Washington Area Water Supply System Faces Population Growth and Climate Change

Residents of the Washington, D.C., metropolitan area (WMA) have the luxury of taking their drinking water for granted. Turn a tap, and water, primarily from the Potomac River, flows. But the *2015 Washington Metropolitan Area Water Supply Study* finds that unless new resources are developed, the system that provides ample water today may become less reliable in the face of population growth and climate change.

Decades of planning by water utilities and management agencies have ensured that the over four and a half million people in the area have enough drinking water, even during severe droughts. The *2015 Washington Metropolitan Area Water Supply Study -- Demand and Resource Availability for the Year 2040* 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.

The 2015 study estimates that WMA water demand (see Figure 2) will rise from its current level of approximately 486 million gallons per day (MGD) to 529 MGD in 2035 and 545 MGD in 2040. Over this same period, population served by the major WMA suppliers is projected to increase from 4.6 to 5.7 million. The study finds that by 2035, under a repeat of conditions similar to a severe historic drought, the WMA's current water supply system will be adequate, but mandatory water use restrictions will be likely. By 2040, a key system reservoir, Little Seneca, may be emptied during drought. In both 2035 and 2040, there is a small chance that flow in the Potomac River will drop slightly below the minimum environmental flow level of 100 MGD at Little Falls dam. Factoring in the potential effects of climate change adds considerable uncertainty to study results. Under some climate change scenarios, serious water supply shortages are projected to occur during a severe drought.

The study concludes that the region's water suppliers should continue their efforts to identify and evaluate potential new water supply storage facilities, and that CO-OP should continue to develop new tools to track water demand and to improve operational efficiencies.

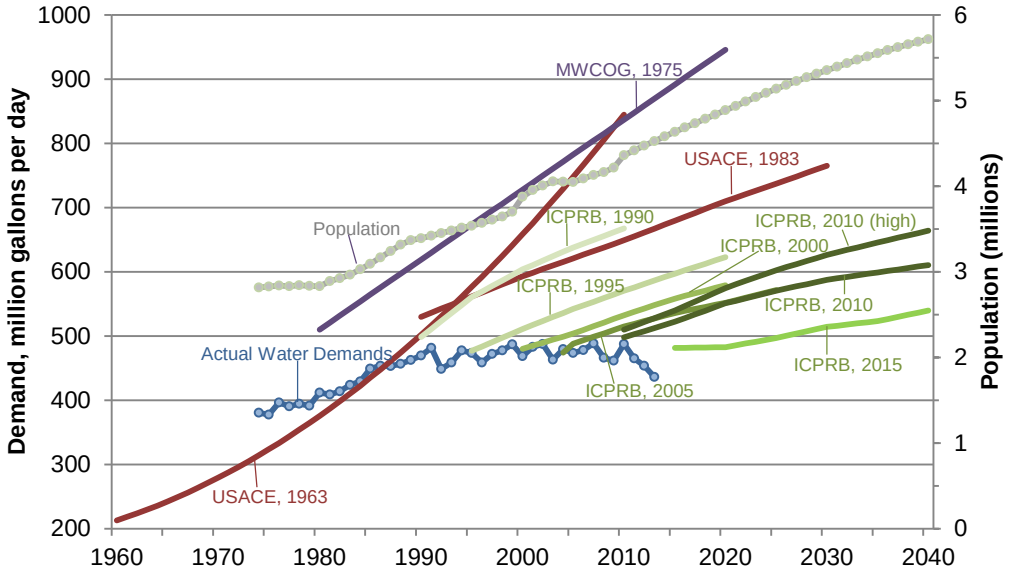

Figure 1: Comparison of actual WMA average annual water demand (blue dotted line) with ICPRB's 2015 forecast and forecasts from previous studies. Actual and forecasted population, in millions of people, is shown by the gray dotted line.

Frequently Asked Questions

How fast is Washington metropolitan area (WMA) water demand growing?
Though WMA population rose by 18 percent from 1990 to 2015, demands have essentially remained flat (Fig. 1) due to falling per household and per employee use.

How well will demands be met in the future?
During conditions similar to a severe historical drought, assuming no changes are made to the current WMA system:

- mandatory water use restrictions are likely by 2035
- depletion of storage in a key system reservoir, Little Seneca, may occur by 2040
- flow in the Potomac River may fall slightly below the specified minimum environmental flow threshold of 100 million gallons per day (MGD) at Little Falls dam

How may climate change affect WMA water supplies?
The potential impact of climate change adds uncertainty to study results. Some projections indicate that climate change could result in serious water supply shortages in the WMA.

How does water use by upstream users affect supplies in the WMA?
Net withdrawals, or "consumptive use," by upstream users reduce flow available to WMA suppliers. Summer upstream consumptive use was estimated to be 111 MGD in 2010 and 141 MGD in 2040.

For the full report, visit www.potomacriver.org

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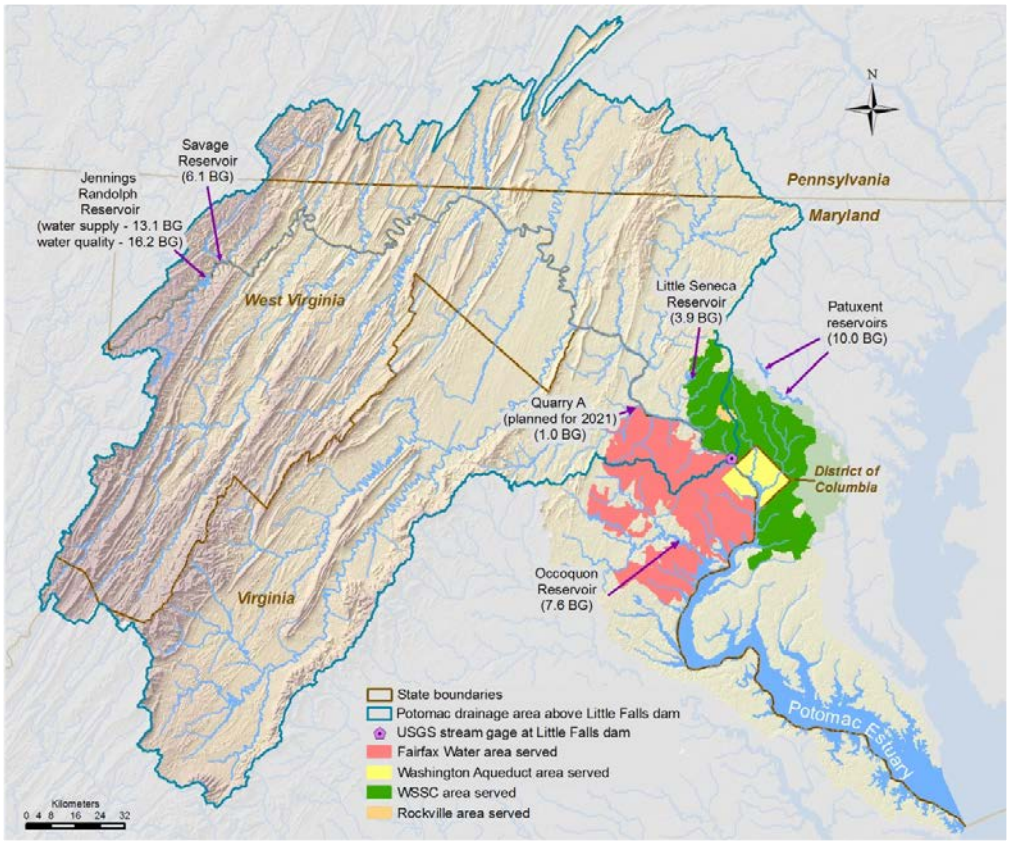

Figure 2: Map of the Potomac River basin showing areas served by the WMA water suppliers, current regional resources and Loudoun Water's planned "Quarry A" (BG – billion gallons).

Methodology

Demand Forecasting

Forecasts of average annual water demand were developed from water supplier billing data, current and future geographic extents of WMA supplier service areas, and demographic forecasts from the Metropolitan Washington Council of Governments (MWCOG).

Resource Analysis

The resource analysis was conducted using ICPRB's Potomac Reservoir and River Simulation Model (PRRISM), an ICPRB computer model that simulates on a daily basis the processes that govern WMA water demand and availability, including: upstream consumptive demands; flows in the Potomac River; inflows, storage, and releases from the system of reservoirs; and withdrawals by the WMA suppliers. PRRISM was used to evaluate how the current system would respond to forecasted water demands under the range of hydrologic conditions that occurred over the historic record.

Climate Change

PRRISM was also used to assess the impact of potential future reductions in stream flows due to a changing climate. These reductions were obtained from a climate response function, developed using the Chesapeake Bay Program Watershed Model and climate change projections. This function links potential changes in climate to changes in stream flows, and can be used to assist water managers in interpreting new climate projections and research results on long-term hydrological trends as they become available.

WMA Water Supply System

The WMA has a unique cooperative system of water supply management based on a set of agreements signed in the early 1980s. This cooperative arrangement helps optimize 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. Also, a retired quarry is being developed as a future regional storage resource by Loudoun Water.

The three major suppliers and their wholesale customers are:

Washington Aqueduct (a Division of the US Army Corps of Engineers), serving the District of Columbia via DC Water and portions of northern Virginia.

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

Fairfax Water, serving Fairfax County and the following wholesale customers in Virginia: Dulles International Airport, Fort Belvoir, Town of Herndon, Loudoun Water, Prince William County Service Authority, and the Virginia American Water Company (serving the City of Alexandria and Dale City).

The Interstate Commission on the Potomac River Basin (ICPRB) is composed of Commissioners representing the federal government, the states of Maryland, Pennsylvania, Virginia, and West Virginia, and the District of Columbia. The ICPRB mission is *to enhance, protect, and conserve the water and associated land resources of the Potomac River basin and its tributaries through regional and interstate cooperation.*

ICPRB's Section for Cooperative Water Supply Operations on the Potomac River (CO-OP) is a special section of the Commission created in 1979 to serve as a technical center for management and coordination of basin resources. CO-OP coordinates upstream reservoir releases and WMA water supply operations during periods of drought to enhance water supply reliability and protect water quality and aquatic ecosystems.