

# Hydrologic Summary 2002-2003

## A Story of Extremes

If you believe that “normal” weather is simply an average of weather extremes – droughts, floods, tornadoes, hurricanes, snowstorms, and other hydrologic calamities – then the Delaware River Basin’s weather over the two-year period of 2002-2003

was quite normal. However, those people who saw their wells go dry or their homes and streets flooded may certainly disagree with this description.

Here is a summary of what happened in 2002 and 2003 throughout the basin, including some of the actions taken by the

commission in response to the sharply contrasting weather patterns of Mother Nature.

### 2002

The drought that began during the summer of 2001 continued unrelenting into 2002. The new year began with the

Delaware River Basin still under the drought emergency declared by the DRBC on December 18, 2001, and the majority of the counties within the basin were under state-declared drought actions.

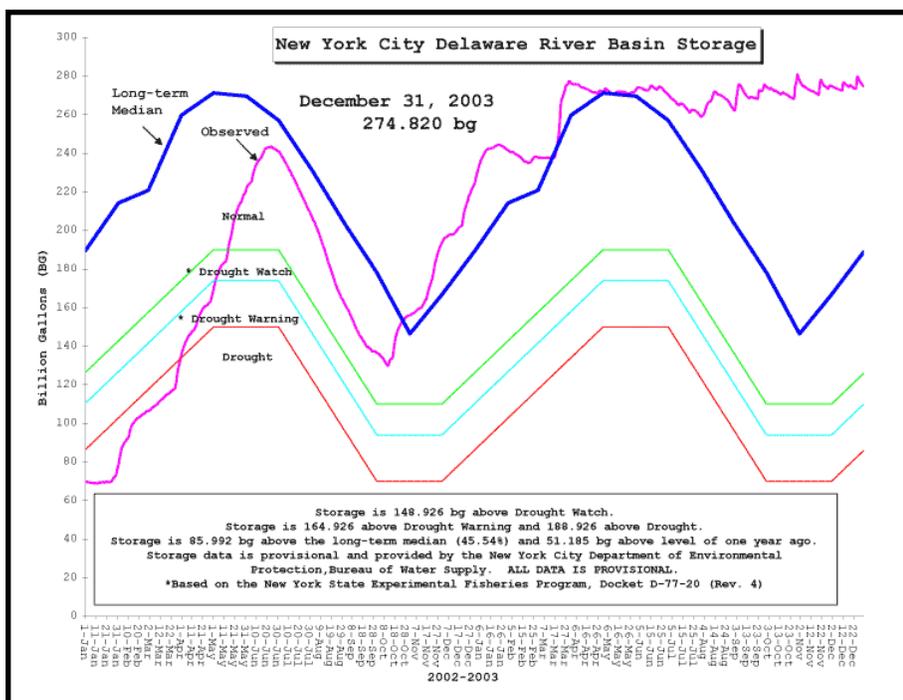
Below-normal precipitation persisted throughout January and into February. February was a

particularly dry month, setting records in Philadelphia and Allentown, Pa. Much needed relief arrived in early spring when normal to above-normal rainfall patterns returned to the basin. Stream levels rose, reservoirs made gains in storage, and ground water in many wells began a seasonal, upward trend. By April 1, a combination of rainfall and snowmelt caused the New York City Delaware reservoirs to rise above the drought threshold for the first time since November 2001. As a result of this improved storage, normal flow objectives at Montague, N.J. and Trenton, N.J. as well as normal out-of-basin diversions to New York City and northern New Jersey resumed on May 26. However, the DRBC’s December 2001 drought declaration, which authorized the commission’s use of emergency reservoir storage totaling 69 billion gallons (bg), remained in effect.

Although the DRBC Water Code would have allowed the commissioners to lift the drought emergency in early July, they unanimously decided on a number of occasions to continue the declaration due to a persistent dry weather pattern during the summer.

This dry pattern broke by early autumn and ample rainfall returned to the basin by the end of September. Although the drought indicators were showing signs of improvement, another period of dry weather could have easily wiped out any gains. Fortunately, drought indicators across the basin continued to show signs of improvement throughout the remainder of the autumn. The improved hydrologic conditions resulted in the commissioners terminating the basinwide drought emergency at their November 25, 2002 meeting.

DRBC’s drought operating plan saved approximately 43 billion gallons in reservoir storage during the drought of 2001-2002.



This graph shows the actual combined water storage in the Cannonsville, Neversink, and Pepacton reservoirs on the last day of 2003. It also illustrates the water storage extremes observed over 2002 and 2003.

Ample rainfall continued through the end of the year, prompting the lifting of various state-declared drought actions as well.

For additional information about 2002 hydrologic conditions, including a timeline of drought declarations and actions, please visit the DRBC web site at <http://www.nj.gov/drbc/02hydrorep.htm>.

## 2003

The drenching of 2003 made the drought of 2001-2002 a distant memory. In a December 30, 2003 article appearing in the *Trenton Times*, New Jersey state climatologist and Rutgers University professor David Robinson said, "It's the fourth wettest year since 1895." He added, "And 2001 was the fourth-driest year on record."

In 2002, about 47 bg of water was released from the Cannonsville, Neversink, and Pepacton reservoirs at the Delaware's headwaters in New York State to meet minimum flow targets on the river at Montague, compared to over 100 bg in 2001. In 2003, directed releases dropped to only 3 bg. However, an incredible 371 bg of water spilled out of the filled reservoirs in 2003, or 100 bg more than their entire combined usable storage!

The winter of 2003 saw generally above-average snowfall in the basin. The President's Day Weekend snow storm in February built up the basin's snow pack to its highest level since January 1996 when a record-breaking snowfall, followed by heavy rain and unseasonably warm temperatures, produced extensive flooding in the basin. The heavy snow pack and a forecast for warmer temperatures and rain in late-February prompted the DRBC to issue a news release

The DRBC created a new web page called, "Tips on Finding Information During Periods of High Flood Potential" that directs basin residents to useful National Weather Service and other agency web sites. You can find it at [http://www.nj.gov/drbc/Flood\\_Website/tips.htm](http://www.nj.gov/drbc/Flood_Website/tips.htm).

due to the increased flood potential. Fortunately, flooding did not occur, but the information contained in the release, such as links to snow pack monitoring by the National Weather Service, will hopefully continue to be useful to basin residents in future winters. The news release can be found at [http://www.nj.gov/drbc/newsrel\\_floodpotential.htm](http://www.nj.gov/drbc/newsrel_floodpotential.htm) on the DRBC's web site.

June and September were particularly rainy months. In fact, September gave the basin not only substantial rainfall, but also floods, four confirmed tornadoes (three in New Jersey and one in Pennsylvania), and a hurricane. Thunderstorms with up to 10 inches of rain caused severe flooding in the Christina River Subbasin that drains portions of Delaware and Pennsylvania just days prior to the arrival of Hurricane Isabel. Fortunately, Isabel lost much of her intensity as the storm tracked to the west of the basin on September 18 and 19, leaving more wind than rain in its path. Nevertheless, the hurricane caused moderate flooding along the Christina River and a tidal surge up the Delaware Bay produced moderate- to severe-tidal flooding. Several days following Isabel, storms that produced the four tornadoes also dropped two- to three-inches of rain

on parts of the basin. This rainfall, in combination with the already saturated ground and higher than normal streamflows, triggered flash floods in the Tannersville and South Whitehall areas of northeastern Pa. Additional flooding occurred along the Brandywine and Christina rivers, as well as the Red Clay and White Clay creeks. The average daily streamflow of the Delaware at Montague during September was 12,724 cubic feet per second (cfs), or nearly 600 percent of normal!

The heavy rainfalls that continued throughout much of the fall resulted in flooding along stretches of the Neshaminy and Assunpink creeks, in addition to many of the lower basin tributaries already mentioned.

More detailed hydrologic information can be found on the DRBC web site at <http://www.nj.gov/drbc/hydro.htm>.



A view of the Delaware River spilling over its bank at Washington Crossing State Park, N.J. on October 30, 2003. Following very heavy rainfall, the river was flowing at about 79,000 cfs at the nearby Trenton stream gage, compared to a mean daily flow of 7,326 cfs. (Photo by Clarke Rupert)

Under the commission's drought plan, freshwater releases from reservoirs help repel the upstream migration of salty water in the Delaware River. If the salt-laced water migrates too far upstream, it can threaten public water supplies and increase costs for industries. Under the DRBC's 2001 drought emergency declaration, F.E. Walter Reservoir, a U.S. Army Corps of Engineers (USACOE) flood control project located on the Lehigh River, was used to provide temporary water storage during the drought. The DRBC requested releases totaling about one billion gallons (bg) from the reservoir's temporary water storage during 2002 to bolster streamflows at Trenton and maintain estuary inflow.

The DRBC also directed releases from Blue Marsh Reservoir (located on a tributary of the Schuylkill River) totaling 614 million gallons for a short period during August and September 2002.

In addition to the available lower basin water storage in Beltsville (located on a tributary of the Lehigh River), F.E. Walter, and Blue Marsh reservoirs, releases were made from Merrill Creek Reservoir (located near Phillipsburg, N.J.) to augment flows at Trenton and replace evaporative losses caused by power generation. A consortium of electric utilities built this 16 billion-gallon storage reservoir in 1987 after the DRBC determined that supplemental water supply storage was needed if basin utilities were to continue to operate at full capacity during droughts. Otherwise, cutbacks might be necessary during water supply emergencies. Over 1.6 bg of water was released from this reservoir between October 2001 and January 2002 to make up for evaporative losses caused by power generation. The commission believes this program may be the only one of its kind in the nation.

In order to meet the upper basin Montague, N.J. minimum flow target while conserving water storage in the NYC Delaware reservoir system, releases totaling about half a billion gallons were directed from Lake Wallenpaupack by the DRBC in January 2002 under the drought emergency provisions of the DRBC Water Code. This reservoir is a power generation impoundment owned by PPL Generation, LLC and is located on a tributary of the Lackawaxen River near Hawley, Pa.

## Reservoirs for Interstate Flow Management in the Delaware River Basin

