

This fact sheet describes the results of a study of water use in the State of Delaware that was conducted by the U.S. Geological Survey (USGS), in cooperation with the Delaware Geological Survey (DGS) and the Delaware Department of Natural Resources and Environmental Control (DNREC), as part of the National Water-Use Information Program of the USGS. The Program is based on Federal and State cooperative agreements to collect, store, and disseminate water-use information nationally and locally.

As the demand for freshwater increases, the stress placed on the surface-water and ground-water resources of Delaware increases. Effective water-resource management depends in part on current and accurate water-use data. Such data are valuable for evaluating the effects of withdrawals on the State's water resources, identifying current water-use patterns, and estimating future water demands. Together, DNREC and USGS collect, compile, estimate, and store site-specific and aggregated water-use data that are useful for State water-resources management.

Delaware water-use data have been published in reports such as the "Water 2020" series (Water Resources Agency for New Castle County, 1990) and USGS publications by Phelan (1987 and 1990). Delaware water-use data are also included in USGS national water-use compilations, which have been published every five years since 1950. State data for 1995 are in USGS Circular 1200, "Estimated Use of Water in the United States in 1995" (Solley, Pierce, and Perlman, 1998).

Total Freshwater Withdrawals

A water user withdraws water from a surface-water or ground-water source (self-supplied), or receives water from a public-supply system or both. Water withdrawn by a public or private water utility and delivered to a variety of users is designated as a "public supply." Homes and small communities relying on individual wells are classified as domestic "self-supplied" water users. Water use for thermoelectric power includes the water used for the generation of electricity by steam-electric plants fueled by conventional fuels. Commercial use includes not only businesses such as

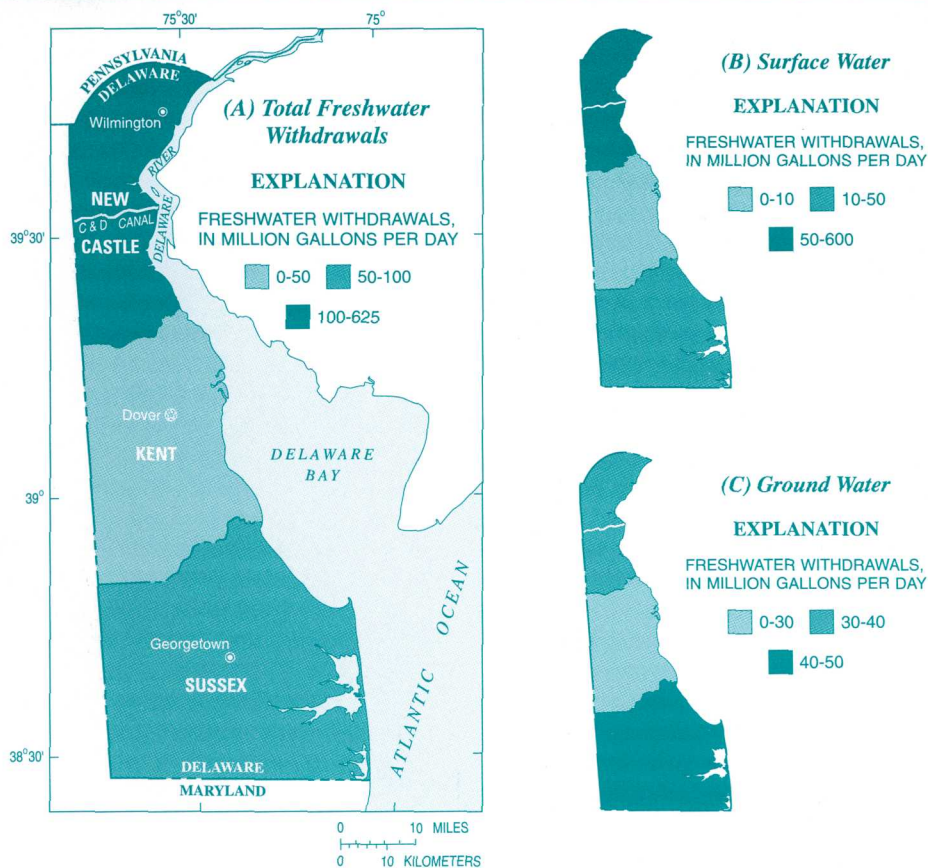


Figure 1. Freshwater withdrawals in Delaware by County, 1995. (A) Total freshwater withdrawals; (B) Fresh surface-water withdrawals; and (C) Fresh ground-water withdrawals.

restaurants, motels, and car washes, but also institutions such as churches, schools, and military installations. Most of the withdrawal data presented in this report were obtained from DNREC; however, some water-use data such as withdrawals for domestic, irrigation, and livestock watering were estimated using water-use coefficients.

During 1995, about 752 million gallons per day (Mgal/d) of freshwater was withdrawn from the surface-water and ground-water sources in Delaware. Surface-water sources provided 85 percent (642 Mgal/d) of all freshwater used in the State during 1995. About 83 percent (534 Mgal/d) of surface-water withdrawals were for cooling condensers in thermoelectric power generation; nearly all of the water withdrawn was returned to the surface-water source. Ground-water sources provided 15 percent (110 Mgal/d) of all freshwater used in Delaware during 1995. Most ground-water withdrawals (57 percent, or about 63 Mgal/d) were from the unconfined (surficial) aquifer, followed by the Potomac Group aquifers which supplied

about 23 Mgal/d; the Cheswold Group aquifers with about 15 Mgal/d; and the Piney Point and Aquia aquifers with about 6 Mgal/d. The remaining 3 Mgal/d of ground-water withdrawals were supplied by the Magothy, Piedmont, and carbonate aquifers. Withdrawals of freshwater by county and water source are shown in figure 1.

The demand for freshwater in Delaware is highest in the densely populated and industrialized northern part of the State, and lowest in the agricultural central and southern parts. Generally, water supplies are adequate in all areas of the State. Sometimes, however, available water supplies are marginal or less than adequate to meet demands, such as during low-flow periods and high seasonal-demand periods, particularly in New Castle County (northern Delaware) (S. Lovell, Delaware Department of Natural Resources and Environmental Control, oral commun., 1998).

New Castle County has the largest population in the Delaware (nearly 468,000), and freshwater withdrawals in

the County account for more than 80 percent (625 Mgal/d in 1995) of all freshwater used in the State. Most of the water withdrawn (nearly 95 percent) is surface water and is used for cooling in the production of electricity (534 Mgal/d) and for public-supply distribution (69 Mgal/d). Kent County, in the central part of the State, has a population of about 121,000 and freshwater withdrawals account for about 5 percent (34 Mgal/d in 1995) of the total freshwater used in the State; almost 85 percent of the water used in this County is ground water. More than one-half of the water used in the County is withdrawn for agricultural irrigation. Sussex County, in the southern part of the State, has a population of about 128,000. The County's freshwater withdrawals account for about 12 percent (93 Mgal/d in 1995) of the freshwater used in the State; nearly 90 percent of this water is from ground-water sources and is used by industries and for irrigation.

Types of Freshwater Use

The major uses of freshwater in Delaware during 1995 included thermoelectric power, public supply, industrial, irrigation, domestic, commercial, and livestock watering (fig. 2).

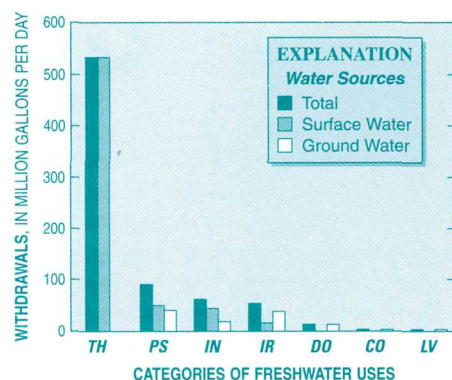


Figure 2. Freshwater withdrawals in Delaware, by category of use and water sources, 1995.

Thermoelectric Power (TH)

Freshwater withdrawals by thermoelectric powerplants during 1995 were 534 Mgal/d, nearly all of which was from surface-water sources. Most of the surface water was used for cooling condensers and then returned to the water source. Only about 0.23 Mgal/d was from ground-water sources and about 0.45 Mgal/d was delivered from public suppliers.

Public Supply (PS)

More than 300 public water-supply systems in Delaware provide water to

about 564,000 people (79 percent of the State's population). Total withdrawals for public supply during 1995 were 89 Mgal/d, of which 49 Mgal/d was from surface-water sources and 40 Mgal/d was from ground-water sources.

The largest withdrawals for public supply were in New Castle County (69 Mgal/d). Of this amount, 49 Mgal/d was from surface-water sources and 20 Mgal/d was from ground-water sources. Public suppliers in Kent and Sussex Counties relied solely on ground-water sources and withdrew 9 Mgal/d and 11 Mgal/d, respectively.

Industrial (IN)

During 1995, about 77 Mgal/d of freshwater was used by industries in Delaware, primarily for making chemicals, plastics, and food products. Of this amount, 16 Mgal/d was provided by public suppliers. The remaining 61 Mgal/d was self-supplied, of which 43 Mgal/d was from surface-water sources and 18 Mgal/d was from ground-water sources. Sussex County had the most withdrawals for industrial use (43 Mgal/d), followed by New Castle County with 16 Mgal/d, and Kent County with 2 Mgal/d.

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 are important factors in determining how much and when water is applied. During 1995, about 49 Mgal/d of freshwater was used for irrigation of primarily farm crops, golf courses, and nursery stock. Of this amount, 15 Mgal/d was from surface-water sources and 34 Mgal/d was from ground-water sources.

Domestic (DO)

Domestic users in Delaware obtain freshwater from public suppliers and from their own wells (self-supplied). During 1995, total use (withdrawals and deliveries) was 55 Mgal/d, of which 43 Mgal/d was delivered by public suppliers. About 153,000 residents (21 percent of the State's total population) withdrew about 12 Mgal/d from individual house wells for water supply.

Commercial (CO)

Commercial users obtained freshwater from public suppliers and from self-supplied sources. Total commercial use during 1995 was 22 Mgal/d, of which about 19 Mgal/d was provided by public

suppliers. The remaining 3 Mgal/d was self-supplied and came from ground-water sources.

Livestock (LV)

During 1995, about 4.13 Mgal/d of freshwater was used for livestock activities, mainly livestock watering, feedlot, and dairy operations. Of the total water withdrawn, 0.35 Mgal/d was from surface-water sources and 3.78 Mgal/d was from ground-water sources. Sussex County withdrew the most water for livestock use (3.36 Mgal/d), followed by Kent County with 0.65 Mgal/d, and New Castle County with 0.12 Mgal/d.

by Judith C. Wheeler

Selected References

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FS-126-99

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