

Freshwater Withdrawals in Maryland, 1995

Maryland has abundant surface-water and ground-water resources. One of the earliest records describing the extent of Maryland's water resources is from 1634 when a colonist wrote of what he had seen in the "Province of Maryland," "... the delightful climate, the fertility of the soil, and the abundance of water and fresh springs" (Johns Hopkins University, 1893). Nearly one-fifth of the total area of the State is covered by water. Within its borders are approximately 9,874 square miles (mi²) of land, 703 mi² of rivers and streams, and 1,726 mi² of Chesapeake Bay (Walker, 1970).

The geographic distribution of freshwater withdrawals from surface-water and ground-water sources in Maryland reflects the physiographic and geologic variability of the State. The selection of a source of water supply is guided primarily by availability or accessibility of the resource. Central and western areas of Maryland are underlain by crystalline and consolidated layers of rocks that in many places do not yield large amounts of water to

wells. In these areas, demands for large quantities of freshwater are most readily met by surface-water sources. Conversely, in the eastern and southern areas of Maryland, unconsolidated deposits, which consist mostly of sand and gravel, commonly provide large quantities of ground water to meet the needs of most users. The area east of Chesapeake Bay depends almost entirely on ground water for freshwater supply.

Population Trends and Water Withdrawals

Since the early 1600's, water has been important in the economic and cultural development of Maryland. Rivers, bays, and harbors gave early settlers ports and access to inland trade. Freshwater streams, wells, and springs provided water supplies for a growing population. At the beginning of the twentieth century, Maryland was still primarily agricultural. The total population in 1900 was about one million people. In 1918, the State had only four cities of more than 10,000 inhabitants; the largest, Baltimore, had a population of about 560,000. By the mid-1990's,

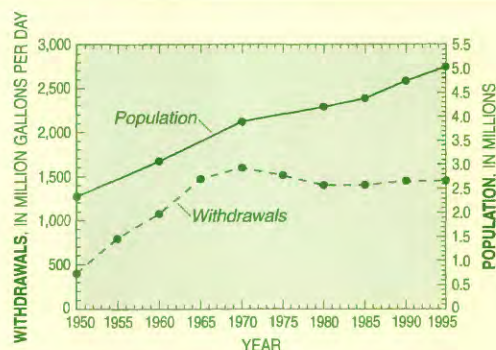


Figure 1. Population and freshwater-withdrawal trends, 1950-95.

Maryland's metropolitan areas had become part of an East Coast megalopolis stretching from Boston, Massachusetts to Washington, D.C., and northern Virginia. By 1995, the State's population had increased to more than five million, and Baltimore's population had increased to more than 691,000. As population grew, freshwater withdrawals increased. Population data for 1900 indicate that total freshwater withdrawals may have been 30 to 50 million gallons per day (Mgal/d). By 1970, total freshwater withdrawals had increased to about 1,500 Mgal/d. During the 1970's freshwater withdrawals began to decline despite continued population growth (fig. 1). Since about 1980, freshwater withdrawals have leveled off. Possible explanations for the trends include changing economic conditions, declining water use among certain industries, varying amounts of precipitation, and increasing use of conservation techniques.

Total Freshwater Withdrawals, 1995

During 1995, about 1,500 Mgal/d of freshwater was withdrawn from surface-water and ground-water sources in Maryland. Withdrawals of freshwater by county are shown in figure 2A. During 1995, about 83 percent of total freshwater withdrawals (1,210 Mgal/d) were from surface-water sources compared to 17 percent (246 Mgal/d) from ground-water sources. The largest fresh surface-water withdrawals (more than 100 Mgal/d) were in Baltimore and Montgomery Counties (about 275 Mgal/d and 724 Mgal/d, respectively) (fig. 2B). The reservoirs and rivers in these Counties are used by public suppliers to meet water demands of the Baltimore City and Washington, D.C., metropolitan areas. The largest ground-water withdrawals (48 Mgal/d) were in Anne Arundel County (fig. 2C) and were used mainly for public supply. The smallest freshwater withdrawals (4 Mgal/d) were in Howard County, which is served primarily by public-supply systems in adjacent counties.

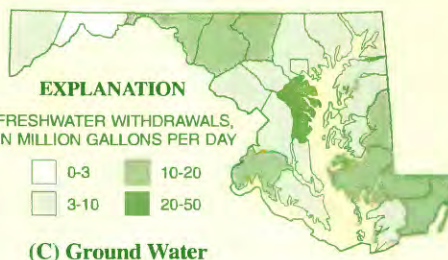
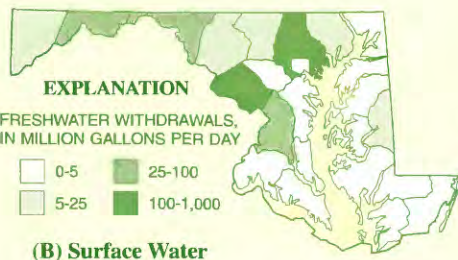
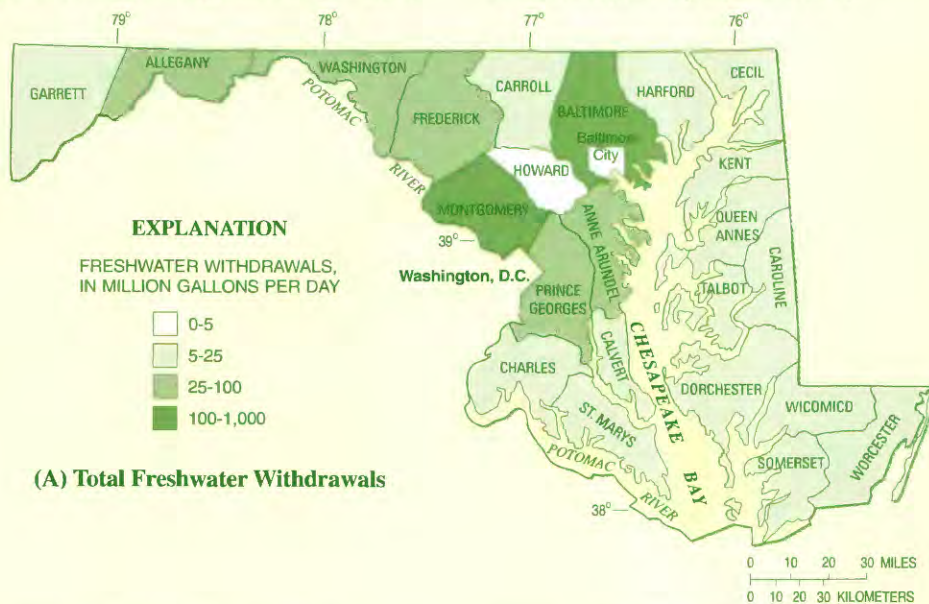


Figure 2. Freshwater withdrawals in Maryland by County, 1995. (A) Total freshwater withdrawals; (B) Fresh surface-water withdrawals; and (C) Fresh ground-water withdrawals.

Freshwater Uses

Most freshwater in Maryland is withdrawn for public supply, domestic, thermo-electric power, industrial, irrigation, and commercial uses (fig. 3). The total freshwater withdrawals for these uses account for more than 96 percent of the total freshwater withdrawals in the State. The remaining 4 percent are withdrawals for aquaculture, livestock, and mining operations. Water withdrawn by a public or private water utility and delivered to a variety of users is designated as a "public supply." If a public supplier is not available or is not used, the water is classified as "self-supplied." Homes and small communities relying on individual wells are classified as domestic self-supplied water users. Thermoelectric power includes water used for the generation of electricity by steam-electric plants fueled by conventional or nuclear fuels. Commercial use includes not only typical businesses such as restaurants, motels, and car washes, but also includes institutions such as churches, schools, and military installations.

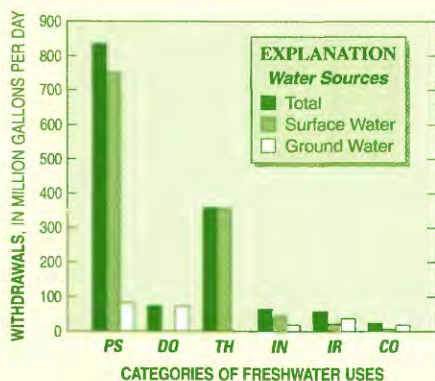


Figure 3. Freshwater withdrawals in Maryland by category of use and water sources, 1995.

Public Supply (PS)

More than 500 public water-supply systems in Maryland provide water to about 4.2 million people (83 percent of the State's population). Total withdrawals for public supply during 1995 were 834 Mgal/d, of which 751 Mgal/d were from surface-water sources and 83 Mgal/d were from ground-water sources. The largest user of surface water for public supply is Baltimore City. During 1995, about 273 Mgal/d were withdrawn by the City for use in parts of Anne Arundel, Baltimore, Carroll, Harford, and Howard Counties, as well as Baltimore City itself. Another large user of water for public supply is the Washington Suburban Sanitary Commission, which withdrew 179 Mgal/d for distribution to most of Montgomery and Prince George's Counties and part of Howard County.

The Potomac River in Maryland is a water source for several neighboring jurisdictions. During 1995, about 74 Mgal/d was transferred to Virginia and West Virginia, and

about 187 Mgal/d was distributed for use in Washington, D.C.

Most public suppliers that rely on ground-water sources are in the eastern and southern parts of Maryland. In counties east of Chesapeake Bay, all public suppliers rely on ground water. The largest ground-water withdrawals for public supply, however, are in Anne Arundel County. During 1995, about 30 Mgal/d was withdrawn for distribution by public suppliers in the County.

Domestic (DO)

Domestic users in Maryland obtain freshwater from public suppliers and from their own wells (self-supplied). During 1995, total use (withdrawals and deliveries) was 506 Mgal/d, of which 433 Mgal/d was delivered by public suppliers. About 875,000 Marylanders (17 percent of the State's population) withdrew an estimated 73 Mgal/d from individual house wells for water supply. All self-supplied domestic withdrawals were assumed to be from ground water.

Thermoelectric Power (TH)

Fourteen steam-generating thermoelectric powerplants operate in Maryland: 13 are fossil-fueled and 1 is nuclear-fueled. Both freshwater and saline water are used to cool operating equipment. During 1995, freshwater use by powerplants was 360 Mgal/d, of which 358 Mgal/d was from surface-water sources and 2 Mgal/d was from ground-water sources. In addition, about 6,360 Mgal/d of saline surface water was used for cooling condensers, of which more than 98 percent was returned to the water source.

Industrial (IN)

Maryland is within a regional manufacturing belt that extends along the eastern seaboard of the United States. Heavy industries include steel, chemical products, and truck assembly. Prominent light industries include food processing, electronics, and pharmaceutical manufacturing. During 1995, about 109 Mgal/d of freshwater was used by industries in Maryland. Of that amount, 44 Mgal/d was provided by public suppliers. The remaining 65 Mgal/d was self-supplied, of which 46 Mgal/d was from surface-water sources and 19 Mgal/d was from ground-water sources.

Irrigation (IR)

The amount of freshwater used for irrigation can vary from year to year and among users. Differences in rainfall distribution and soil type significantly affect the amount of water used for irrigation. During 1995, about 57 Mgal/d of freshwater was used for irrigating farm crops, golf courses, and nursery stock. Of this amount, 21 Mgal/d was from surface-water sources and 36 Mgal/d was from ground-water sources.

Commercial (CO)

Commercial users obtained freshwater from public suppliers and from self-supplied sources. Total commercial use during 1995

was about 109 Mgal/d, of which 85 Mgal/d (78 percent) was provided by public suppliers. The remaining 24 Mgal/d (22 percent) was self-supplied, of which 5 Mgal/d was from surface-water sources and 19 Mgal/d was from ground-water sources.

Maryland Water-Use Program

The Maryland Water-Use Program was developed in the late 1970's as a cooperative effort between the Maryland Department of Natural Resources (DNR) and the U.S. Geological Survey (USGS). Over the years, the program has grown and now includes the Maryland Department of the Environment (MDE), Water Management Administration (WMA), the DNR, Maryland Geological Survey (MGS), and the USGS. Through this multi-agency cooperative program, comprehensive computerized data bases of water-withdrawal information have been maintained and updated annually since 1979. The standardized procedures for estimating water use in Maryland developed by the Water-Use Program were used in developing the data presented in this fact sheet.

Maryland water-use data were published in statewide reports annually from 1985-87, and biennially from 1988-93. Maryland water-use data are also included in USGS National Water-Use Circulars, which have been published every five years since 1950.

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Selected References

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