

# Delaware River Basin Commission

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## FLOOD SUMMARY – JUNE 28-29, 2006

### **Precipitation**

Extremely heavy rainfall over the Delaware River Basin during the June 24-28 period caused flash flooding and record to near-record flood crests along many streams and rivers throughout the basin, including the main stem Delaware River.

Although hydrologic conditions were normal to dry prior to Saturday, June 24, the broad area of the rainfall and its intensity in the western half of the basin produced the flooding. National Weather Service data indicate that six to over 15 inches of rain fell in the Schuylkill, Lehigh, and upper Delaware River watersheds during the period. At least five inches fell throughout most of the Delaware River Basin, with the exception of portions of New Jersey and the immediate Philadelphia area which received less.

Heavy rainfall during June 24-26 saturated the ground and produced bank full and minor flooding conditions by early Tuesday, June 27. This set the stage for high runoff potential for any additional precipitation. Then, precipitation on June 27 and early on Wednesday, June 28 produced from two to over six inches of rainfall in the Schuylkill, Lehigh, and Lackawaxen watersheds as well as in Sullivan and Delaware counties in New York State. The high rate of runoff combined with the already bank full conditions to produce the near-record flooding conditions. During the evening of June 27, National Weather Service flash flood warnings were in effect for nearly all counties in the Pennsylvania and New York portions of the basin.

*National Weather Service maps of the precipitation during the storm event are on the Commission web site at [www.drbc.net](http://www.drbc.net).*

### **Flood Crests**

Preliminary flood crests at select U.S. Geological Survey (USGS) gaging stations upstream of Trenton, N.J. are listed below. All data is provisional and subject to revision. *Provisional USGS stage hydrographs are on the Commission web site at [www.drbc.net](http://www.drbc.net).*

Station	Crest Time/Date	Crest Stage (ft)	Flood Stage (ft)	Crest Discharge (cfs)	Historical Daily Median Discharge <sup>1</sup> (cfs)
West Br. Del. R. @ Hale Eddy	1300 6/28	19.10	11	40,100	481
East Br. Del. R. @ Harvard	1645 6/28	16.62	10	22,100	137
Beaverkill @ Cooks Falls	0900 6/28 <sup>2</sup>	20.54	10	62,400	178
East Br. Del. R. @ Fishs Eddy	1045 6/28	21.45	13	78,600	395
Del. R. @ Callicoon	1715 6/28	20.37	12	141,000	1,100
Lackawaxen R. @ Hawley	1430 6/28	18.80	11	29,900	136
Del. R. @ Port Jervis	1815 6/28	21.47	18	180,000	1,980
Del. R. @ Montague	2215 6/28	32.16	25	212,000	2,350
Brodhead Cr. @ Minisink Hills	1030 6/28 <sup>3</sup>	17.87 <sup>3</sup>	10	37,900 <sup>3</sup>	203
Del. R. @ Belvidere	1130 6/29	27.16	22	225,000	3,580
Lehigh R. @ Bethlehem	1100 6/28	17.74	16	49,000	1,270
Del. R. @ Trenton	2045 6/29	25.09	20	237,000	5,320
Schuylkill R. @ Reading	1430 6/28	23.60	13	54,500	909

<sup>1</sup> Historical median of daily mean values for the crest date.

cfs = cubic feet per second

<sup>2</sup> DRBC estimate from USGS hydrograph.

<sup>3</sup> USGS reported peak prior to backwater flooding from the Delaware River.

The crest for the Delaware River at Trenton was 0.24 ft. lower than the 25.33 ft. crest produced by the flood of April 2005. The 20.37 ft. crest at Callicoon, N.Y. established a new record for the site and exceeded the April 2005 flood crest by 2.57 ft. Preliminary evaluation indicates that lower precipitation amounts in New Jersey and flood storage provided on the Lehigh River by the F.E. Walter and Beltzville reservoirs prevented the flood crest at Trenton from exceeding the April 2005 flood crest.

**Reservoirs**

U.S. Army Corps of Engineers reservoirs in three tributary watersheds are designed to have storage capacity for flood control and stored flood waters during this event. Based on information provided by the Corps, Blue Marsh Reservoir in the Schuylkill River Watershed had stored about 10 billion gallons of flood water as of early Thursday, June 29. F.E. Walter and Beltzville reservoirs in the Lehigh River Watershed had stored approximately 29 billion gallons. In the Lackawaxen River Watershed, Jadwin and Prompton dams stored 5.6 and 4.3 billion gallons of flood water, respectively.

In order to delay spilling from Blue Marsh Reservoir as long as possible, the Corps of Engineers released 5,400 cubic feet per second (cfs) of water from the reservoir beginning on Wednesday morning, June 28. This was less than the 11,000 cfs inflow to the reservoir at the time the release was made. The Corps issued a press statement noting the release and cautioned that there was still a possibility of a spill despite the release. The statement provided information on the expected increases in stage caused by the release downstream on the Tulpehocken Creek and Schuylkill River in the Reading, Pa. vicinity. The rate of inflow at the time of initial release would have produced higher stage increases. Despite the Corps’ efforts, water spilled for the first time since the dam began operations in the late 1970s.

In addition to the Corps’ Jadwin and Prompton dams, Lake Wallenpaupack (owned by PPL, LLC) provided approximately 11.5 billion gallons of flood storage in the Lackawaxen River Watershed. In order to delay opening the roller gates on top of the dam as long as possible, PPL released water through its power plant penstock at a rate of 1,700 cfs until it became necessary to open the roller gates at 3:30 a.m. on June 28. As of 11:15 a.m. on June 28, the release through the roller gates was 8,000 cfs in addition to the 1,700 cfs release through the penstock. PPL’s operating log for the event shows that the peak inflow rate to the reservoir was approximately 19,500 cfs. PPL coordinated the timing of the release with local officials. As of 4:00 a.m. on Thursday, June 29, the rate of release through the roller gates began to be reduced and by noon it was reduced to approximately 7,400 cfs, in addition to the 1,700 cfs discharged through the power turbine penstock.

New York City’s Pepacton and Cannonsville reservoirs were full at the start of the event and a small void was present in the Neversink Reservoir. All reservoirs were spilling by Tuesday, June 27. Based on provisional data from the New York City Department of Environmental Protection, maximum inflow rates and spill rates were as follows:

<b>Reservoir</b>	<b>Maximum Inflow Rate (cfs), Time</b>	<b>Maximum Spill Rate (cfs), Time</b>
Cannonsville	59,100 (1140, 6/28)	34,115 (1200, 6/28)*
Pepacton	28,943 (0920, 6/28)	19,719 (1450, 6/28)
Neversink	13,565 (1045, 6/28)	9,070 (1345, 6/28)

\*Estimated from provisional data at the Stilesville gage immediately downstream of the Cannonsville Reservoir.

Based on the city’s preliminary calculations, the reservoirs held back approximately 25 billion gallons of flood water between Sunday, June 25 and Wednesday, June 28.

Overall, preliminary estimates indicate that a maximum of about 85 billion gallons of runoff accumulated in the basin’s major reservoirs during the flood event. This does not include any storage retention that occurred in the Nockamixon Reservoir in Pa. or the Mongaup reservoir system in N.Y., which is drawn down due to repair work at Swinging Bridge Dam. The numbers provided are subject to change based on additional information.

*Prepared by the Delaware River Basin Commission using data from the National Weather Service, U.S. Army Corps of Engineers, New York City Department of Environmental Protection, PPL, LLC, and the U.S. Geological Survey. It was last updated on October 30, 2006. All data is provisional and subject to revision.*