifically locations and cooling-system classifications for powerplants, were provided from internal USGS sources (Diehl and others, 2013) using USDOE and project ancillary data. A list of industrial and commercial establishments was provided to USGS personnel from a commercial database for use in the industrial estimates. Datasets and sources of information used to produce the national estimates for the livestock, aquaculture, and mining categories include the USDA NASS, USDA county extension agents, USGS Minerals Information Team, USDOE EIA, and the U.S. Bureau of Mines. Sources of information are discussed in greater detail in the individual category sections of this report.

Many of these data, such as those from NASS and USDOE EIA, are collected annually. Other data are provided for years other than 2010, but were used to develop the 2010 estimates in some States because they were the most complete data available. For example, the USDA Census of Agriculture is produced in years ending in 2 and 7, and the USDA Farm and Ranch Irrigation Survey is produced in years ending in 3 and 8. Correlation of water-use data in this report with specific climatic conditions for 2010 is not recommended because some data for years other than 2010 may have been used to develop some water-use estimates.

Guidelines for preparing the 2010 water-use estimates were distributed to USGS personnel in each Water Science Center through workshops, Web-based seminars, and written documents. The same guidelines used in 2005 were implemented in 2010 without change and are published as USGS Techniques and Methods Book 4, Chapter E1, "Guidelines for preparation of State water-use estimates for 2005" (Hutson, 2007). Reports published by individual USGS Water Science Centers as part of the NWUIP, as well as a list of contact personnel in each USGS Water Science Center, also are available online at *http://water.usgs.gov/watuse/*.

Cabbage field in Wellton Valley, Yuma County, Arizona. Photo by Saeid Tadayon, USGS.

Total Water Use

355,000 million gallons per day

Total water withdrawals in the United States for 2010 were estimated for eight categories of use: public supply, domestic, irrigation, livestock, aquaculture, industrial, mining, and thermoelectric power (fig. 1). The three largest categories were thermoelectric power, irrigation, and public supply, cumulatively accounting for 90 percent of the national total. The remaining categories of industrial, aquaculture, mining, domestic, and livestock together were just about 10 percent of total water withdrawals estimated in this report.

Total State populations and withdrawals by source for 2010 are listed in table 1. Total freshwater and saline-water withdrawals were estimated to be 355,000 million gallons per day (Mgal/d), or 397,000 thousand acre-feet per year (acre-ft/yr). Freshwater withdrawals of 306,000 Mgal/d made up 86 percent of the total, and saline-water withdrawals made up the remaining 48,300 Mgal/d (14 percent). Most saline-water withdrawals were seawater and brackish coastal water used for thermoelectric power. Total surface-water withdrawals were estimated to be 275,000 Mgal/d, or 78 percent of the total. About 84 percent (230,000 Mgal/d) of total surface-water withdrawals were freshwater. Total groundwater withdrawals were 79,300 Mgal/d, of which 96 percent (76,000 Mgal/d) was freshwater.

Total withdrawals by category and State are listed in table 2*A*, in million gallons per day, and in table 2*B*, in thousand acre-feet per year. Withdrawals for thermoelectric power (161,000 Mgal/d) are mostly derived from freshwater sources and accounted for 38 percent of the total freshwater withdrawals and about 91 percent of total saline-water withdrawals. Irrigation withdrawals totaled 115,000 Mgal/d and accounted for 38 percent of total freshwater withdrawals. Total withdrawals for public supply (42,000 Mgal/d) represented nearly 14 percent of the total freshwater withdrawals.

In 2010, more than 50 percent of the total withdrawals in the United States were accounted for by 12 States: California, Texas, Idaho, Florida, Illinois, North Carolina, Arkansas, Colorado, Michigan, New York, Alabama, and Ohio. California accounted for 11 percent of the total withdrawals for all categories and 10 percent of total freshwater withdrawals for all categories nationwide. Texas accounted for about 7 percent of total withdrawals for all categories, predominantly for thermoelectric power, irrigation, and public supply. Florida had the largest saline withdrawals, accounting for 18 percent of the total in the United States, mostly saline surface-water withdrawals for thermoelectric power. Oklahoma and Texas accounted for about 70 percent of the total saline groundwater withdrawals in the United States, mostly for mining.

Water withdrawals by category and State are listed for surface water in tables 3*A* and 3*B* and for groundwater in tables 4*A* and 4*B*. In 2010, more surface water than groundwater was withdrawn for all uses except domestic, livestock, and mining. Thermoelectric power accounted for 51 percent of the total fresh surface-water withdrawals and irrigation accounted for 29 percent. The largest surface-water withdrawals in the Nation were in California, where irrigation accounted for 76 percent of total fresh surface-water withdrawals. Large quantities of fresh surface water were also withdrawn for thermoelectric power in Illinois, Texas, Michigan, and Alabama. Large saline surface-water withdrawals for thermoelectric power occurred in Florida, California, Maryland, and New York, which cumulatively accounted for 57 percent of the national total saline surface-water withdrawals.

Of the total fresh groundwater withdrawals (76,000 Mgal/d), irrigation accounted for 65 percent, primarily in California, Arkansas, Texas, and Nebraska. Fresh groundwater irrigation withdrawals in these four States cumulatively accounted for 42 percent of the national total fresh groundwater withdrawals. Nearly all groundwater withdrawals (96 percent) were from freshwater, and irrigation used greater than three times more fresh groundwater than public supply, which was the next largest use of groundwater in the Nation. The largest withdrawals of saline groundwater occurred in Oklahoma and Texas.

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

Public supply, 12 percent

Erin McDaniel, used with permission

Water tower, Newton, Kansas

Domestic, 1 percent

Photo used with permission from Whilpool

High-efficiency washer and dryer

Irrigation, 33 percent

Molly Maupin, USGS

Sprinkler irrigation system, Blaine County, Idaho

Livestock, 1 percent

Saeid Tadayon, USGS

Sheep at water trough on the open range

Aquaculture, 3 percent

Photo ©Keith Philpott

Wild Rose Fish Hatchery, Waushara County, Wisconsin

Industrial, 4 percent

Alan Cressler, USGS

Industrial paper mill in Glynn County, Georgia

Mining, 1 percent

Joan Kenny, USGS

Pumpjack in Gove County, Kansas

Thermoelectric power, 45 percent

Alan Cressler, USGS

Watts Bar Nuclear Powerplant, Rhea County, Tennessee

Figure 1. Total water withdrawals by category, 2010.

Table 1. Total water withdrawals by source and State, 2010.

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

State	Population (in thousands)	Withdrawals (in million gallons per day)						Withdrawals (in million gallons per day)			Withdrawals (in thousand acre-feet per year)		
		By source and type						Total			Total		
		Groundwater			Surface water								
		Fresh	Saline	Total	Fresh	Saline	Total	Fresh	Saline	Total	Fresh	Saline	Total
Alabama	4,780	494	0	494	9,470	0	9,470	9,960	0	9,960	11,200	0	11,200
Alaska	710	478	144	622	391	80.7	472	869	225	1,090	975	252	1,230
Arizona	6,390	2,550	0	2,550	3,540	0	3,540	6,090	0	6,090	6,820	0	6,820
Arkansas	2,920	7,780	5.05	7,790	3,540	0	3,540	11,300	5.05	11,300	12,700	5.66	12,700
California	37,300	12,300	369	12,700	18,800	6,490	25,300	31,100	6,860	38,000	34,900	7,690	42,600
Colorado	5,030	1,540	19.4	1,560	9,440	0	9,440	11,000	19.4	11,000	12,300	21.8	12,300
Connecticut	3,570	216	0	216	600	2,490	3,090	816	2,490	3,310	915	2,800	3,710
Delaware	898	156	0	156	144	417	561	300	417	717	337	468	804
District of Columbia	602	0.05	0	0.05	0.05	0	0.05	0.10	0	0.10	0.11	0	0.11
Florida	18,800	3,970	154	4,120	2,230	8,580	10,800	6,200	8,740	14,900	6,950	9,790	16,700
Georgia	9,690	1,230	0	1,230	3,210	283	3,490	4,440	283	4,720	4,970	317	5,290
Hawaii	1,360	423	50.8	474	248	552	800	671	603	1,270	752	676	1,430
Idaho	1,570	4,250	0	4,250	13,000	0	13,000	17,200	0	17,200	19,300	0	19,300
Illinois	12,800	853	25.5	879	12,200	0	12,200	13,100	25.5	13,100	14,600	28.6	14,700
Indiana	6,480	720	0	720	7,920	0	7,920	8,640	0	8,640	9,690	0	9,690
Iowa	3,050	650	0	650	2,420	0	2,420	3,070	0	3,070	3,440	0	3,440
Kansas	2,850	3,200	0	3,200	800	0	800	4,000	0	4,000	4,490	0	4,490
Kentucky	4,340	199	0	199	4,130	0	4,130	4,330	0	4,330	4,850	0	4,850
Louisiana	4,530	1,570	0	1,570	6,960	1.68	6,970	8,540	1.68	8,540	9,570	1.88	9,570
Maine	1,330	99.4	0	99.4	309	40.8	350	408	40.8	449	458	45.8	504
Maryland	5,770	260	0	260	1,210	5,910	7,120	1,470	5,910	7,380	1,650	6,630	8,280
Massachusetts	6,550	361	0	361	703	1,930	2,640	1,060	1,930	3,000	1,190	2,170	3,360
Michigan	9,880	693	0.57	694	10,100	0	10,100	10,800	0.57	10,800	12,100	0.64	12,100
Minnesota	5,300	736	0	736	3,080	0	3,080	3,820	0	3,820	4,280	0	4,280
Mississippi	2,970	2,610	19.6	2,630	1,240	62.4	1,300	3,850	82.0	3,930	4,320	92.0	4,410
Missouri	5,990	1,810	0	1,810	6,750	0	6,750	8,570	0	8,570	9,610	0	9,610
Montana	989	268	18.6	286	7,360	0	7,360	7,630	18.6	7,650	8,550	20.9	8,570
Nebraska	1,830	4,710	0.13	4,710	3,320	0	3,320	8,040	0.13	8,040	9,010	0.15	9,010
Nevada	2,700	1,190	11.9	1,200	1,420	0	1,420	2,610	11.9	2,620	2,930	13.4	2,940
New Hampshire	1,320	89.7	0	89.7	277	848	1,120	367	848	1,210	411	951	1,360
New Jersey	8,790	612	0	612	1,320	3,740	5,060	1,930	3,740	5,670	2,170	4,190	6,360
New Mexico	2,060	1,570	0	1,570	1,590	0	1,590	3,160	0	3,160	3,540	0	3,540
New York	19,400	704	0	704	5,020	4,850	9,870	5,730	4,850	10,600	6,420	5,430	11,900
North Carolina	9,540	694	0	694	10,400	1,360	11,700	11,100	1,360	12,400	12,400	1,530	13,900
North Dakota	673	139	13.6	153	994	0	994	1,130	13.6	1,150	1,270	15.3	1,290
Ohio	11,500	929	0	929	8,510	0	8,510	9,440	0	9,440	10,600	0	10,600
Oklahoma	3,750	635	1,400	2,030	1,140	0	1,140	1,770	1,400	3,170	1,990	1,570	3,550
Oregon	3,830	2,130	0	2,130	4,600	0	4,600	6,730	0	6,730	7,550	0	7,550
Pennsylvania	12,700	657	0	657	7,480	0	7,480	8,130	0	8,130	9,120	0	9,120
Rhode Island	1,050	36.5	0	36.5	98.0	241	339	134	241	376	151	270	421
South Carolina	4,630	339	0	339	6,440	0	6,440	6,780	0	6,780	7,600	0	7,600
South Dakota	814	339	0	339	287	0	287	626	0	626	701	0	701
Tennessee	6,350	470	0	470	7,230	0	7,230	7,700	0	7,700	8,630	0	8,630
Texas	25,100	6,830	884	7,710	15,800	1,280	17,100	22,600	2,160	24,800	25,400	2,420	27,800
Utah	2,760	1,030	92.6	1,120	3,110	238	3,340	4,130	331	4,460	4,630	371	5,000
Vermont	626	41.6	0	41.6	389	0	389	431	0	431	483	0	483
Virginia	8,000	299	9.97	309	4,140	3,200	7,340	4,440	3,210	7,650	4,970	3,600	8,570
Washington	6,720	1,600	0	1,600	3,320	33.1	3,350	4,920	33.1	4,960	5,520	37.1	5,560
West Virginia	1,850	121	4.82	125	3,410	0	3,410	3,530	4.82	3,530	3,960	5.40	3,960
Wisconsin	5,690	754	0	754	5,400	0	5,400	6,160	0	6,160	6,900	0	6,900
Wyoming	564	550	67.1	617	4,080	0	4,080	4,630	67.1	4,700	5,200	75.2	5,270
Puerto Rico	3,730	125	0.32	125	611	2,270	2,880	736	2,270	3,010	825	2,550	3,370
U.S. Virgin Islands	106	1.14	0	1.14	2.85	124	127	3.99	124	128	4.47	139	143
TOTAL	313,000	76,000	3,290	79,300	230,000	45,000	275,000	306,000	48,300	355,000	343,000	54,200	397,000

Table 2*A*. Total water withdrawals by water-use category, 2010, in million gallons per day.

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

State	Public supply	Self-supplied domestic	Irrigation	Livestock	Aquaculture	Self-supplied industrial		Mining		Thermoelectric power		Total		
						Fresh	Saline	Fresh	Saline	Fresh	Saline	Fresh	Saline	Total
Alabama	831	38.0	159	26.5	59.1	574	0	20.2	0	8,250	0	9,960	0	9,960
Alaska	79.0	14.8	1.59	0.25	684	7.78	4.30	24.1	221	58.0	0	869	225	1,090
Arizona	1,210	27.2	4,570	27.0	47.3	12.9	0	86.6	0	104	0	6,090	0	6,090
Arkansas	429	12.8	8,720	39.0	268	271	5.05	44.3	0	1,540	0	11,300	5.05	11,300
California	6,300	172	23,100	188	973	400	0	36.4	236	65.4	6,540	31,100	6,860	38,000
Colorado	848	37.9	9,710	36.9	122	130	0	8.51	19.4	77	0	11,000	19.4	11,000
Connecticut	427	65.4	24.0	1.01	29.7	66.5	38.5	4.72	0	198	2,460	816	2,490	3,310
Delaware	78.1	14.8	101	1.31	0.06	96.0	0	0.85	0	7.82	417	300	417	717
District of Columbia	0	0	0.10	0	0	0	0	0	0	0	0	0.10	0	0.10
Florida	2,270	214	2,920	21.3	1.86	213	0	113	0	613	8,570	6,200	8,740	14,900
Georgia	1,120	115	839	29.3	49.8	487	0	27.7	0	1,770	283	4,440	283	4,720
Hawaii	274	8.02	323	1.83	4.54	4.63	0	1.51	0	53.2	603	671	603	1,270
Idaho	239	79.0	14,000	47.5	2,750	49.7	0	20.2	0	0.88	0	17,200	0	17,200
Illinois	1,500	92.4	226	36.1	32.0	390	0	70.9	25.5	10,700	0	13,100	25.5	13,100
Indiana	656	126	137	39.2	8.57	2,210	0	88.2	0	5,380	0	8,640	0	8,640
Iowa	393	38.4	42.8	136	18.9	125	0	79.6	0	2,240	0	3,070	0	3,070
Kansas	391	14.9	3,040	114	12.9	40.3	0	13.3	0	377	0	4,000	0	4,000
Kentucky	572	33.2	29.0	43.8	34.1	228	0	30.8	0	3,360	0	4,330	0	4,330
Louisiana	746	47.0	928	8.03	311	2,060	0	11.3	0	4,430	1.68	8,540	1.68	8,540
Maine	91.3	33.0	11.3	2.29	46.9	192	14.8	4.87	0	26.8	26.0	408	40.8	449
Maryland	790	85.6	72.1	8.25	20.8	50.0	146	9.43	0	436	5,760	1,470	5,910	7,380
Massachusetts	679	37.9	139	1.40	49.6	16.3	0	6.60	0	134	1,930	1,060	1,930	3,000
Michigan	1,090	231	209	19.6	82.7	612	0	76.2	0.57	8,520	0	10,800	0.57	10,800
Minnesota	542	79.0	197	59.3	16.9	134	0	285	0	2,510	0	3,820	0	3,820
Mississippi	395	44.6	2,090	18.4	133	203	0	8.78	12.6	956	69.5	3,850	82.0	3,930
Missouri	836	61.8	1,400	72.9	181	68.4	0	32.9	0	5,910	0	8,570	0	8,570
Montana	138	22.2	7,160	41.8	18.9	66.4	0	27.9	18.6	151	0	7,630	18.6	7,650
Nebraska	296	44.0	5,660	114	88.3	31.1	0	8.86	0.13	1,790	0	8,040	0.13	8,040
Nevada	581	29.8	1,570	5.06	49.5	5.23	0	345	0.95	21.6	11.0	2,610	11.9	2,620
New Hampshire	91.2	33.3	1.92	0.89	16.6	17.7	0	2.85	0	202	848	367	848	1,210
New Jersey	1,080	98.3	138	0.98	9.16	83.3	0	8.64	0	513	3,740	1,930	3,740	5,670
New Mexico	283	25.8	2,700	35.8	20.1	11.1	0	37.1	0	51.9	0	3,160	0	3,160
New York	2,260	152	70.4	22.6	40.2	352	0	72.4	0	2,760	4,850	5,730	4,850	10,600
North Carolina	960	231	367	72.0	1,470	271	0	32.6	0	7,660	1,360	11,100	1,360	12,400
North Dakota	68.8	3.68	165	21.6	5.92	18.7	0	13.4	13.6	837	0	1,130	13.6	1,150
Ohio	1,370	137	52.6	24.0	34.3	489	0	115	0	7,220	0	9,440	0	9,440
Oklahoma	657	26.8	564	88.8	10.7	20.8	0	18.0	1,400	385	0	1,770	1,400	3,170
Oregon	534	67.1	5,260	17.0	712	126	0	8.64	0	12.7	0	6,730	0	6,730
Pennsylvania	1,420	201	27.1	52.3	108	866	0	62.0	0	5,390	0	8,130	0	8,130
Rhode Island	108	8.02	2.69	0.18	14.5	7.52	0	0.92	0	1.44	232	135	241	376
South Carolina	619	115	125	12.0	11.0	388	0	8.43	0	5,500	0	6,780	0	6,780
South Dakota	124	5.37	362	47.4	48.4	9.48	0	18.2	0	10.3	0	626	0	626
Tennessee	918	38.7	71.9	27.5	52.6	776	0	14.6	0	5,800	0	7,700	0	7,700
Texas	3,990	259	6,830	259	31.4	680	610	203	810	10,500	661	22,600	2,160	24,800
Utah	673	8.44	3,220	16.5	97.1	47.6	70.6	4.19	246	69.6	11.0	4,130	331	4,460
Vermont	43.1	13.6	2.45	5.63	10.9	5.69	0	3.85	0	345	0	431	0	431
Virginia	665	124	61.4	27.4	295	383	56.1	34.9	0	2,860	3,150	4,440	3,210	7,650
Washington	910	113	3,150	27.8	213	458	33.1	16.7	0	37.9	0	4,920	33.1	4,960
West Virginia	189	31.5	0.09	5.08	52.3	764	3.80	14.5	1.02	2,470	0	3,530	4.82	3,530
Wisconsin	481	78.4	379	73.1	55.8	436	0	19.6	0	4,630	0	6,160	0	6,160
Wyoming	99.0	8.55	4,370	16.5	20.8	6.74	0	50.1	67.1	63.4	0	4,630	67.1	4,700
Puerto Rico	677	2.41	38.2	7.81	0.41	4.30	0	1.61	0.32	3.78	2,270	736	2,270	3,010
U.S. Virgin Islands	5.86	2.67	0	0.02	0	0.22	2.62	0	0.04	0.17	116	3.99	124	128
TOTAL	42,000	3,600	115,000	2,000	9,420	15,000	986	2,250	3,070	117,000	43,900	306,000	48,300	355,000

Table 2*B*. Total water withdrawals by water-use category, 2010, in thousand acre-feet per year.

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

State	Public supply	Self-supplied domestic	Irrigation	Livestock	Aquaculture	Self-supplied industrial		Mining		Thermoelectric power		Total		
						Fresh	Saline	Fresh	Saline	Fresh	Saline	Fresh	Saline	Total
Alabama	932	42.6	178	29.7	66.3	644	0	22.7	0	9,250	0	11,200	0	11,200
Alaska	88.6	16.6	1.78	0.28	767	8.72	4.82	27.0	248	65.0	0	975	252	1,230
Arizona	1,360	30.5	5,120	30.2	53	14.5	0	97.1	0	117	0	6,820	0	6,820
Arkansas	481	14.4	9,770	43.7	300	303	5.66	49.6	0	1,730	0	12,700	5.66	12,700
California	7,060	193	25,800	211	1,090	449	0	40.8	265	73.3	7,330	34,900	7,690	42,600
Colorado	950	42.5	10,900	41.3	137	146	0	9.54	21.8	86.3	0	12,300	21.8	12,300
Connecticut	479	73.3	26.9	1.13	33.3	74.5	43.1	5.29	0	222	2,750	915	2,800	3,710
Delaware	87.5	16.6	114	1.47	0.07	108	0	0.95	0	8.77	468	337	468	804
District of Columbia	0	0	0.11	0	0	0	0	0	0	0	0	0.11	0	0.11
Florida	2,540	240	3,270	23.9	2.09	239	0	127	0	687	9,610	6,950	9,790	16,700
Georgia	1,250	129	940	32.8	55.8	546	0	31.0	0	1,990	317	4,970	317	5,290
Hawaii	307	8.99	363	2.05	5.09	5.19	0	1.69	0	59.6	676	752	676	1,430
Idaho	267	88.6	15,700	53.3	3,090	55.7	0	22.6	0	0.99	0	19,300	0	19,300
Illinois	1,690	104	253	40.4	35.8	438	0	79.4	28.6	12,000	0	14,600	28.6	14,700
Indiana	735	141	154	43.9	9.61	2,470	0	98.9	0	6,030	0	9,690	0	9,690
Iowa	440	43.0	48.0	152	21.2	140	0	89.2	0	2,510	0	3,440	0	3,440
Kansas	439	16.7	3,410	128	14.5	45.2	0	14.9	0	423	0	4,490	0	4,490
Kentucky	641	37.2	32.5	49.1	38.2	255	0	34.5	0	3,760	0	4,850	0	4,850
Louisiana	837	52.7	1,040	9.00	349	2,310	0	12.6	0	4,960	1.88	9,570	1.88	9,570
Maine	102	37.0	12.6	2.57	52.6	215	16.6	5.46	0	30.1	29.1	458	45.8	504
Maryland	885	95.9	80.8	9.25	23.3	56.0	164	10.6	0	489	6,460	1,650	6,630	8,280
Massachusetts	761	42.5	156	1.57	55.7	18.3	0	7.40	0	151	2,160	1,190	2,170	3,360
Michigan	1,220	259	235	22.0	92.7	686	0	85.4	0.64	9,550	0	12,100	0.64	12,100
Minnesota	607	88.5	221	66.5	18.9	150	0	319	0	2,810	0	4,280	0	4,280
Mississippi	443	50.0	2,350	20.6	149	227	0	9.84	14.1	1,070	77.9	4,320	92.0	4,410
Missouri	938	69.3	1,570	81.7	202	76.7	0	36.8	0	6,630	0	9,610	0	9,610
Montana	155	24.9	8,030	46.9	21.2	74.5	0	31.3	20.9	169	0	8,550	20.9	8,570
Nebraska	331	49.3	6,340	128	99.0	34.9	0	9.93	0.15	2,010	0	9,010	0.15	9,010
Nevada	651	33.4	1,760	5.67	55.4	5.86	0	387	1.06	24.2	12.3	2,930	13.4	2,940
New Hampshire	102	37.4	2.15	1.00	18.6	19.8	0	3.19	0	227	951	411	951	1,360
New Jersey	1,210	110	154	1.10	10.3	93.3	0	9.69	0	575	4,190	2,170	4,190	6,360
New Mexico	318	28.9	3,020	40.1	22.5	12.4	0	41.6	0	58.1	0	3,540	0	3,540
New York	2,540	171	78.9	25.3	45.0	395	0	81.1	0	3,090	5,430	6,420	5,430	11,900
North Carolina	1,080	259	411	80.7	1,640	304	0	36.6	0	8,580	1,530	12,400	1,530	13,900
North Dakota	77.2	4.13	185	24.2	6.64	20.9	0	15.0	15.3	938	0	1,270	15.3	1,290
Ohio	1,540	154	58.9	26.9	38.5	548	0	129	0	8,090	0	10,600	0	10,600
Oklahoma	737	30.1	632	99.6	12.0	23.3	0	20.2	1,570	432	0	1,990	1,570	3,550
Oregon	598	75.2	5,890	19.1	798	141	0	9.69	0	14.2	0	7550	0	7,550
Pennsylvania	1,600	225	30.4	58.6	121	971	0	69.5	0	6,050	0	9,120	0	9,120
Rhode Island	121	8.99	3.02	0.20	16.3	8.43	0	1.03	0	1.61	260	151	270	421
South Carolina	693	129	140	13.5	12.3	435	0	9.45	0	6,170	0	7,600	0	7,600
South Dakota	139	6.02	406	53.1	54.3	10.6	0	20.4	0	11.5	0	701	0	701
Tennessee	1,030	43.4	80.6	30.8	59.0	870	0	16.4	0	6,500	0	8,630	0	8,630
Texas	4,480	290	7,660	290	35.2	762	684	227	908	11,700	741	25,400	2,420	27,800
Utah	754	9.46	3,610	18.5	109	53.3	79.2	4.70	276	78.0	12.3	4,630	371	5,000
Vermont	48.3	15.3	2.75	6.31	12.3	6.38	0	4.32	0	387	0	483	0	483
Virginia	745	139	68.8	30.7	331	429	62.9	39.1	0	3,200	3,530	4,970	3,600	8,570
Washington	1,020	126	3,530	31.1	239	513	37.1	18.7	0	42.5	0	5,520	37.1	5,560
West Virginia	212	35.3	0.10	5.69	58.7	857	4.26	16.3	1.14	2,770	0	3,960	5.40	3,960
Wisconsin	540	87.8	425	81.9	62.5	489	0	21.9	0	5,200	0	6,900	0	6,900
Wyoming	111	9.58	4,900	18.5	23.4	7.56	0	56.2	75.2	71.0	0	5,200	75.2	5,270
Puerto Rico	759	2.70	42.8	8.76	0.46	4.82	0	1.80	0.36	4.24	2,540	825	2,550	3,370
U.S. Virgin Islands	6.57	2.99	0	0.02	0	0.25	2.94	0	0.04	0.19	130	4.47	139	143
TOTAL	47,100	4,040	129,000	2,240	10,600	16,800	1,100	2,520	3,440	131,000	49,200	343,000	54,200	397,000

Table 3*A*. Surface-water withdrawals by water-use category, 2010, in million gallons per day.

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

State	Public supply	Self-supplied domestic	Irrigation	Live-stock	Aqua-culture	Self-supplied industrial		Mining		Thermoelectric power		Total		
						Fresh	Saline	Fresh	Saline	Fresh	Saline	Fresh	Saline	Total
Alabama	551	0	74.0	14.8	26.6	540	0	7.49	0	8,250	0	9,470	0	9,470
Alaska	51.8	0.66	0.02	0.15	255	4.40	4.30	24.1	76.4	55.8	0	391	80.7	472
Arizona	628	0	2,880	0	7.77	0	0	0	0	27.1	0	3,540	0	3,540
Arkansas	295	0	1,340	23.4	86.5	214	0	44.1	0	1,540	0	3,540	0	3,540
California	3,470	29.4	14,400	103	802	1.13	0	12.2	0.05	32.2	6,490	18,800	6,490	25,300
Colorado	717	0	8,420	11.8	99.0	127	0	3.05	0	60.2	0	9,440	0	9,440
Connecticut	292	0	23.1	0	23.0	60.2	38.5	3.80	0	198	2,460	600	2,490	3,090
Delaware	33.3	0	15.2	0	0	87.5	0	0.41	0	7.45	417	144	417	561
District of Columbia	0	0	0.05	0	0	0	0	0	0	0	0	0.05	0	0.05
Florida	256	0	1,340	2.22	0	47.7	0	34.1	0	570	8,570	2,230	8,580	10,800
Georgia	873	0	202	26.9	45.9	281	0	8.41	0	1,770	283	3,210	283	3,490
Hawaii	15.8	6.17	223	1.20	2.40	0	0	0.11	0	0	552	248	552	800
Idaho	27.1	0	10,200	9.01	2,690	17.2	0	18.9	0	0	0	13,000	0	13,000
Illinois	1,140	0	17.5	0.03	27.2	267	0	55.4	0	10,700	0	12,200	0	12,200
Indiana	304	0	38.7	13.0	1.97	2,120	0	83.7	0	5,360	0	7,920	0	7,920
Iowa	84.3	0	1.18	33.8	4.45	2.70	0	78.1	0	2,220	0	2,420	0	2,420
Kansas	231	0	160	23.0	8.57	6.79	0	3.98	0	366	0	800	0	800
Kentucky	501	13.5	27.4	41.6	33.5	146	0	23.0	0	3,340	0	4,130	0	4,130
Louisiana	368	0	258	3.88	114	1,830	0	5.94	0	4,390	1.68	6,960	1.68	6,970
Maine	63.6	0	8.77	0.58	21.2	185	14.8	3.73	0	25.9	26.0	309	40.8	350
Maryland	701	0	18.6	2.23	15.7	38.6	146	2.18	0	434	5,760	1,210	5,910	7,120
Massachusetts	489	0	21.4	0.50	42.4	12.1	0	4.78	0	134	1,930	703	1,930	2,640
Michigan	883	0	62.6	1.90	78.5	537	0	66.0	0	8,510	0	10,100	0	10,100
Minnesota	188	0	26.7	0	15.2	71.7	0	276	0	2,510	0	3,080	0	3,080
Mississippi	46.3	0	133	11.1	19.3	125	0	0.55	0	905	62.4	1,240	62.4	1,300
Missouri	543	0	49.6	54.4	170	34.1	0	8.41	0	5,890	0	6,750	0	6,750
Montana	72.4	1.04	7,030	29.5	16.4	29.6	0	26.2	0	150	0	7,360	0	7,360
Nebraska	61.4	0	1,360	21.2	82.2	2.33	0	8.77	0	1,790	0	3,320	0	3,320
Nevada	448	0	921	0	38.8	4.53	0	4.11	0	3.68	0	1,420	0	1,420
New Hampshire	56.6	0	0.67	0.22	8.48	7.06	0	2.84	0	201	848	277	848	1,120
New Jersey	682	0	70.1	0	0	48.5	0	6.91	0	512	3,740	1,320	3,740	5,060
New Mexico	72.4	0	1,460	3.03	4.32	0.83	0	9.68	0	42.3	0	1,590	0	1,590
New York	1,810	0	40.2	8.00	36.8	316	0	64.0	0	2,750	4,850	5,020	4,850	9,870
North Carolina	766	0	279	15.0	1,450	188	0	4.87	0	7,660	1,360	10,400	1,360	11,700
North Dakota	38.3	0	87.2	8.62	5.92	12.9	0	4.63	0	837	0	994	0	994
Ohio	918	2.75	35.4	16.3	19.0	293	0	35.8	0	7,190	0	8,510	0	8,510
Oklahoma	527	0	135	56.3	7.43	14.3	0	13.3	0	384	0	1,140	0	1,140
Oregon	420	7.07	3,350	14.0	679	123	0	1.17	0	11.2	0	4,600	0	4,600
Pennsylvania	1,200	0	19.8	6.75	59.7	792	0	10.5	0	5,390	0	7,480	0	7,480
Rhode Island	92.2	0	0.39	0.01	8.90	3.35	0	0.49	0	1.44	232	98.0	241	339
South Carolina	504	0	57.4	6.79	8.97	365	0	1.74	0	5,500	0	6,440	0	6,440
South Dakota	49.9	0	165	28.3	23.6	2.63	0	11.0	0	6.93	0	287	0	287
Tennessee	618	0	27.6	13.4	37.2	728	0	7.73	0	5,800	0	7,230	0	7,230
Texas	2,860	0	1,730	127	22.2	571	608	81.2	0.49	10,400	661	15,800	1,280	17,100
Utah	309	0	2,730	8.76	0	16.4	33.1	1.60	205	45.6	0.47	3,110	238	3,340
Vermont	29.2	0	1.68	1.41	4.96	3.69	0	3.53	0	344	0	389	0	389
Virginia	594	0	45.4	20.8	286	309	56.1	28.4	0	2,850	3,150	4,140	3,200	7,340
Washington	439	0.02	2,350	8.55	127	358	33.1	3.36	0	36.4	0	3,320	33.1	3,350
West Virginia	155	0.63	0.04	3.42	40.6	729	0	9.00	0	2,470	0	3,410	0	3,410
Wisconsin	221	0	123	7.30	30.2	382	0	8.63	0	4,630	0	5,400	0	5,400
Wyoming	47.5	0	3,930	10.3	18.7	1.82	0	13.0	0	61.1	0	4,080	0	4,080
Puerto Rico	590	0	15.7	2.24	0.40	0	0	0.18	0	2.61	2,270	611	2,270	2,880
U.S. Virgin Islands	4.95	2.67	0	0.01	0	0	2.62	0	0.04	0.17	116	2.85	124	127
TOTAL	26,300	63.9	65,900	797	7,610	12,100	937	1,130	282	116,000	43,800	230,000	45,000	275,000

Table 3*B*. Surface-water withdrawals by water-use category, 2010, in thousand acre-feet per year.

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

State	Public supply	Self-supplied domestic	Irrigation	Live-stock	Aqua-culture	Self-supplied industrial		Mining		Thermoelectric power		Total		
						Fresh	Saline	Fresh	Saline	Fresh	Saline	Fresh	Saline	Total
Alabama	617	0	83.0	16.6	29.9	606	0	8.40	0	9,250	0	10,600	0	10,600
Alaska	58.1	0.74	0.02	0.17	285	4.93	4.82	27.0	85.6	62.6	0	439	90.4	529
Arizona	704	0	3,220	0	8.71	0	0	0	0	30.4	0	3,970	0	3,970
Arkansas	331	0	1,500	26.2	96.9	240	0	49.4	0	1,720	0	3,970	0	3,970
California	3,890	33.0	16,100	116	899	1.27	0	13.7	0.06	36.1	7,270	21,100	7,270	28,400
Colorado	804	0	9,440	13.2	111	142	0	3.42	0	67.5	0	10,600	0	10,600
Connecticut	327	0	25.9	0	25.8	67.5	43.1	4.26	0	222	2,750	673	2,800	3,470
Delaware	37.3	0	17.1	0	0	98.1	0	0.46	0	8.35	468	161	468	629
District of Columbia	0	0	0.06	0	0	0	0	0	0	0	0	0.06	0	0.06
Florida	287	0	1,500	2.49	0	53.5	0	38.2	0	639	9,600	2,500	9,620	12,100
Georgia	979	0	227	30.1	51.4	315	0	9.43	0	1,980	317	3,600	317	3,910
Hawaii	17.7	6.92	249	1.35	2.69	0	0	0.12	0	0	619	278	619	897
Idaho	30.4	0	11,500	10.1	3,010	19.2	0	21.2	0	0	0	14,600	0	14,600
Illinois	1,280	0	19.6	0.03	30.5	299	0	62.1	0	12,000	0	13,700	0	13,700
Indiana	341	0	43.4	14.6	2.21	2,380	0	93.9	0	6,010	0	8,880	0	8,880
Iowa	94.5	0	1.32	37.9	4.99	3.03	0	87.5	0	2,480	0	2,710	0	2,710
Kansas	259	0	179	25.8	9.61	7.61	0	4.46	0	410	0	897	0	897
Kentucky	562	15.1	30.7	46.6	37.6	164	0	25.7	0	3,740	0	4,630	0	4,630
Louisiana	413	0	289	4.35	127	2,050	0	6.66	0	4,920	1.88	7,810	1.88	7,810
Maine	71.3	0	9.83	0.65	23.7	208	16.6	4.18	0	29.0	29.1	347	45.8	392
Maryland	785	0	20.9	2.50	17.6	43.3	164	2.44	0	486	6,460	1,360	6,630	7,980
Massachusetts	548	0	24.0	0.56	47.6	13.5	0	5.36	0	150	2,160	788	2,170	2,950
Michigan	990	0	70.1	2.13	88.0	602	0	74.0	0	9,540	0	11,400	0	11,400
Minnesota	211	0	29.9	0	17.0	80.4	0	310	0	2,810	0	3,460	0	3,460
Mississippi	51.9	0	149	12.4	21.6	140	0	0.62	0	1,020	70.0	1,390	70.0	1,460
Missouri	609	0	55.6	61.0	191	38.3	0	9.43	0	6,610	0	7,570	0	7,570
Montana	81.1	1.17	7,880	33.0	18.4	33.1	0	29.3	0	168	0	8,250	0	8,250
Nebraska	68.8	0	1,520	23.7	92.1	2.61	0	9.83	0	2,010	0	3,730	0	3,730
Nevada	502	0	1,030	0	43.5	5.08	0	4.61	0	4.13	0	1,590	0	1,590
New Hampshire	63.4	0	0.75	0.25	9.51	7.91	0	3.18	0	225	951	310	951	1,260
New Jersey	765	0	78.5	0	0	54.4	0	7.75	0	574	4,190	1,480	4,190	5,670
New Mexico	81.1	0	1,640	3.40	4.84	0.93	0	10.9	0	47.4	0	1,780	0	1,780
New York	2,020	0	45.0	8.97	41.3	354	0	71.8	0	3,090	5,430	5,630	5,430	11,100
North Carolina	858	0	312	16.8	1,630	210	0	5.46	0	8,580	1,530	11,600	1,530	13,100
North Dakota	42.9	0	97.8	9.66	6.64	14.5	0	5.19	0	938	0	1,110	0	1,110
Ohio	1,030	3.08	39.7	18.2	21.3	328	0	40.2	0	8,060	0	9,540	0	9,540
Oklahoma	591	0	151	63.1	8.33	16.0	0	14.9	0	431	0	1,270	0	1,270
Oregon	471	7.93	3,750	15.7	761	138	0	1.31	0	12.6	0	5,160	0	5,160
Pennsylvania	1,340	0	22.1	7.57	66.9	888	0	11.8	0	6,040	0	8,380	0	8,380
Rhode Island	103	0	0.44	0.01	9.98	3.76	0	0.55	0	1.61	260	110	270	380
South Carolina	565	0	64.4	7.61	10.1	409	0	1.95	0	6,160	0	7,220	0	7,220
South Dakota	56.0	0	185	31.7	26.4	2.95	0	12.3	0	7.77	0	322	0	322
Tennessee	692	0	31.0	15.1	41.7	817	0	8.67	0	6,500	0	8,100	0	8,100
Texas	3,200	0	1,940	143	24.9	641	682	91.0	0.55	11,700	741	17,700	1,430	19,200
Utah	346	0	3,060	9.82	0	18.4	37.1	1.79	229	51.1	0.53	3,480	267	3,750
Vermont	32.7	0	1.88	1.58	5.56	4.14	0	3.96	0	386	0	436	0	436
Virginia	666	0	50.8	23.4	320	346	62.9	31.8	0	3,200	3,530	4,640	3,590	8,230
Washington	492	0.02	2,630	9.58	142	402	37.1	3.77	0	40.8	0	3,720	37.1	3,760
West Virginia	174	0.71	0.04	3.83	45.5	817	0	10.1	0	2,770	0	3,820	0	3,820
Wisconsin	247	0	138	8.18	33.9	428	0	9.67	0	5,190	0	6,060	0	6,060
Wyoming	53.3	0	4,410	11.6	21.0	2.04	0	14.6	0	68.4	0	4,580	0	4,580
Puerto Rico	661	0	17.6	2.51	0.45	0	0	0.20	0	2.93	2,540	685	2,540	3,230
U.S. Virgin Islands	5.55	2.99	0	0.01	0	0	2.94	0	0.04	0.19	130	3.19	139	142
TOTAL	29,500	71.7	73,900	893	8,530	13,500	1,050	1,270	316	130,000	49,100	258,000	50,500	309,000

Table 4*A*. Groundwater withdrawals by water-use category, 2010, in million gallons per day.

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

State	Public supply	Self-supplied domestic	Irrigation	Live-stock	Aqua-culture	Self-supplied industrial		Mining		Thermoelectric power		Total		
						Fresh	Saline	Fresh	Saline	Fresh	Saline	Fresh	Saline	Total
Alabama	280	38.0	84.9	11.7	32.4	34.0	0	12.7	0	0	0	494	0	494
Alaska	27.2	14.1	1.57	0.10	429	3.38	0	0.01	144	2.19	0	478	144	622
Arizona	585	27.2	1,690	27.0	39.5	12.9	0	86.6	0	77.3	0	2,550	0	2,550
Arkansas	134	12.8	7,380	15.6	181	56.1	5.05	0.18	0	4.26	0	7,780	5.05	7,790
California	2,830	142	8,690	84.4	171	399	0	24.1	236	33.1	48.4	12,300	369	12,700
Colorado	130	37.9	1,300	25.1	23.0	3.45	0	5.46	19.4	16.8	0	1,540	19.4	1,560
Connecticut	135	65.4	0.85	1.01	6.67	6.28	0	0.92	0	0	0	216	0	216
Delaware	44.8	14.8	86.1	1.31	0.06	8.43	0	0.44	0	0.37	0	156	0	156
District of Columbia	0	0	0.05	0	0	0	0	0	0	0	0	0.05	0	0.05
Florida	2,010	214	1,580	19.1	1.86	165	0	78.8	0	43.5	6.54	3,970	154	4,120
Georgia	243	115	636	2.38	3.92	206	0	19.3	0	2.92	0	1,230	0	1,230
Hawaii	258	1.85	101	0.63	2.14	4.63	0	1.40	0	53.2	50.8	423	50.8	474
Idaho	212	79.0	3,820	38.5	65.6	32.6	0	1.28	0	0.88	0	4,250	0	4,250
Illinois	367	92.4	208	36.0	4.78	124	0	15.5	25.5	5.65	0	853	25.5	879
Indiana	351	126	98.4	26.2	6.60	82.2	0	4.52	0	24.6	0	720	0	720
Iowa	309	38.4	41.6	102	14.4	123	0	1.53	0	21.2	0	650	0	650
Kansas	160	14.9	2,880	91.0	4.37	33.5	0	9.34	0	11.2	0	3,200	0	3,200
Kentucky	71.0	19.7	1.65	2.21	0.53	81.4	0	7.80	0	15.3	0	199	0	199
Louisiana	378	47.0	670	4.15	197	231	0	5.32	0	41.1	0	1,570	0	1,570
Maine	27.7	33.0	2.51	1.71	25.8	6.54	0	1.14	0	0.96	0	99.4	0	99.4
Maryland	89.2	85.6	53.4	6.02	5.06	11.3	0	7.25	0	2.25	0	260	0	260
Massachusetts	191	37.9	118	0.90	7.23	4.28	0	1.82	0	0.21	0	361	0	361
Michigan	204	231	147	17.7	4.21	75.0	0	10.1	0.57	4.12	0	693	0.57	694
Minnesota	353	79.0	171	59.3	1.69	61.8	0	8.32	0	2.34	0	736	0	736
Mississippi	349	44.6	1,960	7.35	113	77.8	0	8.23	12.6	50.0	7.05	2,610	19.6	2,630
Missouri	293	61.8	1,350	18.4	10.5	34.3	0	24.4	0	19.9	0	1,810	0	1,810
Montana	65.6	21.2	127	12.4	2.45	36.9	0	1.73	18.6	0.85	0	268	18.6	286
Nebraska	234	44.0	4,300	93.0	6.07	28.8	0	0.09	0.13	5.25	0	4,710	0.13	4,710
Nevada	133	29.8	653	5.06	10.6	0.70	0	341	0.95	17.9	11.0	1,190	11.9	1,200
New Hampshire	34.7	33.3	1.25	0.67	8.09	10.6	0	0.01	0	1.02	0	89.7	0	89.7
New Jersey	398	98.3	67.6	0.98	9.16	34.8	0	1.73	0	1.57	0	612	0	612
New Mexico	211	25.8	1,240	32.8	15.8	10.3	0	27.4	0	9.59	0	1,570	0	1,570
New York	457	152	30.2	14.6	3.36	35.9	0	8.34	0	2.39	0	704	0	704
North Carolina	194	231	88.3	56.9	11.5	83.8	0	27.8	0	0.37	0	694	0	694
North Dakota	30.5	3.68	77.5	12.9	0	5.77	0	8.73	13.6	0	0	139	13.6	153
Ohio	455	134	17.2	7.70	15.4	197	0	79.0	0	23.0	0	929	0	929
Oklahoma	130	26.8	429	32.5	3.25	6.46	0	4.75	1,400	1.26	0	635	1,400	2,030
Oregon	114	60.0	1,910	3.00	33.4	2.62	0	7.47	0	1.48	0	2,130	0	2,130
Pennsylvania	226	201	7.39	45.6	47.9	73.8	0	51.4	0	4.49	0	657	0	657
Rhode Island	15.8	8.02	2.30	0.17	5.60	4.17	0	0.43	0	0	0	36.5	0	36.5
South Carolina	114	115	67.7	5.23	2.00	22.7	0	6.69	0	4.86	0	339	0	339
South Dakota	74.3	5.37	198	19.1	24.8	6.85	0	7.22	0	3.34	0	339	0	339
Tennessee	301	38.7	44.3	14.0	15.4	47.6	0	6.89	0	1.78	0	470	0	470
Texas	1,130	259	5,100	131	9.13	108	2.04	122	810	38.8	0	6,830	884	7,710
Utah	364	8.44	494	7.77	97.1	31.2	37.5	2.59	41.6	24.0	10.5	1,030	92.6	1,120
Vermont	14.0	13.6	0.77	4.22	5.97	2.00	0	0.32	0	0.74	0	41.6	0	41.6
Virginia	71.0	124	16.0	6.52	9.39	74.2	0.02	6.56	0	1.55	0	299	9.97	309
Washington	471	113	798	19.2	86.4	99.4	0	13.4	0	1.57	0	1,600	0	1,600
West Virginia	34.2	30.9	0.05	1.66	11.7	35.1	3.80	5.53	1.02	1.40	0	121	4.82	125
Wisconsin	261	78.4	256	65.8	25.5	54.3	0	10.9	0	2.78	0	754	0	754
Wyoming	51.5	8.55	437	6.14	2.10	4.92	0	37.1	67.1	2.29	0	550	67.1	617
Puerto Rico	87.3	2.41	22.4	5.57	0.01	4.30	0	1.43	0.32	1.17	0	125	0.32	125
U.S. Virgin Islands	0.91	0	0	0.01	0	0.22	0	0	0	0	0	1.14	0	1.14
TOTAL	15,700	3,540	49,500	1,200	1,820	2,900	48.4	1,120	2,790	587	134	76,000	3,290	79,300

Table 4*B*. Groundwater withdrawals by water-use category, 2010, in thousand acre-feet per year.

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

State	Public supply	Self-supplied domestic	Irrigation	Live-stock	Aqua-culture	Self-supplied industrial		Mining		Thermoelectric power		Total		
						Fresh	Saline	Fresh	Saline	Fresh	Saline	Fresh	Saline	Total
Alabama	314	42.6	95.2	13.1	36.4	38.1	0	14.3	0	0	0	554	0	554
Alaska	30.5	15.9	1.76	0.11	481	3.79	0	0.01	162	2.45	0	536	162	698
Arizona	656	30.5	1,900	30.2	44.3	14.5	0	97.1	0	86.6	0	2,860	0	2,860
Arkansas	150	14.4	8,270	17.4	203	62.9	5.66	0.20	0	4.78	0	8,720	5.66	8,730
California	3,170	160	9,740	94.6	192	448	0	27.0	265	37.1	54.3	13,800	413	14,200
Colorado	146	42.5	1,450	28.1	25.8	3.87	0	6.12	21.8	18.8	0	1,720	21.8	1,750
Connecticut	151	73.3	0.95	1.13	7.48	7.04	0	1.03	0	0	0	242	0	242
Delaware	50.2	16.6	96.5	1.47	0.07	9.45	0	0.49	0	0.41	0	175	0	175
District of Columbia	0	0	0.06	0	0	0	0	0	0	0	0	0.06	0	0.06
Florida	2,260	240	1,770	21.4	2.09	185	0	88.3	0	48.7	7.33	4,450	173	4,620
Georgia	272	129	713	2.67	4.39	231	0	21.6	0	3.27	0	1,380	0	1,380
Hawaii	289	2.07	113	0.71	2.40	5.19	0	1.57	0	59.6	56.9	474	56.9	531
Idaho	237	88.6	4,280	43.2	73.6	36.5	0	1.43	0	0.99	0	4,760	0	4,760
Illinois	411	104	233	40.4	5.36	139	0	17.4	28.6	6.33	0	956	28.6	985
Indiana	394	141	110	29.4	7.40	92.1	0	5.07	0	27.5	0	807	0	807
Iowa	346	43.0	46.7	114	16.2	137	0	1.72	0	23.7	0	729	0	729
Kansas	179	16.7	3,230	102	4.90	37.6	0	10.5	0	12.5	0	3,590	0	3,590
Kentucky	79.5	22.1	1.85	2.48	0.59	91.2	0	8.74	0	17.2	0	224	0	224
Louisiana	424	52.7	751	4.65	221	259	0	5.96	0	46.0	0	1,760	0	1,760
Maine	31.0	37.0	2.81	1.92	28.9	7.33	0	1.28	0	1.08	0	111	0	111
Maryland	100	95.9	59.9	6.75	5.67	12.7	0	8.13	0	2.52	0	292	0	292
Massachusetts	214	42.5	132	1.01	8.10	4.80	0	2.04	0	0.24	0	404	0	404
Michigan	229	259	164	19.9	4.72	84.1	0	11.4	0.64	4.62	0	777	0.64	778
Minnesota	396	88.5	191	66.5	1.89	69.3	0	9.33	0	2.62	0	826	0	826
Mississippi	391	50.0	2,200	8.24	127	87.2	0	9.23	14.1	56.1	7.90	2,930	22.0	2,950
Missouri	328	69.3	1,520	20.6	11.7	38.4	0	27.4	0	22.3	0	2,030	0	2,030
Montana	73.5	23.8	142	13.8	2.75	41.3	0	1.94	20.9	0.95	0	300	20.9	321
Nebraska	263	49.3	4,820	104	6.80	32.3	0	0.1	0.15	5.89	0	5,280	0.15	5,280
Nevada	149	33.4	732	5.67	11.9	0.78	0	383	1.06	20.1	12.3	1,340	13.4	1,350
New Hampshire	38.9	37.4	1.40	0.75	9.07	11.9	0	0.01	0	1.14	0	101	0	101
New Jersey	446	110	75.8	1.10	10.3	39.0	0	1.94	0	1.76	0	686	0	686
New Mexico	236	28.9	1,390	36.7	17.7	11.5	0	30.7	0	10.8	0	1,760	0	1,760
New York	512	171	33.9	16.3	3.77	40.2	0	9.35	0	2.68	0	789	0	789
North Carolina	218	259	98.9	63.8	12.9	94.0	0	31.1	0	0.41	0	778	0	778
North Dakota	34.2	4.13	86.9	14.5	0	6.47	0	9.79	15.3	0	0	156	15.3	171
Ohio	510	151	19.2	8.63	17.2	221	0	88.6	0	25.8	0	1,040	0	1,040
Oklahoma	146	30.1	481	36.4	3.64	7.24	0	5.32	1,570	1.41	0	712	1,570	2,280
Oregon	128	67.3	2,140	3.36	37.4	2.94	0	8.37	0	1.66	0	2,390	0	2,390
Pennsylvania	254	225	8.28	51.1	53.7	82.7	0	57.7	0	5.03	0	737	0	737
Rhode Island	17.7	8.99	2.58	0.19	6.28	4.67	0	0.48	0	0	0	40.9	0	40.9
South Carolina	128	129	75.9	5.86	2.24	25.5	0	7.50	0	5.45	0	380	0	380
South Dakota	83.3	6.02	221	21.4	27.9	7.68	0	8.09	0	3.74	0	380	0	380
Tennessee	337	43.4	49.6	15.8	17.3	53.3	0	7.72	0	2.00	0	526	0	526
Texas	1,270	290	5,710	147	10.2	121	2.29	136	908	43.5	0	7,650	991	8,640
Utah	408	9.46	554	8.71	109	34.9	42.1	2.90	46.6	26.9	11.7	1,150	104	1,250
Vermont	15.6	15.3	0.86	4.73	6.69	2.24	0	0.36	0	0.83	0	46.6	0	46.6
Virginia	79.6	139	18.0	7.31	10.5	83.2	0.02	7.35	0	1.74	0	335	11.2	346
Washington	528	126	894	21.5	96.9	111	0	15.0	0	1.76	0	1,800	0	1,800
West Virginia	38.3	34.6	0.06	1.86	13.1	39.4	4.26	6.20	1.14	1.57	0	135	5.40	141
Wisconsin	292	87.8	287	73.7	28.6	60.9	0	12.3	0	3.12	0	845	0	845
Wyoming	57.7	9.58	490	6.88	2.35	5.52	0	41.6	75.2	2.57	0	616	75.2	692
Puerto Rico	97.9	2.70	25.1	6.24	0.01	4.82	0	1.60	0.36	1.31	0	140	0.36	140
U.S. Virgin Islands	1.02	0	0	0.01	0	0.25	0	0	0	0	0	1.28	0	1.28
TOTAL	17,600	3,970	55,400	1,350	2,030	3,250	54.3	1,250	3,130	658	150	85,200	3,690	88,900

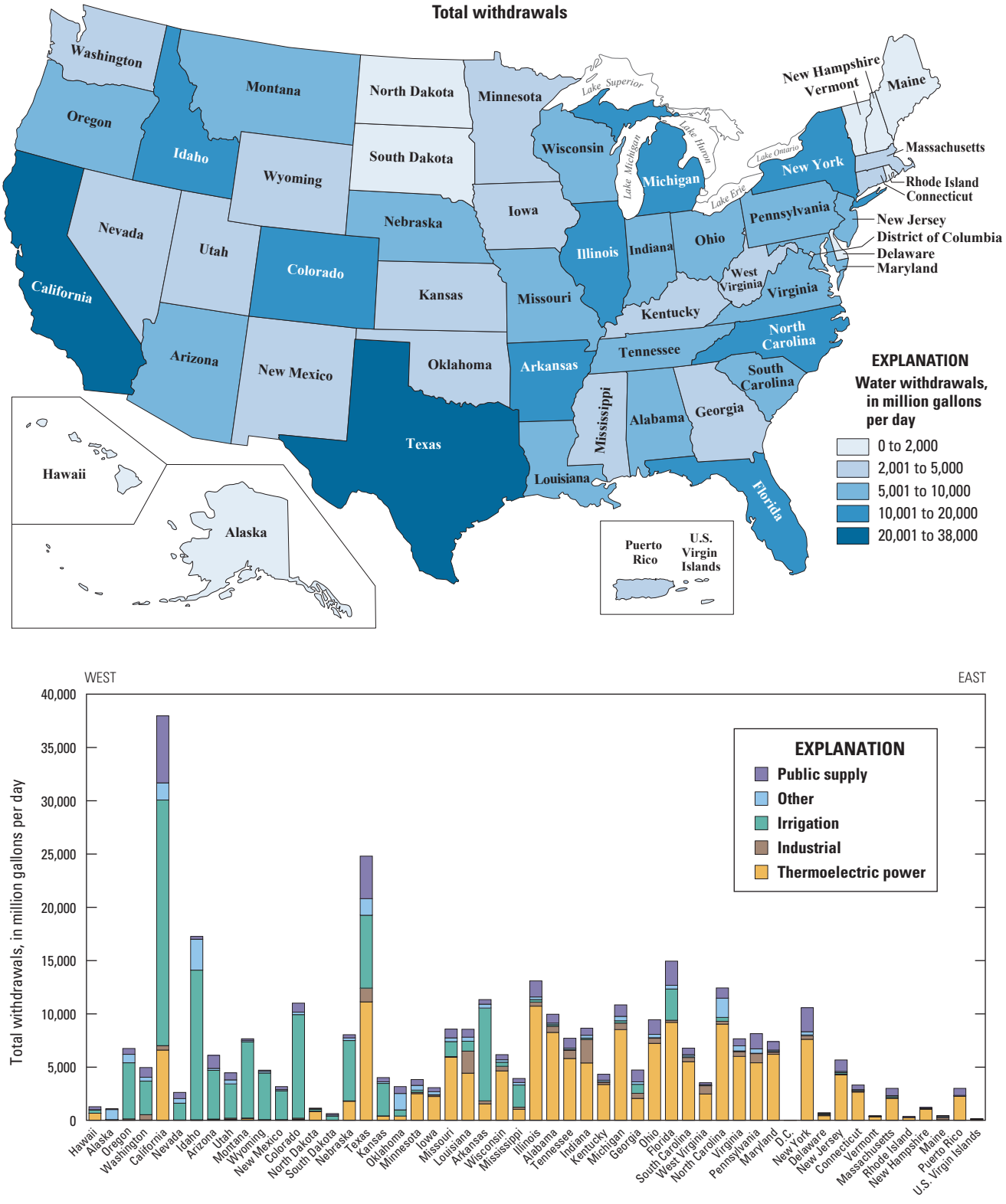

Figure 2. Total water withdrawals by State and barchart showing categories by State from west to east, 2010.

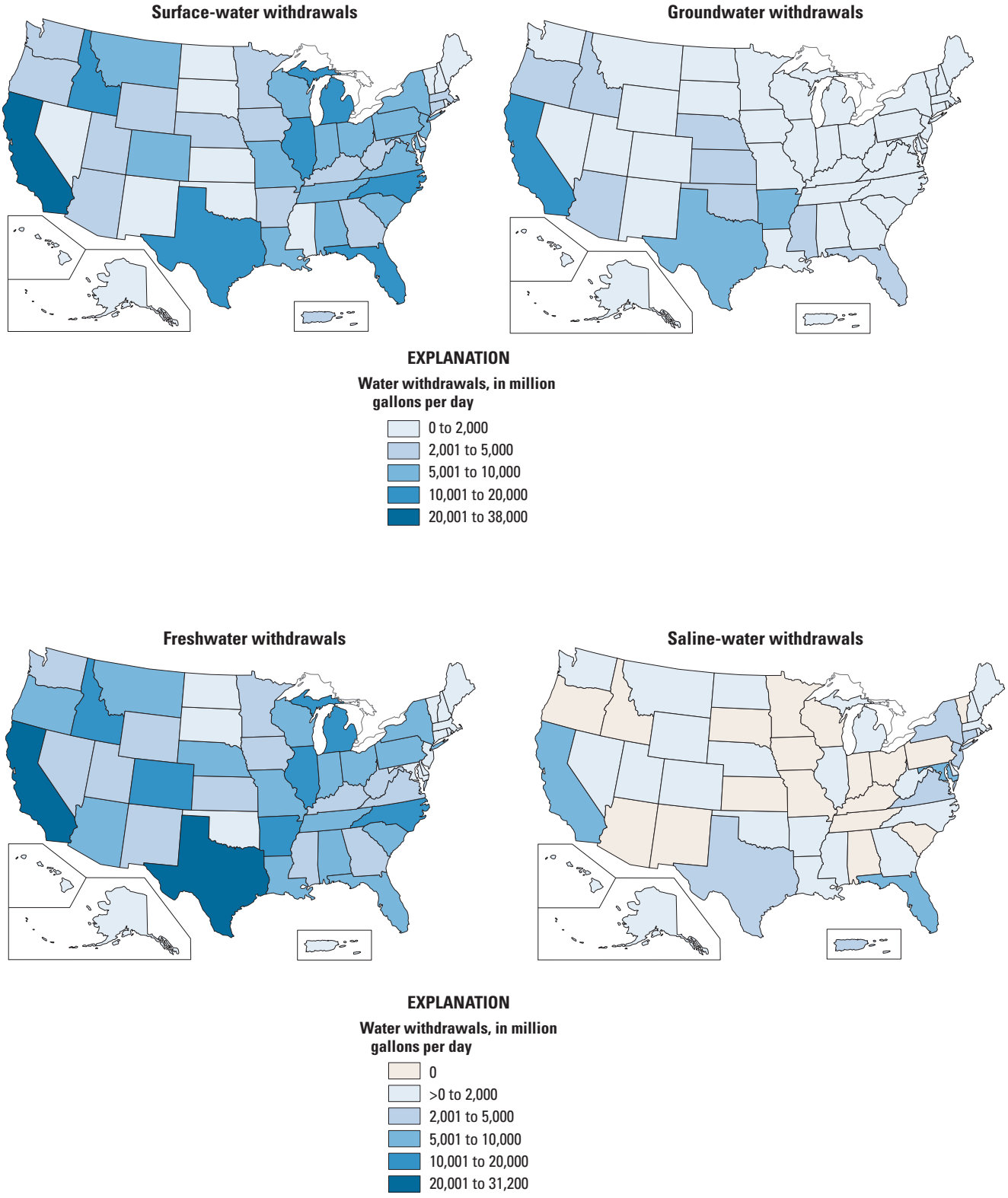

Figure 3. Surface-water and groundwater, and freshwater and saline-water withdrawals, 2010.

12 percent

Public Supply

42,000 million gallons per day

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

Approximately 42,000 Mgal/d (table 5), or 47,100 thousand acre-ft/yr (table 2*B*), of water were withdrawn for public supply in 2010. This amount is 5 percent less than the estimated amount of water withdrawn for public supply in 2005. Public supply represents about 14 percent of total freshwater withdrawals and 22 percent of all withdrawals excluding thermoelectric power. In some States, public-supply water sources include desalinated seawater or brackish groundwater that has been treated to reduce dissolved solids. A combined total of 23.5 Mgal/d saline surface-water withdrawals for public-supply use were reported in Florida, the U.S. Virgin Islands, Massachusetts, and Texas. A combined total of 317 Mgal/d saline groundwater withdrawals for public-supply use were identified in Florida, California, Texas, Virginia, and Utah. Because these saline withdrawals were identified for only seven States and represent less than 1 percent of total public-supply withdrawals, they are not listed separately in table 5 but were included in the calculations.

Public supply water tanks, Yuma, Arizona. Photo by Saeid Tadayon, USGS.

An estimated 268 million people relied on public-supply water for their household use in 2010. This number represents about 86 percent of the total U.S. population. About 35 percent of all public-supply withdrawals were in the four States with the largest populations: California, Texas, New York, and Florida (fig. 4). Sixty-three percent of water withdrawn for public supply in 2010 was from surface sources, such as lakes and streams; the other 37 percent was from groundwater.

Five States—California, Texas, New York, Pennsylvania, and Illinois—each withdrew more than 1,000 Mgal/d of surface water for public supply in 2010 and together accounted for 40 percent of the total surface-water withdrawals for public supply. In 36 States, including Puerto Rico and the U.S. Virgin Islands, surface-water sources provided more than half of the total public-supply withdrawals.

Three States—California, Florida, and Texas—each withdrew more than 1,000 Mgal/d of groundwater for public supply in 2010 and accounted for 38 percent of total groundwater withdrawals for public supply. States that relied on groundwater for 75 percent or more of their public-supply withdrawals were Hawaii, Florida, Idaho, Mississippi, Nebraska, and Iowa.

Most of the public-supply withdrawals are delivered to customers for domestic, commercial, and industrial needs. Part of the total is used for public services, such as public pools, parks, firefighting, water and wastewater treatment, and municipal buildings, and some is unaccounted for because of leaks, flushing, tower maintenance, and other system losses. Domestic deliveries represent the largest single component of public-supply withdrawals, averaging 57 percent of the total nationally. Estimates of public-supply deliveries to domestic use, representing indoor and outdoor water uses at occupied residences, are identified in table 5. Estimates for commercial and industrial deliveries, public use, and system losses were not available for all States and, therefore, are included in table 5 as an aggregate number.

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

Table 5. Public-supply water withdrawals, 2010.

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

State	Population (in thousands)			Withdrawals (in Mgal/d)			Public-supply deliveries		
	Total	Served by public supply		By source		Total	Domestic use (in Mgal/d)	Domestic use (in percent)	All other uses and system losses (in Mgal/d)
		Population	Population (in percent)	Ground-water	Surface water				
Alabama	4,780	4,240	89	280	551	831	327	39	504
Alaska	710	450	63	27.2	51.8	79.0	49.2	62	29.9
Arizona	6,390	6,170	97	585	628	1,210	912	75	301
Arkansas	2,920	2,770	95	134	295	429	295	69	133
California	37,300	34,800	93	2,830	3,470	6,300	3,870	61	2,430
Colorado	5,030	4,720	94	130	717	848	521	61	327
Connecticut	3,570	2,700	76	135	292	427	203	47	224
Delaware	898	713	79	44.8	33.3	78.1	57.0	73	21.0
District of Columbia	602	602	100	0	0	0	74.9	n/a	n/a
Florida	18,800	16,900	90	2,010	256	2,270	1,430	63	838
Georgia	9,690	8,160	84	243	873	1,120	651	58	465
Hawaii	1,360	1,300	96	258	15.8	274	188	69	86.0
Idaho	1,570	1,140	72	212	27.1	239	184	77	54.2
Illinois	12,800	11,700	91	367	1,140	1,500	934	62	571
Indiana	6,480	4,830	74	351	304	656	367	56	289
Iowa	3,050	2,450	81	309	84.3	393	160	41	233
Kansas	2,850	2,700	95	160	231	391	194	50	197
Kentucky	4,340	3,680	85	71.0	501	572	257	45	315
Louisiana	4,530	3,950	87	378	368	746	426	57	321
Maine	1,330	768	58	27.7	63.6	91.3	39.4	43	51.9
Maryland	5,770	4,700	81	89.2	701	790	506	64	283
Massachusetts	6,550	6,010	92	191	489	679	385	57	294
Michigan	9,880	7,210	73	204	883	1,090	548	50	540
Minnesota	5,300	4,180	79	353	188	542	248	46	294
Mississippi	2,970	2,520	85	349	46.3	395	252	64	143
Missouri	5,990	5,110	85	293	543	836	467	56	369
Montana	989	704	71	65.6	72.4	138	83.2	60	54.7
Nebraska	1,830	1,480	81	234	61.4	296	130	44	165
Nevada	2,700	2,540	94	133	448	581	331	57	250
New Hampshire	1,320	871	66	34.7	56.6	91.2	58.6	64	32.6
New Jersey	8,790	7,830	89	398	682	1,080	605	56	475
New Mexico	2,060	1,760	85	211	72.4	283	160	57	123
New York	19,400	17,300	89	457	1,810	2,260	1,370	61	889
North Carolina	9,540	6,230	65	194	766	960	436	45	524
North Dakota	673	623	93	30.5	38.3	68.8	49.9	72	19.0
Ohio	11,500	9,710	84	455	918	1,370	619	45	755
Oklahoma	3,750	3,440	92	130	527	657	292	44	365
Oregon	3,830	3,220	84	114	420	534	365	68	169
Pennsylvania	12,700	9,360	74	226	1,200	1,420	548	38	877
Rhode Island	1,050	940	89	15.8	92.2	108	67.6	63	40.4
South Carolina	4,630	3,470	75	114	504	619	347	56	271
South Dakota	814	739	91	74.3	49.9	124	70.7	57	53.5
Tennessee	6,350	5,810	92	301	618	918	470	51	448
Texas	25,100	22,700	90	1,130	2,860	3,990	2,050	51	1,940
Utah	2,760	2,710	98	364	309	673	453	67	220
Vermont	626	444	71	14.0	29.2	43.1	26.3	61	16.8
Virginia	8,000	6,350	79	71.0	594	665	476	72	188
Washington	6,720	5,720	85	471	439	910	634	70	276
West Virginia	1,850	1,460	79	34.2	155	189	117	62	72.4
Wisconsin	5,690	4,040	71	261	221	481	211	44	270
Wyoming	564	450	80	51.5	47.5	99.0	72.9	74	26.1
Puerto Rico	3,730	3,690	99	87.3	590	677	230	34	447
U.S. Virgin Islands	106	69.0	65	0.91	4.95	5.86	3.67	63	2.19
TOTAL	313,000	268,000	86	15,700	26,300	42,000	23,800	57	18,200

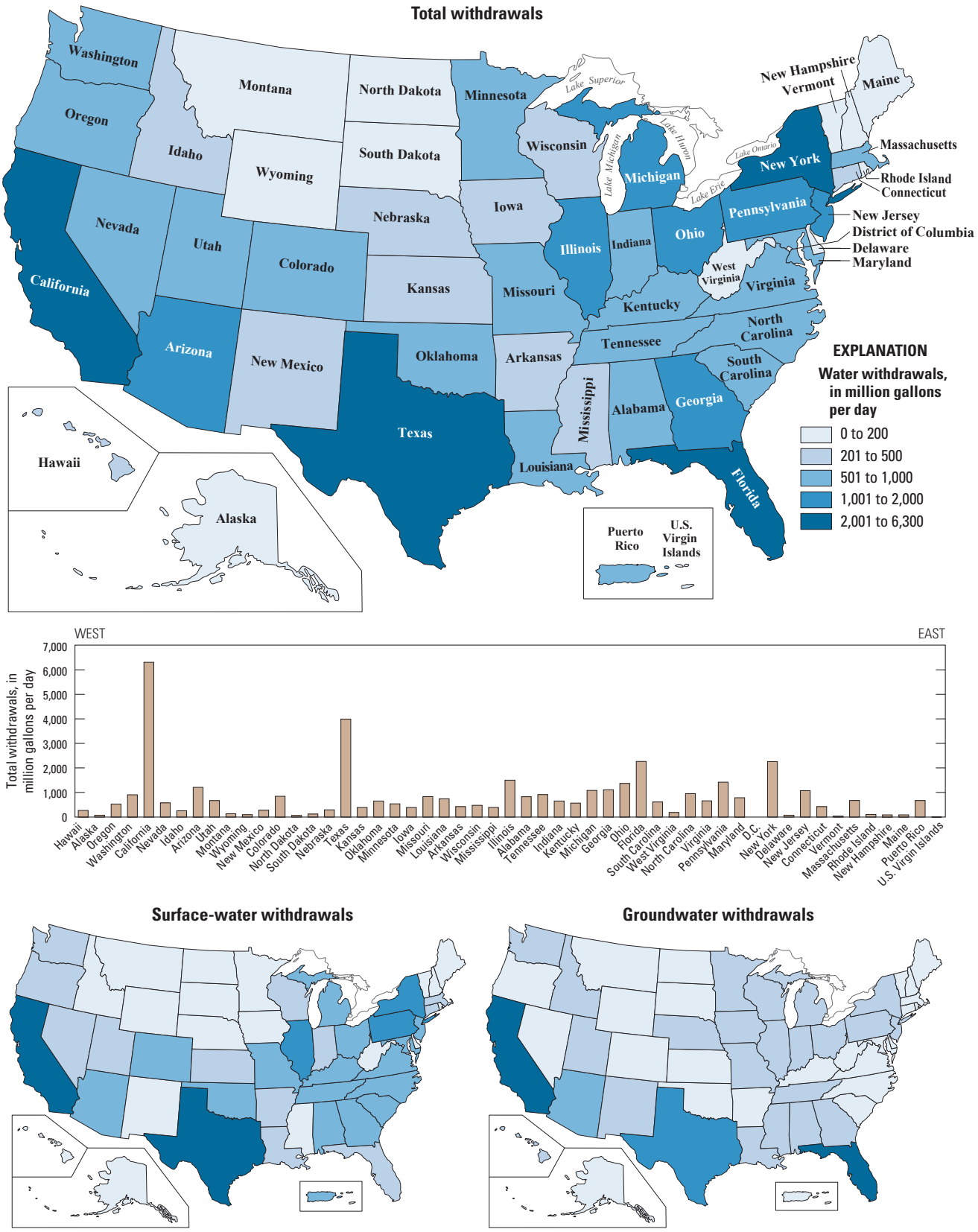

Figure 4. Public-supply withdrawals by source and State, 2010.

Domestic

3,600 million gallons per day (self-supplied)
23,800 million gallons per day (public-supply deliveries)

Domestic water use includes indoor and outdoor uses at residences. Common indoor water uses are drinking, food preparation, washing clothes and dishes, and flushing toilets. Common outdoor uses are watering lawns and gardens or maintaining pools, ponds, or other landscape features in a domestic environment. Domestic water is either self-supplied or provided by public suppliers. Self-supplied domestic water use is typically withdrawn from a private source, such as a well, or captured as rainwater in a cistern. Domestic deliveries are provided to homes by public suppliers. Figure 5 illustrates the proportions of total domestic water from public-supply deliveries and self-supply domestic withdrawals.

Table 6 lists the estimated self-supplied and public-supplied population in each State, as well as the amounts used by each segment of the population for domestic needs and the respective per capita use in gallons per day (gallons per capita daily, gpcd). Domestic self-supplied withdrawals and public-supplied deliveries also are combined in table 6 to show the total estimated domestic use in 2010 and the weighted per capita use in gallons per day calculated for all domestic use.

An estimated 44.5 million people in the United States, or 14 percent of the population, provided their own water for domestic use in 2010. These self-supplied withdrawals were estimated at 3,600 Mgal/d (4,040 thousand acre-ft/yr), or about 1 percent of total withdrawals for all uses in 2010. Nearly all (98 percent) of these self-supplied withdrawals were from fresh groundwater sources. Self-supplied domestic withdrawals are rarely metered or reported; typically this usage is calculated by multiplying an estimate of the population not served by public supply by a coefficient for daily per capita use. For some States, these coefficients were county-specific averages derived from observed residential water use and population estimates in nearby areas served by public suppliers. Other States used the same coefficient for all counties, commonly one used by State regulatory or planning agencies. Self-supplied domestic per capita use ranged from 48 gpcd in Wisconsin to 189 gpcd in Nevada. Generally, per capita use is least in the Northern and Eastern States and greatest in the Mountain and Western States where outdoor watering is more common. The national average self-supplied domestic per capita use in 2010 was 81 gpcd (table 6).

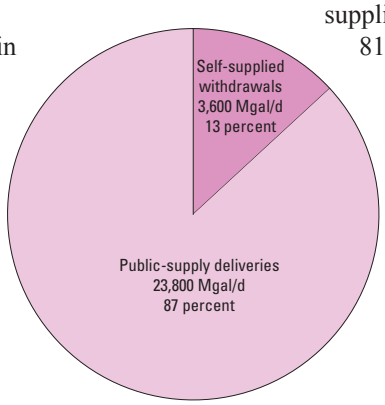

Figure 5. Total domestic water use from public-supply deliveries and self-supplied withdrawals, 2010.

The majority of people in the United States used water provided by public suppliers. Domestic deliveries by public water suppliers totaled 23,800 Mgal/d in 2010 and represented water provided to 268 million people at single-family and multifamily dwellings. Per capita water use for domestic deliveries ranged from 51 gpcd in Maine to 167 gpcd in Utah. The national average was 89 gpcd for public-supplied domestic water use. This per capita usage is less than the rate of 101 gpcd observed in 1995 and 100 gpcd in 2005. Domestic deliveries from public supply were not compiled nationally in 2000.

Combined self-supplied domestic withdrawals and public-supply deliveries totaled 27,400 Mgal/d in 2010, and the national average per capita usage was 88 gpcd. The corresponding average per capita use for total domestic use in 2005 was 98 gpcd. The geographic distribution of total domestic water use by State is shown in figure 6*A*. Self-supplied domestic population in each State, in thousands of people and as a percentage of total State population, are shown in figure 6*B*. Self-supplied domestic populations were largest in Pennsylvania, North Carolina, and Michigan. States with the largest percentages of their population that were self-supplied were Maine, Alaska, and the U.S. Virgin Islands.

Domestic water use in the bathroom (left, photo used with permission from Tyrrell and Laning International, Inc.) and in the kitchen (right, photos from Wikimedia Commons).

Table 6. Domestic water withdrawals and deliveries, 2010.

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

State	Self-supplied domestic						Public supply			Total use		
	Self-supplied population (in thousands)	Percent of total population	Withdrawals (in Mgal/d)			Self-supplied per capita use (in gal/d)	Population served (in thousands)	Public-supply deliveries to domestic use (in Mgal/d)	Public-supply per capita use (in gal/d)	Total population (in thousands)	Water use (withdrawals and deliveries, in Mgal/d)	Total domestic per capita use (in gal/d)
			By source		Total							
			Groundwater	Surface water								
Alabama	539	11	38.0	0	38.0	70	4,240	327	77	4,780	365	76
Alaska	260	37	14.1	0.66	14.8	57	450	49.2	109	710	64.0	90
Arizona	218	3	27.2	0	27.2	125	6,170	912	148	6,390	939	147
Arkansas	144	5	12.8	0	12.8	89	2,770	295	107	2,920	308	106
California	2,480	7	142	29.4	172	69	34,800	3,870	111	37,300	4,040	108
Colorado	312	6	37.9	0	37.9	122	4,720	521	110	5,030	559	111
Connecticut	871	24	65.4	0	65.4	75	2,700	203	75	3,570	268	75
Delaware	185	21	14.8	0	14.8	80	713	57.0	80	898	71.8	80
District of Columbia	0	0	0	0	0	0	602	74.9	125	602	74.9	125
Florida	1,910	10	214	0	214	112	16,900	1,430	85	18,800	1,640	87
Georgia	1,530	16	115	0	115	75	8,160	651	80	9,690	765	79
Hawaii	55.7	4	1.85	6.17	8.02	144	1,300	188	144	1,360	196	144
Idaho	432	28	79.0	0	79.0	183	1,140	184	162	1,570	263	168
Illinois	1,160	9	92.4	0	92.4	80	11,700	934	80	12,800	1,030	80
Indiana	1,660	26	126	0	126	76	4,830	367	76	6,480	493	76
Iowa	591	19	38.4	0	38.4	65	2,450	160	65	3,050	198	65
Kansas	151	5	14.9	0	14.9	99	2,700	194	72	2,850	209	73
Kentucky	664	15	19.7	13.5	33.2	50	3,680	257	70	4,340	290	67
Louisiana	588	13	47.0	0	47.0	80	3,950	426	108	4,530	473	104
Maine	561	42	33.0	0	33.0	59	768	39.4	51	1,330	72.4	55
Maryland	1,070	19	85.6	0	85.6	80	4,700	506	108	5,770	592	103
Massachusetts	534	8	37.9	0	37.9	71	6,010	385	64	6,550	423	65
Michigan	2,680	27	231	0	231	86	7,210	548	76	9,880	779	79
Minnesota	1,130	21	79.0	0	79.0	70	4,180	248	59	5,300	327	62
Mississippi	446	15	44.6	0	44.6	100	2,520	252	100	2,970	297	100
Missouri	883	15	61.8	0	61.8	70	5,110	467	91	5,990	529	88
Montana	285	29	21.2	1.04	22.2	78	704	83.2	118	989	105	107
Nebraska	346	19	44.0	0	44.0	127	1,480	130	88	1,830	174	95
Nevada	158	6	29.8	0	29.8	189	2,540	331	130	2,700	361	134
New Hampshire	446	34	33.3	0	33.3	75	871	58.6	67	1,320	92.0	70
New Jersey	964	11	98.3	0	98.3	102	7,830	605	77	8,790	703	80
New Mexico	303	15	25.8	0	25.8	85	1,760	160	91	2,060	186	90
New York	2,050	11	152	0	152	74	17,300	1,370	79	19,400	1,530	79
North Carolina	3,300	35	231	0	231	70	6,230	436	70	9,540	668	70
North Dakota	49.4	7	3.68	0	3.68	75	623	49.9	80	673	53.6	80
Ohio	1,830	16	134	2.75	137	75	9,710	619	64	11,500	756	66
Oklahoma	316	8	26.8	0	26.8	85	3,440	292	85	3,750	319	85
Oregon	607	16	60.0	7.07	67.1	111	3,220	365	113	3,830	432	113
Pennsylvania	3,350	26	201	0	201	60	9,360	548	59	12,700	749	59
Rhode Island	113	11	8.02	0	8.02	71	940	67.6	72	1,050	75.7	72
South Carolina	1,150	25	115	0	115	100	3,470	347	100	4,630	463	100
South Dakota	75.6	9	5.37	0	5.37	71	739	70.7	96	814	76.1	93
Tennessee	538	8	38.7	0	38.7	72	5,810	470	81	6,350	509	80
Texas	2,440	10	259	0	259	106	22,700	2,050	90	25,100	2,310	92
Utah	50.5	2	8.44	0	8.44	167	2,710	453	167	2,760	462	167
Vermont	182	29	13.6	0	13.6	75	444	26.3	59	626	39.9	64
Virginia	1,650	21	124	0	124	75	6,350	476	75	8,000	600	75
Washington	1,000	15	113	0.02	113	113	5,720	634	111	6,720	747	111
West Virginia	393	21	30.9	0.63	31.5	80	1,460	117	80	1,850	148	80
Wisconsin	1,640	29	78.4	0	78.4	48	4,040	211	52	5,690	290	51
Wyoming	114	20	8.55	0	8.55	75	450	72.9	162	564	81.4	144
Puerto Rico	38.0	1	2.41	0	2.41	63	3,690	230	62	3,730	232	62
U.S. Virgin Islands	37.4	35	0	2.67	2.67	71	69.0	3.67	53	106	6.34	60
TOTAL	44,500	14	3,540	63.9	3,600	81	268,000	23,800	89	313,000	27,400	88

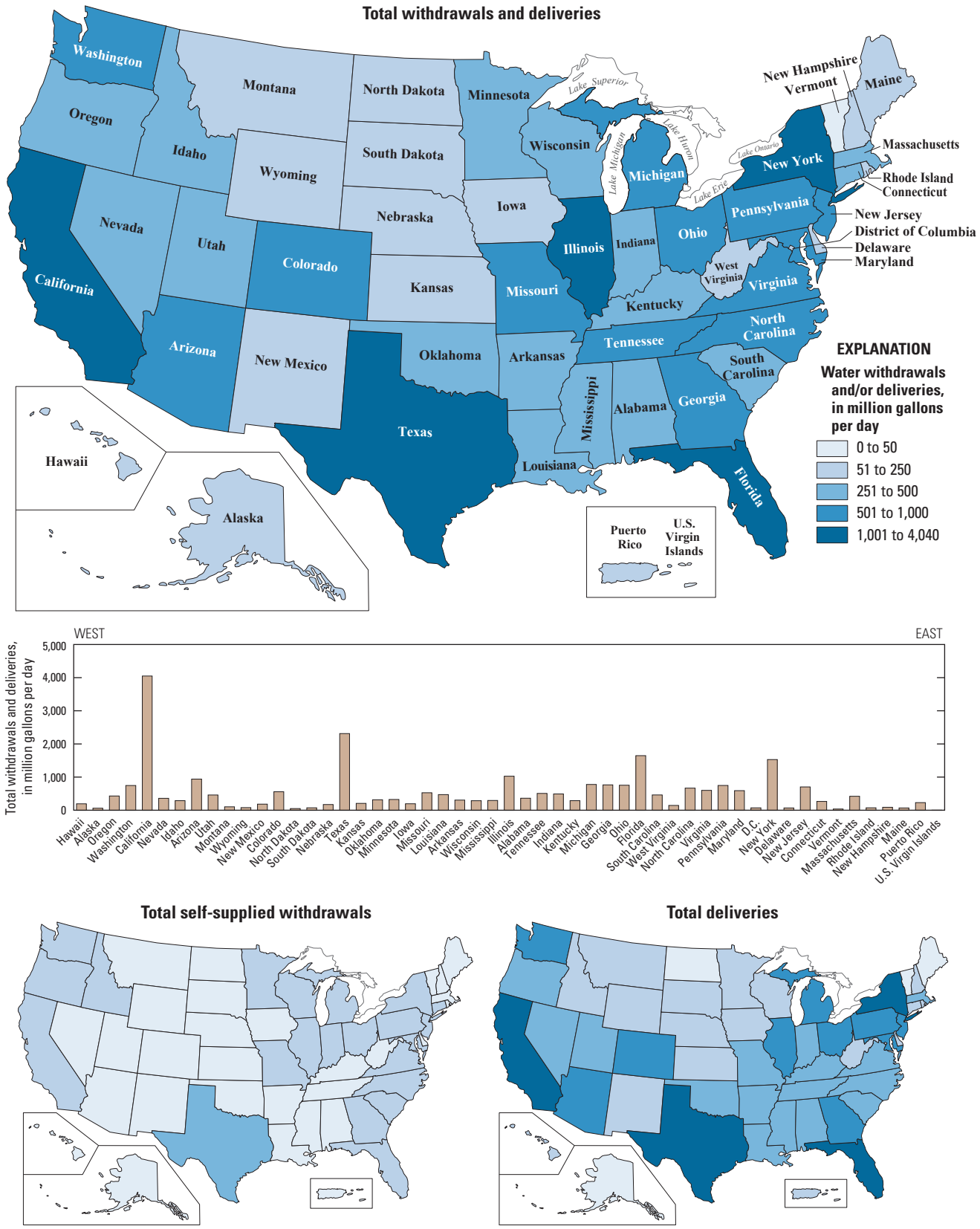

Figure 6*A*. Domestic withdrawals and deliveries by State, 2010.

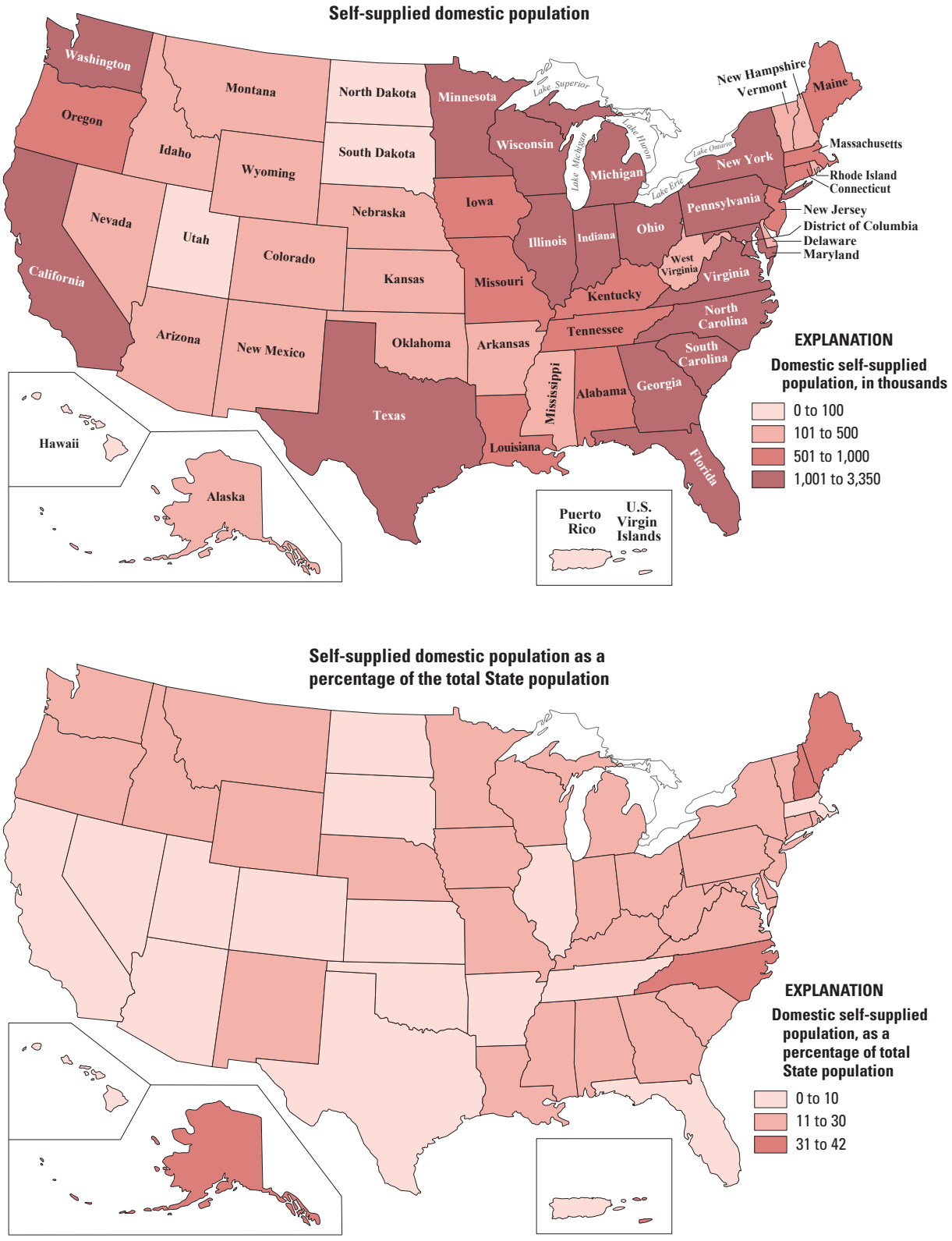

Figure 6*B*. Self-supplied domestic population and percentage of total population by State, 2010.

Irrigation

115,000 million gallons per day

Irrigation water use includes water that is applied by an irrigation system to sustain plant growth in all agricultural and horticultural practices. Irrigation also includes water that is used for pre-irrigation, frost protection, application of chemicals, weed control, field preparation, crop cooling, harvesting, dust suppression, and leaching salts from the root zone. Estimates of irrigation withdrawals include water that is lost in conveyance prior to application on fields as well as water that may subsequently return to a surface-water body as runoff after application, water consumed as evapotranspiration (ET) from plants and ground surfaces, or water that recharges aquifers as it seeps past the root zone. Irrigation of golf courses, parks, nurseries, turf farms, cemeteries, and other self-supplied landscape-watering uses also are included in the estimates. Irrigation water use includes self-supplied withdrawals and deliveries from irrigation companies or districts, cooperatives, or governmental entities. Some irrigation water is reclaimed wastewater from nearby treatment facilities or industries although these quantities are not included in irrigation withdrawals reported here. All irrigation withdrawals are considered freshwater. Irrigated acres are reported by three types of irrigation methods: sprinkler, microirrigation, and surface (flood) systems.

Irrigation withdrawals and irrigated acres by type of irrigation system are listed by State in table 7. For 2010, total irrigation withdrawals were 115,000 Mgal/d, or 129,000 thousand acre-ft/yr, which accounted for 38 percent of total freshwater withdrawals and 61 percent of total freshwater withdrawals for all categories excluding thermoelectric power. Total irrigation withdrawals were 9 percent less than in 2005. Withdrawals from surface-water sources were 65,900 Mgal/d, which accounted for 57 percent of the total irrigation withdrawals, and were almost 12 percent less than in 2005. Groundwater withdrawals for 2010 were 49,500 Mgal/d, or 6 percent less than in 2005.

About 62,400 thousand acres were irrigated in 2010, an increase of about 950 thousand acres (1.5 percent) from 2005. About 31,600 thousand acres (51 percent) were irrigated with sprinkler systems, 26,200 thousand acres with surface (flood), and 4,610 thousand acres with microirrigation systems. The national average application rate for 2010 was 2.07 acre-feet per acre, or 11 percent less than the 2005 average of 2.32 acre-feet per acre.

The geographic distribution of total, surface-water, and groundwater withdrawals for irrigation is shown in figure 7. The majority of total U.S. irrigation withdrawals (83 percent) and irrigated acres (74 percent) were in the 17 conterminous Western States (west of solid line in figure 7), which are typical of areas where average annual precipitation is less than 20 inches and generally insufficient to support crops without supplemental water. Surface water was the primary source of water in the arid West, except in Kansas, Oklahoma, Nebraska, Texas, and South Dakota, where more groundwater was used. The 17 Western States cumulatively accounted for 93 percent of total surface-water irrigation withdrawals and 69 percent of total groundwater irrigation withdrawals.

Because the 17 Western States accounted for the majority of total irrigation withdrawals, changes in those States had a great effect on the overall total. Total irrigation withdrawals declined noticeably in Nebraska, Montana, Idaho, Colorado, and California. Groundwater irrigation withdrawals declined in the West and increased in the East, and surface-water irrigation withdrawals declined in both regions. Total irrigated acres increased in both regions—1 percent (568 thousand acres) in the West, and 2 percent (381 thousand acres) in the East. In the West, the total number of acres irrigated by the less-efficient surface-irrigation methods decreased by about 500 thousand acres, and the number of acres irrigated by more efficient sprinkler (including microirrigation) methods increased by about 1,080 thousand acres.

Average application rates are calculated as a function of total irrigation withdrawals and total irrigated acres. The highest application rates are found in arid Western States, where more surface water than groundwater is used for irrigation and water typically is conveyed longer distances in canals between the points of diversion and use. Among the Western States, cumulatively, more lands were irrigated with sprinkler (including microirrigation) systems than surface methods, and land using the microirrigation system are increasing at a faster rate than the other two types of systems. Several States that used the large quantities of water for irrigation in 2010, such as California, Idaho, Colorado, Texas, and Nebraska, showed declines in application rates from 2005 levels, and in all of these States the number of acres irrigated by sprinkler or microirrigation systems increased in 2010.

Sources of data for irrigation withdrawals and irrigated acres included State and Federal crop reporting programs, irrigation districts, canal companies, incorporated management areas, and satellite data depicting 2010 cropland landscapes. Withdrawals also were estimated using information on irrigated crop acreages by crop type and specific crop water-consumption coefficients, or irrigation-system application rates, as well as soil moisture balance models. Estimation methods varied from one State to the next and sometimes between geographic areas within a State. Estimation methods ideally included adjustments for climate, system efficiencies, conveyance losses, and other irrigation practices such as pre-irrigation, salt leaching, or frost protection. Other methods for estimating irrigation withdrawals included extrapolation of sample data on crop water-application rates or power-consumption coefficients.

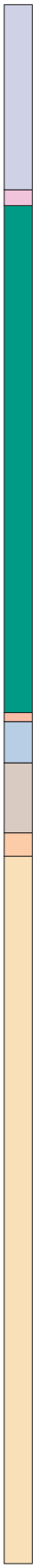

Table 7. Irrigation water withdrawals, 2010.

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

State	Irrigated land (in thousand acres)				Withdrawals (in million gallons per day)			Withdrawals (in thousand acre-feet per year)			Average application rate (in acre-feet per acre)
	By type of irrigation			Total	By source		Total	By source		Total	
	Sprinkler	Micro-irrigation	Surface		Ground-water	Surface water		Ground-water	Surface water		
Alabama	150	1.42	0.52	152	84.9	74.0	159	95.2	83.0	178	1.18
Alaska	3.10	0	0.07	3.17	1.57	0.02	1.59	1.76	0.02	1.78	0.56
Arizona	195	28.1	770	993	1,690	2,880	4,570	1,900	3,220	5,120	5.16
Arkansas	518	0	4,150	4,670	7,380	1,340	8,720	8,270	1,500	9,770	2.09
California	1,790	2,890	5,670	10,400	8,690	14,400	23,100	9,740	16,100	25,800	2.50
Colorado	1,410	0.20	1,930	3,340	1,300	8,420	9,710	1,450	9,440	10,900	3.26
Connecticut	24.0	1.83	0	25.8	0.85	23.1	24.0	0.95	25.9	26.9	1.04
Delaware	132	1.11	0	133	86.1	15.2	101	96.5	17.1	114	0.85
District of Columbia	0.32	0	0	0.32	0.05	0.05	0.10	0.06	0.06	0.11	0.35
Florida	548	712	731	1,990	1,580	1,340	2,920	1,770	1,500	3,270	1.64
Georgia	1,280	152	0	1,430	636	202	839	713	227	940	0.66
Hawaii	11.2	158	0	169	101	223	323	113	249	363	2.14
Idaho	2,420	4.57	1,180	3,600	3,820	10,200	14,000	4,280	11,500	15,700	4.37
Illinois	483	0	0	483	208	17.5	226	233	19.6	253	0.52
Indiana	397	0	0	397	98.4	38.7	137	110	43.4	154	0.39
Iowa	187	0	0	187	41.6	1.18	42.8	46.7	1.32	48.0	0.26
Kansas	2,840	18.0	217	3,080	2,880	160	3,040	3,230	179	3,410	1.11
Kentucky	54.4	3.56	2.35	60.3	1.65	27.4	29.0	1.85	30.7	32.5	0.54
Louisiana	87.3	0	839	926	670	258	928	751	289	1,040	1.12
Maine	46.6	0.06	1.18	47.8	2.51	8.77	11.3	2.81	9.83	12.6	0.26
Maryland	102	3.43	0	105	53.4	18.6	72.1	59.9	20.9	80.8	0.77
Massachusetts	26.2	2.02	12.0	40.3	118	21.4	139	132	24.0	156	3.87
Michigan	477	27.2	1.54	506	147	62.6	209	164	70.1	235	0.46
Minnesota	516	0	24.5	540	171	26.7	197	191	29.9	221	0.41
Mississippi	409	0	1,380	1,790	1,960	133	2,090	2,200	149	2,350	1.31
Missouri	544	2.08	760	1,310	1,350	49.6	1,400	1,520	55.6	1,570	1.20
Montana	753	0.64	886	1,640	127	7,030	7,160	142	7,880	8,030	4.90
Nebraska	6,370	0.57	2,360	8,730	4,300	1,360	5,660	4,820	1,520	6,340	0.73
Nevada	258	0.07	319	577	653	921	1,570	732	1,030	1,760	3.06
New Hampshire	4.87	0.82	0.23	5.92	1.25	0.67	1.92	1.40	0.75	2.15	0.36
New Jersey	68.8	25.6	4.93	99.3	67.6	70.1	138	75.8	78.5	154	1.55
New Mexico	461	19.6	397	878	1,240	1,460	2,700	1,390	1,640	3,020	3.44
New York	81.1	24.6	2.77	108	30.2	40.2	70.4	33.9	45.0	78.9	0.73
North Carolina	262	6.18	0	268	88.3	279	367	98.9	312	411	1.53
North Dakota	192	0	42.2	234	77.5	87.2	165	86.9	97.8	185	0.79
Ohio	59.8	6.06	0	65.9	17.2	35.4	52.6	19.2	39.7	58.9	0.89
Oklahoma	440	5.28	89.1	534	429	135	564	481	151	632	1.18
Oregon	1,210	97.0	594	1,900	1,910	3,350	5,260	2,140	3,750	5,890	3.10
Pennsylvania	53.0	15.1	0	68.1	7.39	19.8	27.1	8.28	22.1	30.4	0.45
Rhode Island	4.93	1.24	0.02	6.19	2.30	0.39	2.69	2.58	0.44	3.02	0.49
South Carolina	141	8.05	4.04	154	67.7	57.4	125	75.9	64.4	140	0.91
South Dakota	144	0	49.6	194	198	165	362	221	185	406	2.10
Tennessee	74.0	9.80	7.98	91.8	44.3	27.6	71.9	49.6	31.0	80.6	0.88
Texas	3,770	244	1,910	5,920	5,100	1,730	6,830	5,710	1,940	7,660	1.29
Utah	625	1.45	710	1,340	494	2,730	3,220	554	3,060	3,610	2.70
Vermont	2.98	0.69	0.31	3.98	0.77	1.68	2.45	0.86	1.88	2.75	0.69
Virginia	102	14.6	0	117	16.0	45.4	61.4	18.0	50.8	68.8	0.59
Washington	1,270	86.1	221	1,580	798	2,350	3,150	894	2,630	3,530	2.24
West Virginia	2.52	0	1.09	3.61	0.05	0.04	0.09	0.06	0.04	0.10	0.03
Wisconsin	356	0	50.3	406	256	123	379	287	138	425	1.04
Wyoming	184	4.12	893	1,080	437	3,930	4,370	490	4,410	4,900	4.53
Puerto Rico	8.17	32.7	0	40.8	22.4	15.7	38.2	25.1	17.6	42.8	1.05
U.S. Virgin Islands	0	0	0	0	0	0	0	0	0	0	0
TOTAL	31,600	4,610	26,200	62,400	49,500	65,900	115,000	55,400	73,900	129,000	2.07

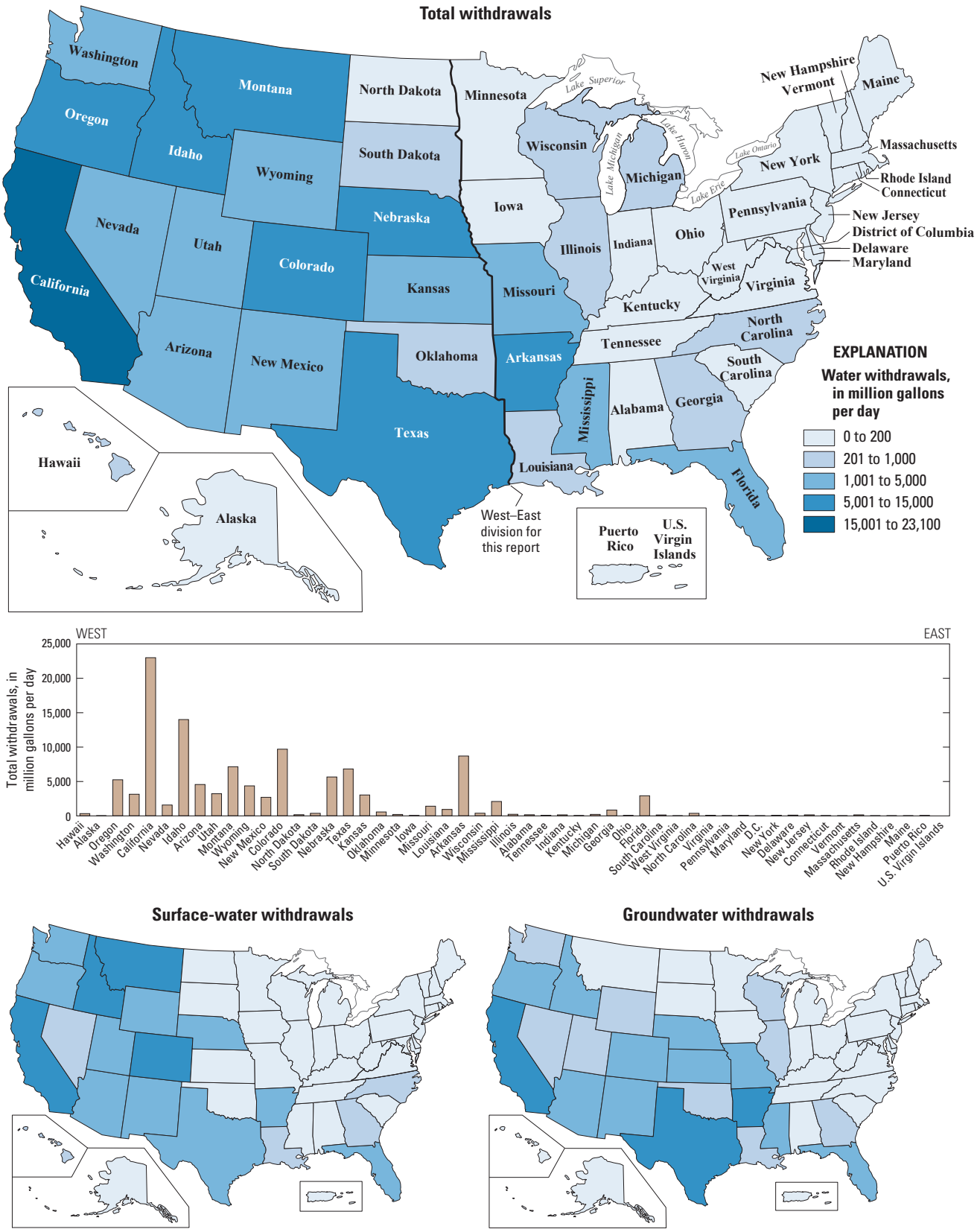

Figure 7. Irrigation withdrawals by source and State, 2010.

Livestock

2,000 million gallons per day

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

Livestock withdrawals for 2010 are listed by State in table 8. During 2010, withdrawals for livestock use were an estimated 2,000 Mgal/d, or 2,240 thousand acre-ft/yr (table 2*B*). Livestock withdrawals were about 1 percent of total freshwater withdrawals and about 1 percent of total freshwater withdrawals for all categories excluding thermoelectric power. Groundwater was the source for 60 percent of total livestock withdrawals. Estimated total livestock withdrawals for 2010 were 7 percent less than in 2005.

The geographic distribution of total, surface-water, and groundwater livestock withdrawals is shown in figure 8. Texas, California, Iowa, Nebraska, and Kansas each used more than 100 Mgal/d for livestock and together accounted for 41 percent of total livestock withdrawals in 2010. Texas, Iowa, Nebraska, Kansas, and California each used more than 80 Mgal/d of groundwater for livestock and accounted for 42 percent of groundwater withdrawals for this use. Texas and California each used more than 100 Mgal/d of surface water for livestock, and accounted for 29 percent of surface-water withdrawals for livestock.

Few State agencies require livestock operations to report water withdrawals; therefore, most estimates of livestock withdrawals were derived using animal population data and water-use coefficients, in gallons per head per day for each animal type. Animal population data generally are available from State agricultural agencies and the NASS. Coefficients vary by State and, for many States, were provided by agricultural extension agents or water-permitting agencies. Coefficients may reflect facility maintenance needs and effects of climate on animal watering. Many of the 2010 withdrawals for livestock were estimated according to methods described by Lovelace (2009a), using livestock population data compiled for the NASS 2007 Census of Agriculture (Robert Hunt, National Agricultural Statistics Service, written commun., 2013) and water-use coefficients.

Stock ponds, Chase County, Kansas. Photo by Joan Kenny, USGS.

1 percent

Table 8. Livestock water withdrawals, 2010.

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

State	Withdrawals (in million gallons per day)		
	By source		Total
	Groundwater	Surface water	
Alabama	11.7	14.8	26.5
Alaska	0.10	0.15	0.25
Arizona	27.0	0	27.0
Arkansas	15.6	23.4	39.0
California	84.4	103	188
Colorado	25.1	11.8	36.9
Connecticut	1.01	0	1.01
Delaware	1.31	0	1.31
District of Columbia	0	0	0
Florida	19.1	2.22	21.3
Georgia	2.38	26.9	29.3
Hawaii	0.63	1.20	1.83
Idaho	38.5	9.01	47.5
Illinois	36.0	0.03	36.1
Indiana	26.2	13.0	39.2
Iowa	102	33.8	136
Kansas	91.0	23.0	114
Kentucky	2.21	41.6	43.8
Louisiana	4.15	3.88	8.03
Maine	1.71	0.58	2.29
Maryland	6.02	2.23	8.25
Massachusetts	0.90	0.50	1.40
Michigan	17.7	1.90	19.6
Minnesota	59.3	0	59.3
Mississippi	7.35	11.1	18.4
Missouri	18.4	54.4	72.9
Montana	12.4	29.5	41.8
Nebraska	93.0	21.2	114
Nevada	5.06	0	5.06
New Hampshire	0.67	0.22	0.89
New Jersey	0.98	0	0.98
New Mexico	32.8	3.03	35.8
New York	14.6	8.00	22.6
North Carolina	56.9	15.0	72.0
North Dakota	12.9	8.62	21.6
Ohio	7.70	16.3	24.0
Oklahoma	32.5	56.3	88.8
Oregon	3.00	14.0	17.0
Pennsylvania	45.6	6.75	52.3
Rhode Island	0.17	0.01	0.18
South Carolina	5.23	6.79	12.0
South Dakota	19.1	28.3	47.4
Tennessee	14.0	13.4	27.5
Texas	131	127	259
Utah	7.77	8.76	16.5
Vermont	4.22	1.41	5.63
Virginia	6.52	20.8	27.4
Washington	19.2	8.55	27.8
West Virginia	1.66	3.42	5.08
Wisconsin	65.8	7.30	73.1
Wyoming	6.14	10.3	16.5
Puerto Rico	5.57	2.24	7.81
U.S. Virgin Islands	0.01	0.01	0.02
TOTAL	1,200	797	2,000

Windmill on Pawnee Butte Grasslands. Photo by Ray Klocek, used with permission.

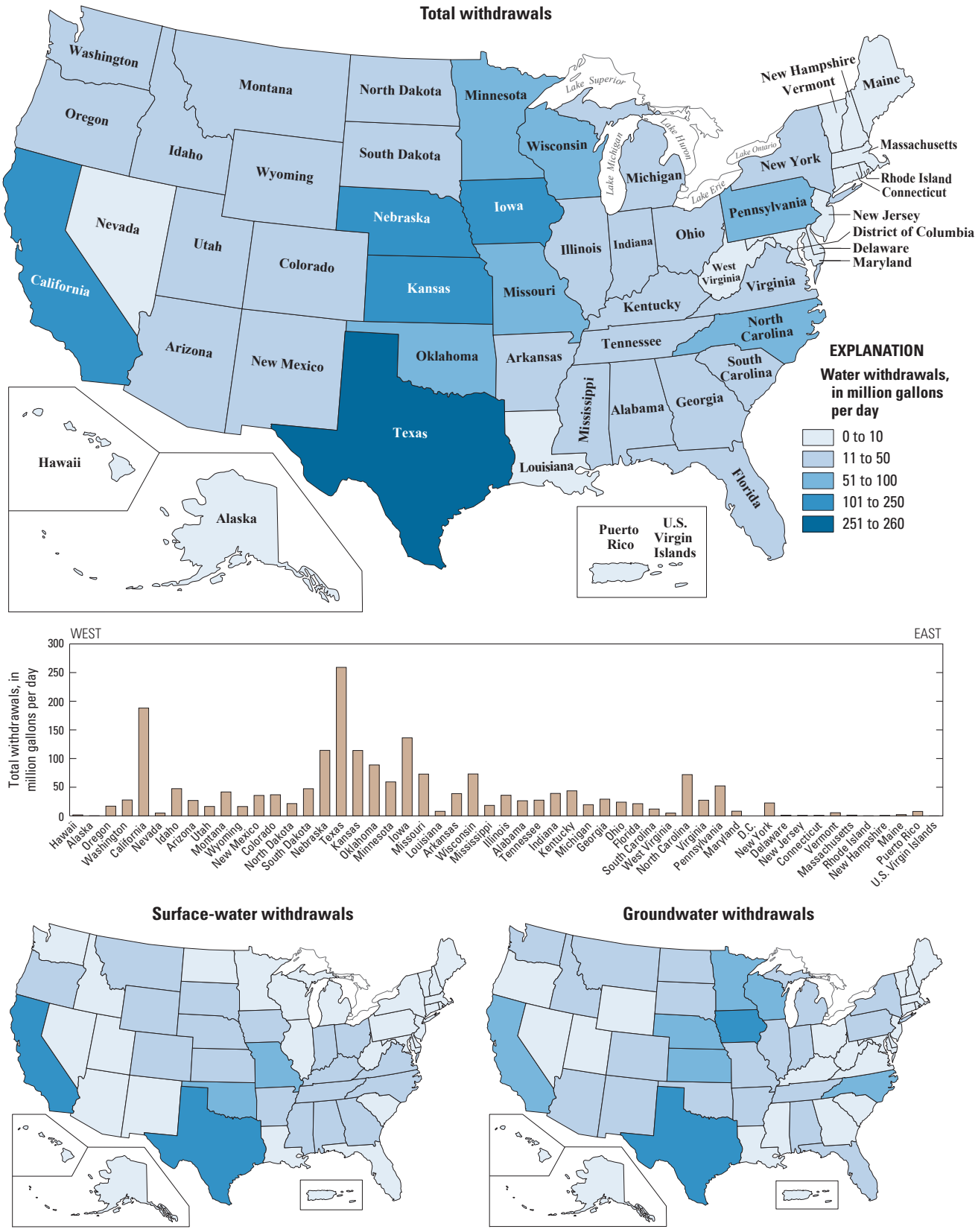

Figure 8. Livestock withdrawals by source and State, 2010.

Aquaculture

9,420 million gallons per day

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

Total withdrawals for aquaculture during 2010 are listed by State in table 9 at 9,420 Mgal/d, or 10,600 thousand acre-ft/yr (table 2*B*). Surface water was the source for about 81 percent of the withdrawals for this category. Much of the surface water was used for flowthrough raceways and was returned to the source after use. A combined total of 14.2 Mgal/d saline surface-water withdrawals, less than 0.2 percent of total aquaculture withdrawals, were reported in Rhode Island (8.80 Mgal/d) and Texas (5.37 Mgal/d); these amounts are not shown separately in table 9 but are included in the total. Aquaculture withdrawals were 3 percent of total withdrawals and 5 percent of total withdrawals for all categories excluding thermoelectric power. Estimated aquaculture withdrawals in 2010 were 7 percent more than in 2005.

The geographic distribution of total, surface-water, and groundwater withdrawals for aquaculture is shown in figure 9. Idaho, North Carolina, California, and Oregon used the most water for aquaculture, about 63 percent of the total and about 74 percent of the surface-water withdrawals for aquaculture. Alaska, Louisiana, Arkansas, California, and Mississippi combined accounted for 60 percent of the total groundwater withdrawals for aquaculture.

Several sources of information were used to estimate 2010 aquaculture withdrawals. Some estimates were derived from State permits that reported water withdrawals or return flows for aquaculture facilities. The EPA Permit Compliance System database also was a source of return-flow data that were used to estimate water withdrawals. Individual aquaculture operations, State regulatory agencies, State offices of the NASS, and Cooperative Extension Service offices also provided information that was used to estimate aquaculture withdrawals in some States.

Many of the 2010 withdrawals for aquaculture were estimated by multiplying the number of aquaculture farms in operation in each county during 2007 by the average groundwater and surface-water withdrawal rates for aquaculture farms in the county. For the purpose of these estimates, the change in the number of aquaculture farms in each county from 2002 to 2007 was assumed to be representative of withdrawal changes from 2005 to 2010. The average groundwater and surface-water withdrawal rates for each county were calculated by dividing the estimated groundwater and surface-water withdrawals for aquaculture in 2005 in the county by the number of aquaculture farms in operation in the county in 2002. The numbers of aquaculture farms in operation in 2002 and 2007 in each county were provided by the NASS (Robert Hunt, National Agricultural Statistics Service, written commun., 2013). In counties where no aquaculture operations existed in 2002, but one or more farms existed in 2007, the State average groundwater and surface-water withdrawal rates per farm were multiplied by the number of farms in the county.

Left, trout in raceways at the historic Leadville National Fish Hatchery, Leadville, Colorado. Photo by Christopher Brown, USGS. Above, student with trout at the Aquaculture Research Institute in Hagerman, Idaho. Photo from University of Idaho, used with permission.

Raceway at historic Leadville National Fish Hatchery, Leadville, Colorado. Photo by Christopher Brown, USGS.

Table 9. Aquaculture water withdrawals, 2010.

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

State	Withdrawals (in million gallons per day)		
	By source		Total
	Groundwater	Surface water	
Alabama	32.4	26.6	59.1
Alaska	429	255	684
Arizona	39.5	7.77	47.3
Arkansas	181	86.5	268
California	171	802	973
Colorado	23.0	99.0	122
Connecticut	6.67	23.0	29.7
Delaware	0.06	0	0.06
District of Columbia	0	0	0
Florida	1.86	0	1.86
Georgia	3.92	45.9	49.8
Hawaii	2.14	2.40	4.54
Idaho	65.6	2,690	2,750
Illinois	4.78	27.2	32.0
Indiana	6.60	1.97	8.57
Iowa	14.4	4.45	18.9
Kansas	4.37	8.57	12.9
Kentucky	0.53	33.5	34.1
Louisiana	197	114	311
Maine	25.8	21.2	46.9
Maryland	5.06	15.7	20.8
Massachusetts	7.23	42.4	49.6
Michigan	4.21	78.5	82.7
Minnesota	1.69	15.2	16.9
Mississippi	113	19.3	133
Missouri	10.5	170	181
Montana	2.45	16.4	18.9
Nebraska	6.07	82.2	88.3
Nevada	10.6	38.8	49.5
New Hampshire	8.09	8.48	16.6
New Jersey	9.16	0	9.16
New Mexico	15.8	4.32	20.1
New York	3.36	36.8	40.2
North Carolina	11.5	1,450	1,470
North Dakota	0	5.92	5.92
Ohio	15.4	19.0	34.3
Oklahoma	3.25	7.43	10.7
Oregon	33.4	679	712
Pennsylvania	47.9	59.7	108
Rhode Island	5.60	8.90	14.5
South Carolina	2.00	8.97	11.0
South Dakota	24.8	23.6	48.4
Tennessee	15.4	37.2	52.6
Texas	9.13	22.2	31.4
Utah	97.1	0	97.1
Vermont	5.97	4.96	10.9
Virginia	9.39	286	295
Washington	86.4	127	213
West Virginia	11.7	40.6	52.3
Wisconsin	25.5	30.2	55.8
Wyoming	2.10	18.7	20.8
Puerto Rico	0.01	0.40	0.41
U.S. Virgin Islands	0	0	0
TOTAL	1,820	7,610	9,420

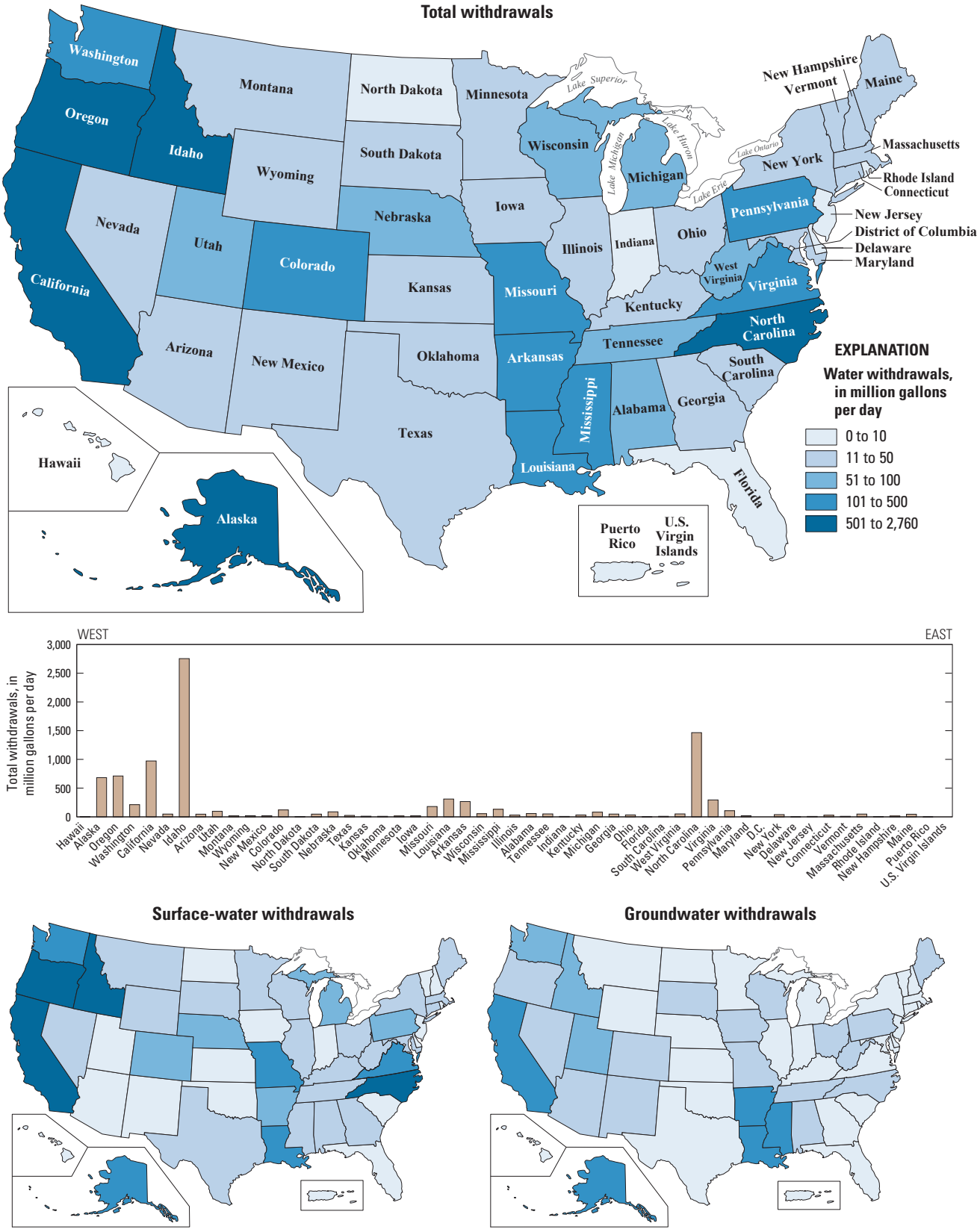

Figure 9. Aquaculture withdrawals by source and State, 2010.

Industrial

15,900 million gallons per day

Industrial withdrawals provide water for such purposes as fabricating, processing, washing, diluting, cooling, or transporting a product; incorporating water into a product; or for sanitation needs within the manufacturing facility. Some industries that use large amounts of water produce such commodities as food, paper, chemicals, refined petroleum, or primary metals. Water for industrial use may be delivered from a public supplier or be self supplied. In this report, industrial use refers to self-supplied industrial withdrawals only. Withdrawals were reported as freshwater or saline water. As in the 2000 and 2005 reports, public-supply deliveries for industrial and consumptive uses were not reported for 2010.

Industrial withdrawals are listed by State in table 10. For 2010, withdrawals were an estimated 15,900 Mgal/d, or 17,900 thousand acre-ft/yr (table 2*B*). Industrial withdrawals were about 4 percent of total withdrawals and about 8 percent of total withdrawals for all categories excluding thermoelectric power. Surface water was the source for 82 percent of total industrial withdrawals, and 93 percent of the surface-water withdrawals for industrial use was freshwater. More than 98 percent of the groundwater withdrawals for industrial use also was freshwater. For 2010, total industrial withdrawals were 12 percent less than in 2005.

The geographic distribution of total, total surface-water, and total groundwater withdrawals for industrial use is shown in figure 10. Indiana, Louisiana, and Texas accounted for 35 percent of total industrial withdrawals, and Indiana and Louisiana accounted for 33 percent of the total fresh surface-water withdrawals. Texas accounted for 65 percent of the saline surface-water industrial withdrawals, mostly from areas along the Gulf coast. The largest fresh groundwater industrial withdrawals were in California, which accounted for 14 percent of the total national fresh groundwater industrial withdrawals. Most of the saline groundwater industrial withdrawals were in Utah.

Sources of data for industrial withdrawals included information obtained directly from facilities or State and Federal permit programs that require reporting of industrial withdrawals or return flows. Industrial withdrawals also were estimated using industry-group employment data and per employee water-use coefficients. A notable improvement from historical estimation methods include additional facility information provided to each USGS Water Science Center that included information about the type of business, number of employees, the location of the facilities, as well as economic indicators of the size of the business. These data were derived from a commercial database and were kept confidential.

4 percent

Lumber mill, Adams County, Idaho. Photo by Molly Maupin, USGS.

Table 10. Industrial self-supplied water withdrawals, 2010.

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

State	Withdrawals (in million gallons per day)								
	By source and type						Total		
	Groundwater			Surface water					
	Fresh	Saline	Total	Fresh	Saline	Total	Fresh	Saline	Total
Alabama	34.0	0	34.0	540	0	540	574	0	574
Alaska	3.38	0	3.38	4.40	4.30	8.70	7.78	4.30	12.1
Arizona	12.9	0	12.9	0	0	0	12.9	0	12.9
Arkansas	56.1	5.05	61.2	214	0	214	271	5.05	276
California	399	0	399	1.13	0	1.13	400	0	400
Colorado	3.45	0	3.45	127	0	127	130	0	130
Connecticut	6.28	0	6.28	60.2	38.5	98.6	66.5	38.5	105
Delaware	8.43	0	8.43	87.5	0	87.5	96.0	0	96.0
District of Columbia	0	0	0	0	0	0	0	0	0
Florida	165	0	165	47.7	0	47.7	213	0	213
Georgia	206	0	206	281	0	281	487	0	487
Hawaii	4.63	0	4.63	0	0	0	4.63	0	4.63
Idaho	32.6	0	32.6	17.2	0	17.2	49.7	0	49.7
Illinois	124	0	124	267	0	267	390	0	390
Indiana	82.2	0	82.2	2,120	0	2,120	2,210	0	2,210
Iowa	123	0	123	2.70	0	2.70	125	0	125
Kansas	33.5	0	33.5	6.79	0	6.79	40.3	0	40.3
Kentucky	81.4	0	81.4	146	0	146	228	0	228
Louisiana	231	0	231	1,830	0	1,830	2,060	0	2,060
Maine	6.54	0	6.54	185	14.8	200	192	14.8	207
Maryland	11.3	0	11.3	38.6	146	185	50.0	146	196
Massachusetts	4.28	0	4.28	12.1	0	12.1	16.3	0	16.3
Michigan	75.0	0	75.0	537	0	537	612	0	612
Minnesota	61.8	0	61.8	71.7	0	71.7	134	0	134
Mississippi	77.8	0	77.8	125	0	125	203	0	203
Missouri	34.3	0	34.3	34.1	0	34.1	68.4	0	68.4
Montana	36.9	0	36.9	29.6	0	29.6	66.4	0	66.4
Nebraska	28.8	0	28.8	2.33	0	2.33	31.1	0	31.1
Nevada	0.70	0	0.70	4.53	0	4.53	5.23	0	5.23
New Hampshire	10.6	0	10.6	7.06	0	7.06	17.7	0	17.7
New Jersey	34.8	0	34.8	48.5	0	48.5	83.3	0	83.3
New Mexico	10.3	0	10.3	0.83	0	0.83	11.1	0	11.1
New York	35.9	0	35.9	316	0	316	352	0	352
North Carolina	83.8	0	83.8	188	0	188	271	0	271
North Dakota	5.77	0	5.77	12.9	0	12.9	18.7	0	18.7
Ohio	197	0	197	293	0	293	489	0	489
Oklahoma	6.46	0	6.46	14.3	0	14.3	20.8	0	20.8
Oregon	2.62	0	2.62	123	0	123	126	0	126
Pennsylvania	73.8	0	73.8	792	0	792	866	0	866
Rhode Island	4.17	0	4.17	3.35	0	3.35	7.52	0	7.52
South Carolina	22.7	0	22.7	365	0	365	388	0	388
South Dakota	6.85	0	6.85	2.63	0	2.63	9.48	0	9.48
Tennessee	47.6	0	47.6	728	0	728	776	0	776
Texas	108	2.04	110	571	608	1,180	680	610	1,290
Utah	31.2	37.5	68.7	16.4	33.1	49.5	47.6	70.6	118
Vermont	2.00	0	2.00	3.69	0	3.69	5.69	0	5.69
Virginia	74.2	0.02	74.3	309	56.1	365	383	56.1	439
Washington	99.4	0	99.4	358	33.1	392	458	33.1	491
West Virginia	35.1	3.80	38.9	729	0	729	764	3.80	768
Wisconsin	54.3	0	54.3	382	0	382	436	0	436
Wyoming	4.92	0	4.92	1.82	0	1.82	6.74	0	6.74
Puerto Rico	4.30	0	4.30	0	0	0	4.30	0	4.30
U.S. Virgin Islands	0.22	0	0.22	0	2.62	2.62	0.22	2.62	2.84
TOTAL	2,900	48.4	2,950	12,100	937	13,000	15,000	986	15,900

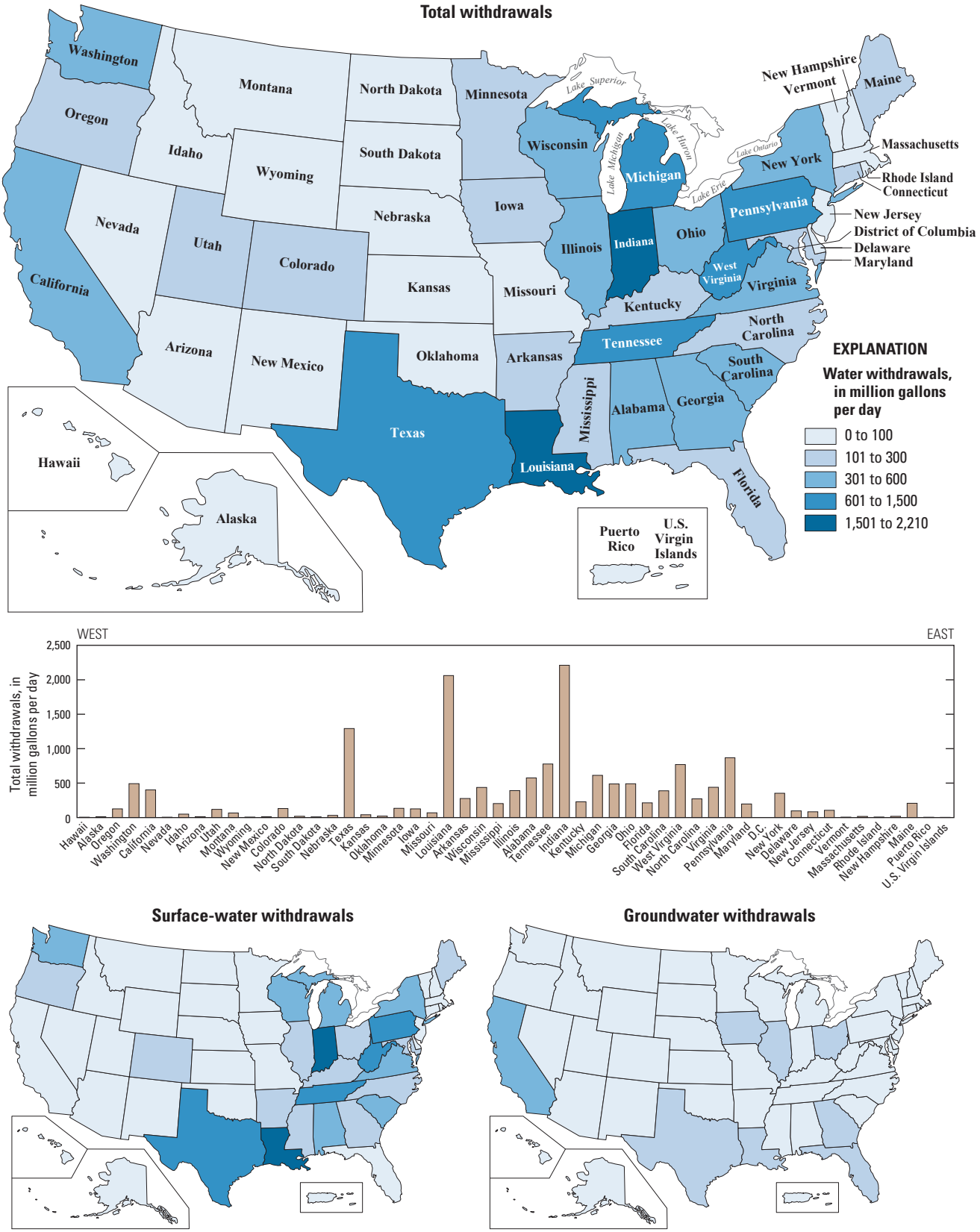

Figure 10. Industrial withdrawals by source and State, 2010.

Mining

5,320 million gallons per day

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

Mining withdrawals during 2010 are listed by State in table 11. During 2010, an estimated 5,320 Mgal/d, or 5,960 thousand acre-ft/yr (table 2*B*), were withdrawn. Mining withdrawals were about 1 percent of total withdrawals and about 3 percent of total withdrawals for all categories excluding thermoelectric power. Groundwater was the source for 73 percent of total withdrawals for mining. Seventy-one percent of the groundwater withdrawn for mining was saline. Eighty percent of the surface-water withdrawn was freshwater. Saline groundwater withdrawals and fresh surface-water withdrawals together represented 74 percent of the total withdrawals for mining.

Total mining withdrawals in 2010 were 39 percent more than in 2005. Groundwater withdrawals were 54 percent more, and surface-water withdrawals were 9 percent more. Freshwater withdrawals in 2010 were only 1 percent less than in 2005, but saline-water withdrawals were 97 percent more than in 2005. Some of the increase in saline withdrawals was attributed to increased accounting of water produced as a byproduct during oil and gas extraction and then re-injected for secondary oil and gas recovery.

The geographic distribution of total, total freshwater, and total saline-water withdrawals is shown in figure 11. Oklahoma and Texas accounted for 46 percent of the total withdrawals for mining. Nevada and Texas accounted for 41 percent of fresh groundwater withdrawals, and Oklahoma and Texas accounted for 79 percent of saline groundwater withdrawals. Minnesota, Indiana, Texas, and Iowa accounted for 46 percent of fresh surface-water withdrawals. Utah and Alaska accounted for almost 100 percent of saline surface-water withdrawals.

Sources of data used to estimate water use for mining included surveys of mining operations and State and Federal agencies that collect water withdrawal, discharge, or mineral production data for mining operations. Many of the 2010 withdrawals for mining were estimated according to methods described by Lovelace (2009b), using mineral production data and water-use coefficients, in gallons per weight or volume of minerals produced. Production data for nonfuel minerals, including metals and nonmetallic minerals, were provided by the USGS Minerals Information Team (Robert Callaghan, U.S. Geological Survey, written commun., 2012). Production or water-injection data for fuel minerals, including coal, petroleum, and natural gas, were obtained from the Energy Information Administration and various State agencies.

The Bingham Canyon Mine in Salt Lake County, Utah. Photo by Alan Cressler, USGS.

Table 11. Mining water withdrawals, 2010.

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

State	Withdrawals (in million gallons per day)								
	By source and type						Total		
	Groundwater			Surface water					
	Fresh	Saline	Total	Fresh	Saline	Total	Fresh	Saline	Total
Alabama	12.7	0	12.7	7.49	0	7.49	20.2	0	20.2
Alaska	0.01	144	144	24.1	76.4	100	24.1	221	245
Arizona	86.6	0	86.6	0	0	0	86.6	0	86.6
Arkansas	0.18	0	0.18	44.1	0	44.1	44.3	0	44.3
California	24.1	236	260	12.2	0.05	12.3	36.4	236	272
Colorado	5.46	19.4	24.9	3.05	0	3.05	8.51	19.4	27.9
Connecticut	0.92	0	0.92	3.80	0	3.80	4.72	0	4.72
Delaware	0.44	0	0.44	0.41	0	0.41	0.85	0	0.85
District of Columbia	0	0	0	0	0	0	0	0	0
Florida	78.8	0	78.8	34.1	0	34.1	113	0	113
Georgia	19.3	0	19.3	8.41	0	8.41	27.7	0	27.7
Hawaii	1.40	0	1.40	0.11	0	0.11	1.51	0	1.51
Idaho	1.28	0	1.28	18.9	0	18.9	20.2	0	20.2
Illinois	15.5	25.5	41.0	55.4	0	55.4	70.9	25.5	96.3
Indiana	4.52	0	4.52	83.7	0	83.7	88.2	0	88.2
Iowa	1.53	0	1.53	78.1	0	78.1	79.6	0	79.6
Kansas	9.34	0	9.34	3.98	0	3.98	13.3	0	13.3
Kentucky	7.80	0	7.80	23.0	0	23.0	30.8	0	30.8
Louisiana	5.32	0	5.32	5.94	0	5.94	11.3	0	11.3
Maine	1.14	0	1.14	3.73	0	3.73	4.87	0	4.87
Maryland	7.25	0	7.25	2.18	0	2.18	9.43	0	9.43
Massachusetts	1.82	0	1.82	4.78	0	4.78	6.60	0	6.60
Michigan	10.1	0.57	10.7	66.0	0	66.0	76.2	0.57	76.8
Minnesota	8.32	0	8.32	276	0	276	285	0	285
Mississippi	8.23	12.6	20.8	0.55	0	0.55	8.78	12.6	21.4
Missouri	24.4	0	24.4	8.41	0	8.41	32.9	0	32.9
Montana	1.73	18.6	20.3	26.2	0	26.2	27.9	18.6	46.5
Nebraska	0.09	0.13	0.22	8.77	0	8.77	8.86	0.13	8.99
Nevada	341	0.95	342	4.11	0	4.11	345	0.95	346
New Hampshire	0.01	0	0.01	2.84	0	2.84	2.85	0	2.85
New Jersey	1.73	0	1.73	6.91	0	6.91	8.64	0	8.64
New Mexico	27.4	0	27.4	9.68	0	9.68	37.1	0	37.1
New York	8.34	0	8.34	64.0	0	64.0	72.4	0	72.4
North Carolina	27.8	0	27.8	4.87	0	4.87	32.6	0	32.6
North Dakota	8.73	13.6	22.3	4.63	0	4.63	13.4	13.6	27.0
Ohio	79.0	0	79.0	35.8	0	35.8	115	0	115
Oklahoma	4.75	1,400	1,400	13.3	0	13.3	18.0	1,400	1,410
Oregon	7.47	0	7.47	1.17	0	1.17	8.64	0	8.64
Pennsylvania	51.4	0	51.4	10.5	0	10.5	62.0	0	62.0
Rhode Island	0.43	0	0.43	0.49	0	0.49	0.92	0	0.92
South Carolina	6.69	0	6.69	1.74	0	1.74	8.43	0	8.43
South Dakota	7.22	0	7.22	11.0	0	11.0	18.2	0	18.2
Tennessee	6.89	0	6.89	7.73	0	7.73	14.6	0	14.6
Texas	122	810	931	81.2	0.49	81.7	203	810	1,010
Utah	2.59	41.6	44.2	1.60	205	206	4.19	246	250
Vermont	0.32	0	0.32	3.53	0	3.53	3.85	0	3.85
Virginia	6.56	0	6.56	28.4	0	28.4	34.9	0	34.9
Washington	13.4	0	13.4	3.36	0	3.36	16.7	0	16.7
West Virginia	5.53	1.02	6.55	9.00	0	9.00	14.5	1.02	15.6
Wisconsin	10.9	0	10.9	8.63	0	8.63	19.6	0	19.6
Wyoming	37.1	67.1	104	13.0	0	13.0	50.1	67.1	117
Puerto Rico	1.43	0.32	1.75	0.18	0	0.18	1.61	0.32	1.93
U.S. Virgin Islands	0	0	0	0	0.04	0.04	0	0.04	0.04
TOTAL	1,120	2,790	3,900	1,130	282	1,410	2,250	3,070	5,320

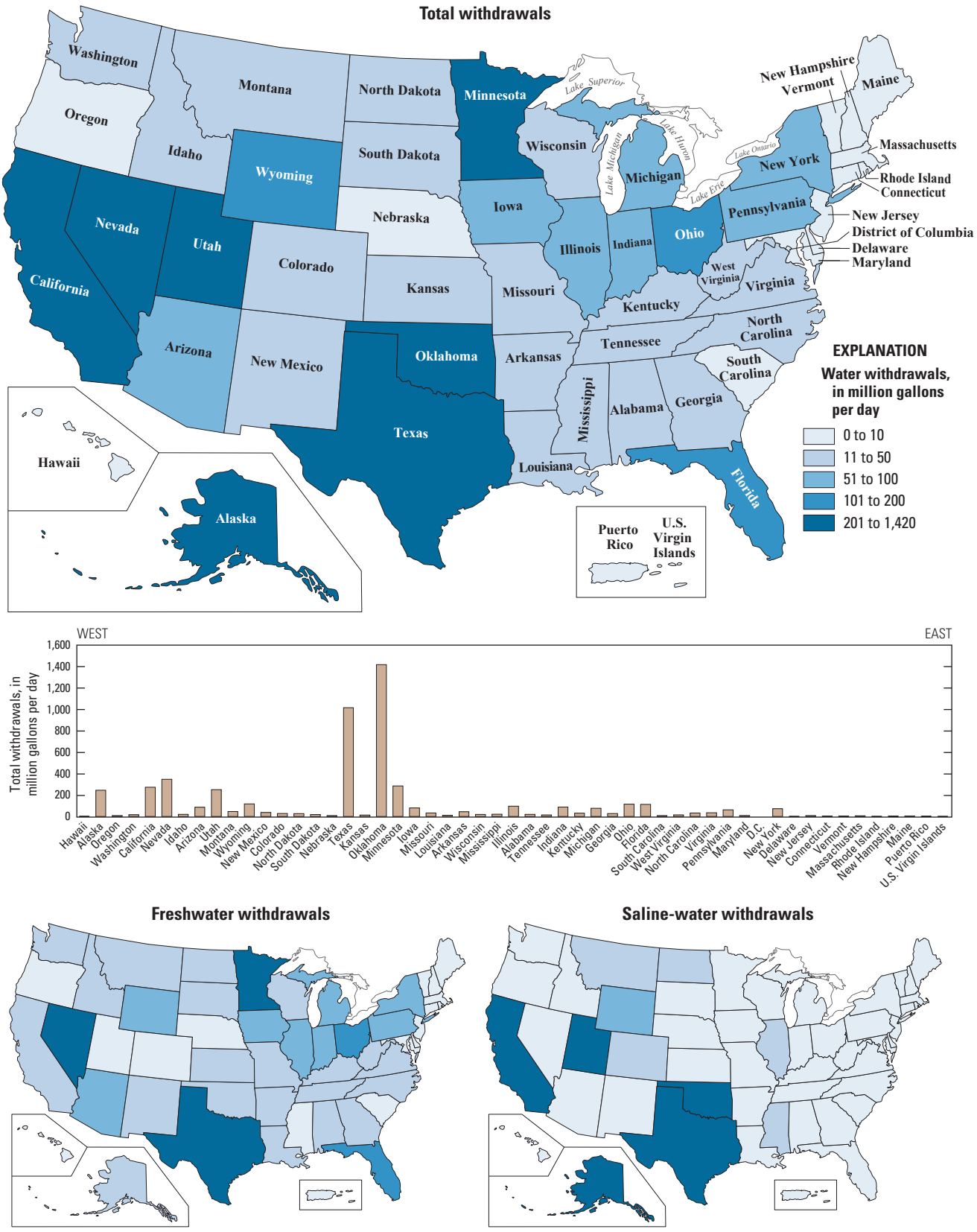

Figure 11. Mining withdrawals by water quality and State, 2010.

Thermoelectric Power

161,000 million gallons per day

Water for thermoelectric power is used in generating electricity with steam-driven turbine generators. Thermoelectric-power withdrawals were compiled by cooling-system type. Once-through cooling systems circulate water through heat exchangers and then return the water to the source. Recirculation cooling systems circulate water through heat exchangers, then cool the water using ponds or towers, and then the water is recirculated. Water withdrawals for a recirculation system are used to replace water lost to evaporation, blowdown, drift, and leakage. Thermoelectric-power withdrawals were reported as freshwater or saline water, as well as by cooling system. Net power generation is also reported by cooling system.

For 2010, public-supply deliveries to thermoelectric powerplants and consumptive use were not reported. However, 1,290 thermoelectric powerplants from the linked heat and water budget models provided monthly and annual estimates of withdrawals and consumptive use by powerplant. These data were provided as supplemental and supportive datasets for the compilation. Datasets substantially improved existing NWUIP capabilities with more accurate and complete information on thermoelectric powerplant locations, categorization of cooling-system types, and water sources. Quality-assured data for net power generation were also provided with linked information about cooling system and fuels, monthly and annual (2010) estimates of withdrawals based on the models, and associated monthly and annual estimates of consumptive use by plant (Diehl and others, 2013; Diehl and Harris, 2014). These data were used either in whole, or in part, for this compilation. Compilers in some States obtained data reported directly from thermoelectric powerplants.

Thermoelectric-power withdrawals and net power generation are listed by State in table 12. Total withdrawals for thermoelectric power for 2010 were 161,000 Mgal/d or 180,000 thousand acre-ft/yr (table 2*B*). Surface water was the source for over 99 percent of total thermoelectric-power withdrawals, and 73 percent of those surface-water withdrawals were from freshwater sources. Saline surface-water withdrawals for thermoelectric power accounted for 97 percent of total saline surface-water withdrawals for all uses. Total withdrawals for thermoelectric power accounted for 45 percent of total water withdrawals, 38 percent of total freshwater withdrawals, and 51 percent of fresh surface-water withdrawals for all uses. Net power generation associated with thermoelectric-power withdrawals was 3,130,000 gWh (gigawatt-hours), or about 2 percent less than in 2005. On average, 19 gal (gallons) were used to produce 1 kWh (kilowatt-hour) of electricity in 2010, compared to almost 23 gal/kWh (gallons per kilowatt-hour) in 2005.

The geographic distribution of total, total freshwater, and total saline-water withdrawals for thermoelectric power is shown in figure 12. The largest total withdrawals for thermoelectric power were in Texas, where nearly all the withdrawals were from freshwater sources. Illinois, Texas, Michigan, and Alabama, together accounted for more than 32 percent of freshwater withdrawals for thermoelectric power. Florida, California, and Maryland accounted for about 48 percent of total saline withdrawals, nearly all from surface water. Hawaii, California, and Nevada accounted for 82 percent of the total saline groundwater withdrawals.

Estimated 2010 thermoelectric withdrawals were 20 percent less than estimates for 2005. Reasons for this large difference include plant closures, use of the linked heat and water budget model data, decrease in use of coal and increase in use of natural gas, and new powerplants using more water-efficient cooling technology.

Eastern States accounted for 86 percent of total thermoelectric-power withdrawals in the United States and 75 percent of the related net power generation. Hydroelectric-power generation is not included in this report but meets the demand for a significant amount of the U.S. total energy needs, predominantly in Western States. In 2010, 61 percent of the total 257,000 gWh from hydroelectric powerplants was produced by public utilities in Washington, California, Oregon, and New York (U.S. Department of Energy, 2011).

Thermoelectric-power withdrawals and net power generated by cooling-system type are listed by State in table 13. Powerplants with once-through cooling systems accounted for 94 percent of total withdrawals and 47 percent of net power generated. Plants with recirculating cooling systems required much less water (6 percent) and produced the majority (53 percent) of the net power generated. Powerplants with recirculating cooling systems are found in every State but were the predominant type of cooling system at powerplants in Western inland States such as Arizona, Oklahoma, Wyoming, Utah, Colorado, Kansas, and New Mexico.

Reclaimed wastewater is a supplemental source of water for thermoelectric power, especially in areas where additional water sources are needed for plant operations, such as for air pollution control equipment, or scrubbers (Veil, 2007). Arizona (67.6 Mgal/d) and California (22.8 Mgal/d) reported substantial amounts of reclaimed water use. Reclaimed wastewater is not included in the thermoelectric-power data or national totals for this report.

Sources for thermoelectric-power withdrawals, cooling-system information, and net power generation included data collected directly from facilities, State permitting or regulatory agencies, the USDOE EIA, and a linked heat and water budget for powerplants in the United States, as mentioned previously. Using information gleaned from the NWC thermoelectric project, some powerplant's cooling-system classifications were changed, thereby making them different from previous compilations. Similarly, net power-generation data from EIA were scrutinized for each plant to determine whether the power that was reported and used in this compilation was associated with a water use.

Table 12. Thermoelectric-power water withdrawals, 2010.

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

State	Withdrawals (in million gallons per day)									Power generated (in million kilowatt-hours)
	By source and type						Total			
	Groundwater			Surface water						
	Fresh	Saline	Total	Fresh	Saline	Total	Fresh	Saline	Total	
Alabama	0	0	0	8,250	0	8,250	8,250	0	8,250	125,000
Alaska	2.19	0	2.19	55.8	0	55.8	58.0	0	58.0	1,760
Arizona	77.3	0	77.3	27.1	0	27.1	104	0	104	86,700
Arkansas	4.26	0	4.26	1,540	0	1,540	1,540	0	1,540	49,000
California	33.1	48.4	81.6	32.2	6,490	6,520	65.4	6,540	6,600	85,400
Colorado	16.8	0	16.8	60.2	0	60.2	77.0	0	77.0	38,300
Connecticut	0	0	0	198	2,460	2,650	198	2,460	2,650	21,600
Delaware	0.37	0	0.37	7.45	417	425	7.82	417	425	5,150
District of Columbia	0	0	0	0	0	0	0	0	0	0
Florida	43.5	6.54	50.0	570	8,570	9,140	613	8,570	9,190	199,000
Georgia	2.92	0	2.92	1,770	283	2,050	1,770	283	2,060	110,000
Hawaii	53.2	50.8	104	0	552	552	53.2	603	656	6,830
Idaho	0.88	0	0.88	0	0	0	0.88	0	0.88	515
Illinois	5.65	0	5.65	10,700	0	10,700	10,700	0	10,700	192,000
Indiana	24.6	0	24.6	5,360	0	5,360	5,380	0	5,380	108,000
Iowa	21.2	0	21.2	2,220	0	2,220	2,240	0	2,240	44,700
Kansas	11.2	0	11.2	366	0	366	377	0	377	43,600
Kentucky	15.3	0	15.3	3,340	0	3,340	3,360	0	3,360	93,400
Louisiana	41.1	0	41.1	4,390	1.68	4,390	4,430	1.68	4,430	63,500
Maine	0.96	0	0.96	25.9	26.0	51.9	26.8	26.0	52.8	7,650
Maryland	2.25	0	2.25	434	5,760	6,200	436	5,760	6,200	41,100
Massachusetts	0.21	0	0.21	134	1,930	2,070	134	1,930	2,070	18,500
Michigan	4.12	0	4.12	8,510	0	8,510	8,520	0	8,520	107,000
Minnesota	2.34	0	2.34	2,510	0	2,510	2,510	0	2,510	42,400
Mississippi	50.0	7.05	57.1	905	62.4	968	956	69.5	1,020	44,200
Missouri	19.9	0	19.9	5,890	0	5,890	5,910	0	5,910	86,200
Montana	0.85	0	0.85	150	0	150	151	0	151	19,000
Nebraska	5.25	0	5.25	1,790	0	1,790	1,790	0	1,790	34,400
Nevada	17.9	11.0	28.9	3.68	0	3.68	21.6	11.0	32.6	9,990
New Hampshire	1.02	0	1.02	201	848	1,050	202	848	1,050	19,500
New Jersey	1.57	0	1.57	512	3,740	4,250	513	3,740	4,250	46,000
New Mexico	9.59	0	9.59	42.3	0	42.3	51.9	0	51.9	29,700
New York	2.39	0	2.39	2,750	4,850	7,600	2,760	4,850	7,600	77,900
North Carolina	0.37	0	0.37	7,660	1,360	9,020	7,660	1,360	9,020	110,000
North Dakota	0	0	0	837	0	837	837	0	837	28,400
Ohio	23.0	0	23.0	7,190	0	7,190	7,220	0	7,220	137,000
Oklahoma	1.26	0	1.26	384	0	384	385	0	385	48,700
Oregon	1.48	0	1.48	11.2	0	11.2	12.7	0	12.7	8,820
Pennsylvania	4.49	0	4.49	5,390	0	5,390	5,390	0	5,390	201,000
Rhode Island	0	0	0	1.44	232	234	1.44	232	234	1,140
South Carolina	4.86	0	4.86	5,500	0	5,500	5,500	0	5,500	97,800
South Dakota	3.34	0	3.34	6.93	0	6.93	10.3	0	10.3	3,300
Tennessee	1.78	0	1.78	5,800	0	5,800	5,800	0	5,800	71,900
Texas	38.8	0	38.8	10,400	661	11,100	10,500	661	11,100	249,000
Utah	24.0	10.5	34.5	45.6	0.47	46.0	69.6	11.0	80.6	38,900
Vermont	0.74	0	0.74	344	0	344	345	0	345	5,230
Virginia	1.55	0	1.55	2,850	3,150	6,000	2,860	3,150	6,000	53,500
Washington	1.57	0	1.57	36.4	0	36.4	37.9	0	37.9	20,100
West Virginia	1.40	0	1.40	2,470	0	2,470	2,470	0	2,470	77,500
Wisconsin	2.78	0	2.78	4,630	0	4,630	4,630	0	4,630	55,400
Wyoming	2.29	0	2.29	61.1	0	61.1	63.4	0	63.4	39,600
Puerto Rico	1.17	0	1.17	2.61	2,270	2,270	3.78	2,270	2,270	19,900
U.S. Virgin Islands	0	0	0	0.17	116	116	0.17	116	116	830
TOTAL	587	134	721	116,000	43,800	160,000	117,000	43,900	161,000	3,130,000

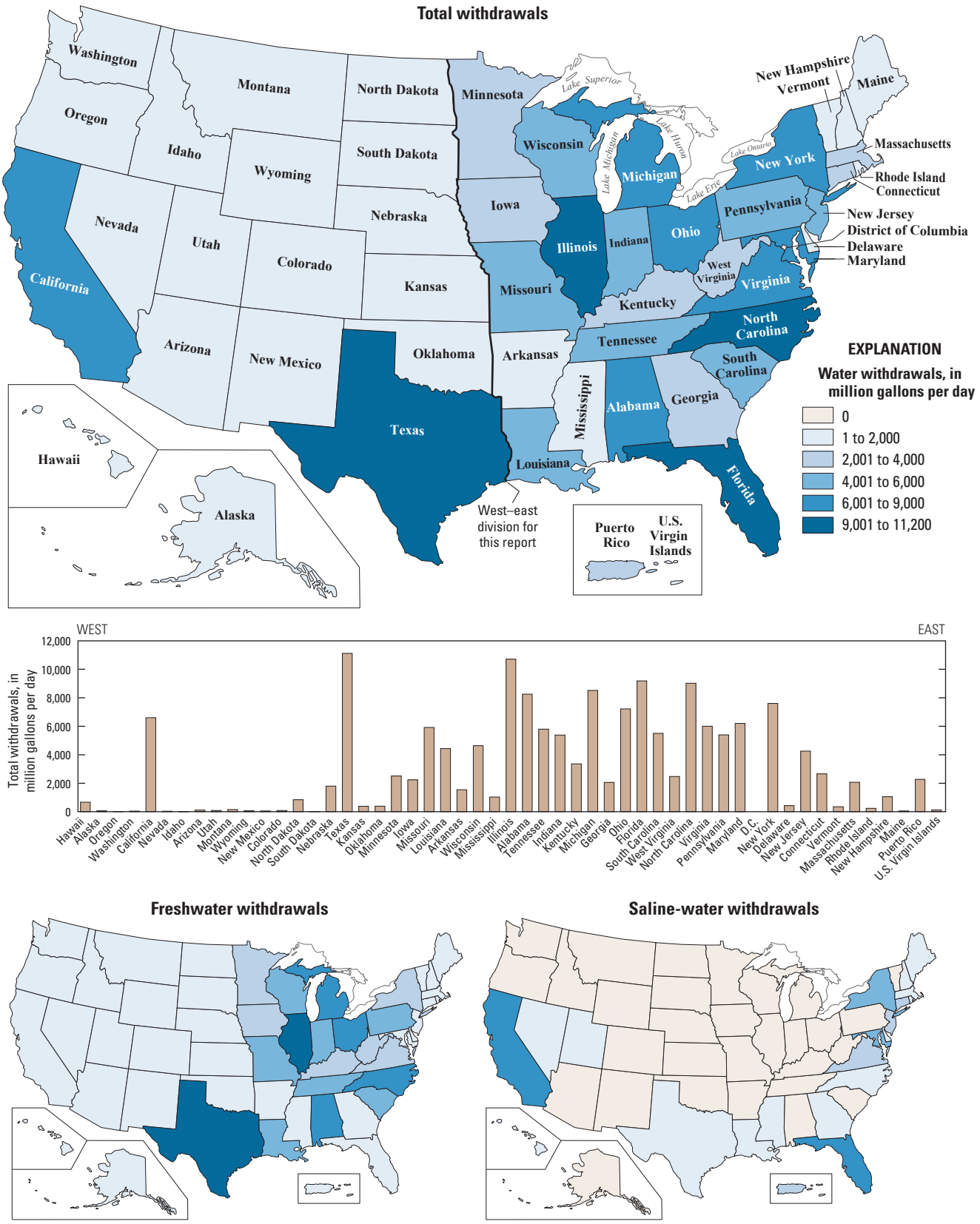

Figure 12. Thermoelectric-power withdrawals by water quality and State, 2010.

Table 13. Thermoelectric-power water withdrawals by cooling type, 2010.

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

State	Withdrawals for once-through cooling					Power generated (in million kilowatt-hours)	Withdrawals for recirculation cooling					Power generated (in million kilowatt-hours)
	By source and type				Total		By source and type				Total	
	Groundwater		Surface water				Groundwater		Surface water			
	Fresh	Saline	Fresh	Saline			Fresh	Saline	Fresh	Saline		
Alabama	0	0	8,120	0	8,120	74,300	0	0	134	0	134	50,700
Alaska	0	0	55.8	0	55.8	533	2.19	0	0	0	2.19	1,230
Arizona	0	0	0	0	0	0	77.3	0	27.1	0	104	86,700
Arkansas	0.80	0	1,480	0	1,480	20,100	3.46	0	58.5	0	62.0	28,900
California	0.73	0	0	6,490	6,490	40,100	32.4	48.4	32.2	1.04	114	45,300
Colorado	3.93	0	13.8	0	17.7	722	12.8	0	46.4	0	59.3	37,600
Connecticut	0	0	198	2,460	2,650	21,500	0	0	0.10	0	0.10	56.8
Delaware	0	0	0	417	417	2,950	0.37	0	7.45	0	7.82	2,210
District of Columbia	0	0	0	0	0	0	0	0	0	0	0	0
Florida	8.12	0	520	8,460	8,990	98,400	35.4	6.54	49.3	104	195	101,000
Georgia	1.46	0	1,470	283	1,760	16,700	1.46	0	299	0	300	92,900
Hawaii	52.8	46.9	0	552	652	5,090	0.32	3.83	0	0	4.15	1,740
Idaho	0	0	0	0	0	0	0.88	0	0	0	0.88	515
Illinois	3.42	0	10,100	0	10,100	92,000	2.23	0	631	0	633	99,500
Indiana	20.6	0	5,240	0	5,260	57,100	3.96	0	116	0	120	51,100
Iowa	9.39	0	2,200	0	2,210	29,600	11.8	0	17.6	0	29.4	15,100
Kansas	0.05	0	311	0	311	11,900	11.1	0	54.6	0	65.7	31,700
Kentucky	0	0	3,270	0	3,270	44,900	15.3	0	71.2	0	86.5	48,500
Louisiana	30.4	0	4,030	1.68	4,060	28,400	10.7	0	359	0	370	35,100
Maine	0	0	24.1	24.2	48.3	280	0.96	0	1.78	1.80	4.54	7,370
Maryland	2.25	0	393	5,750	6,150	32,900	0	0	40.6	11.7	52.3	8,150
Massachusetts	0	0	133	1,930	2,060	18,100	0.21	0	1.62	0.05	1.88	378
Michigan	0.56	0	8,320	0	8,320	84,900	3.56	0	199	0	202	22,000
Minnesota	2.19	0	1,560	0	1,560	28,800	0.15	0	946	0	946	13,600
Mississippi	1.48	0	900	62.4	964	18,000	48.5	7.05	5.26	0	60.8	26,200
Missouri	7.07	0	5,870	0	5,880	70,700	12.8	0	22.8	0	35.6	15,600
Montana	0	0	122	0	122	1,280	0.85	0	27.9	0	28.8	17,700
Nebraska	0	0	1,770	0	1,770	22,500	5.25	0	21.3	0	26.6	11,900
Nevada	0	0	0	0	0	0	17.9	11.0	3.68	0	32.6	9,990
New Hampshire	0.27	0	200	846	1,050	14,600	0.75	0	1.13	2.42	4.30	4,940
New Jersey	0	0	433	3,740	4,170	28,300	1.57	0	78.6	0	80.1	17,800
New Mexico	0	0	0	0	0	0	9.59	0	42.3	0	51.9	29,700
New York	0	0	2,750	4,850	7,600	75,300	2.39	0	4.09	0	6.48	2,620
North Carolina	0	0	6,290	1,360	7,660	71,700	0.37	0	1,360	0	1,360	38,600
North Dakota	0	0	812	0	812	10,300	0	0	24.6	0	24.6	18,100
Ohio	14.5	0	6,640	0	6,650	61,200	8.49	0	558	0	566	75,400
Oklahoma	0.08	0	290	0	290	2,730	1.18	0	94.2	0	95.4	46,000
Oregon	0	0	0	0	0	0	1.48	0	11.2	0	12.7	8,820
Pennsylvania	0.08	0	3,040	0	3,040	28,400	4.41	0	2,350	0	2,360	173,000
Rhode Island	0	0	0	232	232	639	0	0	1.44	0	1.44	499
South Carolina	1.02	0	4,420	0	4,420	38,000	3.84	0	1,080	0	1,090	59,800
South Dakota	0	0	0	0	0	0	3.34	0	6.93	0	10.3	3,300
Tennessee	0	0	5,780	0	5,780	60,500	1.78	0	20.0	0	21.8	11,400
Texas	0	0	10,200	658	10,900	129,000	38.8	0	189	3.81	231	120,000
Utah	0	0	0	0	0	183	24.0	10.5	45.6	0.47	80.6	38,700
Vermont	0	0	344	0	344	4,780	0.74	0	0.29	0	1.03	447
Virginia	0	0	2,830	3,150	5,970	41,800	1.55	0	25.4	0	27.0	11,600
Washington	0	0	0	0	0	0	1.57	0	36.4	0	37.9	20,100
West Virginia	0.02	0	2,320	0	2,320	16,000	1.38	0	154	0	156	61,500
Wisconsin	1.35	0	4,600	0	4,600	40,000	1.43	0	34.2	0	35.6	15,400
Wyoming	0	0	0	0	0	0	2.29	0	61.1	0	63.4	39,600
Puerto Rico	1.15	0	1.12	2,270	2,270	16,700	0.02	0	1.49	0	1.51	3,190
U.S. Virgin Islands	0	0	0.17	116	116	830	0	0	0	0	0	0
TOTAL	164	46.9	107,000	43,600	151,000	1,460,000	423	87.3	9,360	125	9,990	1,660,000

Trends in Water Use, 1950–2010

The USGS has conducted water-use compilations every 5 years since 1950 (*http://water.usgs.gov/watuse/50years.html*). A summary of population growth and withdrawal estimates by category of use and source of water is discussed in this section and shown in table 14 for each 5-year period from 1950 through 2010. These trends are shown graphically for freshwater uses in figure 13 and total uses in figure 14.

Table 14 shows withdrawals for categories of use for each compilation period. Some categories were compiled and presented differently since compilations were begun. For example, self-supplied domestic and livestock withdrawals are shown separately in table 14; however, they were combined as "rural" in the 1950 and 1955 reports. Prior to 1985, the industrial water-use category included withdrawals for commercial, mining, and aquaculture; after 1985 these categories were estimated separately. Water use at fish hatcheries was reported as commercial use in 1990 and 1995, but was included in the aquaculture category for 2000, 2005, and again in 2010. Estimates of commercial withdrawals were not compiled nationally for 2000, 2005 or 2010. Totals in table 14 represent the most current data and incorporate revisions to previously published data; therefore, percentage differences and national totals may be slightly different from previous reports.

Total withdrawals for all categories of use in 2010 were estimated to be 355 Bgal/d, a level of withdrawal not reported since before 1970. Total withdrawals in 2010 were 13 percent less than in 2005, causing an abrupt downward shift to the mostly steady trend exhibited since 1985. This downward trend was caused by significant declines in the largest categories of use, including thermoelectric power, irrigation, public supply, and industrial. Categories with larger withdrawals in 2010 than in 2005 were mining and aquaculture, but these categories are small and increased total withdrawals for those categories of use did not offset the much larger overall decrease of 54 Bgal/d from the other uses.

Although the trend in total population since 1950 has been steadily upward, the rate of increase has varied over time (table 14). Most recently, total population in the United States increased only 4 percent between 2005 and 2010, or an additional 12.3 million people. This continues the upward trend in total population growth exhibited since 1950, but at a slightly slower rate. Historically, decadal growth rates in the United States were at their highest between 1950 and 1960, with an 19 percent increase from an additional 29 million people. Then growth rates exhibited an overall steady trend between 1960 and 1990, with no more than a 27 million person per year increase in the 30 year period. The rates sharply increased with a 13.2 percent increase (32.7 million) between 1990 and 2000 and were most recently at a 9.7 percent (27.3 million) increase from 2000 to 2010. (U.S. Census Bureau, 2011). In the last decade, population growth rate recorded was much faster in Southern and Western States (14.3 and 13.8 percent, respectively) compared to Midwestern States (3.9 percent) and Northeastern States (3.2 percent).

Thermoelectric power continued to account for the largest withdrawals for any category of use at 161 Bgal/d, or 45 percent of the total withdrawals from all categories of use. Total thermoelectric-power withdrawals in 2010 were about 20 percent less than in 2005; freshwater withdrawals were 18 percent less, and saline-water withdrawals were 24 percent less. These were the largest reductions in total withdrawals between 2005 and 2010 when considering all uses and accounted for the majority of the 13 percent decline in total withdrawals for all uses. Total withdrawals for thermoelectric power in 1985 were 11 percent less than in 1980, and fluctuations in total withdrawals during the 5-year intervals between 1985 and 2005 were never more than 5 percent.

Several factors may be attributed to the 20 percent decline in total thermoelectric withdrawals. Since the 1970s, an increasing number of powerplants were built with or converted to recirculating cooling systems or dry cooling systems, which use less water than powerplants with once-through cooling systems. Withdrawals at powerplants have declined in some States due to the implementation of new rules designed to minimize adverse effects to aquatic life at powerplant intakes. The decrease in use of coal and increase in use of natural gas and new powerplants coming online that use more water-efficient cooling technology also have helped to reduce withdrawals for thermoelectric power.

The plant-specific information pertaining to cooling systems, water sources, and net power generation provided estimates of thermoelectric-power withdrawals from the linked heat and water budget models. These data were used in place of data reported to EIA if plant-reported data were not available. Finally, between 2005 and 2010, the closing of once-through plants also contributed significantly to the reduction in total withdrawals. Withdrawals in California were nearly 50 percent less between 2005 and 2010 primarily due to plant closures and upgrades to intakes and cooling systems implemented in order to comply with State regulations (California State Water Resources Control Board, 2013).

Net power generation associated with thermoelectric power was 3,130,000 gWh in 2010 (table 12), or about 2.5 percent less than the 3,200,000 gWh in 2005. Net power generation increased nearly 50 percent between 1985 (2,140,000 gWh) and 2010. On average, 19 gallons were used to produce 1 kWh of electricity in 2010, compared to almost 23 gal/kWh in 2005.

Irrigation withdrawals were 9 percent less between 2005 and 2010, from 127 Bgal/d to 115 Bgal/d, a level not reported since before 1965. This marks the second consecutive 5-year period of decline in irrigation withdrawals and placed 2010 withdrawals 23 percent less than 1980, when withdrawals peaked. However, irrigation withdrawals remained

Table 14. Trends in estimated water use in the United States, 1950–2010.

[Data for 2005 and earlier from Kenny and others (2009). Water-use data are in billion gallons per day (thousand million gallons per day) and are rounded to two significant figures for 1950–80, and to three significant figures for 1985–2005; percentage change is calculated from unrounded numbers. Geographic extent: 1950, 48 States and District of Columbia, and Hawaii; 1955, 48 States and District of Columbia; 1960 and 1975–2005, 50 States and District of Columbia, Puerto Rico, and U.S. Virgin Islands; 1965–70, 50 States and District of Columbia, and Puerto Rico]

	Year													Percentage change 2005 to 2010
	1950	1955	1960	1965	1970	1975	1980	1985	1990	1995	2000	2005	2010	
Population, in millions	150.7	164	179.3	193.8	205.9	216.4	229.6	242.4	252.3	267.1	285.3	300.7	313	4
Total withdrawals	180	240	270	310	370	420	430	397	404	[1]398	413	[1]409	355	–13
Public supply	14	17	21	24	27	29	33	[1]36.6	[1]38.7	40.2	[1]43.3	[1]44.3	42.0	–5
Rural domestic and livestock														
Self-supplied domestic	2.1	2.1	2.0	2.3	2.6	2.8	3.4	3.32	3.39	3.39	3.58	[1]3.71	3.60	–3
Livestock	1.5	1.5	1.6	1.7	1.9	2.1	2.2	2.23	2.25	2.28	[1]2.39	[1]2.15	2.00	–7
Irrigation	89	110	110	120	130	140	150	135	134	130	139	[1]127	115	–9
Thermoelectric power	40	72	100	130	170	200	210	187	194	190	195	201	161	–20
Other														
Self-supplied industrial	37	39	38	46	47	45	45	[1]25.8	[1]22.5	[1]21.6	19.7	[1]18.1	15.9	–12
Mining	[3]	[3]	[3]	[3]	[3]	[3]	[3]	3.44	4.93	[1]3.59	[1]4.16	[1]3.83	5.32	39
Commercial	[3]	[3]	[3]	[3]	[3]	[3]	[3]	1.23	2.39	2.89	[2]	[2]	[2]	
Aquaculture	[3]	[3]	[3]	[3]	[3]	[3]	[3]	2.24	[1]2.24	[1]3.23	[1]5.78	[1]8.84	9.42	7
Source of water														
Ground														
Fresh	34	47	50	60	68	82	83	73.4	[1]79.4	[1]76.3	[1]84.4	[1]78.9	76.0	–4
Saline	[2]	0.6	0.4	0.5	1.0	1.0	0.93	0.66	1.22	1.11	[1]2.48	[1]1.51	3.29	118
Surface														
Fresh	140	180	190	210	250	260	280	263	[1]256	261	265	270	230	–15
Saline	10	18	31	43	53	69	71	59.6	[1]67.1	59.7	61.0	[1]59.4	45.0	–24

[1]Revised data values.
[2]Data not available.
[3]Included in self-supplied industrial category.

the second-largest category of use after thermoelectric. In 1950, irrigation withdrawals accounted for 64 percent of total freshwater withdrawals excluding thermoelectric, and in 2010 irrigation withdrawals accounted for 61 percent of total freshwater withdrawals excluding thermoelectric. Between 1985 and 2010, the majority of irrigation water was supplied by surface-water sources, ranging from 66 percent in 1985 to 57 percent in 2010. The use of more water-efficient irrigation systems continued to increase with nearly 3 percent more irrigated acres using sprinkler systems in 2010 than in 2005. Nearly 2 percent fewer irrigated acres were reported using flood (surface) irrigation systems in 2010 compared to 2005. Microirrigation systems showed the largest percentage increase between 2005 and 2010, with 14 percent more irrigated acres with this type of system. Total irrigated acres were only 2 percent more in 2010 than in 2005.

Public-supply withdrawals in 2010 were 5 percent less than in 2005, decreasing from 44.3 Bgal/d to 42.0 Bgal/d and marking the first decline since public-supply withdrawals were initially reported in 1950. Total public-supply withdrawals in 2010 were at levels not reported since prior to 2000. During decadal periods between 1950 and 1960, public-supply withdrawals increased 50 percent in conjunction with the high population growth rates during those periods. Percentage increases in public-supply withdrawals during the next three decadal periods between 1960 and 1990 averaged 23 percent, again coinciding with the rate of growth in population during the same time periods. Between 1990 and 2000, the rate of increase in public-supply withdrawals was lower at 12 percent. Between 1990 and 2010, public-supply withdrawals have been roughly 60 percent from surface water and 40 percent from groundwater sources. The percentage of the population that is served from public-supply withdrawals has increased from 62 percent in 1950 to 86 percent in 2010.

Self-supplied domestic withdrawals declined 3 percent between 2005 and 2010, from 3.71 Bgal/d to 3.60 Bgal/d. Since 1985, the rate of change in self-supplied domestic withdrawals has remained fairly steady with, at most, a 6 percent increase (1995–2000). Between 1985 and 2010, the percentage of total population that was self-supplied has continuously declined, from about 18 percent to 14 percent. The average per capita use for self-supplied domestic withdrawals decreased from 89 gallons per day in 2005 to 81 gallons per day in 2010. Estimates of self-supplied domestic withdrawals are computed either using a standard coefficient of use or a coefficient derived from data about public-supply domestic

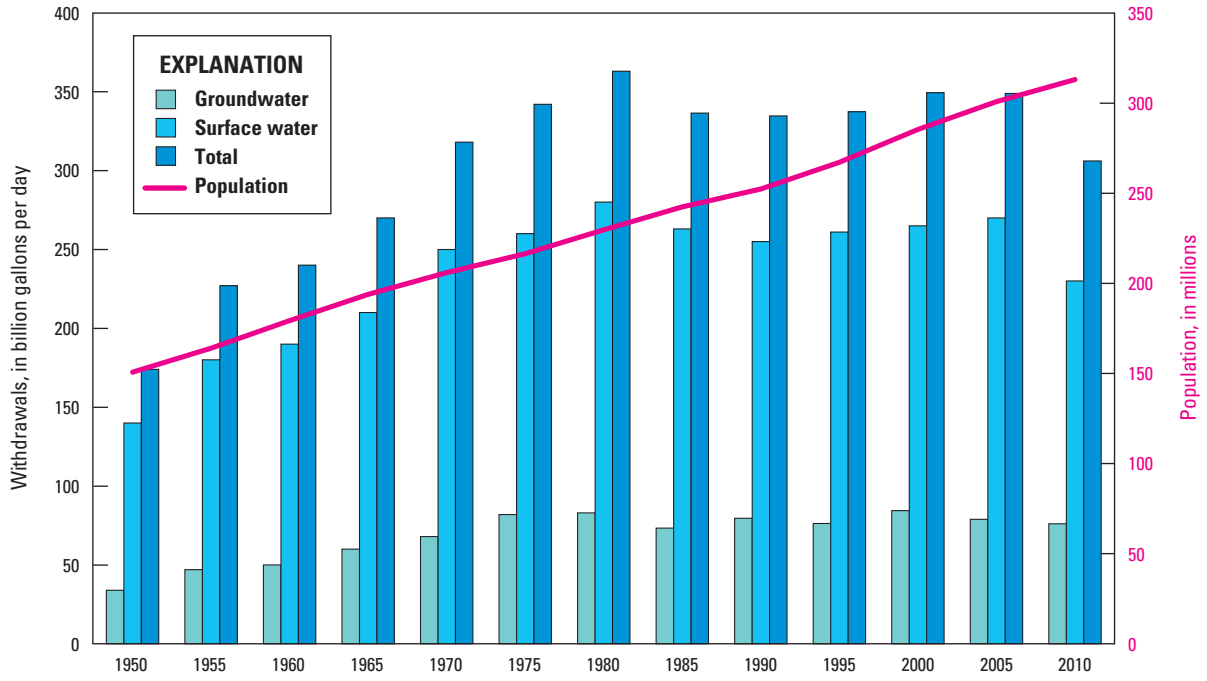

Figure 13. Trends in population and freshwater withdrawals by source, 1950–2010.

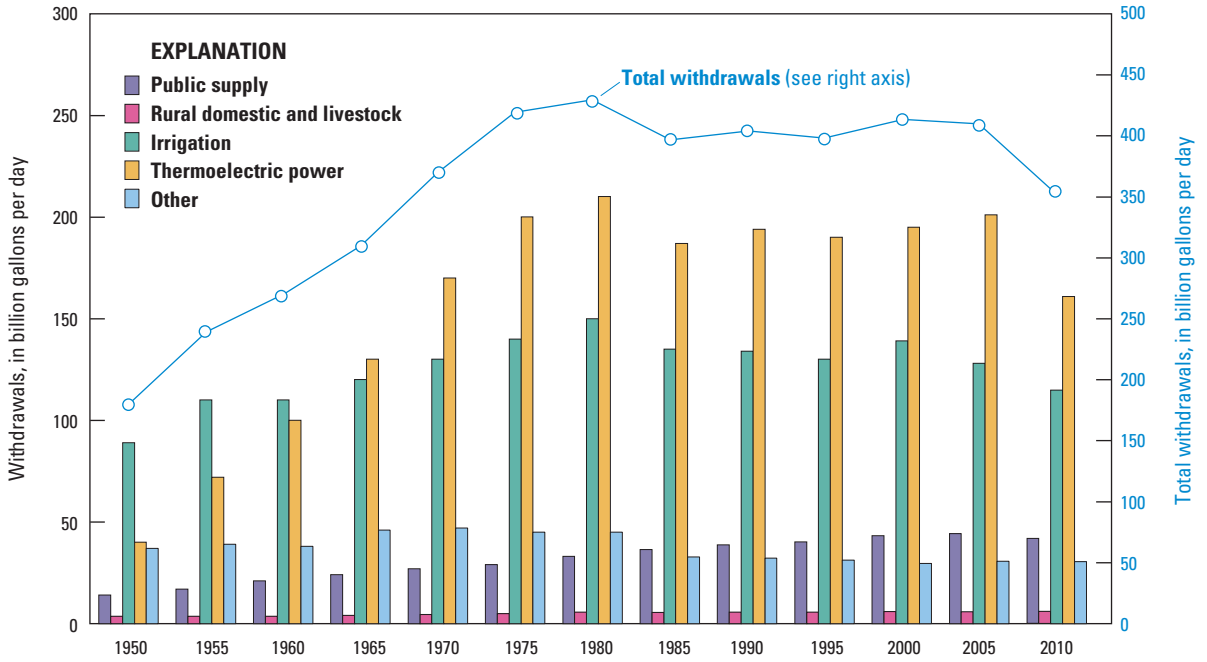

Figure 14. Trends in total water withdrawals by water-use category, 1950–2010.

deliveries. The national average public-supply domestic delivery per capita use declined from 105 gallons per day in 1985 to 89 gallons per day in 2010. The decline in the self-supplied domestic per capita use is most likely a function of the decline in the public-supply domestic delivery per capita use. In particular, California (7 percent self-supplied population) reported 179 gpcd for self-supplied domestic use in 2005, and 69 gpcd in 2010. Similarly, Texas (10 percent self-supplied population) and Wisconsin (30 percent self-supplied population) both reported 8 percent declines in self-supplied domestic per capita use between 2005 and 2010.

Changes in the industrial category can be compared for 1985 through 2010, which are the years this category was compiled separately for commercial, mining, and aquaculture uses. Total industrial withdrawals decreased 12 percent between 2005 and 2010, continuing the decline shown each period since 1985. Total industrial withdrawals decreased by 38 percent between 1985 to 2010, from 25.8 Bgal/d in 1985 to 15.9 Bgal/d in 2010. Groundwater provided 14 percent of the total industrial withdrawals in 1985; this proportion has been in the range of 17 to 18 percent since. Almost all of the industrial groundwater withdrawals were freshwater. Fresh surface-water withdrawals have accounted for more than 90 percent of surface-water withdrawals for industrial use since 1995 and was 93 percent in 2010.

Declines in industrial withdrawals reflects greater efficiencies in industrial processes and an emphasis on water reuse and recycling within industrial facilities, both driven by environmental regulations and limited availability of freshwater resources in some areas. The larger decline in industrial withdrawals from 2005 to 2010 compared to 2000 to 2005 (12 percent compared to 8 percent) may be due in part to lower industrial production in the major water-using industries of wood products, primary metals, paper, and chemicals, all of which had lower production following the 2008 U.S. recession (Board of Governors of the Federal Reserve System, 2014).

Livestock, mining, and aquaculture withdrawals were included with other categories prior to 1985. Livestock initially was included with rural domestic, but since 1960 has been estimated as a separate category and has consistently accounted for about 1 percent of total withdrawals excluding thermoelectric throughout the 1960–2010 period. Withdrawals for livestock decreased 7 percent from 2.15 Bgal/d in 2005 to 2.00 Bgal/d in 2010, showing the second consecutive period of decline. Livestock withdrawals in 2010 were 16 percent less than the peak year of 2000, when 2.39 Bgal/d was reported.

Mining withdrawals were 5.32 Bgal/d in 2010, or a 39 percent increase over 2005 (3.83 Bgal/d). This represented the largest percentage increase of any category of use between 2005 and 2010, but since mining is a relatively small category in terms of total withdrawals, the increase did not offset the large national decreases in total water use. Prior to 1985, mining was included in other industrial withdrawals, but since 1985 has represented from 1.6 to 2.7 percent of total withdrawals excluding thermoelectric. Trends in mining withdrawals have fluctuated between 1985 and 2010, ranging from an increase of 43 percent between 1985 and 1990, followed by a 27 percent decrease between 1990 and 1995.

Aquaculture withdrawals were 9.42 Bgal/d in 2010, or a 7 percent increase from 2005. Aquaculture was the other category along with mining that showed an increase in withdrawals between 2005 and 2010. Since 1985, aquaculture has grown from 1 percent of total withdrawals excluding thermoelectric to almost 5 percent in 2010 with the most increase change between 1995 and 2000 when the total withdrawals increased nearly 80 percent.

The Plant Bowen coal-fired powerplant outside Euharlee in Bartow County, Georgia. Photo by Alan Cressler, USGS.

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Glossary

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

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

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

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

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

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

conveyance loss Water that is lost in transit from a pipe, canal, conduit, or ditch by leakage or evaporation. Generally, the water is not available for further use; however, leakage from an irrigation ditch, for example, may percolate to a groundwater source and be available for further use. Conveyance-loss estimates were included in some previous water-use Circulars but were omitted beginning in 2000. *See also* irrigation water use.

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

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

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

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

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

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

industrial water use Water used for fabrication, processing, washing, and cooling. Includes industries such as chemical and allied products, food, mining, paper and allied products, petroleum refining, and steel. Term used in previous

water-use Circulars to describe the combined public-supply deliveries to industrial users and self-supplied industrial withdrawals. Since 2000, industrial water use refers only to self-supplied industrial withdrawals. *See also* cooling system, cooling-system type, mining water use, public-supply deliveries, public-supply water use, and self-supplied water use.

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

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

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

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

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

mining water use Water used for the extraction of naturally occurring minerals including solids (such as coal, sand, gravel, and other ores), liquids (such as crude petroleum), and gases (such as natural gas). Also includes uses associated with quarrying, milling of mined materials, injection of water for secondary oil recovery or for unconventional oil and gas recovery (such as hydraulic fracturing), and other operations associated with mining activity. Does not include water associated with dewatering of the aquifer that is not put to beneficial use. Also does not include water used in processing, such as smelting, refining petroleum, or slurry pipeline operations. These processing uses are included in industrial water use. *See also* industrial water use and self-supplied water use.

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

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

public-supply deliveries Amount of water delivered from a public supplier to users for domestic, commercial, industrial, thermoelectric-power, or public-use purposes. Estimates of deliveries for each purpose were provided for 1995 and earlier years, but not for 2000. For 2005 and 2010, only domestic deliveries were estimated nationally. *See also* commercial water use, domestic water use, industrial water use, public-supply water use, public water use, and thermoelectric-power use.

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

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

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

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

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

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

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

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

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

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

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

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

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

water use In a restrictive sense, the term refers to water that is withdrawn for a specific purpose, such as for public supply, domestic use, irrigation, thermoelectric-power cooling, or industrial processing. In previous water-use Circulars, water use for the domestic, commercial, industrial, and thermoelectric categories included both self-supplied withdrawals and deliveries from public supply. More broadly, water use pertains to the interaction of humans with and influence on the hydrologic cycle, and includes elements such as water withdrawal, delivery, consumptive use, wastewater release, reclaimed wastewater, return flow, and instream use. *See also* offstream use and instream use.

water withdrawal Water removed from a groundwater or surface-water source for use. *See also* offstream use and self-supplied water use.

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

Cooperating Agencies and Organizations

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

Alabama

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

Alabama Department of Environmental Management, Drinking Water Branch

Alaska

Alaska Department of Administration, Oil and Gas Conservation Commission

Alaska Department of Commerce, Community and Economic Development

Alaska Department of Environmental Conservation, Division of Water

Alaska Department of Fish and Game

Alaska Department of Natural Resources, Division of Agriculture

Alaska Department of Natural Resources, Division of Geological and Geophysical Surveys

Alaska Department of Natural Resources, Division of Mining Land and Water

Alaska Department of Natural Resources, Division of Oil and Gas

University of Alaska, Cooperative Extension Service

Arizona

Arizona Department of Water Resources

Arkansas

Arkansas Association of Conservation Districts

Arkansas Department of Health, Engineering Division

Arkansas Natural Resources Commission

California

California Department of Food and Agriculture, Annual County Agriculture Commissioner Reports

California Department of Public Health

California Department of Water Resources, Land and Water Use

California State Water Resources Control Board, Water Recycling Funding Program

Food and Agricultural Organization of the United Nations

Golf Course Superintendents Association of America

Colorado

Colorado Department of Health and Environment

Colorado Division of Local Affairs

Colorado Division of Reclamation Mining and Safety

Colorado Division of Water Resources

Colorado Oil and Gas Conservation Commission

Colorado Water Conservation Board

Rocky Mountain Golf Course Superintendents Association

Connecticut

State of Connecticut Department of Environmental Protection

Delaware

Calpine Mid-Atlantic Generation LLC

City of Lewes, Delaware

City of Newark, Delaware

City of Wilmington, Brandywine Pumping Station, Delaware

Cogentrix (Logan Generating Co. LP)

Delaware Agricultural Extension Service

Delaware City Refinery (former Premcor)

Delaware Department of Natural Resources and Environmental Control

FPL Energy, Marcus Hook, LP

General Chemical Corp.

Indian River Power, LLC

NACP irrigated data (2012)

NRG Indian River Power LLC

United Water Comp., Delaware

Florida

Florida Department of Environmental Protection, Office of Water Policy

Northwest Florida Water Management District

South Florida Water Management District

Southwest Florida Water Management District

St. Johns River Water Management District

Suwannee River Water Management District

Georgia

Georgia Environmental Protection Division, Watershed Protection Branch

Georgia Power Company

Georgia Soil and Water Conservation Commission

University of Georgia, Cooperative Extension Service

Hawaii

Hawaii Department of Water Supply

Hawaiian Electric Company

Honolulu Board of Water Supply

Kauai Department of Water

Maui Department of Water Supply

Idaho

Idaho Department of Agriculture, Agricultural Statistics Service

Idaho Department of Environmental Quality

Idaho Department of Fish and Game

Idaho Department of Labor

Idaho Department of Water Resources

Idaho Power Company

United Water Idaho

University of Idaho, Research and Extension Center at Kimberly

Illinois

Exelon Corporation

Illinois Association of Wastewater Agencies

Illinois State Water Survey—Illinois Water Inventory Program

U.S. Department of Agriculture, Farm Services Agency

Indiana

Indiana Department of Natural Resources, Division of Water

Iowa

Iowa Department of Natural Resources—Water Allocation and Use Program

Kansas

Kansas Department of Agriculture—Division of Water Resources

Kansas Water Office

Kentucky

Kentucky Energy and Environment Cabinet, Department of Environmental Protection, Division of Water

Louisiana

Capitol Area Ground Water Conservation Committee

Louisiana Cooperative Extension Service

Louisiana Department of Environmental Quality

Louisiana Department of Health and Hospitals

Louisiana Department of Transportation and Development

Louisiana Office of Conservation - Injection and Mining Division

Louisiana State University Agricultural Center

Maine

Maine Department of Agriculture

Maine Department of Environmental Protection

Maine Department of Health and Human Services

Maine Geological Survey

Maine Public Utilities Commission

Maryland

Maryland Department of the Environment

Massachusetts

Massachusetts Department of Environmental Protection

Massachusetts Water Resources Authority

Michigan

Michigan Department of Environmental Quality, Water Use Program

Minnesota

Minnesota Department of Natural Resources

Mississippi

Mississippi Agriculture and Forestry Extension Service

Mississippi Department of Environmental Quality, Office of Land and Water Resources

Mississippi State Department of Health

Yazoo Mississippi Delta Joint Management District

Missouri

Missouri Department of Natural Resources

Montana

Dry Prairie Rural Water Authority

Fort Peck Rural County Water District

Hill County Water District

Montana Department of Environmental Quality

Montana Department of Natural Resources and Conservation

Montana Department of Revenue

Montana Fish, Wildlife and Parks

Montana State University, Central Agricultural Research Center

Montana Water Company

Multiple cities in Montana

PPL Montana
Prairie County Community Hospital
Rosebud Operating Services, Inc.
Valley Capitol, Inc.

Nebraska

Central Nebraska Public Power and Irrigation District
Central Platte Natural Resource District
Lewis and Clark Natural Resource District
Little Blue Natural Resource District
Lower Big Blue Natural Resource District
Lower Elkhorn Natural Resource District
Lower Loup Natural Resource District
Lower Niobrara Natural Resource District
Lower Platte North Natural Resource District
Lower Republican Natural Resource District
Middle Republican Natural Resource District
Nebraska Association of Natural Resource Districts
Nebraska Department of Natural Resources
Nemaha Natural Resource District
North Platte Natural Resource District
South Platte Natural Resource District
Tri-Basin Natural Resource District
Twin Platte Natural Resource District
Upper Big Blue Natural Resource District
Upper Elkhorn Natural Resource District
Upper Loup Natural Resource District
Upper Niobrara-White Natural Resource District
Upper Republican Natural Resource District

Nevada

Boulder City Water Department
Carson City Public Works
Chevron Global Power Company
Colorado River Commission
Federal Water Master
Nevada Bureau of Mines and Geology
Nevada Commission on Mineral Resources
Nevada Department of Business and Industry
Nevada Department of Conservation and Natural Resources, Division of Environmental Protection
Nevada Department of Wildlife
Nevada Division of Water Resources
Pershing County Water Conservation District
Southern Nevada Water Authority
Truckee Carson Irrigation District
Truckee Meadows Water Authority
U.S. Nuclear Regulatory Commission
Virgin Valley Water District

New Hampshire

New Hampshire Department of Environmental Services, Water Management Bureau

New Jersey

New Jersey Department of Environmental Protection

New Mexico

New Mexico Office of the State Engineer—Water Conservation Bureau

New York

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

North Carolina

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

North Dakota

North Dakota Industrial Commission - Oil and Gas Division
North Dakota Regional Water Systems
North Dakota Rural Water Systems Association
North Dakota State Climate Office
North Dakota State Data Center - North Dakota State University
North Dakota State Department of Commerce
North Dakota State University, Department of Agriculture
North Dakota State Water Commission

Ohio

Ohio Department of Natural Resources

Oklahoma

City of Oklahoma City—Water & Wastewater Utilities

City of Tulsa—Department of Public Works

Grand River Dam Authority

National Weather Service

Oklahoma Agricultural Statistics Service

Oklahoma Climatological Survey

Oklahoma Corporation Commission

Oklahoma Department of Commerce

Oklahoma Department of Environmental Quality

Oklahoma Municipal Power Authority

Oklahoma Water Resources Board

Southwest Power Administration

Oregon

Oregon Golf Association

Oregon Health Authority Drinking Water Services

Oregon State University Extension Service

Oregon Water Resources Department

Pennsylvania

Delaware River Basin Commission

Pennsylvania Department of Environmental Protection

Puerto Rico

Puerto Rico Aqueduct and Sewer Authority

Puerto Rico Department of Agriculture

Puerto Rico Department of Health

Puerto Rico Department of Natural and Environmental Resources

Puerto Rico Electric and Power Authority

Puerto Rico Land Authority

Rhode Island

Rhode Island Department of Environmental Management

Rhode Island Department of Health

Rhode Island Water Resources Board

South Carolina

Duke Energy Corporation

Santee Cooper Power

South Carolina Department of Health and Environmental Control

South Carolina Electric and Gas

South Dakota

South Dakota Department of Agriculture

South Dakota Department of Environment and Natural Resources

Tennessee

Memphis Light, Gas and Water

Tennessee Department of Environment and Conservation, Division of Water Resources

Tennessee Valley Authority

U.S. Army Corps of Engineers

Texas

Texas Commission on Environmental Quality

Texas Railroad Commission

Texas Water Development Board—Water Use and Projections & Planning

U.S. Virgin Islands

U.S. Virgin Islands Water and Power Authority

Utah

State of Utah Automated Geographic Reference Center

Utah Department of Agriculture

Utah Department of Natural Resources, Division of Oil, Gas, and Mining

Utah Department of Natural Resources, Division of Water Resources

Utah Department of Natural Resources, Division of Water Rights

Utah Department of Natural Resources, Division of Wildlife Resources

Vermont

Champlain Water District

Vermont Agency of Natural Resources, Department of Environmental Conservation

Vermont Golf Course Superintendents Association

Virginia

Virginia Department of Environmental Quality, Water Supply Planning Program

Virginia Department of Health, Office of Drinking Water

Washington

Washington State Department of Ecology

Washington State Department of Health

West Virginia

West Virginia Department of Environmental Protection, Division of Water And Waste Management

West Virginia Department of Health and Human Resources, Bureau for Public Health

West Virginia Geological and Economic Survey

Wisconsin

Public Service Commission of Wisconsin—Water and Energy Divisions

Wisconsin Department of Natural Resources

Wyoming

Wyoming Agricultural Statistics Service

Wyoming Department of Employment

Wyoming Oil and Gas Conservation Commission

Wyoming Water Development Commission

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