DC Region Water Supply Faces Impacts of Population Growth, Data Centers, and Climate Change

A summary of the [2025 Washington Metropolitan Water Supply Study]

Residents of the Washington, D.C., metropolitan area (WMA) have the luxury of taking their drinking water for granted — turn a tap and water flows. Decades of planning by water utilities and management agencies have ensured that the over 5 million people in the area have enough drinking water, even during extreme droughts.

The *2025 Washington Metropolitan Area Water Supply Study -- Demand and Resource Availability Forecast for the Year 2050* is the most recent in a series of studies conducted every five years by the Section for Cooperative Water Supply Operations on the Potomac (CO-OP) of the Interstate Commission on the Potomac River Basin (ICPRB) on behalf of the three major WMA water suppliers: Fairfax Water, WSSC Water, and the Washington Aqueduct.

Water use in our region has remained stable over the past several decades despite significant population growth (Figure 1) due to the adoption of water-saving plumbing fixtures and household appliances. The 2025 study estimates that WMA water demand will rise from its current level of approximately 465 million gallons per day (MGD) to about 538 MGD in 2050.

Will there be enough water in the future to meet regional demands? The WMA's primary water source is the Potomac River, and river flows are projected to decrease due to rising water use in upstream areas of the watershed, including use by data centers. Climate change is also expected to alter river flows, but its net impact remains highly uncertain, with the effects of rising temperatures tending to decrease flows, while likely increases in precipitation may tend to increase flows.

The WMA's water supplies will continue to be ample during most years. Study results estimate that the likelihood of a water supply shortage in 2030 is between just 0% and 1%, though this rises to between 0% and 5% by 2050. But should an extreme drought occur in 2050, study results indicate that serious water supply shortages are likely unless additional resources are added to the system. Impacts could include emergency water use restrictions, flow in the Potomac River falling below the specified minimum environmental flow threshold of 100 MGD at Little Falls dam, and in the worst-case scenarios, drinking water shortages throughout the WMA.

Fortunately, the US Army Corps of Engineers (USACE), in close collaboration with WMA suppliers, ICPRB, and the Metropolitan Washington Council of Governments (MWCOG), has initiated a feasibility study to identify additional resources to increase system resilience.

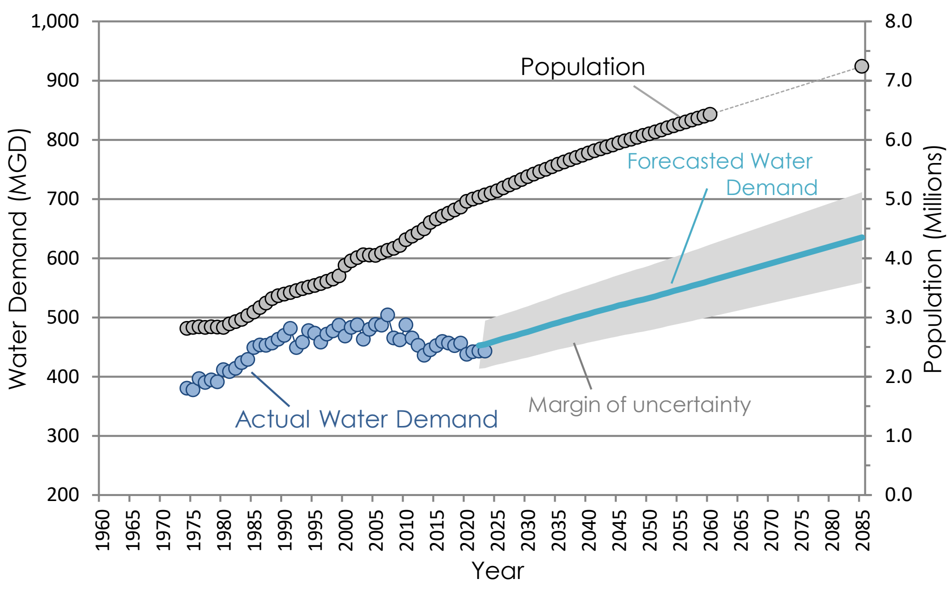

Figure 1: Actual WMA annual water demand (blue dotted line), ICPRB's 2025 forecast (blue solid line), with actual and forecasted population (gray dotted line).

About ICPRB and CO-OP

The Interstate Commission on the Potomac River Basin (ICPRB) is an interstate compact commission made up of commissioners from the District of Columbia, Maryland, Pennsylvania, Virginia, West Virginia, and the federal government. Its mission is to protect and enhance the waters and related resources of the Potomac River basin through science, regional cooperation, and education.

ICPRB's Section for Cooperative Water Supply Operations on the Potomac (CO-OP) provides technical and managerial support to the three major WMA suppliers under the Water Supply Coordination Agreement of 1982.

FAQs

Where does the Washington metropolitan area (WMA) get its water from?

The region typically obtains 75% of its water from the Potomac River and the remainder from Fairfax Water's Occoquan and WSSC Water's Patuxent reservoirs. During droughts, additional water is available in shared upstream reservoirs.

How fast is our region's water demand growing?

Though WMA population rose by 47 percent from 1990 to 2025, demands have essentially remained flat (Fig. 1) due to falling per capita use. Demand is estimated to grow from 465 MGD in 2025 to 538 MGD in 2050, while population is projected to increase from 5.1 to 6.1 million.

How will climate change affect WMA water supplies?

Water supply planning decisions for the WMA are primarily driven by the risk of future extreme drought similar in severity to the 1930 drought of record. The study estimates that if an extreme drought occurs from 2010-2039, changes in flow will be in the range of +3% to -25%, depending on how sensitive flows are to rising temperature, and changes in flow in 2040-2069 will be in the range of +9% to -32%.

How will upstream water use by data centers affect WMA supplies?

Net withdrawals, or "consumptive use," by upstream users reduce flow available to WMA suppliers. Average summertime upstream consumptive use is estimated to be 147 MGD in 2050, including 7 MGD, or approximately 5%, from data centers.

For the full report, visit www.potomacriver.org

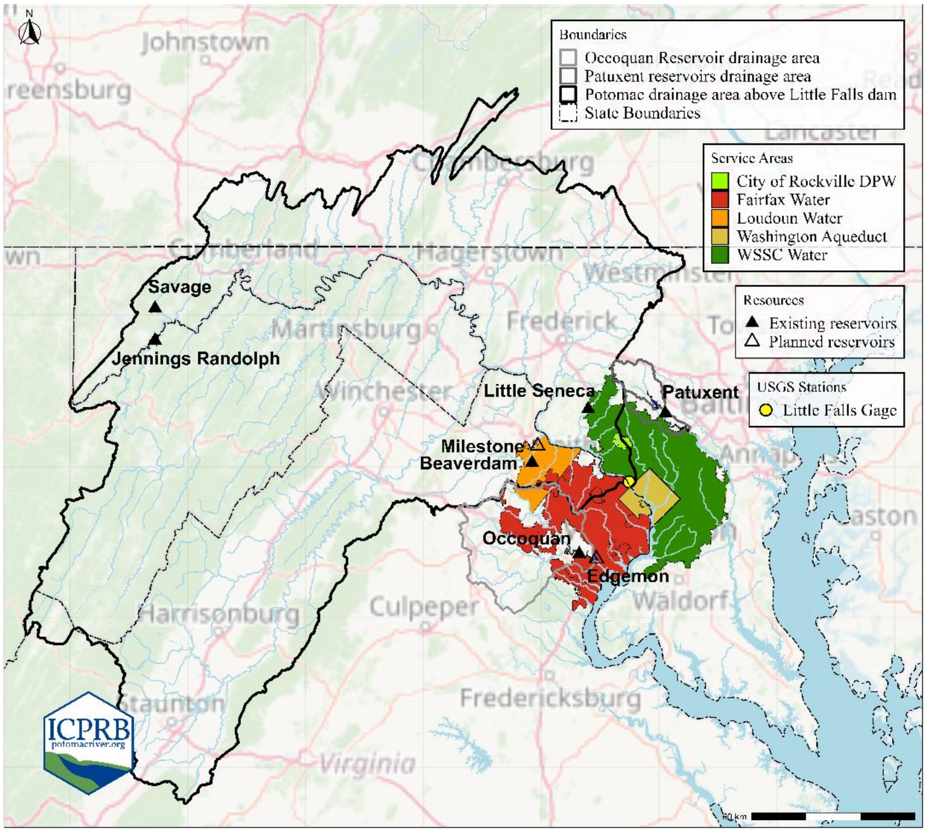

Figure 2: Map of the Potomac River basin showing areas served by the WMA water suppliers, and current and planned regional resources.

Methodology

Demand Forecast

Forecasts of average annual water demands were developed from water supplier billing data, geographic extents of supplier service areas, and demographic forecasts from the MWCOG.

Resource Availability Forecast

The impact of future climate change was obtained from a response function that links changes in climate, derived from the Coupled Model Intercomparison Project Phase 6 (CMIP6), to changes in Potomac River flow, following a methodology described in a recent publication: *Is Hot Drought a Risk in the US Mid-Atlantic: A Potomac Basin Case Study*.

Future reductions in Potomac River flow due to consumptive use by upstream users were estimated using the most recent version of ICPRB's Potomac River Withdrawal and Consumptive Use (WCU) database. A separate analysis of upstream consumptive use by data centers was based on data from regional water suppliers, data center facility-level characteristics, assumptions on cooling technologies, and regional energy forecasts.

Resource Analysis

The resource analysis was conducted using ICPRB's Potomac Reservoir and River Simulation Model (PRRISM) which simulates processes that govern WMA daily water demand and availability, including upstream consumptive demands; Potomac River flows; reservoir inflows, storage, and releases; and WMA supplier withdrawals. PRRISM was used to evaluate how the current and planned system would respond to forecasted water demands under nine different scenarios that represent the uncertainties in future water demands and in the response of basin flows to future changes in climate.

About the WMA System

The WMA has a unique cooperative system of water supply management based on a set of agreements signed in the early 1980s. This arrangement optimizes the use of available resources during periods of drought, providing a more reliable water supply for the region. WMA system resources (Fig. 2) consist of the Potomac River, Fairfax Water's Occoquan Reservoir, WSSC's Patuxent reservoirs, and two upstream reservoirs – Jennings Randolph and Little Seneca – that can release water to augment flow in the Potomac during drought. Two planned resources are Loudoun Water's Milestone Reservoir, scheduled for completion in 2028, and Fairfax Water's Edgemon Reservoir, planned to be operational by 2040.

In September 2024 the USACE initiated a feasibility study to identify additional resources that could be added to the system to increase resilience.

About the WMA suppliers

The WMA suppliers and their wholesale customers are:

Washington Aqueduct (a Division of the USACE), serving the District of Columbia via DC Water and Arlington County, VA.

Washington Suburban Sanitary Commission (WSSC Water), serving Montgomery and Prince George's counties in Maryland, and providing water on a limited or emergency basis to Rockville, Charles County, Howard County, and the City of Bowie.

Fairfax Water, serving Fairfax County, the City of Fairfax, and the City of Falls Church, with wholesale service to Loudoun Water, Prince William Water, Virginia American Water Company (City of Alexandria and Dale City), Town of Vienna, the Town of Herndon, Fort Belvoir, and Dulles Airport.

The *City of Rockville* owns and operates its water supply system, withdrawing water from the Potomac River.

Loudoun Water has long operated its own water system but historically relied heavily on Fairfax Water. With the completion of its Potomac River intake, it now produces a portion of its own supply.

For the full report, visit www.potomacriver.org.

Interstate Commission on the Potomac River Basin ● Section for Cooperative Water Supply Operations on the Potomac
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