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Report of the River Master of the Delaware River for the Period December 1, 2010–November 30, 2011

Open-File Report 2020–1020

U.S. Department of the Interior
U.S. Geological Survey

Calendar for Report Year 2011

December 2010

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Report of the River Master of the Delaware River for the Period December 1, 2010–November 30, 2011

By Vincent J. DiFrenna, William J. Andrews, Kendra L. Russell, J. Michael Norris, and Robert. R. Mason, Jr.

Open-File Report 2020–1020

U.S. Department of the Interior
U.S. Geological Survey

U.S. Department of the Interior
DAVID BERNHARDT, Secretary

U.S. Geological Survey
James F. Reilly II, Director

U.S. Geological Survey, Reston, Virginia: 2020

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Conversion Factors

U.S. customary units to International System of Units

Multiply	By	To obtain
	Length	
inch (in.)	2.54	centimeter (cm)
inch (in.)	25.4	millimeter (mm)
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
	Area	
square mile (mi^2)	259.0	hectare (ha)
square mile (mi^2)	2.590	square kilometer (km^2)
	Volume	
million gallons (Mgal)	3,785	cubic meter (m^3)
billion gallons (Bgal)	3.785	cubic hectometers (hm^3)
cubic foot per second day ([ft^3/s]-d)	2,447	cubic meter (m^3)
	Flow rate	
cubic foot per second (ft^3/s)	0.02832	cubic meter per second (m^3/s)
million gallons per day (Mgal/d)	0.04381	cubic meter per second (m^3/s)

Temperature in degrees Celsius (°C) may be converted to degrees Fahrenheit (°F) as follows:

$$°F = (1.8 \times °C) + 32.$$

Datum

Vertical coordinate information is referenced to the Bureau of Water Supply (BWS) datum, which was established by the New York City Department of Environmental Protection, Bureau of Water Supply.

Horizontal coordinate information is referenced to the North American Datum of 1983 (NAD 83).

Elevation, as used in this report, refers to distance above the vertical datum.

Supplemental Information

Specific conductance is given in microsiemens per centimeter at 25 degrees Celsius (µS/cm at 25 °C).

Concentrations of chemical constituents in water are given in milligrams per liter (mg/L).

RIVER MASTER LETTER OF TRANSMITTAL AND SPECIAL REPORT

OFFICE OF THE DELAWARE RIVER MASTER
United States Geological Survey
415 National Center
Reston, Virginia 20192

April 10, 2020

The Honorable
John G. Roberts, Jr.
Chief Justice of the United States

The Honorable
John Carney
Governor of Delaware

The Honorable
Phil Murphy
Governor of New Jersey

The Honorable
Andrew M. Cuomo
Governor of New York

The Honorable
Tom Wolf
Governor of Pennsylvania

The Honorable
Bill de Blasio
Mayor of the City of New York

No. 5, Original.—October Term, 1950
State of New Jersey, Complainant,
v.
State of New York and City of New York, Defendants,
Commonwealth of Pennsylvania and State of Delaware, Intervenors.

Dear Sirs:

For the record, and in compliance with the provisions of the Amended Decree of the Supreme Court of the United States entered June 7, 1954, I am hereby transmitting the 58th Annual Report of the River Master of the Delaware River for the 12-month period from December 1, 2010, to November 30, 2011. In this report, this period is referred to as the River Master report year.

During the 2011 River Master report year, monthly precipitation in the upper Delaware River Basin ranged from 62 percent of the long-term average in January 2011 to 300 percent of the long-term average in August 2011. Precipitation from December to May, when reservoirs typically refill, was 29.72 inches. Precipitation was below normal in January and November and above normal in the other 10 months.

On December 1, 2010, when the report year began, combined useable storage in the New York City reservoirs in the upper Delaware River Basin was 230.430 billion gallons (Bgal) or 85.1 percent of combined storage capacity. The reservoirs were at about 100 percent of usable capacity on May 31, 2011. Combined storage remained high (above 80 percent combined capacity) through November 2011. The combined usable storage was 254.101 Bgal at the end

of the report year on November 30, 2011. During the report year, operations in the basin were conducted as stipulated by the Decree and the Flexible Flow Management Program (FFMP).

On May 26, 2011, the Delaware River Master Advisory Committee (Advisory Committee) met at the Sheraton Hotel in Parsippany, New Jersey, to discuss the issues related to updating the FFMP and using New York City's new Operations Support Tool (OST). During the report year, the following individuals served as members of the Advisory Committee:

Delaware	John H. Talley until June 2011; Peter P. McLaughlin, Jr., served as an interim member through November 2011
New Jersey	John Plonski
New York	Mark Klotz
New York City	Paul Rush
Pennsylvania	John Hines

During the year, the River Master and staff participated in a number of water-supply-related meetings of the Delaware River Basin Commission (DRBC). The Deputy Delaware River Master met periodically with representatives of the Decree Parties as a member of the Decree Parties Work Group and the DRBC's Regulated Flow Advisory Committee. River Master operations were executed through the U.S. Geological Survey (USGS) Office of the Delaware River Master located at Milford, Pennsylvania. Gary N. Paulachok, Deputy Delaware River Master, continued in charge of the office, assisted by Bruce E. Krejmas, hydrologist.

During the year, the River Master's office continued the weekly distribution of a summary hydrologic report. These reports contain provisional data on precipitation in the upper Delaware River Basin, releases and spills from New York City reservoirs to the Delaware River, diversions to the New York City water-supply system, reservoir contents, daily segregation of flow of the Delaware River at the USGS Montague, New Jersey, gaging station, and diversions by New Jersey. The reports were distributed to members of the Advisory Committee and to other parties interested in Delaware River operations. A monthly summary of hydrologic conditions also was provided to Advisory Committee members. The weekly and monthly hydrologic reports are available through the Office of the Delaware River Master website (https://webapps.usgs.gov/odrm/data_archive.html).

The first section of this report documents Delaware River operations during the report year. During the year, New York City diverted 197.550 Bgal from the Delaware River Basin and released 280.279 Bgal from Pepacton, Cannonsville, and Neversink Reservoirs to the Delaware River. A total of 234.189 Bgal was spilled from the Pepacton, Cannonsville, and Neversink Reservoirs. The River Master directed releases from these reservoirs to the Delaware River that totaled 847 million gallons. The second section of this report describes water quality at various monitoring sites on the Delaware Estuary. It includes basic data on chemical properties and physical characteristics of the water and presents summary statistics on the data.

Throughout the year, diversions to New York City's water-supply system and releases designed to maintain the flow of the Delaware River at Montague were made as directed by the River Master. Diversions by New York City from its reservoirs in the Delaware River Basin did not exceed the limit stipulated by the Decree. Diversions by New Jersey also were within stipulated limits.

The River Master and staff are grateful for the continued cooperation and support of the Decree Parties. Also, the contributions of the PPL Corporation and Eagle Creek Renewable Energy in informing the River Master of plans for power generation and furnishing data on reservoir releases and elevations are greatly appreciated.

Sincerely yours,

/Signed/

Robert R. Mason, Jr., P.E.
Delaware River Master

Acknowledgments

The River Master's daily operation records were prepared from hydrologic data collected mainly on a day-to-day basis. Data for these records were collected and computed by the Office of the Delaware River Master (ODRM) or were furnished by the following agencies and utilities: Data for streamflow of the Delaware River at Montague, New Jersey, by the U.S. Geological Survey (USGS) New Jersey Water Science Center (WSC) and for other locations and tributaries by the USGS New York and Pennsylvania WSCs; for Pepacton, Cannonsville, and Neversink Reservoirs by the New York City Department of Environmental Protection (DEP), Bureau of Water Supply; for Lake Wallenpaupack by the PPL Corporation; and for Rio Reservoir by Eagle Creek Renewable Energy. Quantitative precipitation forecasts and some precipitation data were provided by the National Weather Service offices in Binghamton, New York, and State College, Pennsylvania.

Gary Paulochak and Bruce Krejmas, both of the USGS, were the ODRM Deputy Delaware River Master and staff hydrologist, respectively, during the 2011 report year. They were responsible for collecting the data used in the directed release design process and making the determinations for the directed release quantities from New York City reservoirs. Margaret Philips, USGS, assisted and contributed to this report by collecting, organizing, and reviewing data. Darwin Ockerman, USGS, assisted with collecting and checking precipitation data.

Report of the River Master of the Delaware River for the Period December 1, 2010–November 30, 2011

By Vincent J. DiFrenna, William J. Andrews, Kendra L. Russell, J. Michael Norris, and Robert. R. Mason, Jr.

Abstract

A Decree of the Supreme Court of the United States, entered June 7, 1954, established the position of Delaware River Master within the U.S. Geological Survey. In addition, the Decree authorizes diversion of water from the Delaware River Basin and requires compensating releases from certain reservoirs, owned by New York City, to be made under the supervision and direction of the River Master. The Decree stipulates that the River Master will furnish reports to the Court, not less frequently than annually. This report is the 58th Annual Report of the River Master of the Delaware River. It covers the 2011 River Master report year, the period from December 1, 2010, to November 30, 2011.

During the report year, precipitation in the upper Delaware River Basin was 71.43 inches or 162 percent of the long-term average. On December 1, 2010, combined usable storage in the New York City reservoirs in the upper Delaware River Basin was 230.430 billion gallons (Bgal) or 85.1 percent of combined storage capacity. The reservoirs were at about 100 percent of usable capacity on May 31, 2011. Combined storage remained high (above 80 percent combined capacity) through November 2011. River Master operations during the year were conducted as stipulated by the Decree and the Flexible Flow Management Program.

Diversions from the Delaware River Basin by New York City and New Jersey were in full compliance with the Decree. Reservoir releases were made as directed by the River Master at rates designed to meet the flow objective for the Delaware River at Montague, New Jersey, on 5 days during the report year (July 24–28, 2011). Conservation releases, designed to relieve thermal stress and protect the fishery and aquatic habitat in the tailwaters of the reservoirs, were also made during the report year.

The quality of water in the Delaware Estuary between Trenton, New Jersey, and Reedy Island Jetty, Delaware, was monitored at various locations. Data on water temperature, specific conductance, dissolved oxygen, and pH were collected continuously by electronic instruments at four sites.

Definition of Terms and Procedures

The following definitions apply to various terms and procedures used in the operations documented in this report. A table for converting U.S. customary units to the International System of Units (SI) is given on page vi.

- **Balancing adjustment**—An operating procedure used by the River Master to correct for inaccuracies inherent in the design of releases from New York City reservoirs to meet the Montague flow objective. The balancing adjustment calls for more water to be released when previous directed releases (or lack of releases) were insufficient to meet the Montague flow objective. It calls for less water to be released when previous directed releases were higher than required to meet the Montague flow objective. The balancing adjustment is computed as 10 percent of the difference between the cumulative adjusted directed release and the cumulative directed release required for exact forecasting. The balancing adjustment is applied to the following day's release design. The maximum daily balancing adjustment is intentionally limited to preclude unacceptably large variations in the adjusted flow objective.

- **Capacity**—Total usable volume in a reservoir between the point of maximum depletion and the elevation of the lower crest of the spillway.

- **Conservation releases**—Controlled releases from Pepacton, Cannonsville, and Neversink Reservoirs that are designed to maintain specified minimum flows in stream channels immediately below the reservoirs (tailwaters). The conservation rates are defined as follows:

  - **L1**—Discharge Mitigation Releases are releases designed to help mitigate the effects of spilling immediately below the Delaware Basin reservoirs. New York City shall make such controlled releases from the Delaware Basin reservoirs in accordance with figures 1 and 2 and table 3 in the Flexible Flow Management Program (FFMP). Zones or volumes may change depending on the specific requirements of the FFMP in effect at the time and may change during a report year if a new FFMP becomes effective. Three zones of reservoir-specific storage (L1-a, L1-b, and L1-c) are defined relative to two rule curves for each reservoir.
  - **Normal**—Conservation releases when New York City combined reservoir storage is in the normal (L2) storage zone.
  - **Watch**—Conservation releases when New York City combined reservoir storage is in the drought watch (L3) storage zone.
  - **Warning**—Conservation releases when New York City combined reservoir storage is in the drought warning (L4) storage zone.
  - **Drought**—Conservation releases when New York City combined reservoir storage is in the drought (L5) storage zone (also referred to as Drought Emergency).
- **Directed releases**—Controlled releases from New York City reservoirs in the upper Delaware River Basin, designed by the Delaware River Master to meet the Montague flow objective.
- **Diversions**—The out-of-basin transfer of water by New York City from Pepacton, Cannonsville, and Neversink Reservoirs in the upper Delaware River Basin through the East Delaware, West Delaware, and Neversink Tunnels, respectively, to the City's water-supply system. Also, the out-of-basin transfer of water by New Jersey from the Delaware River through the Delaware and Raritan Canal.
- **Excess quantity**—As defined by the Decree, the excess quantity of water is equal to 83 percent of the amount by which the estimated consumption by New York City during the year is less than the City's estimate of continuous safe yield (1,665 million gallons per day [Mgal/d] stipulated by the 1954 Decree) from all its sources of supply obtainable without pumping, except that the excess quantity shall not exceed 70 billion gallons (Bgal). Each year, the seasonal period for release of the excess quantity begins on June 15.
- **Flexible Flow Management Program**—A set of rules for the management of storage, diversions, releases, and flow targets relating to the apportioning of water from the Delaware River Basin under the 1954 U.S. Supreme Court Decree (available at https://webapps.usgs.gov/odrm/decree.html) and unanimously agreed to by the Decree Parties.
- **Index gaging stations**—Specific sites on tributaries of the upper Delaware River where systematic observations of gage height and discharge are made. These stations are used mainly during the directed-releases season to help estimate inflows of surface water to the upper Delaware River.
- **Interim Excess Release Quantity**—An Interim Excess Release Quantity (IERQ) was defined in the FFMP and made available for interim periods from October 1, 2007, to May 31, 2011, and from June 1, 2011, to May 31, 2012. The IERQ is computed as 83 percent of the difference between the highest year's consumption of the New York City water-supply system during the period 2002–2006—1,257 Mgal/d—and New York City's current estimate of continuous safe yield of the New York City water-supply system of 1,290 Mgal/d, obtainable without pumping. During the 2011 report year, the IERQ was available for release of 15,468 cubic feet per second day ([ft^3/s]-d). For the current FFMP, 6,045 (ft^3/s)-d of IERQ is incorporated in the releases tables to enhance base releases from the New York City Delaware Basin reservoirs. The IERQ balance of 9,423 (ft^3/s)-d is reserved and may be used for additional releases to meet the Trenton Equivalent Flow Objective or to establish an Extraordinary Needs Bank.
- **Interim Excess Release Quantity Extraordinary Needs Bank**—In addition to the hydrologic criteria described in Section 2.5.6 A. of the Delaware River Basin Water Code and subject to other provisional uses of the IERQ as provided in the FFMP, including Section 6.b, the Decree Parties, the Delaware River Basin Commission (DRBC), and the Delaware River Master may at any time review extraordinary water needs to support such research, aquatic life, or other water-use activity as may be approved by the DRBC. Upon unanimous agreement, the Decree Parties may bank all or a portion of the IERQ remaining at such time, and such portion shall be placed in an "IERQ Extraordinary Needs Bank" and used to provide for such extraordinary water needs. Such banked quantity shall be deducted from the IERQ.

- **Key gaging stations**—Specific sites on the East Branch Delaware River, West Branch Delaware River, Neversink River, Delaware and Raritan Canal, and mainstem Delaware River where continuous, systematic observations of gage height and discharge are made. These stations are used on a year-round basis in River Master operations.
- **Maximum reservoir depletion**—The minimum water-surface level or elevation below which a reservoir ceases to continue making delivery of quantities of water for all purposes for which the reservoir was designed. This is also referred to as minimum full-operating level.
- **Rate of flow**—Mean discharge for a specified 24-hour period, in cubic feet per second or million gallons per day (ft^3/sec or Mgal/d).
- **Rate of flow at Montague**—Daily mean discharge of the Delaware River at Montague, New Jersey, computed on a calendar-day basis. In the February 14, 2011, and June 1, 2011, FFMP documents (appendixes 1–3), the Montague flow objective is set at 1,750 ft^3/s. This objective is a benchmark used to control upstream releases and withdrawals of water in the Delaware River Basin.
- **Reservoir-controlled releases**—Controlled releases from reservoirs passed through outlet valves in the dams or through turbines in powerplants. These releases do not include spillway overflow at the reservoirs.
- **Salt front**—The salt front is defined as the 250-parts-per-million isochlor, or line of equal chloride concentration, in the Delaware Estuary. One part per million is one part of solute (in this case, chloride) per one million parts of solvent (river water). The 7-day average location of the salt front is used as an indicator of salinity intrusion in the Delaware Estuary.
- **Storage or contents**—Usable volume of water in a reservoir. Unless otherwise indicated, volume is computed on the basis of the level of pool above the point of maximum depletion.
- **Time of day**—Time of day is expressed in 24-hour Eastern Standard Time, which during the report year included a 23-hour day on March 13 and a 25-hour day on November 6.
- **Uncontrolled runoff at Montague**—Runoff from the 3,480-square-mile drainage area above Montague, New Jersey, excluding the drainage area above Pepacton, Cannonsville, Neversink, Wallenpaupack, and Rio Dams, but including spillway overflow at these dams.

Introduction

An Amended Decree of the Supreme Court of the United States, entered June 7, 1954, (available at https://webapps.usgs.gov/odrm/decree.html) authorizes diversion of water from the Delaware River Basin and provides for releases of water from three New York City reservoirs—Pepacton, Cannonsville, and Neversink—to the upper Delaware River. The Decree stipulates that these diversions and releases are to be made under the supervision and direction of the Delaware River Master. The Decree also stipulates that reports on Delaware River operations be made to the Court not less frequently than annually. The reports can be accessed at https://webapps.usgs.gov/odrm/reports/reports.html.

This report documents operations from December 1, 2010, to November 30, 2011, or the 2011 River Master report year. This report also presents information on the quality of water in the Delaware Estuary during the report year.

Since 2007, the Decree Parties have unanimously approved a series of Flexible Flow Management Program (FFMP) agreements (available at https://webapps.usgs.gov/odrm/ffmp/index.html) to manage the shared waters of the Delaware River Basin. On December 10, 2008, the Decree Parties (Delaware, New Jersey, New York, New York City, and Pennsylvania) signed an FFMP to guide the operations of the Office of the Delaware River Master (ODRM) (Russell and others, 2019). Effective February 14, 2011, a new FFMP was issued (appendix 1), and on February 15, 2011, the FFMP was revised to modify how the water equivalent of snow pack was used to calculate combined storage to determine reservoir release rates (appendix 2). On June 1, 2011, the Decree Parties signed an FFMP to guide the operations of the ODRM through May 31, 2012 (appendix 3). The June 1, 2011, FFMP differs from the original FFMP signed on October 1, 2007, in the following ways:

- Use of additional tables (that is, schedules) of reservoir release rates for the New York City Delaware Basin reservoirs, developed on the basis of Forecast-based Available Water (FAW) not needed contemporaneously for New York City's water supply;
- Use of new releases tables that replace releases tables used in the initial implementation cycle FFMP in 2007;

- Use of new rule curves that replace rule curves used in the initial implementation cycle FFMP;
- Use of New York City's Operations Support Tool (OST) to guide selection of appropriate releases tables;
- Use of release rates based, in part, upon recommendations provided jointly by the New York State Department of Environmental Conservation and the Pennsylvania Fish and Boat Commission (2010);
- Use of drought condition release rates (L3–L5) that are consistent among the releases tables;
- Modifications of New Jersey's diversion during drought conditions and the establishment of a Diversion Offset Bank for New Jersey;
- Incorporation of the seasonal releases design of the FFMP Temporary Summer 2010 fisheries program;
- Redirection of the Interim Excess Release Quantity (IERQ) used to support the seasonal flow increment, which was intended to increase the Montague flow objective from 1,750 cubic feet per second (ft^3/s) to 1,850 ft^3/s between June 15 and September 15, 2011;
- Use of 6,045 cubic feet per second day ($[ft^3/s]$-d) of the IERQ to increase the base release rates in the FFMP tables;
- Reattachment of the Montague flow objective with the location of the Delaware Estuary salt front;
- Use of a modified spill mitigation program to maintain reservoir levels at the Conditional Storage Objective, creating a high probability of maintaining 10 percent available capacity from September 1, 2011, through March 15, 2012; and
- Postponement of a water-resources reassessment study until more information is available.

The additional releases tables and use of the OST can facilitate the redirection of spilled water to managed water to benefit downstream interests when water in New York City's Delaware Basin reservoirs is forecasted to be available for purposes other than New York City's water supply.

Some hydrologic data presented in this report are records of streamflow and water quality for U.S. Geological Survey (USGS) data-collection stations. These records were collected and computed by the offices of the USGS at Troy, New York; Exton, New Cumberland, and Milford, Pennsylvania; and Lawrenceville, New Jersey, in cooperation with the States of New York and New Jersey, the Commonwealth of Pennsylvania, and the City of New York. The locations of major streams and reservoirs, and selected USGS streamflow-gaging stations, in the Delaware River Basin are shown in figure 1.

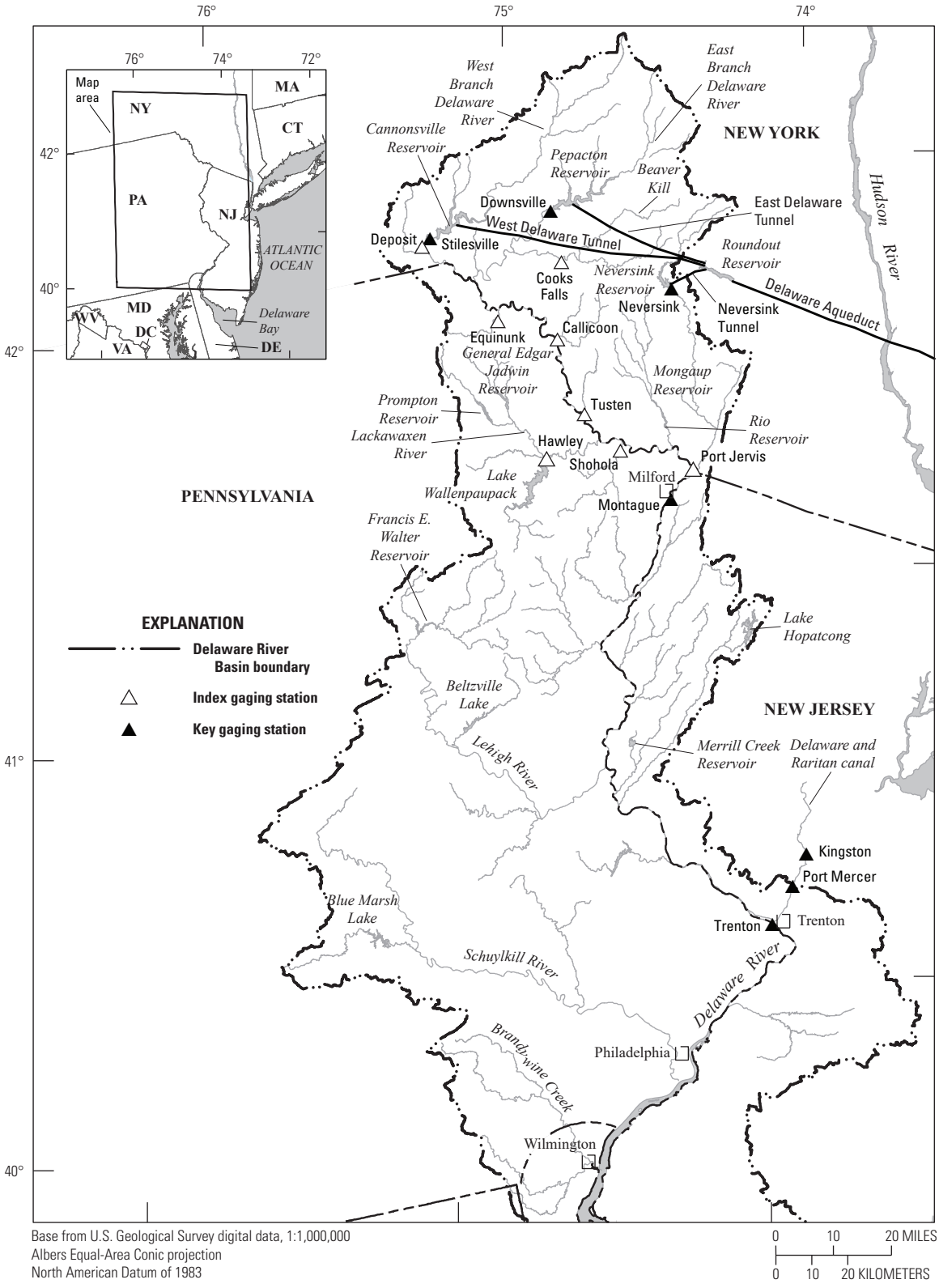

Figure 1. Map showing the Delaware River Basin upstream from Wilmington, Delaware.

Method to Determine Directed Releases from New York City Reservoirs

The data and computations of the various components of streamflow form the basic operational record used by the River Master to carry out specific responsibilities related to the Montague formula. The operational record has two parts: (1) segregating the streamflow components of the current daily mean discharge at the USGS streamflow gage at Montague, New Jersey (station number 01438500), to compute the uncontrolled runoff and (2) forecasting the uncontrolled runoff and using forecasted information from other sources to predict the flow at Montague with adequate advance time to direct releases. The forecasting process is used to determine whether the River Master directs New York City reservoirs to release water to maintain the minimum flow objective at the USGS streamflow gage at Montague, New Jersey. Directed releases are needed when the forecasted flow at Montague, excluding releases from the New York City reservoirs, is less than the Montague flow objective.

Segregating Streamflow Components, Delaware River at Montague, New Jersey

Segregation of streamflow at Montague involves determining the components of flow, including New York City reservoir releases, releases for generation of hydroelectric power, and uncontrolled runoff. For the segregation of the current flow, the following components of daily mean flow at Montague are used:

1. Controlled releases from the Pepacton, Cannonsville, and Neversink Reservoirs of New York City.
2. Controlled releases from Lake Wallenpaupack on Wallenpaupack Creek to produce hydroelectric power.
3. Controlled releases from Rio Reservoir on the Mongaup River to produce hydroelectric power.

To determine the contributions of each of these releases, the amount of time it takes the water to travel from the release point to the USGS gage at Montague, New Jersey, is required. The various travel times are used to determine the appropriate time-delayed flow contributions from the above sources. The time-adjusted controlled flows of the above sources are subtracted from the total streamflow measured at the Montague gaging station to determine the uncontrolled runoff (including reservoir spills and groundwater) from the drainage area upstream from Montague.

Travel times were computed from reservoir and powerplant operations data and historical streamflow records. The travel times are generally adequate for River Master operations. Occasionally, however, significant exceptions are observed. For example, during a large increase in directed release from Cannonsville Reservoir, the arrival time of the water at Montague can be delayed as much as 1.5 days because a substantial amount of water must first fill the channel before a steady flow arrives at Montague. During winter, the formation of ice, together with lower streamflow, gradually increases the resistance to water flow, resulting in increased travel times. Because ice-affected travel times increase gradually over several days, and releases were not directed to meet the Montague flow objective during periods of ice, no adjustments were made to compensate for increased travel times during these periods of the report year. The following table lists the average times for the effective travel of water from the various sources of controlled supply to Montague, New Jersey. These times were used for flow routing during the 2010 report year.

Source	Travel time, in hours
Pepacton Reservoir	60
Cannonsville Reservoir	48
Neversink Reservoir	33
Lake Wallenpaupack	16
Rio Reservoir	8

Forecasting Streamflow, Delaware River at Montague, New Jersey

The second step in the process for determining the directed releases is to forecast the streamflow at Montague exclusive of releases from New York City's Delaware River Basin reservoirs. The flow must be forecast three days in advance to account for the travel time needed from the furthest New York City reservoir, Pepacton.

The electric utilities (PPL Corporation and Eagle Creek Renewable Energy) furnished forecasts of power generation and releases. Because the hydroelectric plants were used mainly for meeting rapidly varying peak power demands, the forecasts were subject to various modifying factors, including the vagaries of weather on electricity demand. In addition, because the power companies are members of regional transmission organizations, demand for power outside of the local service area may unexpectedly affect generation schedules. Consequently, at times, the actual use of water for power generation differs considerably from the forecasts used in the design of reservoir releases.

For computational purposes during periods of low flow, estimates of uncontrolled runoff at Montague were treated as two components: (1) current runoff and (2) forecasted runoff from precipitation.

An estimate of uncontrolled runoff was computed by using a routing and recession procedure based on discharges at 0800 hours at the following USGS gaging stations:

Station name (and number)	Drainage area (square miles)
Beaver Kill at Cooks Falls, New York (01420500)	241
Oquaga Creek at Deposit, New York (01426000)	67.6
Equinunk Creek at Equinunk, Pennsylvania (01427203)	56.3
Callicoon Creek at Callicoon, New York (01427500)	110
Tenmile River at Tusten, New York (01428000)	45.6
Lackawaxen River at Hawley, Pennsylvania (01431500)	290
Shohola Creek near Shohola, Pennsylvania (01432500)	83.6
Neversink River at Port Jervis, New York (01438000)	336

Forecasted runoff was determined from data provided by the National Weather Service (NWS) office in Binghamton, New York, which furnished quantitative forecasts of average precipitation and air temperatures for the 3,480-square-mile (mi^2) drainage basin upstream from Montague, New Jersey. During winter, runoff was estimated on the basis of the status of snow and ice, along with forecasted precipitation and temperature. During other periods, forecasted precipitation was used to estimate runoff.

The forecasted flow at Montague, exclusive of releases from New York City's Delaware Basin reservoirs, is computed as the sum of forecasted releases from power reservoirs, estimated uncontrolled runoff including conservation releases from Rio Reservoir, and estimated runoff from predicted rainfall. All of these inputs are adjusted for travel time. If the computed total flow is less than the flow objective at Montague, then the deficiency is made up by releases from New York City's reservoirs, as directed by the River Master.

When updated forecasts of precipitation or powerplant releases showed appreciable changes after a release was directed, the release required from the City's reservoirs was recomputed on the basis of the updated forecasts. Commonly, this procedure resulted in a reduced release requirement for New York City reservoirs that day. Only final values for releases from New York City reservoirs are presented in this report.

Hydrologic Conditions

Precipitation

Average precipitation in the Delaware River Basin above Montague, New Jersey, totaled 71.43 inches (in.) during the 2011 report year and was 162 percent of the long-term (70-year) average. Monthly precipitation ranged from 62 percent of the long-term average in January 2011 to 300 percent of the long-term average in August 2011 (table 1). Precipitation data for the 2011 report year were computed from records for five geographically distributed stations: the Pepacton, Neversink, and Cannonsville

Reservoir stations; the NWS Hawley, Pennsylvania, station; and the USGS Milford, Pennsylvania, station. These stations were operated by the NWS, New York City Department of Environmental Protection (DEP), Bureau of Water Supply; and ODRM.

The seasonal period from December to May typically is when surface-water and groundwater reservoirs refill. During this period in 2010–2011, total precipitation was 29.72 in., which is about 45 percent of the 70-year average. During the June to November period, total precipitation was 41.71 in., which is about 176 percent of the long-term average.

Reservoir Storage

The following table summarizes the "point of maximum depletion" and other pertinent levels and contents of Pepacton, Cannonsville, and Neversink Reservoirs. This information was provided by the New York City DEP, Bureau of Water Supply.

[Reservoir contents are in billion gallons. —, not applicable]

Level	Pepacton Reservoir		Cannonsville Reservoir		Neversink Reservoir	
	Elevation	Contents	Elevation	Contents	Elevation	Contents
Full pool or spillway crest	1,280	—	1,150	—	1,440	—
Point of maximum depletion	1,152	[1]140.190	1,040	[1]95.706	1,319	[1]34.941
Sill of diversion tunnel	1,143	[2]3.511	[3]1,035	[2]1.020	1,314	[2]0.525
Sill of river outlet tunnel	1,126.50	[4]4.200	1,020.50	[4]1.564	1,314	—
Dead storage	—	1.800	—	0.328	—	1.680

[1]Quantity stored between full pool or spillway crest and point of maximum depletion.

[2]Quantity stored between point of maximum depletion and sill of diversion tunnel.

[3]Elevation of mouth of inlet channel of diversion works.

[4]Quantity stored between sill of diversion tunnel and sill of river outlet tunnel.

Daily storage in Pepacton, Cannonsville, and Neversink Reservoirs above the "point of maximum depletion," or minimum full-operating level, is given in tables 2, 3, and 4, respectively, and combined storage during the report year is shown in figure 2. On December 1, 2010, combined useable storage in the three reservoirs was 230.430 Bgal or 85.1 percent of combined capacity. From December to May, inflow to the New York City reservoirs typically exceeds outflow and consequently, storage increases. Combined storage increased during the report year, and the reservoirs were at about 100 percent of usable capacity on May 31, 2011. Combined storage remained high (above 80 percent combined capacity) through November 2011. The lowest combined storage was 217.991 Bgal or 80.5 percent on February 18, 2011.

The three reservoirs spilled a total of 234.189 Bgal during the year. Pepacton spilled during the following periods: March 12–26, 2011; April 14–May 14, 2011; May 17–June 2, 2011; July 3–8, 2011; August 28–September 19, 2011; and September 29–October 7, 2011. Cannonsville spilled from March 10 to 28, 2011; from April 6 to June 5, 2011; and from September 6 to 18, 2011. Neversink spilled during the following periods: March 11–22, 2011; April 17–19, 2011; April 27–May 5, 2011; May 18–24, 2011; June 24–27, 2011; July 3–7, 2011; and August 28–October 27, 2011. Combined storage reached a maximum for the report year on September 9, 2011, at 285.312 Bgal. The reservoirs' storage decreased from that point, and the combined storage was 254.101 Bgal or 93.8 percent of combined capacity on November 30, 2011.

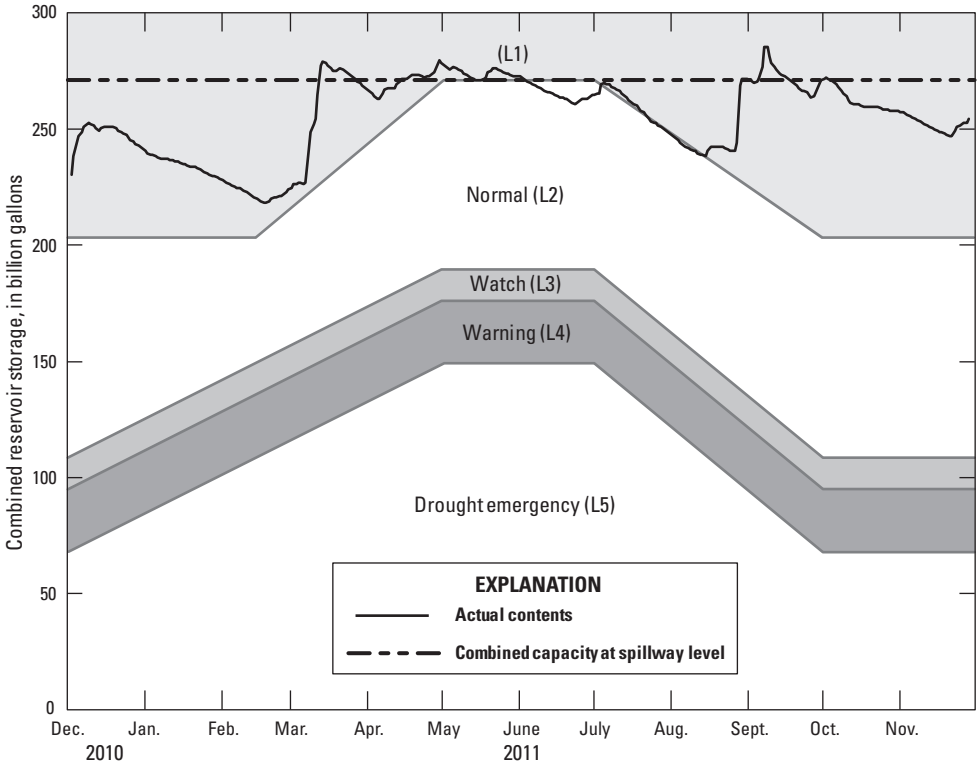

Figure 2. Graph showing operation curves and actual contents for New York City reservoirs in the Delaware River Basin, December 1, 2010, to November 30, 2011.

Operations

Operations were conducted as described by the effective FFMPs (appendixes 1 and 3). Throughout the report year, the New York City storage condition was normal. Therefore, the allowable diversions to New York City and New Jersey were 800 million gallons per day (Mgal/d) and 100 Mgal/d, respectively, and the Montague flow objective was 1,750 ft^3/s. Conservation releases from New York City reservoirs were made at the rates shown in table 3 of both FFMPs applying to the 2011 report year (appendixes 1 and 3) and tables 4f and 4g (appendix 3) in June and July, tables 4a–4g (appendix 3) in September, and tables 4f and 4g (appendix 3) in October and November (see "Archived OST Summary Data" at https://webapps.usgs.gov/odrm/data_archive.html).

Diversions to New York City Water Supply

The 1954 Amended Decree authorizes New York City to divert water from the Delaware River Basin at a rate not to exceed the equivalent of 800 Mgal/d. The Decree specifies that the diversion rate shall be computed as the aggregate total diversion beginning June 1 of each year divided by the total number of days elapsed since the preceding May 31.

Records of daily diversions through the East Delaware, West Delaware, and Neversink Tunnels (fig. 1) were furnished to the ODRM by the New York City DEP. These records were obtained from the City's calibrated instruments connected to venturi meters installed in the tunnel conduits. The measured flows were transmitted electronically on a 15-second interval to City computers, and 5-minute interval release and diversion quantities for the preceding 5-minute period were computed by using the instantaneous rate-of-flow data from each instrument. These 5-minute quantities were then summed to compute daily total flows, which were reported to the ODRM each day. Each week, the computed diversion values were checked against the flow meter totalizer readings by New York City DEP and corrected when necessary.

Daily diversions during the report year from Pepacton, Cannonsville, and Neversink Reservoirs to the New York City water-supply system (Rondout Reservoir) are given in table 5. A running account of the average rates of combined diversions from the three reservoirs, computed as stipulated by the Decree, also is shown in table 5. A total of 197.550 Bgal of water was diverted to the New York City water-supply system during the report year with an average of 541 Mgal/d, which is

below the maximum diversion rate. The maximum daily diversion from a single reservoir was 537 million gallons (Mgal) on April 12, 2011, from Pepacton Reservoir. The maximum daily combined diversion from all three reservoirs was 1,165 Mgal on January 1, 2011. Diversions by New York City did not exceed the limits stipulated by the Decree and the FFMP. Data on water consumption by New York City for each calendar year since 1950, from all sources of supply, are presented in table 6.

The East Delaware Tunnel is used to divert water from Pepacton Reservoir to Rondout Reservoir. The hydroelectric powerplant at the downstream end of the East Delaware Tunnel operated most days of the report year. When the powerplant was not in operation, some water leaked through the wicket gates and was not recorded on the totalizer. A current-meter measurement made in 1989 showed that the (assumed constant) rate of leakage is about 8.0 Mgal/d. Because the powerplant was not in operation for the equivalent of 99 days during the 2011 report year, the estimated quantity of unmeasured leakage (diverted but not recorded) was about 0.8 Bgal.

The West Delaware Tunnel is used to divert water from Cannonsville Reservoir to Rondout Reservoir. Inspections of the channel below the outlet, when the valves were closed, revealed only negligible leakage. A hydroelectric powerplant uses water diverted through the West Delaware Tunnel, but the plant operates only when diversions are less than 300 Mgal/d. When the powerplant is not operating, the valves on the pipelines to the plant are closed, and there is no leakage through the system.

The Neversink Tunnel is used to divert water from Neversink Reservoir to Rondout Reservoir. A hydroelectric powerplant uses water diverted through the Neversink Tunnel. When the powerplant is not operating and the main valve on the diversion tunnel is open, leakage develops that is not recorded on the venturi instruments. One current-meter measurement made in 1999 showed a leakage rate of 16.2 ft^3/s (10.5 Mgal/d). When the powerplant is operating, the leakage is included in the recorded flow. No leakage occurs when the main valve on the tunnel is closed. During the 2011 report year, the powerplant operated part of the day on most days and was not operated the equivalent of 200 days. About 2.1 Bgal of water was diverted but not recorded, according to the leakage rate noted above and records of powerplant operation.

Diversions by New Jersey

The Decree authorizes New Jersey to divert water from the Delaware River and its tributaries in New Jersey to areas outside of the Delaware River Basin, without compensating releases. Under the FFMP, New Jersey diversions shall not exceed 100 Mgal/d as a monthly average, and the daily mean diversion shall not exceed 120 Mgal/d. When the lower basin is in a drought warning period, diversions shall not exceed 85 Mgal/d as a running average. The lower basin was never in a drought warning period during the 2011 report year.

The USGS gaging station on the Delaware and Raritan Canal at Port Mercer, New Jersey (station number 01460440) (fig. 1), is used as the official control point for measuring these diversions by New Jersey. On the basis of data collected by the USGS at this site, the maximum monthly average diversion was 91.8 Mgal/d during January 2011 (table 7). The maximum daily mean diversion was 103 Mgal on January 18, 2011 (table 7). Diversions by New Jersey did not exceed the limits stipulated by the FFMP.

Montague Flow Objective

The components of forecasted flow at Montague during low flow (forecasted releases from power reservoirs, estimated uncontrolled runoff including conservation releases from Rio Reservoir, and forecasted increase in runoff from precipitation) and the sums of flows exclusive of releases from New York City's reservoirs are given in table 8. If the computed sum of the components is less than the flow objective at Montague, then the deficiency is made up by releases from the City's reservoirs, as directed by the River Master. Table 9 presents the River Master daily operations record of reservoir releases and segregation of the various components contributing to the flow of the Delaware River at Montague, New Jersey.

The forecasted flow of the Delaware River at Montague, exclusive of water released from the New York City reservoirs, was greater than the flow objective on all days in the period from December 1, 2010, to November 30, 2011, with directed releases on 5 days, July 24–28, 2011. The observed daily mean discharge at Montague was greater than the applicable flow objective (1,750 ft^3/s) on all days during this period (table 10).

The total flow observed at Montague in July and August 2011 is shown in figure 3. It is segregated into the portion derived from the New York City reservoirs, the portion contributed by the power reservoirs, and uncontrolled runoff from the drainage area below the reservoirs. As described above, the uncontrolled runoff was computed as the residual of observed flow minus releases and spills from all reservoirs and was subject to errors in observations, transit times, and routings of the various components of flow. The conservation release from Rio Reservoir is included in the uncontrolled runoff component. The effect of these uncertainties is incorporated in the computation of uncontrolled runoff.

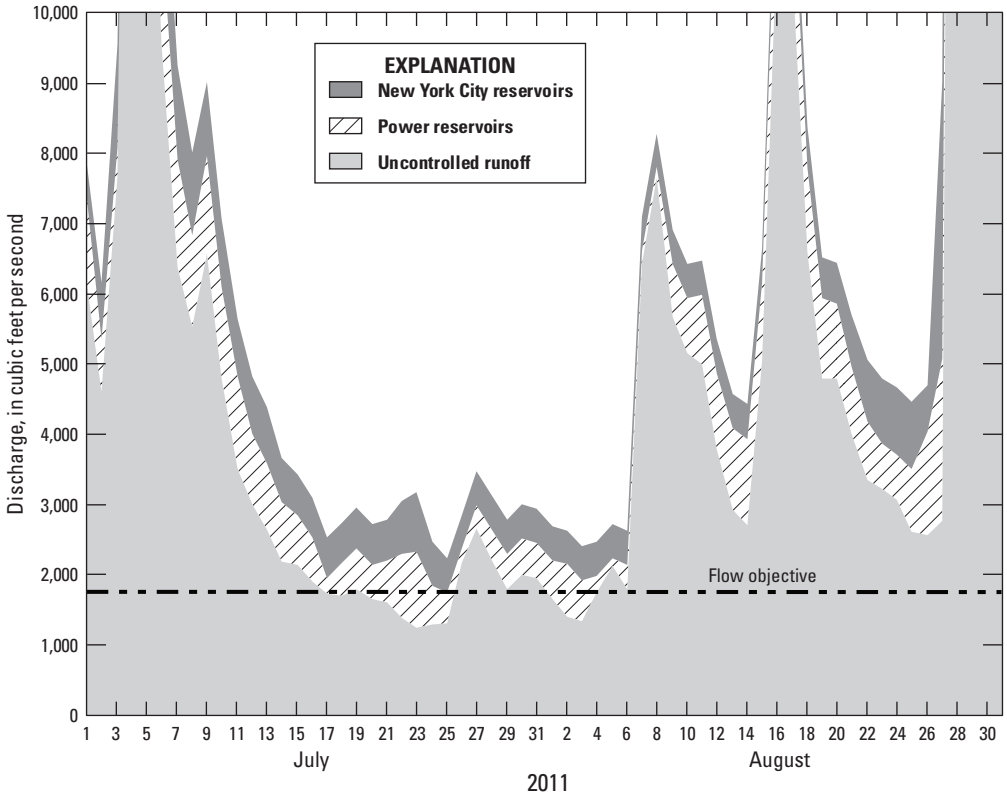

Figure 3. Graph showing components of flow, Delaware River at Montague, New Jersey, July 1 to August 31, 2011.

Excess Release Quantity and Interim Excess Release Quantity

An IERQ was defined in the FFMP and made available for interim periods from October 1, 2007, to May 31, 2011, and from June 1, 2011, to May 31, 2012. The IERQ is computed as 83 percent of the difference between the highest year's consumption of the New York City water-supply system during the period 2002–2006—1,257 Mgal/d—and New York City's current estimate of continuous safe yield of the New York City water-supply system of 1,290 Mgal/d, obtainable without pumping. During the 2011 report year, the IERQ was available for release of 15,468 (ft^3/s)-d. For the current FFMP, 6,045 (ft^3/s)-d of IERQ is incorporated in the releases tables to enhance base releases from the New York City reservoirs. The IERQ balance of 9,423 (ft^3/s)-d is reserved and may be used for additional releases to meet the Trenton Equivalent Flow Objective or to establish an Extraordinary Needs Bank. Three thermal releases were made in 2011 per the terms of a July 22, 2011, temporary agreement (appendix 4); the releases were made on the following Montague design dates: July 24, 2011—126 (ft^3/s)-d; July 25, 2011—409 (ft^3/s)-d; and July 26, 2011—226 (ft^3/s)-d. The total of those releases was 761 (ft^3/s)-d. No water was released in 2011 to meet the Trenton Equivalent Flow Objective.

Tailwaters Habitat Protection and Discharge Mitigation Program

The FFMP established a Tailwaters Habitat Protection and Discharge Mitigation Program (THPDMP), which consists of (1) conservation releases designed for protecting the ecology in the tailwaters below the New York City reservoirs and (2) discharge mitigation releases designed to help mitigate the effects of spilling immediately below the City's reservoirs. Controlled releases were made from the New York City reservoirs in accordance with the FFMP. From December 1, 2010, to November 30, 2011, 280.279 Bgal was released from the New York City Delaware Basin reservoirs in accordance with the THPDMP.

Comparison of River Master Operations Data with Other Records

River Master operations are conducted on a day-to-day basis and, by necessity, use preliminary data on streamflow. In this section, records used in River Master operations are compared to final data published for selected USGS gaging stations. Data on releases were reported in million gallons per day and converted to cubic feet per second for use in the comparisons.

Analysis of Forecasts

Forecasts of streamflow at Montague, based on anticipated contributions from the components described previously but excluding releases from New York City reservoirs, differed from observed flow on most days. Occasionally, variations in the components were partially compensating, and observed flows compared favorably with forecasted flows.

The forecasted flow of the Delaware River at Montague, exclusive of releases from the New York City reservoirs, was less than the flow objective from July 24 to 28, 2011. The following tabulation computes forecasted and actual hydroelectric power releases for the period from July 23 to August 8, 2011.

Releases and runoff	Sum of forecasted flow ([ft^3/s]-d)	Sum of actual flow ([ft^3/s]-d)
Lake Wallenpaupack	4,498	5,788
Rio Reservoir	2,355	1,685
Runoff from uncontrolled area	20,841	40,754

For the July 23 to August 8, 2011, period shown in the tabulation above, actual releases from Lake Wallenpaupack and Rio Reservoir averaged 29 percent more and 28 percent less than the forecasted releases, respectively. Observed runoff from the uncontrolled area was about 96 percent more than forecasted runoff.

On any given day, forecasted releases and actual releases from Lake Wallenpaupack and Rio Reservoir can differ considerably. The ranges of actual daily releases from July 23 to August 8, 2011, are as follows: daily releases at Lake Wallenpaupack differed from forecasted releases by 155 ft^3/s less to 233 ft^3/s greater, and daily releases at Rio Reservoir differed from forecasted releases by 248 ft^3/s less to 320 ft^3/s greater. On the basis of gaged streamflow at Montague, only five directed releases from New York City reservoirs were required during the report year. These directed releases, which were between July 24 and 28, 2011, inclusive, ranged from 167 to 343 ft^3/s, and were less than the conservation releases being made at the times of these release requests. On the basis of gaged streamflow at Montague, the directed releases from New York City reservoirs during the report year were not needed for exact forecasting.

Comparison of hydrographs of forecasted daily runoff and observed daily runoff from the uncontrolled area (fig. 4) indicated that the forecasts generally were suitable for use in designing releases from New York City Delaware Basin reservoirs. Numerical adjustments to the designs were made when needed to compensate for errors in the forecasts, but because of travel times, the effects of the adjustments on flows at Montague were not evident until several days after the design date.

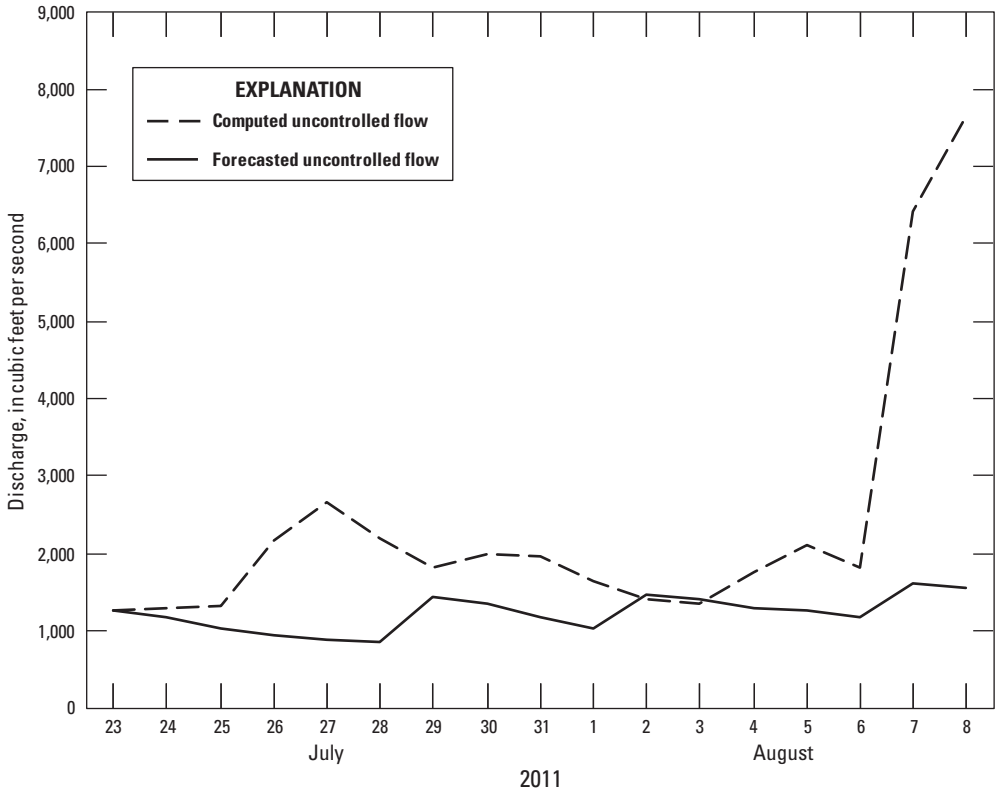

Figure 4. Hydrograph of uncontrolled runoff component, Delaware River at Montague, New Jersey, July 23 to August 8, 2011.

Releases from New York City Reservoirs

River Master operations data on controlled releases from Pepacton, Cannonsville, and Neversink Reservoirs to the Delaware River were furnished by the New York City DEP. These data were collected from calibrated instruments connected to venturi meters installed in the outlet conduits of the reservoirs.

The USGS gaging station on East Branch Delaware River at Downsville, New York (station number 01417000), is 0.5 miles (mi) downstream from Downsville Dam (fig. 1). Discharge measured at this station includes releases from Pepacton Reservoir and a small amount of seepage and any runoff that enters the channel between the dam and the gaging station. The drainage area is 371 mi^2 at the dam and 372 mi^2 at the gaging station. The gaging station's records are rated good, which means that about 95 percent of the daily mean discharges are within 10 percent of the true discharge.

Figure 5*A* shows releases from Pepacton Reservoir, including spillway, conservation, and directed releases, reported by New York City, versus the final records for the USGS gaging station on East Branch Delaware River at Downsville, New York (table 11) from December 1, 2010, to November 30, 2011. The mean difference is 8.1 percent, and 95 percent of the daily differences between the gage readings and New York City records are less than 32.2 percent. Larger differences rarely occur and may be due to rainfall. Instruments connected to the venturi meters were recalibrated periodically by New York City to improve the accuracy of the recorded flow data.

The USGS gaging station on West Branch Delaware River at Stilesville, New York (station number 01425000), is 1.4 mi downstream from Cannonsville Dam (fig. 1). Discharge measured at this station includes releases from Cannonsville Reservoir and runoff from 2 mi^2 of drainage area between the dam and the gaging station. The drainage area is 454 mi^2 at the dam and 456 mi^2 at the gaging station. The gaging-station records are rated fair, which means that about 95 percent of the daily mean discharges are within 15 percent of the true discharge. The records include runoff from the area between the dam and the gaging station and seepage near the base of the dam.

Figure 5*B* shows releases from Cannonsville Reservoir (including spillway, conservation, and directed releases), reported by New York City, versus the records for the USGS gaging station on West Branch Delaware River at Stilesville, New York (table 12), from December 1, 2010, to November 30, 2011. The mean difference is 6.7 percent, and 95 percent of the daily differences between the gage readings and New York City records are less than 18.2 percent.

The USGS gaging station on Neversink River at Neversink, New York (station number 01436000), is 1,650 ft downstream from Neversink Dam (fig. 1). Discharge measured at this station includes releases from Neversink Reservoir and, during storms, a small amount of runoff that originates between the dam and the gaging station. The drainage area is 92.5 mi^2 at the dam and 92.6 mi^2 at the gaging station. The gaging station records are rated good, which means that about 95 percent of the daily mean discharges are within 10 percent of the true discharge.

Figure 5*C* shows releases from Neversink Reservoir, including spillway, conservation, and directed releases, reported by New York City, versus the records for the USGS gaging station on Neversink River at Neversink, New York (table 13), from December 1, 2010, to November 30, 2011. The mean difference is 8.7 percent, and 95 percent of the daily differences between the gage readings and New York City records are less than 33.5 percent.

Delaware River at Montague, New Jersey

The River Master's operations record for the Delaware River at Montague, New Jersey (table 9), showed about 0.1 percent less discharge for the report year than the published USGS record for the gaging station (table 10). Daily values for the two records agreed closely, except during ice-affected periods and the summer vegetation growth season.

Conformance of Operations Under the Amended Decree of the U.S. Supreme Court Entered June 7, 1954

From December 1, 2010, to November 30, 2011, operations of the Delaware River Master were conducted as stipulated by the Decree and the FFMP.

Diversions from the Delaware River Basin to the New York City water-supply system did not exceed those authorized by the Decree and the FFMP. New York City released water from its reservoirs at rates directed by the River Master to meet the applicable flow objectives at Montague, New Jersey. During the report year, New York City complied fully with all directives and requests of the River Master.

Diversions from the Delaware River Basin by New Jersey were within limits stipulated by the Decree. New Jersey complied fully with all directives and requests of the River Master.

The IERQ was used in accordance with the FFMP and agreements completed throughout the report year.

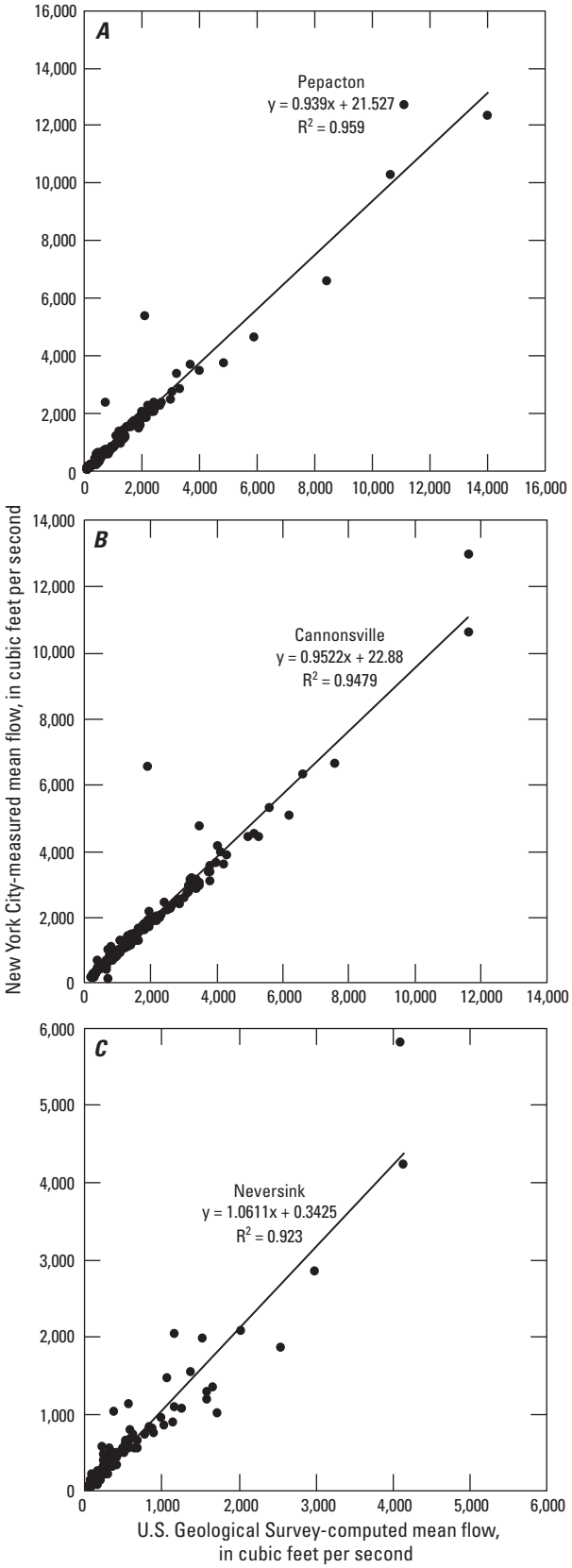

Figure 5. Graphs showing measured New York City reservoir releases versus mean flow records for downstream U.S. Geological Survey (USGS) gaging stations: (*A*) Pepacton Reservoir and gaging station on East Branch Delaware River at Downsville, New York; (*B*) Cannonsville Reservoir and gaging station on West Branch Delaware River at Stilesville, New York; and (*C*) Neversink Reservoir and gaging station on Neversink River at Neversink, New York.

Table 1. Precipitation in the Delaware River Basin upstream from Montague, New Jersey.

[Source: National Weather Service and New York City Department of Environmental Protection. All values, except percentages, in inches. —, not applicable]

Month	December 1940 to November 2010 monthly average	December 2010 to November 2011			
		Amount	Percent of average	Excess (+) or deficit (−) compared with long-term average	
				Month	Cumulative
December	3.46	3.88	112	0.42	0.42
January	3.05	1.90	62	−1.15	−0.73
February	2.64	3.93	149	1.29	0.56
March	3.40	6.11	180	2.71	3.27
April	3.75	7.28	194	3.53	6.80
May	4.14	6.62	160	2.48	9.28
June	4.13	6.35	154	2.22	11.50
July	4.14	4.64	112	0.50	12.09
August	3.95	11.85	300	7.90	19.90
September	4.00	11.59	290	7.59	27.49
October	3.72	3.71	100	−0.01	27.48
November	3.76	3.57	95	−0.19	27.29
Total for 12 months	**44.14**	**71.43**	**162**	—	—

Table 2. Storage in Pepacton Reservoir, New York, for year ending November 30, 2011.

[River Master daily operations record; gage reading at 0800 hours; data provided by New York City. Storage in millions of gallons above elevation 1,152.00 feet. Add 7,711 million gallons for total contents above sill of outlet tunnel, elevation 1,126.50 feet. Storage at spillway level is 140,190 million gallons. —, not applicable]

Day	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
1	117,568	125,278	118,596	116,663	138,003	142,005	140,486	138,829	130,848	141,820	141,283	137,601
2	121,282	125,122	118,411	116,646	137,583	141,691	140,227	138,921	130,493	141,301	141,468	137,657
3	123,204	125,105	118,158	116,730	137,127	141,561	140,116	138,995	130,014	140,894	141,449	137,638
4	124,533	124,950	117,770	116,746	136,636	141,746	139,895	140,616	129,642	140,690	141,246	137,401
5	125,574	124,794	117,451	116,763	136,472	142,005	139,656	140,968	129,201	141,264	141,023	137,218
6	126,429	124,515	117,283	117,451	136,908	141,709	139,418	140,820	128,761	141,839	140,765	137,036
7	127,075	124,395	117,081	123,653	137,310	141,431	139,142	140,616	128,479	143,629	140,412	136,781
8	127,250	124,274	116,897	126,866	137,455	141,172	138,811	140,246	128,075	145,755	140,171	136,544
9	127,250	124,135	116,796	128,462	137,510	140,950	138,498	139,859	127,670	144,399	139,840	136,253
10	127,181	123,911	116,528	129,642	137,455	140,765	138,314	139,381	127,653	142,995	139,491	136,000
11	127,111	123,739	116,177	133,797	137,638	140,597	137,966	138,866	127,319	142,230	139,105	135,801
12	127,006	123,600	115,826	139,785	138,737	140,468	137,802	138,314	126,901	141,783	138,903	135,493
13	127,512	123,480	115,459	141,691	139,418	140,320	137,583	137,802	126,447	141,338	138,811	135,203
14	127,987	123,204	115,144	142,005	140,006	140,209	137,419	137,273	126,429	141,005	138,682	134,859
15	128,233	122,912	114,845	141,949	140,375	140,171	137,273	136,763	126,447	140,746	139,455	134,588
16	128,339	122,670	114,479	141,635	140,542	140,079	137,108	136,345	127,495	140,690	139,656	134,336
17	128,479	122,429	114,147	141,412	141,079	140,171	136,981	136,018	128,322	140,542	139,767	133,995
18	128,497	122,173	113,964	141,338	141,431	140,579	137,054	135,656	128,849	140,375	139,767	133,725
19	128,462	122,156	114,213	141,746	141,357	141,209	136,927	135,312	129,412	140,227	139,693	133,473
20	128,304	121,951	114,396	141,949	141,412	141,617	136,745	134,931	129,571	139,951	139,528	133,186
21	128,198	121,814	114,562	141,857	141,283	141,764	136,544	134,516	129,518	139,472	139,472	132,880
22	128,093	121,609	114,661	141,617	141,153	141,691	136,308	134,228	129,784	138,940	139,308	132,576
23	127,882	121,300	114,678	141,338	141,116	141,543	136,036	133,887	129,642	138,425	139,050	132,737
24	127,706	121,009	114,628	140,987	141,283	141,524	136,272	133,473	129,394	138,076	138,811	133,635
25	127,425	120,735	114,645	140,653	141,264	141,264	136,745	133,078	128,989	137,857	138,516	134,120
26	127,181	120,412	115,260	140,357	141,357	140,968	137,072	133,132	129,025	137,510	138,241	134,390
27	126,936	120,089	115,692	140,061	141,727	141,042	137,292	132,844	128,937	137,273	137,985	134,570
28	126,621	119,784	116,177	139,675	142,136	140,968	137,328	132,469	130,795	137,547	137,930	134,624
29	126,377	119,478	—	139,326	142,640	140,708	138,076	132,129	145,341	138,113	137,693	134,606
30	125,974	119,189	—	138,866	142,322	140,708	138,627	131,755	143,462	140,431	137,657	135,004
31	125,609	118,867	—	138,443	—	140,653	—	131,291	142,397	—	137,638	—
Change[1]	+8,041	−6,412	−2,419	+21,780	+4,319	−1,352	−1,859	−7,538	+11,549	−1,389	−3,645	−2,597
Equiv. million gallons per day[2]	+259.4	−206.8	−86.4	+702.6	+144.0	−43.6	−62.0	−243.2	+372.5	−46.3	−117.6	−86.6
Equiv. cubic feet per second[3]	+401	−320	−134	+1,087	+223	−67.5	−95.9	−376	+576	−71.6	−182	−134

[1]Change = storage on the last day of the month − storage on the first day of the month. Net change for the year is +17,436.0 million gallons. Minimum/maximum storage for December–May is 113,964/142,640; minimum/maximum storage for June–November is 126,429/145,755.

[2]Net equivalent (equiv.) for year is +47.8 million gallons per day.

[3]Net equiv. for year is +73.9 cubic feet per second.

Table 3. Storage in Cannonsville Reservoir, New York, for year ending November 30, 2011.

[River Master daily operations record; gage reading at 0800 hours; data provided by New York City. Storage in millions of gallons above elevation 1,040.00 feet. Add 2,584 million gallons for total contents above sill of outlet tunnel, elevation 1,020.50 feet. Storage at spillway level is 95,706 million gallons. —, not applicable]

Day	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
1	83,215	84,270	79,300	80,074	94,504	100,373	97,379	91,477	84,863	94,489	94,352	85,427
2	85,484	84,183	79,106	80,626	94,155	99,665	96,993	91,553	84,646	94,520	94,885	85,427
3	87,291	84,342	78,830	81,134	93,759	99,118	96,704	91,583	84,371	94,307	95,371	85,412
4	88,556	84,328	78,553	81,365	93,409	99,150	96,205	93,166	84,285	93,972	95,341	85,441
5	89,545	84,169	78,194	81,047	93,561	99,842	95,851	93,790	84,039	94,079	94,930	85,398
6	90,351	84,039	78,014	81,235	95,128	99,665	95,508	93,622	83,605	95,174	94,291	85,326
7	91,036	84,039	77,945	86,944	96,092	99,311	95,158	93,409	83,359	97,025	93,531	85,210
8	91,462	84,024	77,807	90,260	96,511	98,989	94,687	93,212	83,099	103,770	92,679	85,065
9	91,583	83,981	77,628	91,827	96,591	98,651	94,276	93,059	82,724	105,494	91,751	84,906
10	91,127	83,909	77,379	92,710	96,639	98,329	93,911	92,953	82,449	102,965	90,792	84,704
11	90,412	83,807	77,131	96,639	96,655	98,056	93,531	92,862	82,333	101,033	89,743	84,545
12	89,758	83,750	76,840	102,096	96,704	97,814	93,333	92,740	82,117	100,019	88,678	84,371
13	89,712	83,634	76,620	101,967	96,816	97,379	93,227	92,573	81,885	98,893	87,623	84,140
14	90,016	83,504	76,357	101,130	96,961	97,041	93,212	92,405	81,654	97,911	86,669	83,865
15	89,971	83,273	76,177	100,277	96,848	96,832	93,166	91,994	81,423	97,186	86,207	83,648
16	89,834	82,969	75,984	99,343	96,494	96,816	92,847	91,568	81,336	96,736	85,716	83,446
17	89,727	82,724	75,804	98,619	96,607	97,138	92,497	91,112	81,409	96,269	85,080	83,330
18	89,545	82,435	75,611	98,345	97,009	97,379	92,192	90,655	81,322	95,803	84,747	83,172
19	89,165	82,305	75,984	98,732	96,993	97,621	91,888	90,245	81,120	95,326	84,675	82,955
20	88,739	82,263	76,606	98,812	97,009	98,233	91,538	89,788	80,946	94,839	84,863	82,724
21	88,237	82,088	77,020	98,523	96,929	99,295	91,081	89,286	80,695	94,337	85,239	82,507
22	87,768	81,871	77,310	98,168	96,736	99,343	90,564	88,784	80,502	93,774	85,383	82,261
23	87,233	81,582	77,531	97,846	96,575	99,022	90,214	88,100	80,322	93,090	85,441	82,391
24	86,684	81,293	77,628	97,524	96,832	98,716	90,351	87,363	80,032	92,923	85,456	83,504
25	86,106	81,004	78,042	97,154	96,816	98,378	90,442	86,828	79,755	92,694	85,398	84,183
26	85,600	80,806	78,498	96,784	97,138	98,088	90,549	86,539	79,686	92,147	85,282	84,661
27	85,268	80,585	78,899	96,430	97,959	97,895	90,594	86,149	79,783	91,340	85,196	85,051
28	85,152	80,378	79,300	96,028	98,732	97,814	90,579	85,774	80,364	91,248	85,282	85,253
29	84,979	80,115	—	95,676	101,307	97,621	90,838	85,528	87,623	92,025	85,326	85,369
30	84,762	79,866	—	95,311	101,097	97,669	91,294	85,354	92,512	93,470	85,383	86,149
31	84,516	79,576	—	94,915	—	97,573	—	85,123	94,018	—	85,398	—
Change[1]	+1,301	−4,694	0	+14,841	+6,593	−2,800	−6,085	−6,354	+9,155	−1,019	−8,954	+722
Equiv. million gallons per day[2]	+42.0	−151.4	0	+478.7	+219.8	−90.3	−202.8	−205.0	+95.3	−34.0	−288.8	+24.1
Equiv. cubic feet per second[3]	+64.9	−234	0	+741	+340	−140	−314	−317	+457	−52.5	−447	+37.2

[1]Change = storage on the last day of the month − storage on the first day of the month. Net change for the year is +2,934.0 million gallons. Minimum/maximum storage for December–May is 75,611/102,096; minimum/maximum storage for June–November is 79,686/105,494.

[2]Net equivalent (equiv.) for year is +8.0 million gallons per day.

[3]Net equiv. for year is +12.4 cubic feet per second.

Table 4. Storage in Neversink Reservoir, New York, for year ending November 30, 2011.

[River Master daily operations record; gage reading at 0800 hours; data provided by New York City. Storage in millions of gallons above elevation 1,319.00 feet. Add 525 million gallons for total contents above sill of outlet tunnel, elevation 1,314.00 feet. Storage at spillway level is 34,941 million gallons. —, not applicable]

Day	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
1	29,647	29,778	29,248	29,172	33,321	35,150	34,660	34,616	31,774	35,110	35,239	34,606
2	32,643	29,455	29,284	28,985	33,249	35,145	34,542	34,528	31,569	35,085	35,170	34,345
3	33,273	29,159	29,306	28,751	33,177	35,135	34,409	34,478	31,354	35,085	35,165	33,944
4	33,514	28,999	29,297	28,522	33,091	35,055	34,443	35,259	31,146	35,110	35,120	33,548
5	33,684	28,852	29,288	28,311	33,081	34,996	34,523	35,150	30,943	35,160	35,090	33,341
6	33,824	28,668	29,311	28,127	33,398	34,823	34,582	35,075	30,730	35,339	35,055	33,125
7	33,901	28,672	29,347	30,538	33,616	34,650	34,640	34,986	30,666	36,009	35,041	32,905
8	33,703	28,712	29,351	31,466	33,813	34,538	34,684	34,853	30,533	35,598	35,036	32,691
9	33,341	28,756	29,151	31,798	33,625	34,409	34,695	34,749	30,515	35,419	35,026	32,481
10	32,972	28,773	28,933	32,023	33,451	34,248	34,739	34,587	30,621	35,224	35,011	32,260
11	32,800	28,791	28,716	34,023	33,283	34,067	34,793	34,409	30,616	35,165	35,001	32,042
12	32,628	28,852	28,486	35,399	33,577	33,949	34,774	34,233	30,607	35,150	34,991	32,027
13	32,819	28,884	28,473	35,244	34,067	33,934	34,730	34,072	30,588	35,090	34,991	31,990
14	32,929	28,870	28,455	35,170	34,513	33,824	34,582	33,906	30,566	35,075	35,036	31,953
15	32,871	28,884	28,442	35,125	34,577	33,910	34,419	33,708	30,612	35,060	35,145	31,939
16	32,848	28,902	28,429	35,095	34,423	34,032	34,262	33,504	31,911	35,045	35,095	31,920
17	32,776	28,924	28,403	35,150	34,848	34,111	34,267	33,485	32,377	35,031	35,085	31,939
18	32,676	28,955	28,416	35,115	35,085	34,350	34,330	33,461	32,216	35,021	35,070	31,925
19	32,567	29,012	28,522	35,244	34,981	35,334	34,370	33,254	31,892	35,016	35,011	31,901
20	32,386	29,426	28,592	35,140	34,936	35,329	34,379	33,240	31,881	35,001	35,016	31,873
21	32,326	29,128	28,632	35,075	34,823	35,229	34,379	33,216	31,822	34,971	35,036	31,846
22	32,184	29,151	28,637	35,006	34,665	35,170	34,389	32,810	31,724	34,981	35,021	31,813
23	32,042	29,155	28,685	34,833	34,513	35,155	34,572	32,586	31,728	35,031	35,006	31,948
24	31,887	29,172	28,725	34,577	34,635	35,006	34,616	32,562	31,789	35,145	34,996	32,269
25	31,728	29,186	28,786	34,414	34,631	34,858	35,254	32,533	31,771	35,120	34,976	32,386
26	31,569	29,190	28,959	34,199	34,675	34,739	35,224	32,691	31,704	35,080	34,956	32,472
27	31,406	29,190	29,074	34,072	34,754	34,695	35,016	32,719	31,713	35,036	34,961	32,533
28	31,202	29,195	29,159	33,925	35,135	34,655	34,784	32,529	32,615	35,165	34,873	32,572
29	30,864	29,204	—	33,761	35,389	34,582	34,853	32,377	35,658	35,404	34,700	32,596
30	30,510	29,213	—	33,601	35,209	34,538	34,734	32,213	35,304	35,419	34,635	32,948
31	30,132	29,231	—	33,427	—	34,670	—	32,000	35,180	—	34,621	—
Change[1]	+485	−547	−89	+4,255	+1,888	−480	+74	−2,616	+3,405	+309	−618	−1,658
Equiv. million gallons per day[2]	+15.6	−17.6	−3.2	+137.3	+62.9	−15.5	+2.5	−84.4	+109.8	+10.3	−19.9	−55.3
Equiv. cubic feet per second[3]	+24.2	−27.3	−4.9	+212	+97.4	−24.0	+3.8	−131	+170	+15.9	−30.8	−85.5

[1]Change = storage on the last day of the month − storage on the first day of the month. Net change for the year is +3,301.0 million gallons. Minimum/maximum storage for December–May is 28,127/35,399; minimum/maximum storage for June–November is 30,515/36,009.

[2]Net equivalent (equiv.) for year is +9.0 million gallons per day.

[3]Net equiv. for year is +14.0 cubic feet per second.

Table 5. Diversions to New York City water-supply system.

[River Master daily operations record. Million gallons per day for 24-hour period beginning 0800 local time. —, not applicable]

Date	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average June 1, 2010, to date
12/1/2010	0	0	0	674
12/2/2010	0	0	0	670
12/3/2010	0	0	0	666
12/4/2010	0	0	0	663
12/5/2010	0	0	0	659
12/6/2010	0	0	0	656
12/7/2010	364	0	330	656
12/8/2010	450	0	411	657
12/9/2010	450	162	407	659
12/10/2010	450	200	199	660
12/11/2010	450	200	197	661
12/12/2010	450	199	203	662
12/13/2010	450	20	204	662
12/14/2010	450	0	204	662
12/15/2010	450	0	212	662
12/16/2010	450	0	174	662
12/17/2010	450	0	211	662
12/18/2010	450	0	213	662
12/19/2010	450	0	214	662
12/20/2010	447	0	152	661
12/21/2010	450	0	199	661
12/22/2010	450	0	209	661
12/23/2010	450	0	212	661
12/24/2010	450	0	212	661
12/25/2010	450	0	212	661
12/26/2010	450	0	212	661
12/27/2010	450	0	216	661
12/28/2010	450	276	385	663
12/29/2010	450	298	409	666
12/30/2010	450	298	409	668
12/31/2010	450	298	413	670
Total	**11,161**	**1,951**	**6,419**	**—**

Date	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average June 1, 2010, to date
1/1/2011	450	298	417	673
1/2/2011	450	298	417	675
1/3/2011	450	298	228	676
1/4/2011	450	299	211	678
1/5/2011	450	299	213	679
1/6/2011	450	299	8	679
1/7/2011	450	299	0	680
1/8/2011	450	299	0	680
1/9/2011	450	299	0	680
1/10/2011	450	299	0	681
1/11/2011	450	299	0	681
1/12/2011	380	299	0	681
1/13/2011	450	299	0	681
1/14/2011	450	299	0	681
1/15/2011	450	299	0	682
1/16/2011	450	299	0	682
1/17/2011	450	299	0	682
1/18/2011	450	299	0	683
1/19/2011	450	299	0	683
1/20/2011	450	298	0	683
1/21/2011	450	296	0	683
1/22/2011	450	295	0	684
1/23/2011	450	295	0	684
1/24/2011	450	298	0	684
1/25/2011	450	298	0	684
1/26/2011	450	298	0	685
1/27/2011	450	298	0	685
1/28/2011	450	298	0	685
1/29/2011	450	298	0	686
1/30/2011	450	298	0	686
1/31/2011	450	298	0	686
Total	**13,880**	**9,246**	**1,494**	**—**

Table 5. Diversions to New York City water-supply system.—Continued

[River Master daily operations record. Million gallons per day for 24-hour period beginning 0800 local time. —, not applicable]

Date	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average June 1, 2010, to date
2/1/2011	450	299	0	686
2/2/2011	450	298	0	687
2/3/2011	450	299	0	687
2/4/2011	450	298	0	687
2/5/2011	450	298	0	687
2/6/2011	450	298	0	688
2/7/2011	450	298	0	688
2/8/2011	310	298	213	688
2/9/2011	450	298	214	689
2/10/2011	450	299	214	690
2/11/2011	451	299	211	692
2/12/2011	451	299	0	692
2/13/2011	451	299	0	692
2/14/2011	450	299	0	692
2/15/2011	450	299	0	692
2/16/2011	450	299	0	693
2/17/2011	450	299	0	693
2/18/2011	450	299	0	693
2/19/2011	450	299	0	693
2/20/2011	450	299	0	693
2/21/2011	450	300	0	694
2/22/2011	450	300	0	694
2/23/2011	450	300	0	694
2/24/2011	450	29	0	693
2/25/2011	0	0	0	691
2/26/2011	0	0	0	688
2/27/2011	0	0	0	686
2/28/2011	308	0	204	685
Total	**10,971**	**6,902**	**1,056**	—

Date	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average June 1, 2010, to date
3/1/2011	450	0	303	685
3/2/2011	450	0	304	686
3/3/2011	450	0	309	686
3/4/2011	450	0	310	686
3/5/2011	311	0	311	686
3/6/2011	310	0	313	686
3/7/2011	13	0	9	683
3/8/2011	0	0	0	681
3/9/2011	0	0	0	678
3/10/2011	0	0	0	676
3/11/2011	0	0	0	674
3/12/2011	0	0	0	671
3/13/2011	0	0	0	669
3/14/2011	0	0	0	667
3/15/2011	0	0	0	664
3/16/2011	0	0	0	662
3/17/2011	0	0	175	660
3/18/2011	0	0	205	659
3/19/2011	0	0	208	657
3/20/2011	0	0	216	656
3/21/2011	0	0	280	654
3/22/2011	0	0	387	653
3/23/2011	244	0	399	653
3/24/2011	428	0	318	654
3/25/2011	450	0	302	654
3/26/2011	451	0	210	654
3/27/2011	451	0	212	654
3/28/2011	450	0	209	654
3/29/2011	450	0	207	654
3/30/2011	450	0	207	654
3/31/2011	449	0	207	654
Total	**6,257**	**0**	**5,601**	—

Table 5. Diversions to New York City water-supply system.—Continued

[River Master daily operations record. Million gallons per day for 24-hour period beginning 0800 local time. —, not applicable]

Date	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average June 1, 2010, to date
4/1/2011	447	0	203	654
4/2/2011	437	0	199	654
4/3/2011	450	0	200	654
4/4/2011	450	0	199	654
4/5/2011	450	0	0	653
4/6/2011	450	200	0	653
4/7/2011	450	201	4	653
4/8/2011	450	201	403	655
4/9/2011	450	0	405	655
4/10/2011	450	0	408	656
4/11/2011	0	0	209	655
4/12/2011	537	0	0	654
4/13/2011	462	0	0	654
4/14/2011	450	0	285	654
4/15/2011	450	0	431	655
4/16/2011	450	0	395	655
4/17/2011	25	0	395	654
4/18/2011	0	0	397	654
4/19/2011	0	0	398	653
4/20/2011	0	0	400	652
4/21/2011	0	0	417	651
4/22/2011	0	0	414	651
4/23/2011	0	0	414	650
4/24/2011	0	0	411	649
4/25/2011	0	0	411	648
4/26/2011	0	0	406	648
4/27/2011	0	0	34	646
4/28/2011	0	0	0	644
4/29/2011	0	0	0	642
4/30/2011	0	0	0	640
Total	**6,858**	**602**	**7,438**	**—**

Date	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average June 1, 2010, to date
5/1/2011	0	0	0	638
5/2/2011	0	0	0	636
5/3/2011	0	0	180	635
5/4/2011	0	0	377	634
5/5/2011	228	0	415	634
5/6/2011	299	0	408	634
5/7/2011	448	0	304	635
5/8/2011	448	0	299	635
5/9/2011	450	0	298	635
5/10/2011	450	0	303	636
5/11/2011	450	0	242	636
5/12/2011	435	266	91	636
5/13/2011	450	300	219	637
5/14/2011	450	300	0	638
5/15/2011	450	300	3	638
5/16/2011	450	39	190	638
5/17/2011	6	0	99	637
5/18/2011	0	0	0	635
5/19/2011	0	0	0	633
5/20/2011	0	0	0	631
5/21/2011	0	0	0	629
5/22/2011	0	0	0	628
5/23/2011	0	0	340	627
5/24/2011	0	0	400	626
5/25/2011	228	0	326	626
5/26/2011	300	0	217	626
5/27/2011	297	0	201	625
5/28/2011	448	0	200	625
5/29/2011	448	0	196	625
5/30/2011	448	0	194	625
5/31/2011	448	2	202	626
Total	**7,631**	**1,207**	**5,704**	**—**

Table 5. Diversions to New York City water-supply system.—Continued

[River Master daily operations record. Million gallons per day for 24-hour period beginning 0800 local time. —, not applicable]

Date	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average June 1, 2011, to date
6/1/2011	448	18	198	664
6/2/2011	449	2	204	660
6/3/2011	449	277	0	682
6/4/2011	449	298	0	698
6/5/2011	449	298	0	708
6/6/2011	449	298	0	714
6/7/2011	450	299	0	719
6/8/2011	449	299	0	723
6/9/2011	450	299	0	726
6/10/2011	450	299	0	728
6/11/2011	451	299	166	745
6/12/2011	451	299	194	762
6/13/2011	312	9	199	743
6/14/2011	300	0	200	726
6/15/2011	300	257	197	728
6/16/2011	301	301	0	720
6/17/2011	302	216	0	708
6/18/2011	302	204	0	697
6/19/2011	302	204	0	687
6/20/2011	302	281	0	682
6/21/2011	302	300	0	678
6/22/2011	302	300	0	674
6/23/2011	90	13	381	666
6/24/2011	0	0	400	655
6/25/2011	0	0	14	629
6/26/2011	0	0	256	615
6/27/2011	176	0	391	613
6/28/2011	200	0	389	612
6/29/2011	201	0	495	615
6/30/2011	285	0	325	615
Total	**9,371**	**5,070**	**4,009**	—

Date	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average June 1, 2011, to date
7/1/2011	302	0	228	612
7/2/2011	303	0	191	609
7/3/2011	26	0	16	591
7/4/2011	0	0	0	574
7/5/2011	0	0	0	558
7/6/2011	152	0	114	550
7/7/2011	368	0	210	550
7/8/2011	400	0	215	552
7/9/2011	400	0	216	554
7/10/2011	400	0	218	555
7/11/2011	400	0	203	556
7/12/2011	400	0	196	557
7/13/2011	400	0	197	558
7/14/2011	401	204	205	564
7/15/2011	400	207	207	570
7/16/2011	400	206	0	570
7/17/2011	400	205	4	571
7/18/2011	400	205	208	576
7/19/2011	400	204	0	577
7/20/2011	400	204	0	577
7/21/2011	303	204	403	584
7/22/2011	341	204	189	587
7/23/2011	400	204	0	587
7/24/2011	401	204	0	587
7/25/2011	401	204	0	588
7/26/2011	401	204	0	588
7/27/2011	401	204	171	591
7/28/2011	317	8	145	589
7/29/2011	445	0	210	590
7/30/2011	449	0	212	592
7/31/2011	449	0	212	593
Total	**10,660**	**2,871**	**4,170**	—

Table 5. Diversions to New York City water-supply system.—Continued

[River Master daily operations record. Million gallons per day for 24-hour period beginning 0800 local time. —, not applicable]

Date	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average June 1, 2011, to date
8/1/2011	451	0	205	594
8/2/2011	451	0	203	595
8/3/2011	452	0	199	596
8/4/2011	452	0	196	596
8/5/2011	451	200	197	600
8/6/2011	452	202	198	604
8/7/2011	451	201	197	607
8/8/2011	438	201	0	608
8/9/2011	305	144	0	606
8/10/2011	451	16	0	604
8/11/2011	451	0	0	602
8/12/2011	451	0	0	600
8/13/2011	0	0	0	591
8/14/2011	0	0	0	584
8/15/2011	144	0	0	578
8/16/2011	0	0	0	570
8/17/2011	0	0	345	567
8/18/2011	4	0	449	566
8/19/2011	476	0	207	567
8/20/2011	500	0	211	569
8/21/2011	500	0	208	571
8/22/2011	498	0	71	571
8/23/2011	301	0	0	568
8/24/2011	300	0	0	564
8/25/2011	1	0	104	559
8/26/2011	0	0	0	553
8/27/2011	0	0	0	546
8/28/2011	0	0	0	540
8/29/2011	0	0	0	534
8/30/2011	0	0	0	528
8/31/2011	0	0	0	523
Total	**7,980**	**964**	**2,990**	—

Date	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average June 1, 2011, to date
9/1/2011	0	0	0	517
9/2/2011	0	0	0	512
9/3/2011	0	0	0	506
9/4/2011	0	0	0	501
9/5/2011	0	0	0	496
9/6/2011	0	0	0	491
9/7/2011	0	0	0	486
9/8/2011	0	0	0	481
9/9/2011	0	0	0	476
9/10/2011	0	0	0	471
9/11/2011	0	0	0	467
9/12/2011	0	0	0	462
9/13/2011	0	0	0	458
9/14/2011	0	0	0	454
9/15/2011	0	0	0	449
9/16/2011	0	0	0	445
9/17/2011	0	0	0	441
9/18/2011	0	0	0	437
9/19/2011	105	0	0	434
9/20/2011	387	0	0	434
9/21/2011	400	0	0	433
9/22/2011	400	145	0	434
9/23/2011	342	137	0	435
9/24/2011	221	327	0	436
9/25/2011	207	344	0	437
9/26/2011	26	467	0	437
9/27/2011	0	479	0	438
9/28/2011	0	101	0	435
9/29/2011	0	0	0	431
9/30/2011	0	0	0	428
Total	**2,088**	**2,000**	**0**	—

Table 5. Diversions to New York City water-supply system.—Continued

[River Master daily operations record. Million gallons per day for 24-hour period beginning 0800 local time. —, not applicable]

Date	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average June 1, 2011, to date
10/1/2011	0	0	0	424
10/2/2011	0	0	0	421
10/3/2011	0	155	0	419
10/4/2011	0	416	0	419
10/5/2011	0	481	0	419
10/6/2011	291	482	0	422
10/7/2011	307	481	0	425
10/8/2011	310	481	0	428
10/9/2011	307	481	0	430
10/10/2011	307	481	0	433
10/11/2011	85	480	0	434
10/12/2011	0	480	0	434
10/13/2011	170	479	0	436
10/14/2011	202	479	0	438
10/15/2011	202	479	0	439
10/16/2011	166	478	0	441
10/17/2011	168	478	0	442
10/18/2011	199	478	0	444
10/19/2011	201	477	0	446
10/20/2011	201	478	0	447
10/21/2011	201	478	0	449
10/22/2011	201	478	0	451
10/23/2011	201	478	0	452
10/24/2011	200	478	0	454
10/25/2011	200	478	0	455
10/26/2011	200	478	0	457
10/27/2011	200	478	175	459
10/28/2011	199	478	187	462
10/29/2011	1	478	101	463
10/30/2011	0	478	0	463
10/31/2011	0	478	0	463
Total	**4,719**	**13,502**	**463**	—

Date	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average June 1, 2011, to date
11/1/2011	0	478	277	465
11/2/2011	0	478	419	468
11/3/2011	173	478	422	472
11/4/2011	166	478	208	474
11/5/2011	209	498	217	477
11/6/2011	199	478	213	480
11/7/2011	203	478	212	482
11/8/2011	200	477	203	485
11/9/2011	192	477	215	487
11/10/2011	201	477	210	490
11/11/2011	201	477	0	491
11/12/2011	200	477	0	492
11/13/2011	200	477	0	493
11/14/2011	200	477	0	494
11/15/2011	200	477	0	495
11/16/2011	200	477	0	496
11/17/2011	200	477	0	497
11/18/2011	201	477	0	498
11/19/2011	202	477	0	499
11/20/2011	201	477	0	500
11/21/2011	201	477	0	501
11/22/2011	201	476	0	502
11/23/2011	201	477	0	503
11/24/2011	202	478	0	504
11/25/2011	202	478	0	505
11/26/2011	201	478	0	506
11/27/2011	201	478	0	507
11/28/2011	201	478	0	508
11/29/2011	200	478	0	509
11/30/2011	17	479	0	509
Total	**5,375**	**14,344**	**2,596**	—

Table 6. Consumption of water by New York City, 1950 to 2011.

[Data furnished by New York City Department of Environmental Protection, Bureau of Water Supply. Mgal/d, million gallons per day; Bgal, billion gallons]

Year	Average daily consumption			Annual consumption (Bgal)
	City proper (Mgal/d)	Outside communities (Mgal/d)	Total (Mgal/d)	
1950	953.3	29.1	982.4	358.6
1951	1,041.9	28.1	1,070.0	390.6
1952	1,087.0	32.7	1,119.7	409.8
1953	1,093.9	44.6	1,138.5	415.6
1954	1,063.4	46.3	1,109.7	405.0
1955	1,109.9	45.3	1,155.2	421.6
1956	1,111.3	48.9	1,160.2	424.6
1957	1,169.0	57.2	1,226.2	447.6
1958	1,152.9	49.6	1,202.5	438.9
1959	1,204.3	60.3	1,264.6	461.6
1960	1,199.4	58.9	1,258.3	460.5
1961	1,221.0	64.0	1,285.0	469.0
1962	1,207.6	68.8	1,276.4	465.9
1963	1,218.0	76.7	1,294.7	472.6
1964	1,189.2	79.4	1,268.6	464.3
1965	1,052.1	71.2	1,123.3	410.0
1966	1,044.9	73.2	1,118.1	408.1
1967	1,135.3	71.0	1,206.3	440.3
1968	1,242.0	78.2	1,320.2	483.2
1969	1,328.7	80.1	1,408.8	514.2
1970	1,400.3	90.4	1,490.7	544.1
1971	1,423.6	87.9	1,511.5	551.7
1972	1,412.4	83.0	1,495.4	547.3
1973	1,448.9	95.4	1,544.3	563.7
1974	1,441.8	96.3	1,538.1	561.4
1975	1,415.0	92.1	1,507.1	550.1
1976	1,435.0	95.8	1,530.8	560.3
1977	1,483.0	104.7	1,587.7	579.5
1978	1,479.4	103.0	1,582.4	577.6
1979	1,513.0	104.6	1,617.6	590.4
1980	1,506.3	110.1	1,616.3	591.6
1981	1,309.5	100.0	1,409.5	514.5
1982	1,383.0	104.8	1,487.8	543.1
1983	1,424.2	112.6	1,536.8	561.0
1984	1,465.2	113.9	1,579.1	578.0
1985	1,325.4	106.5	1,431.9	522.7
1986	1,351.1	115.2	1,466.3	535.2
1987	1,447.1	119.8	1,566.9	571.9
1988	1,484.3	125.6	1,609.9	589.1
1989	1,402.0	113.4	1,515.4	553.2
1990	1,424.4	122.4	1,546.8	564.6
1991	1,469.9	123.6	1,593.5	581.6

Table 6. Consumption of water by New York City, 1950 to 2011.—Continued

[Data furnished by New York City Department of Environmental Protection, Bureau of Water Supply. Mgal/d, million gallons per day; Bgal, billion gallons]

Year	Average daily consumption			Annual consumption (Bgal)
	City proper (Mgal/d)	Outside communities (Mgal/d)	Total (Mgal/d)	
1992	1,368.7	113.9	1,482.6	542.6
1993	1,368.9	118.8	1,487.7	543.0
1994	1,357.8	119.2	1,477.0	539.1
1995	1,326.1	123.1	1,449.2	529.0
1996	1,283.5	120.2	1,403.7	512.4
1997	1,201.3	123.5	1,324.8	483.6
1998	1,220.0	124.7	1,344.7	490.8
1999	1,237.2	128.6	1,365.8	498.5
2000	1,240.4	124.9	1,365.3	499.7
2001	1,184.0	128.4	1,312.4	479.0
2002	1,135.6	121.1	1,256.7	458.7
2003	1,093.7	115.9	1,209.6	441.5
2004	1,099.6	117.5	1,217.1	445.5
2005	1,107.6	123.8	1,231.4	449.5
2006	1,069.2	116.8	1,186.0	432.9
2007	1,114.0	122.9	1,237.0	451.5
2008	1,082.9	114.8	1,197.7	438.4
2009	1,007.2	109.4	1,116.6	407.6
2010	1,039.0	119.0	1,158.0	422.7
2011	1,021.0	116.0	1,137.0	415.0

Table 7. Diversions by New Jersey; daily mean discharge, Delaware and Raritan Canal at Port Mercer, New Jersey (station number 01460440), for report year ending November 30, 2011.

[U.S. Geological Survey published record. All values except totals are in million gallons per day, Mgal/d; totals are in million gallons, Mgal; —, not applicable]

Day	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
1	89	92	90	81	88	86	92	85	74	[1]19	[1]8	[1]6
2	85	93	94	78	86	90	90	85	85	[1]19	[1]8	[1]6
3	88	92	91	80	87	91	91	83	86	[1]16	[1]8	[1]5
4	88	94	91	80	89	90	92	78	92	[1]16	[1]6	[1]4
5	87	92	94	80	90	87	95	79	88	[1]13	[1]6	[1]3
6	87	89	94	69	87	89	94	98	89	[1]12	[1]6	[1]1
7	87	90	93	43	87	90	93	97	89	[1]12	[1]6	[1]1
8	87	91	95	85	86	90	94	105	89	[1]10	[1]5	[1]8
9	88	89	90	94	88	90	99	101	92	[1]10	[1]5	45
10	90	90	91	92	92	92	102	99	89	[1]10	[1]5	47
11	89	94	92	47	89	91	98	100	89	[1]8	[1]5	48
12	92	96	90	81	90	92	100	101	87	[1]8	[1]5	44
13	87	94	89	89	74	90	96	102	81	[1]8	[1]5	46
14	86	94	92	90	86	91	101	101	70	[1]6	[1]5	55
15	88	93	88	95	89	94	93	100	70	[1]6	[1]5	69
16	88	94	90	91	78	88	89	98	101	[1]6	[1]5	72
17	94	95	84	92	−41	85	101	100	96	[1]6	[1]5	74
18	91	103	82	94	94	87	93	99	96	[1]6	[1]5	76
19	96	100	78	94	92	87	94	101	96	[1]6	[1]5	77
20	94	97	80	92	[1]93	90	81	100	98	[1]6	[1]5	79
21	94	94	85	88	92	91	84	98	87	[1]6	[1]5	78
22	97	86	86	89	[1]93	93	87	95	56	[1]6	[1]5	80
23	94	81	84	85	89	92	86	83	98	[1]8	[1]5	21
24	94	80	83	84	87	90	87	79	87	[1]8	[1]5	61
25	94	84	63	85	77	101	83	79	92	[1]8	[1]5	61
26	92	86	74	88	81	98	83	85	93	[1]8	[1]5	62
27	84	91	83	88	87	94	86	82	89	[1]8	[1]5	64
28	86	94	82	85	85	95	86	81	[1]39	[1]8	[1]5	65
29	92	94	—	85	78	95	86	84	[1]26	[1]8	[1]6	68
30	92	94	—	86	85	94	87	81	[1]23	[1]8	[1]6	58
31	92	91	—	89	—	93	—	72	[1]23	—	[1]6	—
Total[2]	**2,792**	**2,847**	**2,428**	**2,599**	**2,478**	**2,826**	**2,743**	**2,831**	**2,470**	**266**	**167**	**1,383**
Mean[3]	90.1	91.8	86.7	83.8	82.6	91.2	91.4	91.3	79.7	8.9	5.4	47.4

[1]Estimated.

[2]Year total is 25,823 Mgal.

[3]Year mean is 70.8 Mgal/d.

Table 8. New York City reservoir release design data.

[River Master daily operations record. Montague design rate = 1,750 cubic feet per second (ft^3/s) from December 1, 2009, to November 30, 2011. Column (Col.) 1 and Col. 2 are furnished by power companies; Col. 3 is computed from index stations; Col. 4 is the increase in runoff computed on the basis of quantitative precipitation forecasts; Col. 5 = Col. 1 + Col. 2 + Col. 3 + Col. 4; Col. 6 = design rate − Col. 5, when positive, otherwise Col. 6 = 0; Col. 7 = Col. 14 (4 days earlier); Col. 8 = Col. 6 + Col. 7, when positive, otherwise Col. 8 =0; Col. 9 = Col. 7 from table 9; Col. 10 = summation of Col. 9; Col. 11 = design rate − (Col. 9 + Col. 10 from table 9), when positive, otherwise Col. 11 = 0; Col. 12 = summation of Col. 11; Col. 13 = Col. 10 − Col. 12; Col. 14 = Col. 13 divided by −10, limited to ± 50 ft^3/s. The estimated Montague discharge was greater than the Montague design rate from December 1, 2010, to July 19, 2011, and from August 6, 2011, to November 30, 2011.

Advance estimate of discharge of Delaware River at Montague, New Jersey, exclusive of New York City reservoir releases							Indicated deficiency (ft^3/s)	Balancing adjustment (ft^3/s)	Directed release (ft^3/s)	Computation of balancing adjustment					
Date of advance estimate	Powerplant release forecasts		Uncontrolled runoff		Montague date	Discharge (ft^3/s)				Adjusted directed release		Actual deficiency		Cumulative difference (ft^3/s)-d	Balancing adjustment (ft^3/s)
	Lake Wallenpaupack (ft^3/s)	Rio Reservoir (ft^3/s)	Current condition (ft^3/s)	Weather adjustment (ft^3/s)						Daily (ft^3/s)	Cumulative ([ft^3/s]-d)	Daily (ft^3/s)	Cumulative ([ft^3/s]-d)		
2011	Col. 1	Col. 2	Col. 3	Col. 4	2011	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12	Col. 13	Col. 14
7/20	443	106	1,271	0	7/23	1,820	0	0	0	0	0	0	0	0	0
7/21	302	106	1,165	0	7/24	1,573	177	0	177	177	177	0	0	177	−18
7/22	302	106	1,025	5	7/25	1,438	312	0	312	312	489	0	0	489	−49
7/23	264	106	947	266	7/26	1,583	167	0	167	167	656	0	0	656	−50
7/24	264	106	881	156	7/27	1,407	343	0	343	343	999	0	0	999	−50
7/25	264	106	846	205	7/28	1,421	329	−18	311	311	1,310	0	0	1,310	−50
7/26	264	106	1,420	76	7/29	1,866	0	−49	0	0	1,310	0	0	1,310	−50
7/27	347	142	1,331	16	7/30	1,836	0	−50	0	0	1,310	0	0	1,310	−50
7/28	264	248	1,161	404	7/31	2,077	0	−50	0	0	1,310	0	0	1,310	−50
7/29	264	248	1,036	660	8/1	2,208	0	−50	0	0	1,310	0	0	1,310	−50
7/30	264	248	1,462	18	8/2	1,992	0	−50	0	0	1,310	0	0	1,310	−50
7/31	264	248	1,390	26	8/3	1,928	0	−50	0	0	1,310	0	0	1,310	−50
8/1	264	195	1,279	37	8/4	1,775	0	−50	0	0	1,310	0	0	1,310	−50
8/2	264	213	1,271	63	8/5	1,811	0	−50	0	0	1,310	0	0	1,310	−50
8/3	288	0	1,184	538	8/6	2,010	0	−50	0	0	1,310	0	0	1,310	−50
8/4	0	71	1,619	741	8/7	2,431	0	−50	0	0	1,310	0	0	1,310	−50
8/5	176	0	1,553	587	8/8	2,316	0	−50	0	0	1,310	0	0	1,310	−50

Table 9. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey.

[River Master daily operations record. Mean discharge in cubic feet per second for 24 hours. Column (Col.) 2, 24 hours beginning 1200 of date shown; Col. 3, 24 hours ending 2400 1 day later; Col. 4, 24 hours beginning 1500 1 day later; Col. 5, 24 hours beginning 0800 of date shown; Col. 6, 24 hours beginning 1600 of date shown; Col. 7 = Col. 2 + Col. 3 + Col. 4 in response to direction (Col. 1); Col. 8 = Col. 2 + Col. 3 + Col. 4 − Col. 7; Col. 9 = Col. 5 + Col. 6; Col. 10 = Col. 11 − Col. 7 − Col. 8 − Col. 9; Col. 11 = 24 hours of calendar day shown; Col. 12, Interim Excess Release Quantity (IERQ) releases to meet the Trenton, New Jersey, flow objective and releases to relieve thermal stress (Th); —, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow, Delaware River at Montague, New Jersey						IERQ bank releases
Directed		Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	Controlled releases			Computed uncontrolled	Total	
									New York City reservoirs		Power-plants			
Date	Amount								Directed	Other				
2010	Col. 1	Col. 2	Col. 3	Col. 4	2010	Col. 5	Col. 6	2010	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
11/28	0	85	200	60	11/30	380	833	12/1	0	345	1,213	8,192	9,750	0
11/29	0	85	200	62	12/1	846	833	12/2	0	347	1,679	32,874	34,900	0
11/30	0	87	201	71	12/2	825	833	12/3	0	359	1,658	20,283	22,300	0
12/1	0	71	200	114	12/3	879	833	12/4	0	385	1,712	13,503	15,600	0
12/2	0	84	274	189	12/4	964	663	12/5	0	547	1,627	10,126	12,300	0
12/3	0	85	340	190	12/5	851	663	12/6	0	615	1,514	8,071	10,200	0
12/4	0	85	340	190	12/6	787	663	12/7	0	615	1,450	6,975	9,040	0
12/5	0	85	342	181	12/7	1,099	663	12/8	0	608	1,762	5,940	8,310	0
12/6	0	178	402	190	12/8	885	603	12/9	0	770	1,488	5,012	7,270	0
12/7	0	186	763	190	12/9	679	674	12/10	0	1,139	1,353	4,038	6,530	0
12/8	0	186	1,316	190	12/10	480	230	12/11	0	1,692	710	4,038	6,440	0
12/9	0	186	1,471	190	12/11	234	248	12/12	0	1,847	482	4,431	6,760	0
12/10	0	186	1,493	190	12/12	334	337	12/13	0	1,869	671	8,460	11,000	0
12/11	0	186	1,491	190	12/13	937	674	12/14	0	1,867	1,611	9,422	12,900	0
12/12	0	186	1,501	190	12/14	1,554	443	12/15	0	1,877	1,997	7,026	10,900	0
12/13	0	186	1,505	162	12/15	1,549	674	12/16	0	1,853	2,223	6,124	10,200	0
12/14	0	186	1,505	99	12/16	713	674	12/17	0	1,790	1,387	5,193	8,370	0
12/15	0	186	1,496	101	12/17	470	674	12/18	0	1,783	1,144	4,583	7,510	0
12/16	0	186	1,272	101	12/18	256	479	12/19	0	1,559	735	4,606	6,900	0
12/17	0	186	1,497	101	12/19	330	319	12/20	0	1,784	649	3,957	6,390	0
12/18	0	186	1,497	99	12/20	413	177	12/21	0	1,782	590	3,968	6,340	0
12/19	0	184	1,491	101	12/21	416	248	12/22	0	1,776	664	3,440	5,880	0
12/20	0	186	1,501	101	12/22	670	337	12/23	0	1,788	1,007	3,075	5,870	0
12/21	0	186	1,502	101	12/23	449	337	12/24	0	1,789	786	2,905	5,480	0
12/22	0	186	1,497	101	12/24	0	390	12/25	0	1,784	390	2,756	4,930	0
12/23	0	186	1,501	101	12/25	0	390	12/26	0	1,788	390	2,652	4,830	0

Table 9. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey.—Continued

[River Master daily operations record. Mean discharge in cubic feet per second for 24 hours. Column (Col.) 2, 24 hours beginning 1200 of date shown; Col. 3, 24 hours ending 2400 1 day later; Col. 4, 24 hours beginning 1500 1 day later; Col. 5, 24 hours beginning 0800 of date shown; Col. 6, 24 hours beginning 1600 of date shown; Col. 7 = Col. 2 + Col. 3 + Col. 4 in response to direction (Col. 1); Col. 8 = Col. 2 + Col. 3 + Col. 4 − Col. 7; Col. 9 = Col. 5 + Col. 6; Col. 10 = Col. 11 − Col. 7 − Col. 8 − Col. 9; Col. 11 = 24 hours of calendar day shown; Col. 12, Interim Excess Release Quantity (IERQ) releases to meet the Trenton, New Jersey, flow objective and releases to relieve thermal stress (Th); —, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow, Delaware River at Montague, New Jersey						
Directed		Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	Controlled releases			Computed uncontrolled	Total	IERQ bank releases
									New York City reservoirs		Power-plants			
Date	Amount								Directed	Other				
2010/2011	Col. 1	Col. 2	Col. 3	Col. 4	2010/2011	Col. 5	Col. 6	2010/2011	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
12/24	0	186	1,448	101	12/26	0	390	12/27	0	1,735	390	2,445	4,570	0
12/25	0	186	1,067	101	12/27	323	390	12/28	0	1,354	713	2,493	4,560	0
12/26	0	186	665	101	12/28	422	390	12/29	0	952	812	2,256	4,020	0
12/27	0	186	357	101	12/29	464	284	12/30	0	644	748	2,358	3,750	0
12/28	0	186	334	94	12/30	410	248	12/31	0	614	658	2,298	3,570	0
12/29	0	186	342	65	12/31	0	248	1/1	0	593	248	2,429	3,270	0
12/30	0	186	347	65	1/1	0	248	1/2	0	598	248	2,394	3,240	0
12/31	0	186	345	65	1/2	0	71	1/3	0	596	71	2,813	3,480	0
1/1	0	186	343	65	1/3	358	248	1/4	0	594	606	2,690	3,890	0
1/2	0	186	345	65	1/4	360	248	1/5	0	596	608	2,446	3,650	0
1/3	0	186	343	65	1/5	332	248	1/6	0	594	580	2,206	3,380	0
1/4	0	186	345	65	1/6	357	248	1/7	0	596	605	2,049	3,250	0
1/5	0	170	251	65	1/7	329	106	1/8	0	486	435	2,169	3,090	0
1/6	0	85	198	65	1/8	0	0	1/9	0	348	0	2,062	2,410	0
1/7	0	84	196	65	1/9	62	124	1/10	0	345	186	2,509	3,040	0
1/8	0	84	198	65	1/10	436	284	1/11	0	347	720	2,543	3,610	0
1/9	0	87	198	65	1/11	510	213	1/12	0	350	723	2,207	3,280	0
1/10	0	87	200	65	1/12	590	0	1/13	0	352	590	2,438	3,380	0
1/11	0	85	196	65	1/13	498	35	1/14	0	346	533	2,261	3,140	0
1/12	0	85	203	65	1/14	314	0	1/15	0	353	314	2,223	2,890	0
1/13	0	85	258	65	1/15	0	0	1/16	0	408	0	1,892	2,300	0
1/14	0	85	340	65	1/16	32	0	1/17	0	490	32	2,148	2,670	0
1/15	0	85	342	65	1/17	522	0	1/18	0	492	522	2,096	3,110	0
1/16	0	85	342	65	1/18	546	0	1/19	0	492	546	2,402	3,440	0
1/17	0	85	342	65	1/19	749	0	1/20	0	492	749	2,799	4,040	0

Table 9. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey.—Continued

[River Master daily operations record. Mean discharge in cubic feet per second for 24 hours. Column (Col.) 2, 24 hours beginning 1200 of date shown; Col. 3, 24 hours ending 2400 1 day later; Col. 4, 24 hours beginning 1500 1 day later; Col. 5, 24 hours beginning 0800 of date shown; Col. 6, 24 hours beginning 1600 of date shown; Col. 7 = Col. 2 + Col. 3 + Col. 4 in response to direction (Col. 1); Col. 8 = Col. 2 + Col. 3 + Col. 4 − Col. 7; Col. 9 = Col. 5 + Col. 6; Col. 10 = Col. 11 − Col. 7 − Col. 8 − Col. 9; Col. 11 = 24 hours of calendar day shown; Col. 12, Interim Excess Release Quantity (IERQ) releases to meet the Trenton, New Jersey, flow objective and releases to relieve thermal stress (Th); —, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow, Delaware River at Montague, New Jersey						
Directed		Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	Controlled releases			Computed uncontrolled	Total	IERQ bank releases
									New York City reservoirs		Power-plants			
Date	Amount								Directed	Other				
2011	Col. 1	Col. 2	Col. 3	Col. 4	2011	Col. 5	Col. 6	2011	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
1/18	0	85	342	65	1/20	739	0	1/21	0	492	739	2,819	4,050	0
1/19	0	85	340	65	1/21	923	0	1/22	0	490	923	2,687	4,100	0
1/20	0	85	343	65	1/22	740	0	1/23	0	493	740	2,367	3,600	0
1/21	0	85	340	65	1/23	769	301	1/24	0	490	1,070	2,240	3,800	0
1/22	0	85	342	65	1/24	664	266	1/25	0	492	930	2,278	3,700	0
1/23	0	85	340	65	1/25	764	71	1/26	0	490	835	2,645	3,970	0
1/24	0	93	340	65	1/26	743	71	1/27	0	498	814	2,288	3,600	0
1/25	0	186	340	65	1/27	352	53	1/28	0	591	405	2,704	3,700	0
1/26	0	186	340	65	1/28	353	0	1/29	0	591	353	2,256	3,200	0
1/27	0	186	340	65	1/29	0	142	1/30	0	591	142	2,067	2,800	0
1/28	0	93	340	65	1/30	57	0	1/31	0	498	57	1,945	2,500	0
1/29	0	85	340	65	1/31	567	0	2/1	0	490	567	2,143	3,200	0
1/30	0	85	339	65	2/1	525	0	2/2	0	489	525	2,186	3,200	0
1/31	0	85	340	65	2/2	473	0	2/3	0	490	473	2,037	3,000	0
2/1	0	85	340	65	2/3	525	0	2/4	0	490	525	2,185	3,200	0
2/2	0	85	337	68	2/4	648	0	2/5	0	490	648	2,362	3,500	0
2/3	0	85	342	101	2/5	0	0	2/6	0	528	0	2,072	2,600	0
2/4	0	85	347	101	2/6	0	71	2/7	0	533	71	2,496	3,100	0
2/5	0	85	345	101	2/7	387	89	2/8	0	531	476	2,593	3,600	0
2/6	0	85	343	101	2/8	395	89	2/9	0	529	484	2,687	3,700	0
2/7	0	85	347	101	2/9	443	0	2/10	0	533	443	2,524	3,500	0
2/8	0	85	345	101	2/10	394	0	2/11	0	531	394	2,275	3,200	0
2/9	0	85	345	101	2/11	441	0	2/12	0	531	441	2,228	3,200	0
2/10	0	204	343	101	2/12	0	0	2/13	0	648	0	2,152	2,800	0
2/11	0	206	343	101	2/13	19	0	2/14	0	650	19	2,131	2,800	0
2/12	0	206	343	101	2/14	307	0	2/15	0	650	307	2,443	3,400	0

Table 9. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey.—Continued

[River Master daily operations record. Mean discharge in cubic feet per second for 24 hours. Column (Col.) 2, 24 hours beginning 1200 of date shown; Col. 3, 24 hours ending 2400 1 day later; Col. 4, 24 hours beginning 1500 1 day later; Col. 5, 24 hours beginning 0800 of date shown; Col. 6, 24 hours beginning 1600 of date shown; Col. 7 = Col. 2 + Col. 3 + Col. 4 in response to direction (Col. 1); Col. 8 = Col. 2 + Col. 3 + Col. 4 − Col. 7; Col. 9 = Col. 5 + Col. 6; Col. 10 = Col. 11 − Col. 7 − Col. 8 − Col. 9; Col. 11 = 24 hours of calendar day shown; Col. 12, Interim Excess Release Quantity (IERQ) releases to meet the Trenton, New Jersey, flow objective and releases to relieve thermal stress (Th); —, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow, Delaware River at Montague, New Jersey						
Directed		Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	Controlled releases			Computed uncontrolled	Total	IERQ bank releases
									New York City reservoirs		Power-plants			
Date	Amount								Directed	Other				
2011	Col. 1	Col. 2	Col. 3	Col. 4	2011	Col. 5	Col. 6	2011	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
2/13	0	206	340	101	2/15	314	0	2/16	0	647	314	2,539	3,500	0
2/14	0	206	340	101	2/16	304	0	2/17	0	647	304	2,349	3,300	0
2/15	0	206	340	96	2/17	355	0	2/18	0	642	355	2,503	3,500	0
2/16	0	206	340	65	2/18	251	0	2/19	0	636	251	4,013	4,900	0
2/17	0	139	342	65	2/19	0	0	2/20	0	546	0	6,154	6,700	0
2/18	0	105	345	65	2/20	0	0	2/21	0	515	0	5,585	6,100	0
2/19	0	105	343	65	2/21	0	0	2/22	0	513	0	4,987	5,500	0
2/20	0	105	340	65	2/22	0	0	2/23	0	510	0	4,190	4,700	0
2/21	0	105	339	65	2/23	0	18	2/24	0	509	18	4,173	4,700	0
2/22	0	105	340	65	2/24	0	248	2/25	0	510	248	4,242	5,000	0
2/23	0	105	342	65	2/25	0	160	2/26	0	512	160	7,228	7,900	0
2/24	0	105	343	65	2/26	0	337	2/27	0	513	337	7,150	8,000	0
2/25	0	105	343	65	2/27	0	408	2/28	0	513	408	6,889	7,810	0
2/26	0	105	342	71	2/28	0	532	3/1	0	518	532	11,150	12,200	0
2/27	0	105	342	101	3/1	1,437	426	3/2	0	548	1,863	10,189	12,600	0
2/28	0	105	342	101	3/2	1,625	496	3/3	0	548	2,121	7,931	10,600	0
3/1	0	105	343	101	3/3	1,677	496	3/4	0	549	2,173	6,618	9,340	0
3/2	0	105	393	65	3/4	1,686	851	3/5	0	574	2,537	6,739	9,850	0
3/3	0	105	1,405	65	3/5	1,686	532	3/6	0	1,575	2,218	12,807	16,600	0
3/4	0	105	1,494	65	3/6	1,680	727	3/7	0	1,664	2,407	60,329	64,400	0
3/5	0	105	1,501	65	3/7	1,679	851	3/8	0	1,671	2,530	32,999	37,200	0
3/6	0	91	1,511	91	3/8	1,675	851	3/9	0	1,693	2,526	20,181	24,400	0
3/7	0	127	1,505	189	3/9	1,675	851	3/10	0	1,821	2,526	16,353	20,700	0
3/8	0	668	1,502	192	3/10	1,671	851	3/11	0	2,362	2,522	66,116	71,000	0
3/9	0	161	585	127	3/11	1,285	851	3/12	0	873	2,136	60,591	63,600	0

Table 9. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey.—Continued

[River Master daily operations record. Mean discharge in cubic feet per second for 24 hours. Column (Col.) 2, 24 hours beginning 1200 of date shown; Col. 3, 24 hours ending 2400 1 day later; Col. 4, 24 hours beginning 1500 1 day later; Col. 5, 24 hours beginning 0800 of date shown; Col. 6, 24 hours beginning 1600 of date shown; Col. 7 = Col. 2 + Col. 3 + Col. 4 in response to direction (Col. 1); Col. 8 = Col. 2 + Col. 3 + Col. 4 − Col. 7; Col. 9 = Col. 5 + Col. 6; Col. 10 = Col. 11 − Col. 7 − Col. 8 − Col. 9; Col. 11 = 24 hours of calendar day shown; Col. 12, Interim Excess Release Quantity (IERQ) releases to meet the Trenton, New Jersey, flow objective and releases to relieve thermal stress (Th); —, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow, Delaware River at Montague, New Jersey						
Directed		Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	Controlled releases			Computed uncontrolled	Total	IERQ bank releases
									New York City reservoirs		Power-plants			
Date	Amount								Directed	Other				
2011	Col. 1	Col. 2	Col. 3	Col. 4	2011	Col. 5	Col. 6	2011	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
3/10	0	57	84	175	3/12	1,721	851	3/13	0	316	2,572	37,712	40,600	0
3/11	0	90	84	183	3/13	1,721	851	3/14	0	357	2,572	28,671	31,600	0
3/12	0	572	80	184	3/14	1,718	851	3/15	0	836	2,569	21,395	24,800	0
3/13	0	77	82	190	3/15	1,718	851	3/16	0	349	2,569	18,982	21,900	0
3/14	0	65	439	190	3/16	1,721	851	3/17	0	694	2,572	18,934	22,200	0
3/15	0	260	1,349	190	3/17	1,721	851	3/18	0	1,799	2,572	17,529	21,900	0
3/16	0	685	1,499	187	3/18	1,721	851	3/19	0	2,371	2,572	19,757	24,700	0
3/17	0	701	1,501	189	3/19	1,721	851	3/20	0	2,391	2,572	18,037	23,000	0
3/18	0	538	1,501	190	3/20	1,721	851	3/21	0	2,229	2,572	14,999	19,800	0
3/19	0	90	1,513	190	3/21	1,724	851	3/22	0	1,793	2,575	14,232	18,600	0
3/20	0	105	1,484	190	3/22	1,724	851	3/23	0	1,779	2,575	13,346	17,700	0
3/21	0	370	1,497	190	3/23	1,724	851	3/24	0	2,057	2,575	11,468	16,100	0
3/22	0	687	1,496	190	3/24	1,728	851	3/25	0	2,373	2,579	9,348	14,300	0
3/23	0	699	1,504	190	3/25	1,725	851	3/26	0	2,393	2,576	7,531	12,500	0
3/24	0	702	1,502	190	3/26	1,728	124	3/27	0	2,379	1,852	6,169	10,400	0
3/25	0	702	1,497	190	3/27	1,728	142	3/28	0	2,389	1,870	5,551	9,810	0
3/26	0	701	1,499	189	3/28	1,728	284	3/29	0	2,389	2,012	4,879	9,280	0
3/27	0	701	1,502	190	3/29	1,733	248	3/30	0	2,393	1,981	4,506	8,880	0
3/28	0	701	1,496	189	3/30	1,430	248	3/31	0	2,386	1,678	4,216	8,280	0
3/29	0	701	1,493	186	3/31	747	319	4/1	0	2,380	1,066	4,774	8,220	0
3/30	0	701	1,493	65	4/1	760	390	4/2	0	2,259	1,150	5,701	9,110	0
3/31	0	701	1,496	65	4/2	777	248	4/3	0	2,262	1,025	5,443	8,730	0
4/1	0	701	1,501	65	4/3	756	355	4/4	0	2,267	1,111	5,262	8,640	0
4/2	0	701	1,502	63	4/4	538	390	4/5	0	2,266	928	6,396	9,590	0
4/3	0	701	1,496	65	4/5	540	390	4/6	0	2,262	930	10,308	13,500	0

Table 9. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey.—Continued

[River Master daily operations record. Mean discharge in cubic feet per second for 24 hours. Column (Col.) 2, 24 hours beginning 1200 of date shown; Col. 3, 24 hours ending 2400 1 day later; Col. 4, 24 hours beginning 1500 1 day later; Col. 5, 24 hours beginning 0800 of date shown; Col. 6, 24 hours beginning 1600 of date shown; Col. 7 = Col. 2 + Col. 3 + Col. 4 in response to direction (Col. 1); Col. 8 = Col. 2 + Col. 3 + Col. 4 − Col. 7; Col. 9 = Col. 5 + Col. 6; Col. 10 = Col. 11 − Col. 7 − Col. 8 − Col. 9; Col. 11 = 24 hours of calendar day shown; Col. 12, Interim Excess Release Quantity (IERQ) releases to meet the Trenton, New Jersey, flow objective and releases to relieve thermal stress (Th); —, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow, Delaware River at Montague, New Jersey						
Directed		Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	Controlled releases			Computed uncontrolled	Total	IERQ bank releases
									New York City reservoirs		Power-plants			
Date	Amount								Directed	Other				
2011	Col. 1	Col. 2	Col. 3	Col. 4	2011	Col. 5	Col. 6	2011	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
4/4	0	699	1,501	65	4/6	332	390	4/7	0	2,265	722	9,913	12,900	0
4/5	0	701	1,499	65	4/7	266	390	4/8	0	2,265	656	9,079	12,000	0
4/6	0	701	1,494	65	4/8	257	248	4/9	0	2,260	505	7,835	10,600	0
4/7	0	701	1,499	65	4/9	0	355	4/10	0	2,265	355	6,940	9,560	0
4/8	0	701	1,499	65	4/10	8	213	4/11	0	2,265	221	6,684	9,170	0
4/9	0	688	1,496	65	4/11	0	337	4/12	0	2,249	337	6,484	9,070	0
4/10	0	220	1,501	65	4/12	15	638	4/13	0	1,786	653	8,061	10,500	0
4/11	0	84	1,508	65	4/13	733	248	4/14	0	1,657	981	8,962	11,600	0
4/12	0	87	1,502	65	4/14	808	195	4/15	0	1,654	1,003	7,543	10,200	0
4/13	0	87	1,501	65	4/15	566	124	4/16	0	1,653	690	6,597	8,940	0
4/14	0	87	1,499	65	4/16	0	124	4/17	0	1,651	124	20,525	22,300	0
4/15	0	91	1,499	65	4/17	1,702	230	4/18	0	1,655	1,932	21,013	24,600	0
4/16	0	415	1,497	73	4/18	1,724	426	4/19	0	1,985	2,150	15,365	19,500	0
4/17	0	699	1,496	121	4/19	1,724	426	4/20	0	2,316	2,150	14,634	19,100	0
4/18	0	699	1,493	190	4/20	1,724	426	4/21	0	2,382	2,150	13,068	17,600	0
4/19	0	699	1,494	181	4/21	1,721	426	4/22	0	2,374	2,147	10,479	15,000	0
4/20	0	699	1,505	108	4/22	579	426	4/23	0	2,312	1,005	9,783	13,100	0
4/21	0	699	1,510	65	4/23	0	426	4/24	0	2,274	426	15,600	18,300	0
4/22	0	702	1,508	65	4/24	136	426	4/25	0	2,275	562	14,063	16,900	0
4/23	0	699	1,507	65	4/25	1,721	426	4/26	0	2,271	2,147	15,982	20,400	0
4/24	0	699	1,508	65	4/26	1,639	550	4/27	0	2,272	2,189	22,739	27,200	0
4/25	0	699	1,508	65	4/27	1,414	443	4/28	0	2,272	1,857	29,471	33,600	0
4/26	0	571	1,505	67	4/28	1,426	798	4/29	0	2,143	2,224	42,333	46,700	0
4/27	0	73	774	190	4/29	1,668	851	4/30	0	1,037	2,519	28,444	32,000	0
4/28	0	65	82	190	4/30	1,718	851	5/1	0	337	2,569	21,294	24,200	0

Table 9. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey.—Continued

[River Master daily operations record. Mean discharge in cubic feet per second for 24 hours. Column (Col.) 2, 24 hours beginning 1200 of date shown; Col. 3, 24 hours ending 2400 1 day later; Col. 4, 24 hours beginning 1500 1 day later; Col. 5, 24 hours beginning 0800 of date shown; Col. 6, 24 hours beginning 1600 of date shown; Col. 7 = Col. 2 + Col. 3 + Col. 4 in response to direction (Col. 1); Col. 8 = Col. 2 + Col. 3 + Col. 4 − Col. 7; Col. 9 = Col. 5 + Col. 6; Col. 10 = Col. 11 − Col. 7 − Col. 8 − Col. 9; Col. 11 = 24 hours of calendar day shown; Col. 12, Interim Excess Release Quantity (IERQ) releases to meet the Trenton, New Jersey, flow objective and releases to relieve thermal stress (Th); —, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow, Delaware River at Montague, New Jersey						
Directed		Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	Controlled releases			Computed uncontrolled	Total	IERQ bank releases
									New York City reservoirs		Power-plants			
Date	Amount								Directed	Other				
2011	Col. 1	Col. 2	Col. 3	Col. 4	2011	Col. 5	Col. 6	2011	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
4/29	0	65	80	159	5/1	1,718	851	5/2	0	304	2,569	16,627	19,500	0
4/30	0	65	145	85	5/2	1,718	851	5/3	0	295	2,569	13,736	16,600	0
5/1	0	101	201	85	5/3	1,330	851	5/4	0	387	2,181	13,932	16,500	0
5/2	0	108	200	85	5/4	624	851	5/5	0	393	1,475	19,032	20,900	0
5/3	0	110	198	85	5/5	1,019	851	5/6	0	393	1,870	16,137	18,400	0
5/4	0	102	203	85	5/6	289	851	5/7	0	390	1,140	12,970	14,500	0
5/5	0	110	201	85	5/7	0	851	5/8	0	396	851	11,253	12,500	0
5/6	0	110	201	85	5/8	55	851	5/9	0	396	906	9,698	11,000	0
5/7	0	110	201	85	5/9	689	319	5/10	0	396	1,008	7,996	9,400	0
5/8	0	110	203	85	5/10	726	319	5/11	0	398	1,045	6,947	8,390	0
5/9	0	110	203	85	5/11	765	443	5/12	0	398	1,208	5,994	7,600	0
5/10	0	110	201	85	5/12	694	301	5/13	0	396	995	5,089	6,480	0
5/11	0	110	201	85	5/13	178	372	5/14	0	396	550	4,594	5,540	0
5/12	0	110	201	85	5/14	0	479	5/15	0	396	479	4,035	4,910	0
5/13	0	110	201	85	5/15	0	514	5/16	0	396	514	5,050	5,960	0
5/14	0	110	201	85	5/16	409	638	5/17	0	396	1,047	6,497	7,940	0
5/15	0	110	201	85	5/17	1,306	603	5/18	0	396	1,909	7,485	9,790	0
5/16	0	108	201	84	5/18	1,340	514	5/19	0	393	1,854	17,353	19,600	0
5/17	0	110	201	85	5/19	1,364	851	5/20	0	396	2,215	25,889	28,500	0
5/18	0	110	203	87	5/20	1,540	851	5/21	0	400	2,391	25,809	28,600	0
5/19	0	110	203	90	5/21	1,622	390	5/22	0	403	2,012	20,185	22,600	0
5/20	0	111	240	101	5/22	1,554	408	5/23	0	452	1,962	15,086	17,500	0
5/21	0	130	255	101	5/23	20	337	5/24	0	486	357	14,757	15,600	0
5/22	0	127	255	101	5/24	0	851	5/25	0	483	851	13,266	14,600	0
5/23	0	133	255	101	5/25	325	461	5/26	0	489	786	10,525	11,800	0

Table 9. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey.—Continued

[River Master daily operations record. Mean discharge in cubic feet per second for 24 hours. Column (Col.) 2, 24 hours beginning 1200 of date shown; Col. 3, 24 hours ending 2400 1 day later; Col. 4, 24 hours beginning 1500 1 day later; Col. 5, 24 hours beginning 0800 of date shown; Col. 6, 24 hours beginning 1600 of date shown; Col. 7 = Col. 2 + Col. 3 + Col. 4 in response to direction (Col. 1); Col. 8 = Col. 2 + Col. 3 + Col. 4 − Col. 7; Col. 9 = Col. 5 + Col. 6; Col. 10 = Col. 11 − Col. 7 − Col. 8 − Col. 9; Col. 11 = 24 hours of calendar day shown; Col. 12, Interim Excess Release Quantity (IERQ) releases to meet the Trenton, New Jersey, flow objective and releases to relieve thermal stress (Th); —, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow, Delaware River at Montague, New Jersey						
Directed		Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	Controlled releases			Computed uncontrolled	Total	IERQ bank releases
									New York City reservoirs		Power-plants			
Date	Amount								Directed	Other				
2011	Col. 1	Col. 2	Col. 3	Col. 4	2011	Col. 5	Col. 6	2011	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
5/24	0	130	255	101	5/26	495	426	5/27	0	486	921	9,493	10,900	0
5/25	0	130	254	101	5/27	440	426	5/28	0	485	866	8,849	10,200	0
5/26	0	130	254	101	5/28	0	426	5/29	0	485	426	7,709	8,620	0
5/27	0	130	255	101	5/29	0	337	5/30	0	486	337	6,857	7,680	0
5/28	0	130	255	101	5/30	774	266	5/31	0	486	1,040	10,274	11,800	0
5/29	0	130	255	101	5/31	1,718	355	6/1	0	486	2,073	7,741	10,300	0
5/30	0	130	255	110	6/1	1,194	355	6/2	0	495	1,549	5,906	7,950	0
5/31	0	133	464	141	6/2	398	248	6/3	0	738	646	4,966	6,350	0
6/1	0	152	599	141	6/3	261	0	6/4	0	892	261	3,927	5,080	0
6/2	0	152	599	133	6/4	0	87	6/5	0	884	87	3,299	4,270	0
6/3	0	150	535	110	6/5	0	0	6/6	0	795	0	3,055	3,850	0
6/4	0	141	500	110	6/6	426	0	6/7	0	751	426	2,803	3,980	0
6/5	0	142	497	110	6/7	470	160	6/8	0	749	630	2,601	3,980	0
6/6	0	139	497	110	6/8	491	284	6/9	0	746	775	2,319	3,840	0
6/7	0	141	493	110	6/9	389	124	6/10	0	744	513	2,273	3,530	0
6/8	0	139	495	110	6/10	314	0	6/11	0	744	314	2,432	3,490	0
6/9	0	139	500	110	6/11	55	71	6/12	0	749	126	3,155	4,030	0
6/10	0	139	498	110	6/12	0	0	6/13	0	747	0	5,233	5,980	0
6/11	0	139	500	110	6/13	236	0	6/14	0	749	236	4,055	5,040	0
6/12	0	139	500	110	6/14	251	0	6/15	0	749	251	3,720	4,720	0
6/13	0	141	498	110	6/15	391	53	6/16	0	749	444	3,337	4,530	0
6/14	0	141	498	110	6/16	270	160	6/17	0	749	430	3,291	4,470	0
6/15	0	141	497	110	6/17	105	53	6/18	0	748	158	3,814	4,720	0
6/16	0	141	497	110	6/18	0	0	6/19	0	748	0	3,572	4,320	0
6/17	0	141	495	110	6/19	14	0	6/20	0	746	14	2,920	3,680	0

Table 9. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey.—Continued

[River Master daily operations record. Mean discharge in cubic feet per second for 24 hours. Column (Col.) 2, 24 hours beginning 1200 of date shown; Col. 3, 24 hours ending 2400 1 day later; Col. 4, 24 hours beginning 1500 1 day later; Col. 5, 24 hours beginning 0800 of date shown; Col. 6, 24 hours beginning 1600 of date shown; Col. 7 = Col. 2 + Col. 3 + Col. 4 in response to direction (Col. 1); Col. 8 = Col. 2 + Col. 3 + Col. 4 − Col. 7; Col. 9 = Col. 5 + Col. 6; Col. 10 = Col. 11 − Col. 7 − Col. 8 − Col. 9; Col. 11 = 24 hours of calendar day shown; Col. 12, Interim Excess Release Quantity (IERQ) releases to meet the Trenton, New Jersey, flow objective and releases to relieve thermal stress (Th); —, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow, Delaware River at Montague, New Jersey						
Directed		Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	Controlled releases			Computed uncontrolled	Total	IERQ bank releases
									New York City reservoirs		Power-plants			
Date	Amount								Directed	Other				
2011	Col. 1	Col. 2	Col. 3	Col. 4	2011	Col. 5	Col. 6	2011	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
6/18	0	141	498	110	6/20	569	0	6/21	0	749	569	2,362	3,680	0
6/19	0	141	500	110	6/21	470	195	6/22	0	751	665	2,854	4,270	0
6/20	0	141	500	110	6/22	389	390	6/23	0	751	779	12,270	13,800	0
6/21	0	141	498	110	6/23	1468	851	6/24	0	749	2,319	22,832	25,900	0
6/22	0	141	497	110	6/24	1663	851	6/25	0	748	2,514	24,038	27,300	0
6/23	0	141	500	175	6/25	1663	851	6/26	0	816	2,514	15,070	18,400	0
6/24	0	141	498	190	6/26	1663	851	6/27	0	829	2,514	9,157	12,500	0
6/25	0	141	498	190	6/27	1664	851	6/28	0	829	2,515	6,596	9,940	0
6/26	0	141	498	125	6/28	1394	851	6/29	0	764	2,245	6,511	9,520	0
6/27	0	141	498	110	6/29	373	851	6/30	0	749	1,224	9,227	11,200	0
6/28	0	141	497	110	6/30	371	851	7/1	0	748	1,222	6,140	8,110	0
6/29	0	141	497	110	7/1	415	337	7/2	0	748	752	4,610	6,110	0
6/30	0	141	507	110	7/2	228	177	7/3	0	758	405	7,687	8,850	0
7/1	0	141	511	124	7/3	251	798	7/4	0	776	1,049	21,575	23,400	0
7/2	0	149	498	190	7/4	619	851	7/5	0	837	1,470	14,593	16,900	0
7/3	0	671	774	190	7/5	805	816	7/6	0	1,635	1,621	9,544	12,800	0
7/4	0	701	1,496	190	7/6	761	780	7/7	0	2,387	1,541	6,372	10,300	0
7/5	0	701	1,439	190	7/7	871	426	7/8	0	2,330	1,297	5,533	9,160	0
7/6	0	701	1,241	190	7/8	970	426	7/9	0	2,132	1,396	6,572	10,100	0
7/7	0	699	1,009	190	7/9	887	426	7/10	0	1,898	1,313	4,789	8,000	0
7/8	0	699	804	189	7/10	884	426	7/11	0	1,692	1,310	3,508	6,510	0
7/9	0	702	653	179	7/11	730	284	7/12	0	1,534	1,014	3,002	5,550	0
7/10	0	701	606	147	7/12	660	284	7/13	0	1,454	944	2,642	5,040	0
7/11	0	692	606	141	7/13	560	284	7/14	0	1,439	844	2,187	4,470	0
7/12	0	501	602	141	7/14	427	284	7/15	0	1,244	711	2,135	4,090	0

Table 9. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey.—Continued

[River Master daily operations record. Mean discharge in cubic feet per second for 24 hours. Column (Col.) 2, 24 hours beginning 1200 of date shown; Col. 3, 24 hours ending 2400 1 day later; Col. 4, 24 hours beginning 1500 1 day later; Col. 5, 24 hours beginning 0800 of date shown; Col. 6, 24 hours beginning 1600 of date shown; Col. 7 = Col. 2 + Col. 3 + Col. 4 in response to direction (Col. 1); Col. 8 = Col. 2 + Col. 3 + Col. 4 − Col. 7; Col. 9 = Col. 5 + Col. 6; Col. 10 = Col. 11 − Col. 7 − Col. 8 − Col. 9; Col. 11 = 24 hours of calendar day shown; Col. 12, Interim Excess Release Quantity (IERQ) releases to meet the Trenton, New Jersey, flow objective and releases to relieve thermal stress (Th); —, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow, Delaware River at Montague, New Jersey						
Directed		Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	Controlled releases			Computed uncontrolled	Total	IERQ bank releases
									New York City reservoirs		Power-plants			
Date	Amount								Directed	Other				
2011	Col. 1	Col. 2	Col. 3	Col. 4	2011	Col. 5	Col. 6	2011	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
7/13	0	501	599	141	7/15	475	142	7/16	0	1,241	617	1,912	3,770	0
7/14	0	497	599	141	7/16	228	0	7/17	0	1,237	228	1,725	3,190	0
7/15	0	195	599	141	7/17	318	142	7/18	0	935	460	1,705	3,100	0
7/16	0	150	599	141	7/18	353	230	7/19	0	890	583	1,797	3,270	0
7/17	0	152	599	141	7/19	355	142	7/20	0	892	497	1,651	3,040	0
7/18	0	150	599	141	7/20	433	177	7/21	0	890	610	1,600	3,100	0
7/19	0	150	599	141	7/21	595	319	7/22	0	890	914	1,386	3,190	0
7/20	0	150	596	139	7/22	656	426	7/23	0	885	1,082	1,253	3,220	0
7/21	177	150	726	139	7/23	405	142	7/24	177	838	547	1,288	2,850	126 (Th)
7/22	312	150	1,009	141	7/24	439	0	7/25	312	988	439	1,311	3,050	409 (Th)
7/23	167	150	826	135	7/25	199	0	7/26	167	944	199	2,170	3,480	226 (Th)
7/24	343	150	538	107	7/26	344	0	7/27	343	452	344	2,651	3,790	0
7/25	311	138	495	110	7/27	366	71	7/28	311	432	437	2,190	3,370	0
7/26	0	141	501	110	7/28	319	177	7/29	0	752	496	1,802	3,050	0
7/27	0	141	501	110	7/29	400	124	7/30	0	752	524	1,994	3,270	0
7/28	0	141	500	108	7/30	497	0	7/31	0	749	497	1,954	3,200	0
7/29	0	141	500	110	7/31	427	124	8/1	0	751	551	1,648	2,950	0
7/30	0	141	498	111	8/1	482	266	8/2	0	750	748	1,402	2,900	0
7/31	0	141	500	110	8/2	425	160	8/3	0	751	589	1,334	2,670	0
8/1	0	141	500	110	8/3	238	0	8/4	0	751	238	1,751	2,740	0
8/2	0	141	498	110	8/4	113	0	8/5	0	749	113	2,118	2,980	0
8/3	0	141	498	111	8/5	338	0	8/6	0	750	338	1,802	2,890	0
8/4	0	139	500	110	8/6	119	71	8/7	0	749	190	6,431	7,370	0
8/5	0	139	501	110	8/7	21	124	8/8	0	750	145	7,655	8,550	0
8/6	0	139	503	110	8/8	426	337	8/9	0	752	763	5,665	7,180	0

Table 9. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey.—Continued

[River Master daily operations record. Mean discharge in cubic feet per second for 24 hours. Column (Col.) 2, 24 hours beginning 1200 of date shown; Col. 3, 24 hours ending 2400 1 day later; Col. 4, 24 hours beginning 1500 1 day later; Col. 5, 24 hours beginning 0800 of date shown; Col. 6, 24 hours beginning 1600 of date shown; Col. 7 = Col. 2 + Col. 3 + Col. 4 in response to direction (Col. 1); Col. 8 = Col. 2 + Col. 3 + Col. 4 − Col. 7; Col. 9 = Col. 5 + Col. 6; Col. 10 = Col. 11 − Col. 7 − Col. 8 − Col. 9; Col. 11 = 24 hours of calendar day shown; Col. 12, Interim Excess Release Quantity (IERQ) releases to meet the Trenton, New Jersey, flow objective and releases to relieve thermal stress (Th); —, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow, Delaware River at Montague, New Jersey						
Directed		Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	Controlled releases			Computed uncontrolled	Total	IERQ bank releases
									New York City reservoirs		Power-plants			
Date	Amount								Directed	Other				
2011	Col. 1	Col. 2	Col. 3	Col. 4	2011	Col. 5	Col. 6	2011	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
8/7	0	141	501	110	8/9	410	372	8/10	0	752	782	5,156	6,690	0
8/8	0	141	501	110	8/10	362	621	8/11	0	752	983	5,005	6,740	0
8/9	0	141	501	110	8/11	421	674	8/12	0	752	1,095	3,783	5,630	0
8/10	0	141	501	110	8/12	495	674	8/13	0	752	1,169	2,919	4,840	0
8/11	0	141	501	110	8/13	517	709	8/14	0	752	1,226	2,712	4,690	0
8/12	0	141	498	110	8/14	475	638	8/15	0	749	1,113	5,048	6,910	0
8/13	0	141	500	110	8/15	483	851	8/16	0	751	1,334	11,015	13,100	0
8/14	0	141	500	114	8/16	486	851	8/17	0	755	1,337	10,508	12,600	0
8/15	0	149	545	190	8/17	354	851	8/18	0	884	1,205	6,591	8,680	0
8/16	0	150	600	150	8/18	293	851	8/19	0	900	1,144	4,796	6,840	0
8/17	0	149	599	141	8/19	210	851	8/20	0	889	1,061	4,800	6,750	0
8/18	0	149	599	141	8/20	285	674	8/21	0	889	959	4,002	5,850	0
8/19	0	150	599	141	8/21	164	674	8/22	0	890	838	3,342	5,070	0
8/20	0	149	599	141	8/22	212	426	8/23	0	889	638	3,223	4,750	0
8/21	0	150	599	141	8/23	177	461	8/24	0	890	638	3,072	4,600	0
8/22	0	489	599	149	8/24	213	674	8/25	0	1,237	887	2,616	4,740	0
8/23	0	645	599	189	8/25	622	851	8/26	0	1,433	1,473	2,564	5,470	0
8/24	0	699	597	190	8/26	1,453	851	8/27	0	1,486	2,304	2,770	6,560	0
8/25	0	699	597	173	8/27	1,416	851	8/28	0	1,469	2,267	37,064	40,800	0
8/26	0	688	597	108	8/28	1,024	851	8/29	0	1,393	1,875	75,432	48,700	0
8/27	0	166	565	56	8/29	1,413	851	8/30	0	787	2,264	37,449	40,500	0
8/28	0	108	619	84	8/30	1,466	851	8/31	0	811	2,317	21,172	24,300	0
8/29	0	76	707	190	8/31	1,465	851	9/1	0	973	2,316	14,311	17,600	0
8/30	0	76	1,047	190	9/1	1,465	851	9/2	0	1,313	2,316	10,871	14,500	0
8/31	0	91	1,496	190	9/2	1,463	851	9/3	0	1,777	2,314	8,409	12,500	0

Table 9. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey.—Continued

[River Master daily operations record. Mean discharge in cubic feet per second for 24 hours. Column (Col.) 2, 24 hours beginning 1200 of date shown; Col. 3, 24 hours ending 2400 1 day later; Col. 4, 24 hours beginning 1500 1 day later; Col. 5, 24 hours beginning 0800 of date shown; Col. 6, 24 hours beginning 1600 of date shown; Col. 7 = Col. 2 + Col. 3 + Col. 4 in response to direction (Col. 1); Col. 8 = Col. 2 + Col. 3 + Col. 4 − Col. 7; Col. 9 = Col. 5 + Col. 6; Col. 10 = Col. 11 − Col. 7 − Col. 8 − Col. 9; Col. 11 = 24 hours of calendar day shown; Col. 12, Interim Excess Release Quantity (IERQ) releases to meet the Trenton, New Jersey, flow objective and releases to relieve thermal stress (Th); —, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow, Delaware River at Montague, New Jersey						
Directed		Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	Controlled releases			Computed uncontrolled	Total	IERQ bank releases
									New York City reservoirs		Power-plants			
Date	Amount								Directed	Other				
2011	Col. 1	Col. 2	Col. 3	Col. 4	2011	Col. 5	Col. 6	2011	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
9/1	0	602	1,502	190	9/3	1,458	851	9/4	0	2,294	2,309	6,397	11,000	0
9/2	0	699	1,501	190	9/4	1,465	851	9/5	0	2,390	2,316	7,194	11,900	0
9/3	0	699	1,502	190	9/5	1,465	851	9/6	0	2,391	2,316	15,093	19,800	0
9/4	0	707	1,501	190	9/6	1,390	851	9/7	0	2,398	2,241	52,161	56,800	0
9/5	0	546	1,508	156	9/7	1,391	851	9/8	0	2,210	2,242	95,548	100,000	0
9/6	0	135	399	108	9/8	1,415	851	9/9	0	1,361	2,266	82,173	85,800	0
9/7	0	144	399	128	9/9	1,415	851	9/10	0	671	2,266	44,863	47,800	0
9/8	0	141	401	190	9/10	1,415	851	9/11	0	732	2,266	27,502	30,500	0
9/9	0	145	402	190	9/11	1,415	851	9/12	0	737	2,266	20,797	23,800	0
9/10	0	139	401	190	9/12	1,415	851	9/13	0	730	2,266	17,704	20,700	0
9/11	0	164	710	190	9/13	1,415	851	9/14	0	1,064	2,266	14,670	18,000	0
9/12	0	596	1,493	190	9/14	1,415	851	9/15	0	2,279	2,266	11,055	15,600	0
9/13	0	699	1,497	190	9/15	1,417	851	9/16	0	2,386	2,268	9,646	14,300	0
9/14	0	701	1,499	190	9/16	1,214	851	9/17	0	2,390	2,065	8,345	12,800	0
9/15	0	701	1,499	190	9/17	1,381	851	9/18	0	2,390	2,232	7,378	12,000	0
9/16	0	701	1,497	190	9/18	1,383	851	9/19	0	2,388	2,234	4,908	9,530	0
9/17	0	701	1,493	190	9/19	1,383	550	9/20	0	2,384	1,933	3,883	8,200	0
9/18	0	702	1,502	190	9/20	1,385	213	9/21	0	2,394	1,598	3,888	7,880	0
9/19	0	701	1,490	190	9/21	1,400	319	9/22	0	2,381	1,719	3,990	8,090	0
9/20	0	701	1,488	190	9/22	1,385	372	9/23	0	2,379	1,757	4,594	8,730	0
9/21	0	701	1,490	190	9/23	1,387	851	9/24	0	2,381	2,238	11,481	16,100	0
9/22	0	701	1,496	190	9/24	1,387	124	9/25	0	2,387	1,511	12,902	16,800	0
9/23	0	699	1,499	190	9/25	1,385	142	9/26	0	2,388	1,527	8,685	12,600	0
9/24	0	699	1,497	190	9/26	1,385	337	9/27	0	2,386	1,722	6,592	10,700	0
9/25	0	699	1,499	190	9/27	1,236	461	9/28	0	2,388	1,697	21,615	25,700	0

Table 9. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey.—Continued

[River Master daily operations record. Mean discharge in cubic feet per second for 24 hours. Column (Col.) 2, 24 hours beginning 1200 of date shown; Col. 3, 24 hours ending 2400 1 day later; Col. 4, 24 hours beginning 1500 1 day later; Col. 5, 24 hours beginning 0800 of date shown; Col. 6, 24 hours beginning 1600 of date shown; Col. 7 = Col. 2 + Col. 3 + Col. 4 in response to direction (Col. 1); Col. 8 = Col. 2 + Col. 3 + Col. 4 − Col. 7; Col. 9 = Col. 5 + Col. 6; Col. 10 = Col. 11 − Col. 7 − Col. 8 − Col. 9; Col. 11 = 24 hours of calendar day shown; Col. 12, Interim Excess Release Quantity (IERQ) releases to meet the Trenton, New Jersey, flow objective and releases to relieve thermal stress (Th); —, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow, Delaware River at Montague, New Jersey						
Directed		Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	Controlled releases			Computed uncontrolled	Total	IERQ bank releases
									New York City reservoirs		Power-plants			
Date	Amount								Directed	Other				
2011	Col. 1	Col. 2	Col. 3	Col. 4	2011	Col. 5	Col. 6	2011	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
9/26	0	699	1,496	190	9/28	1,385	851	9/29	0	2,385	2,236	37,679	42,300	0
9/27	0	701	1,490	190	9/29	1,394	851	9/30	0	2,381	2,245	39,474	44,100	0
9/28	0	704	1,494	189	9/30	1,423	851	10/1	0	2,387	2,274	24,039	28,700	0
9/29	0	701	1,502	192	10/1	1,432	851	10/2	0	2,395	2,283	18,322	23,000	0
9/30	0	701	1,507	190	10/2	1,430	851	10/3	0	2,398	2,281	16,821	21,500	0
10/1	0	682	1,507	190	10/3	1,430	851	10/4	0	2,379	2,281	13,940	18,600	0
10/2	0	610	1,501	190	10/4	1,419	851	10/5	0	2,301	2,270	13,629	18,200	0
10/3	0	699	1,504	190	10/5	1,403	851	10/6	0	2,393	2,254	11,453	16,100	0
10/4	0	699	1,507	190	10/6	1,393	727	10/7	0	2,396	2,120	8,984	13,500	0
10/5	0	701	1,505	190	10/7	1,390	656	10/8	0	2,396	2,046	6,858	11,300	0
10/6	0	701	1,505	190	10/8	1,392	426	10/9	0	2,396	1,818	5,396	9,610	0
10/7	0	701	1,505	190	10/9	1,361	443	10/10	0	2,396	1,804	4,560	8,760	0
10/8	0	701	1,504	190	10/10	14	727	10/11	0	2,395	741	4,274	7,410	0
10/9	0	701	1,499	190	10/11	0	727	10/12	0	2,390	727	3,873	6,990	0
10/10	0	701	1,497	190	10/12	0	727	10/13	0	2,388	727	3,925	7,040	0
10/11	0	701	1,493	190	10/13	0	691	10/14	0	2,384	691	5,495	8,570	0
10/12	0	701	1,490	190	10/14	0	426	10/15	0	2,381	426	10,793	13,600	0
10/13	0	701	1,501	190	10/15	0	461	10/16	0	2,392	461	8,647	11,500	0
10/14	0	701	1,502	190	10/16	0	461	10/17	0	2,393	461	6,606	9,460	0
10/15	0	701	1,499	190	10/17	0	674	10/18	0	2,390	674	6,056	9,120	0
10/16	0	698	1,363	190	10/18	0	674	10/19	0	2,251	674	4,575	7,500	0
10/17	0	705	647	190	10/19	0	355	10/20	0	1,542	355	5,383	7,280	0
10/18	0	702	235	190	10/20	0	248	10/21	0	1,127	248	7,945	9,320	0
10/19	0	701	224	190	10/21	0	195	10/22	0	1,115	195	6,210	7,520	0
10/20	0	701	224	190	10/22	0	160	10/23	0	1,115	160	5,325	6,600	0
10/21	0	702	224	190	10/23	0	301	10/24	0	1,116	301	4,873	6,290	0

Table 9. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey.—Continued

[River Master daily operations record. Mean discharge in cubic feet per second for 24 hours. Column (Col.) 2, 24 hours beginning 1200 of date shown; Col. 3, 24 hours ending 2400 1 day later; Col. 4, 24 hours beginning 1500 1 day later; Col. 5, 24 hours beginning 0800 of date shown; Col. 6, 24 hours beginning 1600 of date shown; Col. 7 = Col. 2 + Col. 3 + Col. 4 in response to direction (Col. 1); Col. 8 = Col. 2 + Col. 3 + Col. 4 − Col. 7; Col. 9 = Col. 5 + Col. 6; Col. 10 = Col. 11 − Col. 7 − Col. 8 − Col. 9; Col. 11 = 24 hours of calendar day shown; Col. 12, Interim Excess Release Quantity (IERQ) releases to meet the Trenton, New Jersey, flow objective and releases to relieve thermal stress (Th); —, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow, Delaware River at Montague, New Jersey						
Directed		Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	Controlled releases			Computed uncontrolled	Total	IERQ bank releases
									New York City reservoirs		Power-plants			
Date	Amount								Directed	Other				
2011	Col. 1	Col. 2	Col. 3	Col. 4	2011	Col. 5	Col. 6	2011	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
10/22	0	702	224	190	10/24	0	160	10/25	0	1,116	160	4,424	5,700	0
10/23	0	702	224	190	10/25	0	53	10/26	0	1,116	53	4,121	5,290	0
10/24	0	701	224	190	10/26	0	89	10/27	0	1,115	89	3,986	5,190	0
10/25	0	701	224	190	10/27	0	213	10/28	0	1,115	213	5,112	6,440	0
10/26	0	701	226	190	10/28	258	142	10/29	0	1,117	400	5,443	6,960	0
10/27	0	701	229	190	10/29	957	230	10/30	0	1,120	1,187	5,083	7,390	0
10/28	0	701	231	190	10/30	1,034	319	10/31	0	1,122	1,353	5,135	7,610	0
10/29	0	701	227	190	10/31	454	426	11/1	0	1,118	880	5,132	7,130	0
10/30	0	701	226	190	11/1	404	426	11/2	0	1,117	830	5,183	7,130	0
10/31	0	678	224	189	11/2	380	390	11/3	0	1,091	770	4,979	6,840	0
11/1	0	610	224	190	11/3	383	426	11/4	0	1,024	809	4,887	6,720	0
11/2	0	701	224	190	11/4	416	408	11/5	0	1,115	824	4,301	6,240	0
11/3	0	699	224	190	11/5	0	301	11/6	0	1,113	301	4,116	5,530	0
11/4	0	701	224	198	11/6	22	408	11/7	0	1,118	430	3,982	5,530	0
11/5	0	729	234	190	11/7	465	355	11/8	0	1,153	820	3,687	5,660	0
11/6	0	701	224	190	11/8	449	408	11/9	0	1,115	857	3,498	5,470	0
11/7	0	701	224	190	11/9	775	443	11/10	0	1,115	1,218	3,397	5,730	0
11/8	0	701	224	190	11/10	417	355	11/11	0	1,115	772	3,323	5,210	0
11/9	0	699	224	190	11/11	414	426	11/12	0	1,113	840	3,247	5,200	0
11/10	0	699	224	190	11/12	0	426	11/13	0	1,113	426	3,091	4,630	0
11/11	0	702	224	190	11/13	11	337	11/14	0	1,116	348	2,976	4,440	0
11/12	0	701	224	190	11/14	386	301	11/15	0	1,115	687	2,828	4,630	0
11/13	0	701	224	190	11/15	442	248	11/16	0	1,115	690	3,225	5,030	0
11/14	0	701	224	190	11/16	409	89	11/17	0	1,115	498	3,947	5,560	0
11/15	0	701	223	190	11/17	448	18	11/18	0	1,114	466	4,160	5,740	0

Table 9. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey.—Continued

[River Master daily operations record. Mean discharge in cubic feet per second for 24 hours. Column (Col.) 2, 24 hours beginning 1200 of date shown; Col. 3, 24 hours ending 2400 1 day later; Col. 4, 24 hours beginning 1500 1 day later; Col. 5, 24 hours beginning 0800 of date shown; Col. 6, 24 hours beginning 1600 of date shown; Col. 7 = Col. 2 + Col. 3 + Col. 4 in response to direction (Col. 1); Col. 8 = Col. 2 + Col. 3 + Col. 4 − Col. 7; Col. 9 = Col. 5 + Col. 6; Col. 10 = Col. 11 − Col. 7 − Col. 8 − Col. 9; Col. 11 = 24 hours of calendar day shown; Col. 12, Interim Excess Release Quantity (IERQ) releases to meet the Trenton, New Jersey, flow objective and releases to relieve thermal stress (Th); —, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow, Delaware River at Montague, New Jersey						
Directed		Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	Controlled releases			Computed uncontrolled	Total	IERQ bank releases
									New York City reservoirs		Power-plants			
Date	Amount								Directed	Other				
2011	Col. 1	Col. 2	Col. 3	Col. 4	2011	Col. 5	Col. 6	2011	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
11/16	0	701	224	190	11/18	431	53	11/19	0	1,115	484	3,551	5,150	0
11/17	0	702	224	190	11/19	0	89	11/20	0	1,116	89	3,385	4,590	0
11/18	0	702	224	190	11/20	31	319	11/21	0	1,116	350	3,374	4,840	0
11/19	0	699	224	190	11/21	523	426	11/22	0	1,113	949	3,068	5,130	0
11/20	0	701	223	190	11/22	479	355	11/23	0	1,114	834	11,252	13,200	0
11/21	0	639	223	190	11/23	439	603	11/24	0	1,052	1,042	17,906	20,000	0
11/22	0	657	223	190	11/24	200	266	11/25	0	1,070	466	11,864	13,400	0
11/23	0	702	224	190	11/25	444	319	11/26	0	1,116	763	8,921	10,800	0
11/24	0	702	226	190	11/26	525	284	11/27	0	1,118	809	7,593	9,520	0
11/25	0	701	224	192	11/27	1,495	337	11/28	0	1,117	1,832	6,571	9,520	0
11/26	0	701	224	190	11/28	1,621	390	11/29	0	1,115	2,011	5,994	9,120	0
11/27	0	701	224	190	11/29	1,621	390	11/30	0	1,115	2,011	13,174	16,300	0
							Monthly totals							
Dec. 2010	**0**	**4,935**	**30,669**	**4,053**	—	**18,619**	**15,594**	—	**0**	**39,657**	**34,213**	**203,500**	**277,370**	**0**
Jan. 2011	**0**	**3,748**	**9,421**	**2,015**	—	**12,099**	**3,225**	—	**0**	**15,184**	**15,324**	**73,072**	**103,580**	**0**
Feb. 2011	**0**	**3,439**	**9,576**	**2,311**	—	**6,348**	**1,420**	—	**0**	**15,326**	**7,768**	**96,516**	**119,610**	**0**
Mar. 2011	**0**	**10,375**	**32,874**	**4,820**	—	**50,231**	**21,275**	—	**0**	**48,069**	**71,506**	**589,265**	**708,840**	**0**
Apr. 2011	**0**	**16,406**	**44,284**	**2,544**	—	**24,281**	**11,634**	—	**0**	**63,234**	**35,915**	**389,481**	**488,630**	**0**
May 2011	**0**	**3,415**	**6,410**	**2,964**	—	**22,712**	**18,191**	—	**0**	**12,789**	**40,903**	**374,418**	**428,110**	**0**
June 2011	**0**	**4,220**	**14,657**	**3,616**	—	**18,299**	**8,492**	—	**0**	**22,493**	**26,791**	**185,336**	**234,620**	**0**
July 2011	**1,310**	**10,587**	**21,625**	**4,477**	—	**15,821**	**9,542**	—	**1,310**	**35,379**	**25,363**	**129,278**	**191,330**	**761**
Aug. 2011	**0**	**6,931**	**16,814**	**3,870**	—	**15,540**	**17,040**	—	**0**	**27,615**	**32,584**	**284,845**	**315,040**	**0**
Sept. 2011	**0**	**15,466**	**38,120**	**5,522**	—	**41,974**	**21,240**	—	**0**	**59,108**	**63,214**	**613,808**	**736,130**	**0**
Oct. 2011	**0**	**21,625**	**31,521**	**5,891**	—	**16,336**	**15,391**	—	**0**	**59,037**	**31,727**	**241,286**	**332,050**	**0**
Nov. 2011	**0**	**20,830**	**6,733**	**5,709**	—	**14,084**	**10,022**	—	**0**	**33,272**	**24,106**	**166,612**	**223,990**	**0**

Table 10. Daily mean discharge of the Delaware River at Montague, New Jersey (station number 01438500), for report year ending November 30, 2011.

[U.S. Geological Survey published record. All values except totals are in cubic feet per second, ft^3/s; totals are in cubic feet per second day, (ft^3/s)-d; —, not applicable]

Day	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
1	9,750	3,270	[1]2,260	12,200	8,220	24,200	10,200	8,110	2,950	17,600	28,700	7,130
2	34,900	3,240	[1]2,420	12,600	9,110	19,500	7,860	6,110	2,900	14,500	23,000	7,130
3	22,300	3,480	[1]2,510	10,600	8,730	16,600	6,270	8,850	2,670	12,500	21,500	6,840
4	15,600	3,890	[1]2,440	9,340	8,640	16,500	5,000	23,400	2,740	11,000	18,600	6,720
5	12,300	3,650	[1]2,880	9,850	9,590	20,900	4,200	16,900	2,980	11,900	18,200	6,240
6	10,200	3,380	[1]2,910	17,000	13,500	18,400	3,780	12,800	2,890	19,800	16,100	5,530
7	9,040	[1]2,930	[1]2,810	64,400	12,900	14,500	3,910	10,300	7,370	56,800	13,500	5,530
8	8,310	[1]2,670	[1]3,120	37,200	12,000	12,500	3,910	9,160	8,550	100,000	11,300	5,660
9	7,270	[1]2,260	[1]2,970	24,400	10,600	11,000	3,770	10,100	7,180	85,800	9,610	5,470
10	6,530	[1]2,020	[1]2,940	20,700	9,560	9,400	3,460	8,000	6,690	47,800	8,760	5,730
11	6,440	[1]2,850	[1]2,670	71,000	9,170	8,390	3,420	6,510	6,740	30,500	7,410	5,210
12	6,760	[1]2,980	[1]2,610	63,600	9,070	7,600	3,960	5,550	5,630	23,800	6,990	5,200
13	11,000	[1]2,670	[1]2,540	40,600	10,500	6,480	5,900	5,040	4,840	20,700	7,040	4,630
14	12,900	[1]2,340	[1]2,610	31,600	11,600	5,540	4,960	4,470	4,690	18,000	8,570	4,440
15	10,900	[1]2,390	[1]2,860	24,800	10,200	4,910	4,650	4,090	6,910	15,600	13,600	4,630
16	10,200	[1]2,250	[1]3,150	21,900	8,940	5,960	4,460	3,770	13,100	14,300	11,500	5,030
17	8,370	[1]1,960	[1]3,170	22,200	22,300	7,940	4,400	3,190	12,600	12,800	9,460	5,560
18	7,510	[1]2,420	[1]3,410	21,900	24,600	9,790	4,640	3,100	8,680	12,000	9,120	5,740
19	6,900	[1]3,110	[1]4,450	24,700	19,500	19,600	4,250	3,270	6,840	9,530	7,500	5,150
20	6,390	[1]3,630	[1]5,540	23,000	19,100	28,500	3,690	3,040	6,750	8,200	7,280	4,590
21	6,340	[1]3,360	[1]5,940	19,800	17,600	28,600	3,680	3,100	5,850	7,880	9,320	4,840
22	5,880	[1]2,890	[1]5,400	18,600	15,000	22,600	4,270	3,190	5,070	8,090	7,520	5,130
23	5,870	[1]2,620	[1]4,730	17,700	13,100	17,500	13,800	3,220	4,750	8,730	6,600	13,200
24	5,480	[1]2,620	[1]4,410	16,100	18,300	15,600	25,900	2,850	4,600	16,100	6,290	20,000
25	4,930	[1]3,220	[1]5,520	14,300	16,900	14,500	27,300	3,050	4,740	16,800	5,700	13,400
26	4,830	[1]2,920	[1]7,790	12,500	20,400	11,800	18,400	3,480	5,470	12,600	5,290	10,800
27	4,570	[1]3,160	[1]7,870	10,400	27,200	10,800	12,500	3,790	6,580	10,700	5,190	9,520
28	4,560	[1]3,100	7,810	9,810	33,600	10,100	9,940	3,370	41,800	25,700	6,440	9,520
29	4,020	[1]3,090	—	9,280	46,700	8,520	9,520	3,050	78,700	42,300	6,960	9,120
30	3,750	[1]2,750	—	8,880	32,000	7,580	11,200	3,270	40,500	44,100	7,390	16,300
31	3,570	[1]2,260	—	8,280	—	11,700	—	3,200	24,300	—	7,610	—
Total[2]	**277,370**	**89,380**	**109,740**	**709,240**	**488,630**	**427,510**	**233,200**	**191,330**	**346,060**	**736,130**	**332,050**	**223,990**
Mean[3]	8,947	2,883	3,919	22,879	16,288	13,791	7,773	6,172	11,163	24,538	10,711	7,466

[1]Estimated

[2]Year total is 4,164,630 (ft^3/s)-d.

[3]Year mean is 11,378 ft^3/s.

Table 11. Daily mean discharge of the East Branch Delaware River at Downsville, New York (station number 01417000), for report year ending November 30, 2011.

[U.S. Geological Survey published record. All values except totals are in cubic feet per second, ft^3/s; totals are in cubic feet per second day (ft^3/s)-d; —, not applicable]

Day	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
1	78	193	80	92	692	2,380	289	135	143	2,380	1,980	579
2	73	193	79	92	692	1,900	179	134	143	1,860	2,080	692
3	80	192	78	92	692	1,580	148	424	143	1,360	1,890	692
4	80	192	78	92	692	2,210	138	1,070	143	1,170	1,560	692
5	80	192	78	93	692	2,400	133	1,360	142	2,030	1,320	692
6	126	121	78	95	692	1,840	133	1,250	142	3,190	1,080	692
7	194	79	78	82	692	1,400	133	996	143	11,100	786	692
8	192	80	78	386	693	1,040	133	745	143	14,000	674	692
9	192	80	78	471	693	766	133	717	143	8,380	668	692
10	192	80	140	58	482	556	133	717	143	4,800	668	692
11	192	80	208	60	72	395	133	717	143	2,960	669	693
12	192	80	207	732	72	276	133	595	143	2,350	678	693
13	192	80	207	2,600	73	182	134	507	143	1,900	679	692
14	193	80	206	2,640	104	118	135	507	143	1,420	679	692
15	193	80	207	2,290	295	106	135	358	147	1,210	680	692
16	192	80	207	2,340	625	101	134	147	152	1,070	680	692
17	192	80	153	2,120	1,650	194	134	147	151	924	680	692
18	193	80	98	2,230	2,140	500	134	148	151	796	680	692
19	193	80	97	2,480	2,040	1,340	133	152	152	729	698	692
20	192	80	98	2,470	2,040	1,950	132	155	152	717	688	692
21	193	80	96	2,380	1,810	2,090	133	155	153	712	683	692
22	192	80	95	2,300	1,580	1,830	133	157	323	710	688	586
23	193	80	95	1,870	1,660	1,550	133	158	571	707	685	692
24	193	80	94	1,330	1,770	1,450	133	160	717	706	688	692
25	193	142	94	961	1,710	1,240	132	155	717	708	690	692
26	193	190	93	741	1,970	880	133	146	717	712	692	692
27	191	192	93	692	2,420	982	133	143	418	715	692	692
28	192	146	94	692	3,650	811	134	142	2,090	717	692	692
29	192	80	—	692	4,000	522	134	141	10,600	717	692	690
30	193	80	—	692	3,050	508	134	142	5,870	1,180	692	691
31	193	80	—	692	—	424	—	143	3,300	—	692	—
Total[1]	**5,329**	**3,432**	**3,287**	**34,557**	**39,443**	**33,521**	**4,221**	**12,623**	**28,381**	**71,930**	**27,103**	**20,540**
Mean[2]	171.9	110.7	117.4	1,114.7	1,314.8	1,081.3	140.7	407.2	915.5	2,397.7	874.3	684.7

[1]Year total is 284,369 (ft^3/s)-d.

[2]Year mean is 777.6 ft^3/s.

Table 12. Daily mean discharge of the West Branch Delaware River at Stilesville, New York (station number 01425000), for report year ending November 30, 2011.

[U.S. Geological Survey published record. All values except totals are in cubic feet per second, ft^3/s; totals are in cubic feet per second day (ft^3/s)-d; —, not applicable]

Day	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
1	236	331	326	336	1,520	4,220	1,210	516	513	1,550	1,540	232
2	235	331	327	338	1,520	3,380	1,120	515	511	1,550	1,540	232
3	276	332	326	367	1,520	2,740	922	510	513	1,550	1,520	232
4	329	333	329	1,430	1,510	3,170	647	815	511	1,560	1,520	231
5	331	330	332	1,550	1,530	3,760	513	1,570	513	1,560	1,520	232
6	330	270	331	1,580	1,530	3,460	502	1,510	523	1,610	1,520	232
7	368	219	333	1,590	1,620	3,030	502	1,300	527	3,450	1,540	232
8	697	218	334	1,570	1,780	2,600	502	1,040	522	11,600	1,540	232
9	1,080	219	336	1,570	1,810	2,180	503	820	520	11,600	1,530	231
10	1,410	219	336	691	1,830	1,820	502	653	519	7,580	1,530	232
11	1,450	222	336	1,880	1,840	1,550	506	598	515	5,250	1,520	230
12	1,440	221	336	6,580	1,910	1,290	511	598	516	4,320	1,520	230
13	1,450	223	336	6,190	1,990	975	505	592	519	3,790	1,520	230
14	1,450	259	332	4,920	2,040	757	502	588	519	2,850	1,530	230
15	1,450	324	331	4,120	1,930	624	502	588	515	2,270	1,530	231
16	1,440	326	331	3,970	1,780	660	503	588	549	1,920	1,530	230
17	1,240	326	331	3,380	1,950	882	510	593	598	1,670	1,380	229
18	1,550	331	333	3,240	2,160	1,030	506	599	599	1,540	640	229
19	1,550	329	335	3,780	2,150	1,320	505	598	600	1,520	244	229
20	1,550	326	336	3,800	2,150	1,970	510	598	598	1,520	231	229
21	1,550	329	336	3,480	2,070	3,140	510	597	599	1,520	231	229
22	1,550	326	336	3,160	1,930	3,080	511	741	597	1,520	230	230
23	1,550	326	336	2,830	1,900	2,650	510	1,050	598	1,520	230	239
24	1,550	326	336	2,490	2,020	2,300	510	849	597	1,520	230	234
25	1,500	326	337	2,160	2,020	1,930	510	544	599	1,520	230	232
26	1,090	326	336	1,880	2,420	1,610	510	510	598	1,520	232	232
27	649	326	337	1,680	3,230	1,510	510	512	601	1,530	235	232
28	348	326	339	1,560	4,020	1,390	513	510	605	1,530	238	232
29	322	326	—	1,510	5,600	1,240	513	510	650	1,540	238	235
30	326	326	—	1,500	5,130	1,280	510	510	737	1,540	235	425
31	331	326	—	1,520	—	1,190	—	510	1,090	—	232	—
Total[1]	**30,628**	**9,278**	**9,340**	**76,652**	**66,410**	**62,738**	**17,090**	**22,032**	**17,971**	**85,520**	**29,506**	**7,135**
Mean[2]	988.0	299.3	333.6	2,472.6	2,213.7	2,023.8	569.7	710.7	579.7	2,850.7	951.8	237.8

[1]Year total is 434,300 (ft^3/s)-d.

[2]Year mean is 1,185.9 ft^3/s.

Table 13. Daily mean discharge of the Neversink River at Neversink, New York (station number 01436000), for report year ending November 30, 2011.

[U.S. Geological Survey published record. All values except totals are in cubic feet per second, ft^3/s; totals are in cubic feet per second day (ft^3/s)-d; —, not applicable]

Day	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
1	68	69	69	99	63	562	124	107	107	378	841	182
2	88	68	68	98	62	468	141	108	106	294	631	183
3	150	66	67	85	61	352	137	319	107	239	527	183
4	189	66	83	63	62	293	117	1,150	107	234	425	182
5	190	66	104	63	62	176	107	657	107	377	361	183
6	190	67	104	66	62	88	107	422	107	1,170	306	183
7	181	67	105	63	62	88	107	213	107	4,140	267	183
8	190	67	103	134	63	88	107	182	107	2,980	249	186
9	193	65	104	185	63	88	108	182	108	1,590	237	186
10	195	66	104	186	63	88	107	182	107	846	220	187
11	195	67	104	574	64	88	107	154	107	588	205	183
12	196	66	103	1,730	63	88	107	134	107	508	196	183
13	194	66	104	1,030	62	88	107	132	107	410	205	185
14	194	66	103	687	62	88	107	135	107	355	326	187
15	133	67	102	510	62	88	107	135	113	349	485	187
16	106	66	104	511	63	89	107	135	148	304	353	187
17	106	67	86	563	165	89	107	135	172	248	299	185
18	107	67	67	592	290	90	107	135	142	229	251	185
19	107	67	66	869	189	1,370	107	135	137	211	236	187
20	105	67	65	445	186	1,270	107	135	140	206	268	187
21	105	67	63	308	178	782	107	135	140	197	274	187
22	106	67	62	194	79	533	108	135	139	232	240	187
23	105	66	63	182	63	351	109	135	140	290	215	188
24	106	67	62	182	63	123	214	135	168	551	204	187
25	107	67	63	182	64	98	1,160	117	195	413	223	187
26	106	67	63	181	65	99	687	105	195	303	180	187
27	97	67	63	181	73	98	195	106	145	256	183	187
28	105	68	82	180	1,530	98	108	107	4,100	1,060	182	187
29	106	68	—	180	1,580	98	115	107	2,540	2,030	179	189
30	87	68	—	182	888	98	108	105	994	1,660	178	188
31	69	68	—	129	—	98	—	108	540	—	179	—
Total[1]	**4,176**	**2,073**	**2,336**	**10,634**	**6,412**	**8,115**	**5,143**	**6,182**	**11,646**	**22,648**	**9,125**	**5,568**
Mean[2]	134.7	66.9	83.4	343.0	213.7	261.8	171.4	199.4	375.7	754.9	294.4	185.6

[1]Year total is 94,060 (ft^3/s)-d.

[2]Year mean is 257.1 ft^3/s.

Quality of Water in the Delaware Estuary

This section describes water-quality monitoring programs for the Delaware Estuary during the River Master 2011 report year. Selected data are presented, and water-quality conditions are summarized.

Water-Quality Monitoring Programs

U.S. Geological Survey Continuous Water-Quality Monitoring Program

As part of a long-term program, in cooperation with the DRBC, the USGS operates continuous water-quality monitors at four locations in the Delaware Estuary between Trenton, New Jersey, and Reedy Island Jetty, Delaware (fig. 6).

Continuous water temperature, specific conductance, dissolved-oxygen, and pH data were collected at four sites—Delaware River at Trenton, New Jersey (station number 01463500); Delaware River at Benjamin Franklin Bridge at Philadelphia, Pennsylvania (station number 01467200); Delaware River at Chester, Pennsylvania, (station number 01477050); and Delaware River at Reedy Island Jetty, Delaware (station number 01482800). Continuous turbidity data also were collected at Trenton, Benjamin Franklin Bridge, and Reedy Island Jetty stations. The DRBC and others use these data to assess water-quality conditions and track the movement of the "salt front" in the Delaware Estuary. Continuous monitor data are processed and stored in the USGS National Water Information System database (NWIS; U.S. Geological Survey, 2019) and are available at https://waterdata.usgs.gov/nwis. Selected monitor data from the 2011 report year are included in this report.

Delaware Estuary Boat Run Monitoring Program

Each year, the DBRC contracts with the Delaware Department of Natural Resources and Environmental Control to collect water samples at 22 locations on the Delaware Estuary from Biles Channel to South Brown Shoal (sites A through W, fig. 6) (Delaware River Basin Commission, 2016). Samples are collected once a month from April to October. The goals of this program are to provide accurate, precise, and defensible estimates of the surface-water quality of the Delaware Estuary and to allow assessment of compliance with water-quality criteria. Sample analysis includes routine and bacterial parameters, nutrients, heavy metals, chlorophyll a, dissolved silica, and volatile organics. Water-quality data for these DBRC sampling sites are not presented in this report but are accessible from the DRBC Boat Run Water Quality Data Explorer (https://www.nj.gov/drbc/quality/datum/boat-run_explorer-app.html).

Water Quality During the 2011 Report Year

Streamflow

Streamflow has a major effect on the quality of water in the Delaware Estuary. Large freshwater inflows commonly result in improved water quality by limiting upstream movement of seawater and reducing the concentration of dissolved substances. High inflows also aid in maintaining lower water temperatures during warm weather and in supporting higher concentrations of dissolved oxygen. Under certain conditions, however, high streamflows can transport large quantities of nutrients to the estuary, which could result in excessive levels of algae.

Streamflow from the Delaware River Basin upstream from Trenton, New Jersey, is the major source of freshwater inflow to the Delaware Estuary. During the report year, monthly mean streamflow measured at USGS gaging station 01463500, Delaware River at Trenton, New Jersey, was highest during September 2011 (50,477 ft^3/s) and lowest during January 2011 (6,450 ft^3/s; table 14). Long-term monthly mean streamflow was computed for the period from February 1913 to September 2010 (U.S. Geological Survey, 2010). Monthly mean streamflows were less than long-term mean monthly flows in January and February 2011. The greatest percentage of flow deficiency was in January 2011, when monthly mean streamflow was 50 percent of the long-term mean monthly flow. The highest daily mean streamflow during the report year was 172,000 ft^3/s on September 9, 2011. The lowest daily mean streamflow was 4,500 ft^3/s on January 18, 2011 (table 14).

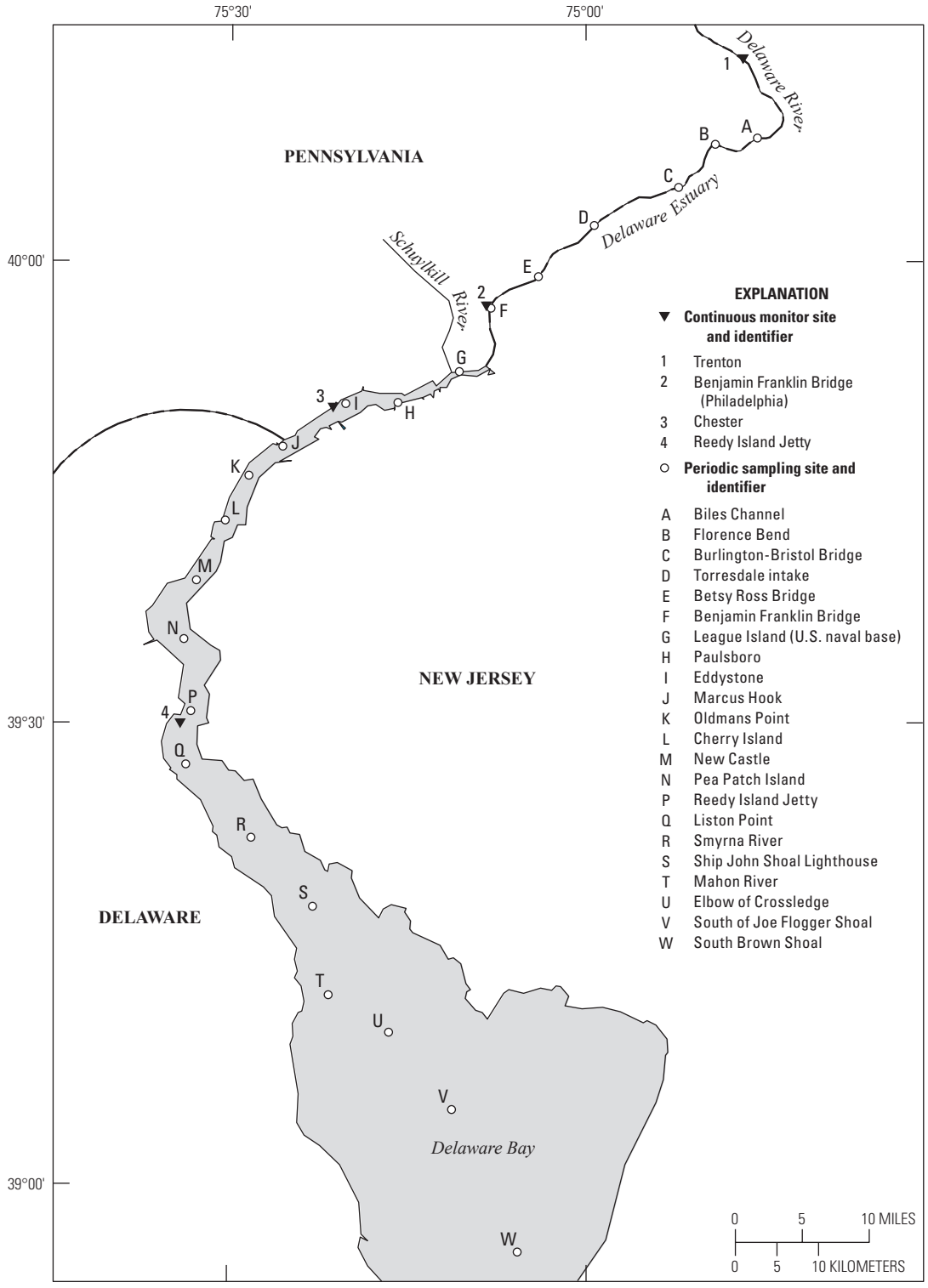

Figure 6. Map showing location of water-quality monitoring sites on the Delaware Estuary.

Water Temperature

Water temperature has an important influence on water quality, as it affects various physical, chemical, and biological properties of water (U.S. Geological Survey, 2020c). Generally, increases in water temperature have detrimental effects on water quality by decreasing the saturation level of dissolved oxygen and increasing the biological activity of aquatic organisms. Although the primary factors that affect water temperature in the Delaware Estuary are climatic, various kinds of water use, especially powerplant cooling, also can have substantial effects.

Water temperature data for the monitoring site at the Benjamin Franklin Bridge, Philadelphia, Pennsylvania, were collected almost continuously from April to November 2011 (U.S. Geological Survey, 2019). The available mean daily temperature data were retrieved from the USGS NWIS database for the months of April through November, and the average mean value was computed for each month. Long-term mean water temperatures were computed by using data for the period from 1964 to 2011 (fig. 7). In June and July 2011, the monthly mean temperatures were greater than the long-term mean monthly temperatures (fig. 7). Monthly mean temperatures were less than the respective long-term means in April, May, and August–November 2011 (fig. 7). The maximum daily mean water temperature of 29.1 degrees Celsius was recorded on August 1, 2011.

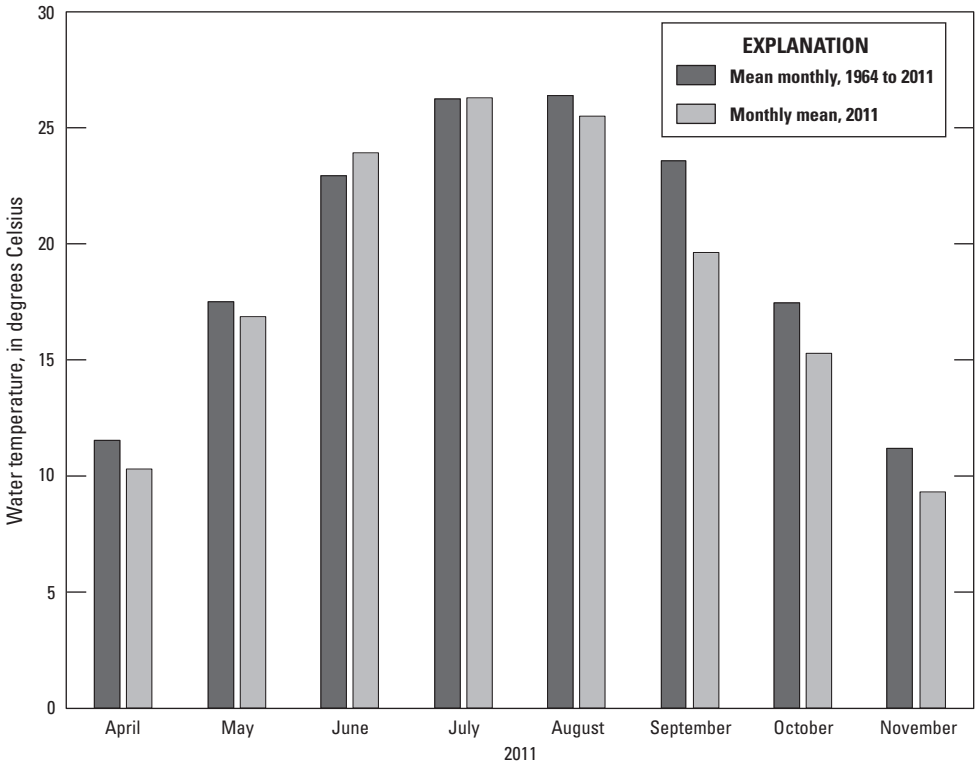

Figure 7. Graph showing water temperature in the Delaware Estuary at Benjamin Franklin Bridge at Philadelphia, Pennsylvania, April to November 2011.

Specific Conductance and Chloride

Specific conductance is a measure of the capacity of water to conduct an electrical current and is a function of the types and quantities of dissolved substances in water (U.S. Environmental Protection Agency, 2018). As concentrations of dissolved ions increase, specific conductance of the water also increases. Specific conductance measurements are good indicators of dissolved solids content and total ion concentrations. Seawater and some man-made constituents can cause the specific conductance of estuary water to increase substantially. Dilution associated with high freshwater inflows results in decreased levels of dissolved solids and lower specific conductance, whereas low inflows have the opposite effect.

The upstream movement of seawater and the accompanying increase in chloride concentrations is an important concern for water supplies obtained from the Delaware Estuary (Kauffman and others, 2008). Water with chloride concentrations greater than 250 milligrams per liter (mg/L) is considered undesirable for domestic use, and water with concentrations exceeding 50 mg/L is unsatisfactory for chemically sensitive consumers and some industrial processes. Chloride concentrations in the estuary increase in a downstream direction, with proximity to the Atlantic Ocean.

Specific conductance, not chloride concentration, was measured by the USGS at the site at Reedy Island Jetty, Delaware. At Reedy Island Jetty, the greatest daily maximum specific conductance was 23,200 microsiemens per centimeter at 25 degrees Celsius (µS/cm at 25 °C) on January 18, 2011 (table 15). Daily maximum specific conductance during the report year exceeded 3,780 µS/cm at 25 °C on approximately 72 percent of the days. The lowest daily minimum specific conductance was 133 µS/cm at 25 °C on September 12–13, 2011. Daily minimum specific conductance exceeded 3,780 µS/cm at 25 °C on approximately 34 percent of the days.

Chloride concentrations at Chester, Pennsylvania (table 16), were measured directly by Kimberly Clark Chester Operations (Gail Blum, Delaware River Basin Commission, written commun., 2018) and are not derived from specific conductance data.

At Chester, the greatest daily maximum chloride concentration was 193 mg/L on February 8, 2011 (table 16). During the report year, daily maximum concentrations exceeded 50 mg/L on about 24 percent of the 357 days on which chloride concentrations were measured at this location. The lowest daily minimum chloride concentration was 16 mg/L on March 14, 2011 (table 16). Daily minimum concentrations exceeded 50 mg/L on about 15 percent of the 357 days on which chloride concentrations were measured at this location. Chloride concentrations were persistently high from mid-January through the first week of March 2011, when daily minimum concentrations exceeded 50 mg/L on all days.

Dissolved Oxygen

Dissolved oxygen in water is necessary for the respiratory processes of aquatic organisms and for chemical reactions in aquatic environments (U.S. Geological Survey, 2020a). Fish and many other clean-water species consistently require relatively high dissolved-oxygen concentrations. The major source of dissolved oxygen in the Delaware Estuary is diffusion from the atmosphere and, to a lesser extent, photosynthetic activity of aquatic plants. The principal factors that affect dissolved-oxygen concentrations in the estuary are water temperature, biochemical oxygen demand, freshwater inflow, phytoplankton, turbidity, salinity, and tidal and wind-driven mixing.

Concentrations of dissolved oxygen at several sites on the Delaware Estuary have been measured since 1961 by the USGS. Two of these sites, Delaware River at Benjamin Franklin Bridge at Philadelphia, Pennsylvania, and Delaware River at Chester, Pennsylvania, have nearly continuous records and are in the reach of the estuary most affected by effluent discharges. For these stations, the daily mean and minimum daily mean dissolved-oxygen concentrations for the 3-month period of July to September during the 1965–2011 report years are shown in figure 8. Although dissolved oxygen concentrations have increased considerably over this 47-year period, mean concentrations can vary substantially from year to year. Due to changes in technology and other factors, the process used to calculate mean dissolved-oxygen concentrations and the values of those data have changed slightly through time. The procedures used to create figure 8 of this report were started for the 2009–2010 River Master report (Russell and others, 2019). The available mean and minimum daily dissolved-oxygen-concentration data were downloaded from the USGS NWIS database for the months of July, August, and September; and the average mean and average minimum dissolved-oxygen concentrations of all the daily values were computed over the 3-month period of each report year.

Concentrations of dissolved oxygen in the Delaware Estuary generally are greatest near Trenton and decrease in a downstream direction. In an area just downstream from the Benjamin Franklin Bridge, concentrations commonly reach minimum levels. During the report year, the lowest recorded daily mean concentration near the Benjamin Franklin Bridge was 3.8 mg/L on August 5, 2011 (table 17). Daily mean concentrations of dissolved oxygen were consistently 6.0 mg/L or greater on all days from April 1 through June 12, 2011, and from August 28 through November 30, 2011. During the 2011 report year, daily dissolved-oxygen data at Chester were available on December 1, 2010; April 5 to May 27, 2011; June 1 to August 3, 2011; and August 5 to November 30, 2011. Of those data collected at Chester during the 2011 report year, the lowest recorded daily mean dissolved-oxygen concentration was 4.8 mg/L on July 30, 2011 (table 18).

Histograms of half-hourly dissolved-oxygen concentrations during the critical summer period at the Benjamin Franklin Bridge (August 7, 2011, to September 30, 2011) and Chester (July 14, 2011, to September 30, 2011) monitoring sites are presented in figure 9. During the 2011 critical summer period, half-hourly dissolved-oxygen concentrations were 4 mg/L or less on 13 days (14 percent of days) at the Benjamin Franklin Bridge site and 0 days at Chester.

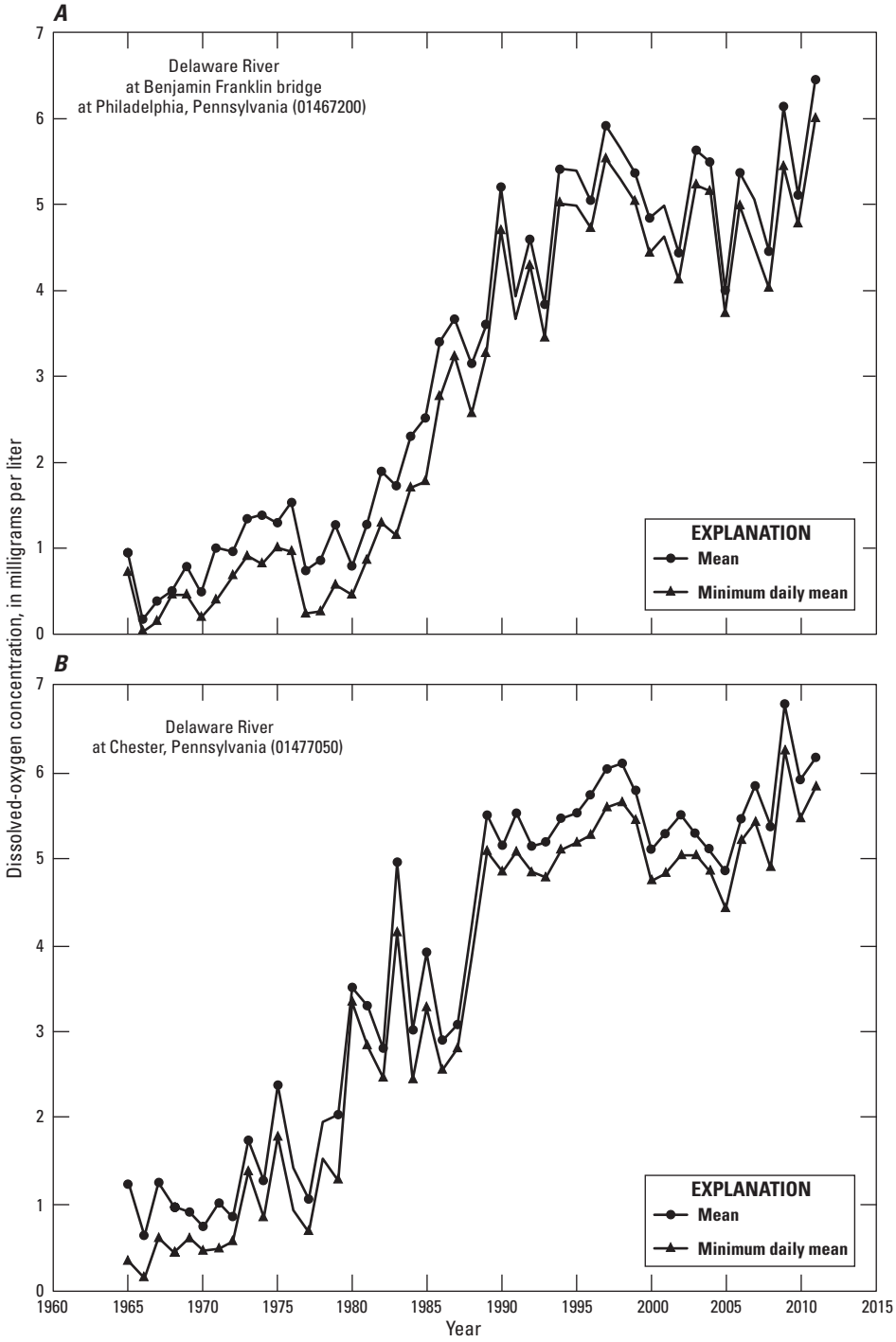

Figure 8. Graphs showing mean and minimum daily mean dissolved-oxygen concentrations from July to September at two sites on the Delaware Estuary, 1965–2011: (*A*) Delaware River at Benjamin Franklin Bridge at Philadelphia, Pennsylvania, and (*B*) Delaware River at Chester, Pennsylvania.

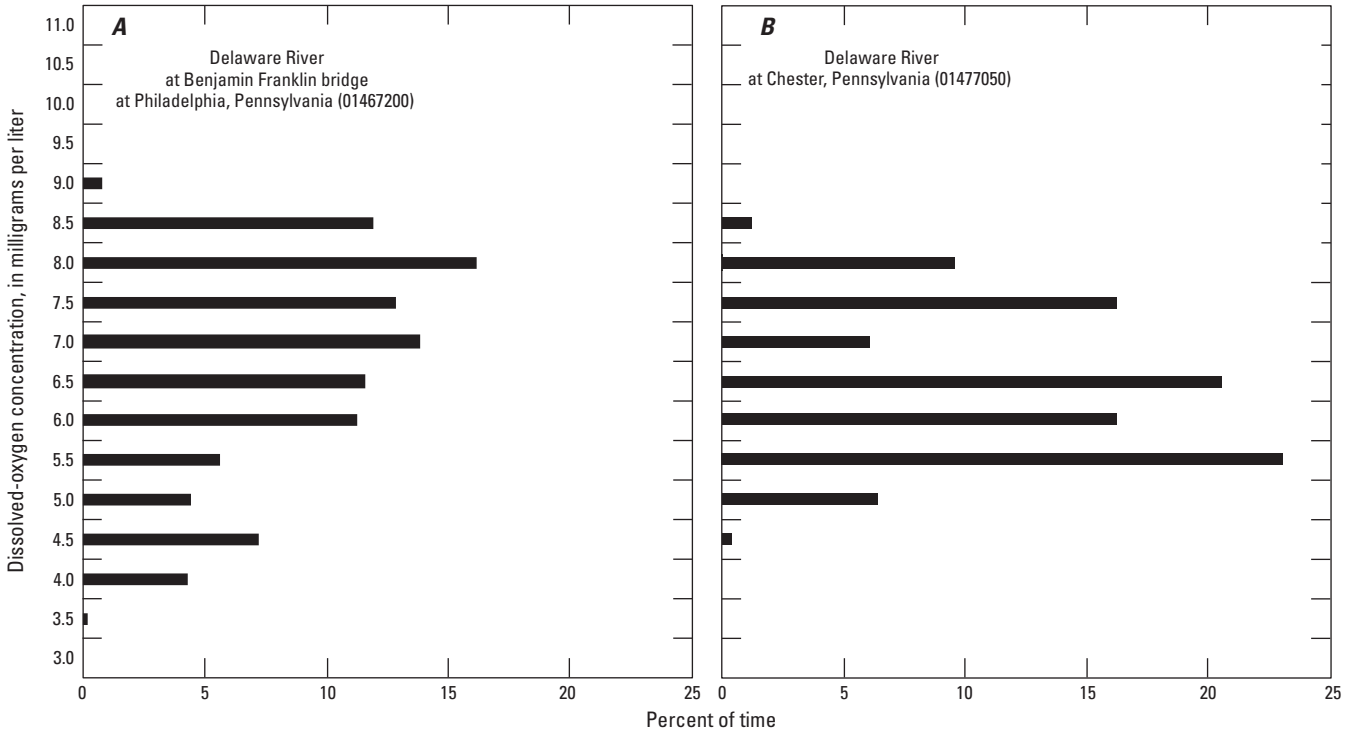

Figure 9. Graphs showing distribution of half-hourly dissolved-oxygen concentrations at two monitor sites on the Delaware Estuary, July to September 2011: (*A*) Delaware River at Benjamin Franklin Bridge at Philadelphia, Pennsylvania, and (*B*) Delaware River at Chester, Pennsylvania.

Hydrogen-Ion Activity (pH)

The pH of a solution is a measure of the effective concentration (activity) of dissolved hydrogen ions. Solutions with pH less than 7 are characterized as acidic, whereas solutions with pH greater than 7 are considered basic or alkaline. The pH of uncontaminated surface water generally ranges from 6.5 to 8.5. Major factors affecting the pH of surface water include the geologic composition of the drainage basin and human inputs, including effluent discharges. In addition, photosynthetic activity and dissolved gases, including carbon dioxide, hydrogen sulfide and ammonia, can have a considerable effect on pH. The pH of water determines the solubility (amount that can be dissolved in the water) and biological availability (amount that can be utilized by aquatic life) of chemical constituents such as nutrients (phosphorus, nitrogen, and carbon) and heavy metals (for example, lead, copper, and cadmium) (U.S. Geological Survey, 2020b). During the report year, pH was measured seasonally (April through November) at the Benjamin Franklin Bridge and Chester monitor sites and continuously at the Reedy Island Jetty site. During these periods, the ranges of daily median pH measured at these stations were as follows: Benjamin Franklin Bridge, 6.7 to 7.5; Chester, 7.0 to 7.7; and Reedy Island Jetty, 6.7 to 7.9 (U.S. Geological Survey, 2019). Generally, the pH of water in the Delaware Estuary is lowest near Trenton, New Jersey, and increases (water becomes more alkaline) in a downstream direction. The pH of water in the Delaware Estuary between the Benjamin Franklin Bridge and Reedy Island Jetty was not a limiting factor for aquatic health or other beneficial uses of the water during the report year.

Table 14. Daily mean discharge of the Delaware River at Trenton, New Jersey (station number 01463500), for report year ending November 30, 2011.

[U.S. Geological Survey published record. All values except totals are in cubic feet per second, ft^3/s; totals are in cubic feet per second day (ft^3/s)-d; —, not applicable]

Day	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
1	14,000	7,240	6,460	26,400	17,700	46,600	18,900	15,400	5,790	47,400	72,400	18,900
2	46,300	7,030	6,390	29,700	18,300	36,200	17,000	12,400	5,220	35,400	55,400	18,600
3	57,200	7,170	7,360	27,400	18,700	30,400	14,200	10,400	4,960	27,400	48,900	17,800
4	39,800	7,180	7,620	22,900	18,000	27,500	11,900	14,900	4,980	23,300	42,100	16,700
5	30,900	7,610	6,870	20,100	18,100	29,700	10,500	28,600	4,670	21,900	36,400	15,800
6	25,700	7,350	7,610	22,400	20,500	31,800	9,320	21,300	4,790	43,800	33,300	14,700
7	21,100	6,640	8,070	79,200	24,800	27,500	8,600	17,300	6,780	98,100	29,100	13,200
8	18,000	6,320	7,980	100,000	24,600	22,800	8,370	14,800	17,200	167,000	25,300	12,500
9	16,500	6,110	8,680	62,100	23,700	20,300	7,840	15,800	14,300	172,000	22,200	12,400
10	14,500	5,510	7,580	50,800	21,300	18,300	7,970	16,000	12,300	120,000	19,700	12,100
11	12,800	4,570	6,840	103,000	19,500	16,400	7,830	12,900	10,400	76,700	18,200	11,900
12	13,600	5,650	5,950	138,000	19,200	14,800	8,490	10,700	10,200	57,500	16,100	11,500
13	20,500	6,730	5,770	93,500	25,000	13,500	8,520	9,190	8,870	48,000	15,500	11,100
14	24,300	5,890	5,600	68,600	27,600	12,300	11,000	8,280	20,800	42,000	16,600	10,400
15	24,100	5,150	6,810	56,000	26,300	11,700	10,900	7,570	23,100	37,200	23,100	10,000
16	20,300	[1]4,850	7,040	48,600	24,300	13,400	9,810	6,810	22,000	34,000	26,200	10,300
17	17,700	[1]4,700	7,450	45,100	52,700	14,200	10,000	6,420	25,800	29,200	23,600	13,600
18	16,000	4,500	11,100	40,400	57,100	18,500	11,300	5,650	21,500	24,600	21,700	13,800
19	14,400	5,330	16,100	36,600	48,500	24,000	11,000	5,230	16,400	22,000	20,800	12,900
20	12,900	7,110	15,200	37,900	42,500	42,200	9,550	5,490	15,000	19,000	22,800	11,700
21	12,300	7,550	14,600	35,000	39,400	49,000	8,150	5,230	14,400	17,000	21,700	10,800
22	11,700	7,010	14,200	32,900	34,400	44,000	7,650	5,040	16,100	16,300	20,600	11,000
23	11,400	[1]6,100	12,700	31,300	30,300	35,400	7,940	5,010	12,800	17,500	17,600	38,500
24	11,100	[1]6,050	11,400	33,400	29,100	33,500	22,700	4,990	10,700	32,300	16,000	48,000
25	10,400	[1]5,500	16,300	30,300	34,500	30,800	37,400	5,050	9,960	36,000	14,800	40,800
26	9,490	[1]6,600	23,200	26,900	30,200	26,900	35,300	11,700	10,800	30,900	13,600	30,300
27	[1]8,700	[1]6,550	21,300	23,900	33,200	22,600	25,300	8,340	14,300	25,700	12,800	24,400
28	[1]7,900	[1]6,500	22,700	21,000	60,300	19,200	19,000	7,190	101,000	32,800	13,500	21,700
29	7,940	[1]6,500	—	19,700	—	—	15,600	6,600	139,000	74,200	14,900	21,200
30	7,680	10,500	—	18,700	61,500	17,200	14,300	6,010	107,000	85,100	17,700	29,100
31	7,650	8,450	—	18,300	—	16,300	—	5,840	65,300	—	19,100	—
Total[2]	**566,860**	**199,950**	**298,880**	**1,400,100**	**942,800**	**787,900**	**406,340**	**316,140**	**756,420**	**1,514,300**	**771,700**	**545,700**
Mean[3]	18,286.0	6,450.0	10,674.0	45,165.0	31,427.0	25,416.0	13,545.0	10,198.0	24,401.0	50,477.0	24,894.0	18,190.0

[1]Estimated.

[2]Year total is 8,507,090 (ft^3/s)-d.

[3]Year mean is 23,260.25 ft^3/s.

Table 15. Daily maximum and minimum specific conductance, Delaware River at Reedy Island Jetty, Delaware (station number 01482800), for report year ending November 30, 2011.

[Concentrations are in microsiemens per centimeter at 25 degrees Celsius. max, maximum value; min, minimum value; —, not applicable]

Day	Dec. max / min	Jan. max / min	Feb. max / min	Mar. max / min	Apr. max / min	May max / min	June max / min	July max / min	Aug. max / min	Sept. max / min	Oct. max / min	Nov. max / min
1	13,400 / 6,530	17,100 / 8,500	19,000 / 10,900	8,390 / 2,960	10,900 / 4,280	784 / 247	4,680 / 466	13,200 / 4,000	16,400 / 7,870	176 / 149	784 / 239	6,740 / 1,180
2	11,000 / 770	17,500 / 8,310	19,800 / 11,900	9,340 / 2,520	9,540 / 3,340	784 / 260	3,720 / 439	12,900 / 4,450	15,500 / 7,700	175 / 148	255 / 235	6,320 / 1,220
3	9,240 / 2,790	16,500 / 8,410	16,000 / 10,600	6,980 / 1,840	7,780 / 2,790	753 / 250	3,720 / 463	11,700 / 4,440	16,100 / 7,750	175 / 149	268 / 230	4,980 / 1,180
4	8,090 / 1,780	17,900 / 8,320	18,400 / 10,200	8,340 / 1,840	8,040 / 2,920	808 / 244	6,240 / 567	11,500 / 4,740	16,100 / 8,450	176 / 155	247 / 215	6,080 / 1,100
5	6,960 / 1,490	15,200 / 7,300	14,800 / 10,400	6,590 / 1,870	7,420 / 2,260	744 / 250	7,560 / 1,070	12,600 / 4,530	16,100 / 8,430	336 / 171	3,630 / 211	7,740 / 1,230
6	6,140 / 1,040	16,900 / 8,430	15,000 / 8,520	5,590 / 1,840	5,940 / 1,580	2,850 / 280	7,200 / 1,480	12,100 / 4,330	16,000 / 8,960	464 / 209	5,050 / 206	8,280 / 2,030
7	4,350 / 677	17,200 / 8,510	14,000 / 8,830	4,950 / 763	4,450 / 1,650	2,840 / 264	8,090 / 1,680	10,700 / 4,000	14,800 / 8,620	305 / 175	4,740 / 204	6,870 / 1,520
8	6,910 / 653	16,800 / 9,810	16,200 / 8,720	1,340 / 479	6,280 / 1,690	3,190 / 279	7,440 / 1,710	10,900 / 4,100	15,800 / 8,060	231 / 160	4,960 / 258	7,260 / 1,510
9	8,520 / 693	14,000 / 8,220	12,400 / 7,040	692 / 380	4,510 / 1,550	2,540 / 299	8,110 / 1,920	10,000 / 3,560	15,600 / 7,790	224 / 161	4,320 / 300	9,060 / 1,560
10	10,500 / 1,410	14,600 / 7,530	13,600 / 7,120	588 / 404	4,830 / 1,380	5,040 / 327	8,160 / 2,170	10,300 / 3,410	15,300 / 7,340	212 / 147	5,550 / 429	9,400 / 2,020
11	10,800 / 2,010	16,700 / 7,530	16,000 / 6,720	1,350 / 283	3,780 / 1,140	5,520 / 860	10,200 / 2,550	10,200 / 3,220	15,500 / 6,940	198 / 140	6,310 / 550	8,040 / 1,910
12	11,500 / 2,980	17,400 / 9,350	16,200 / 6,750	477 / 233	2,490 / 973	5,420 / 979	10,300 / 2,950	11,000 / 3,230	16,100 / 6,840	169 / 133	7,230 / 862	9,040 / 1,780
13	10,300 / 3,540	17,200 / 6,560	14,900 / 6,370	463 / 206	4,040 / 924	4,100 / 1,110	10,800 / 3,200	11,000 / 3,230	15,000 / 6,740	155 / 133	7,480 / 1,410	7,660 / 1,720
14	9,210 / 3,440	21,300 / 9,030	15,900 / 7,500	455 / 212	3,810 / 657	4,110 / 1,170	11,800 / 3,260	12,000 / 3,390	14,300 / 6,210	177 / 142	6,310 / 1,620	7,590 / 1,710
15	11,200 / 4,420	20,500 / 13,000	14,500 / 6,920	2,840 / 216	3,740 / 658	4,530 / 1,090	12,700 / 3,770	13,600 / 4,540	9,980 / 4,330	203 / 153	3,380 / 1,080	7,140 / 1,700
16	13,700 / 5,830	20,500 / 12,000	18,300 / 7,760	4,270 / 251	5,380 / 885	4,530 / 986	11,700 / 4,260	12,000 / 4,370	10,100 / 3,300	205 / 151	2,000 / 603	8,880 / 1,650
17	15,100 / 5,350	21,400 / 12,700	16,000 / 8,050	725 / 252	5,360 / 487	4,630 / 1,010	11,800 / 4,250	11,400 / 4,210	9,770 / 2,920	182 / 156	3,530 / 358	9,150 / 2,090
18	15,900 / 4,990	23,200 / 13,100	15,400 / 8,110	821 / 227	1,240 / 401	4,040 / 916	10,300 / 3,890	10,600 / 3,870	8,250 / 2,670	1,190 / 162	3,940 / 406	7,650 / 1,790
19	17,500 / 5,650	22,600 / 12,800	13,300 / 6,390	326 / 211	628 / 385	3,330 / 855	10,500 / 3,800	9,620 / 3,650	7,320 / 2,450	2,050 / 170	6,120 / 494	8,410 / 1,990
20	17,800 / 7,120	20,700 / 13,100	12,400 / 4,860	340 / 215	484 / 360	2,290 / 786	10,400 / 4,100	10,900 / 3,780	7,050 / 2,240	2,620 / 181	5,380 / 870	7,540 / 1,990
21	17,600 / 7,460	18,500 / 12,800	15,100 / 6,640	511 / 217	416 / 320	1,660 / 622	9,780 / 3,970	11,000 / 4,500	8,200 / 2,170	3,660 / 188	1,600 / 279	8,920 / 1,710
22	19,300 / 8,120	18,900 / 12,100	16,200 / 6,300	324 / 209	389 / 302	1,510 / 507	8,400 / 3,880	10,400 / 4,400	8,040 / 1,870	3,960 / 279	4,450 / 271	10,700 / 2,210
23	15,100 / 8,270	18,400 / 11,500	13,000 / 5,640	324 / 209	392 / 297	1,350 / 482	9,630 / 3,760	11,700 / 4,250	9,750 / 1,770	5,260 / 350	5,090 / 324	9,170 / 1,990
24	18,900 / 8,330	18,400 / 11,500	13,200 / 6,000	412 / 226	364 / 286	617 / 407	10,700 / 3,770	12,000 / 4,650	12,400 / 2,360	2,780 / 375	5,240 / 434	6,770 / 1,020
25	19,000 / 8,630	18,200 / 11,600	13,900 / 4,660	270 / 205	360 / 298	1,550 / 434	11,400 / 3,890	15,500 / 5,460	11,100 / 3,300	1,400 / 294	4,690 / 414	4,950 / 701
26	16,500 / 8,630	17,900 / 11,200	9,350 / 3,610	241 / 210	333 / 271	2,220 / 434	11,500 / 3,390	15,100 / 6,520	11,700 / 2,500	1,410 / 323	4,980 / 528	2,550 / 671
27	15,900 / 8,150	19,900 / 12,300	10,100 / 3,640	1,420 / 219	326 / 280	2,590 / 382	11,100 / 3,200	16,600 / 6,750	11,300 / 3,060	1,260 / 307	6,170 / 671	3,190 / 676
28	14,300 / 7,640	20,000 / 11,800	11,600 / 3,300	4,110 / 212	368 / 292	3,320 / 418	12,400 / 2,650	17,500 / 6,110	11,500 / 299	1,510 / 322	6,680 / 682	2,000 / 629
29	17,300 / 7,180	19,100 / 11,000	—	6,430 / 278	368 / 280	2,550 / 432	12,400 / 3,510	17,500 / 7,200	1,060 / 194	949 / 280	6,610 / 1,140	2,280 / 635
30	19,200 / 7,530	19,200 / 11,400	—	7,980 / 1,430	309 / 261	2,460 / 442	12,300 / 3,850	17,600 / 7,320	453 / 171	329 / 254	7,140 / 1,110	940 / 604
31	18,200 / 8,270	18,900 / 10,400	—	10,200 / 3,200	—	3,960 / 407	—	16,500 / 7,800	201 / 153	—	6,010 / 994	—
Mean	13,207 / 5,012	18,471 / 10,326	14,805 / 7,266	3,132 / 768	3,476 / 1,107	2,794 / 562	9,501 / 2,796	12,568 / 4,645	11,509 / 4,628	1,071 / 204	4,505 / 569	6,843 / 1,458
Max	19,300 / 8,630	23,200 / 13,100	19,800 / 11,900	10,200 / 3,200	10,900 / 4,280	5,520 / 1,170	12,700 / 4,260	17,600 / 7,800	16,400 / 8,960	5,260 / 375	7,480 / 1,620	10,700 / 2,210
Min	4,350 / 653	14,000 / 6,560	9,350 / 3,300	241 / 205	309 / 261	617 / 244	3,720 / 439	9,620 / 3,220	201 / 153	155 / 133	247 / 204	940 / 604

Table 16. Daily maximum and minimum chloride concentrations, Delaware River at Chester, Pennsylvania (station number 01477050), for report year ending November 30, 2011.

[Record furnished by Kimberly Clark Chester Operations. Concentrations are in milligrams per liter. max, maximum value; min, minimum value; *, missing data; —, not applicable]

Day	Dec. max / min	Jan. max / min	Feb. max / min	Mar. max / min	Apr. max / min	May max / min	June max / min	July max / min	Aug. max / min	Sept. max / min	Oct. max / min	Nov. max / min
1	42 / 42	42 / 42	131 / 104	77 / 67	*	42 / 36	33 / 28	49 / 42	46 / 40	28 / 28	42 / 35	43 / 35
2	42 / 42	49 / 42	138 / 126	77 / 67	56 / 42	35 / 28	33 / 33	49 / 42	46 / 40	49 / 28	35 / 29	42 / 35
3	49 / 35	49 / 42	138 / 126	77 / 67	56 / 49	35 / 29	40 / 33	49 / 35	46 / 40	49 / 28	35 / 29	42 / 35
4	42 / 35	56 / 49	150 / 115	67 / 57	56 / 42	35 / 35	33 / 28	49 / 42	46 / 40	49 / 35	29 / 29	39 / 29
5	42 / 35	59 / 35	150 / 138	67 / 39	49 / 42	35 / 29	36 / 28	42 / 42	46 / 40	35 / 28	49 / 29	42 / 39
6	35 / 28	56 / 49	150 / 150	57 / 39	49 / 42	35 / 28	40 / 40	49 / 42	53 / 46	42 / 28	29 / 29	42 / 35
7	35 / 28	56 / 49	150 / 94	48 / 39	49 / 42	35 / 35	40 / 32	49 / 35	53 / 40	42 / 35	35 / 29	49 / 35
8	42 / 28	56 / 56	193 / 150	39 / 39	56 / 49	35 / 35	46 / 40	49 / 42	61 / 46	28 / 28	35 / 29	42 / 35
9	35 / 28	56 / 49	150 / 104	39 / 39	49 / 42	35 / 35	46 / 40	42 / 35	53 / 46	30 / 28	29 / 29	42 / 35
10	35 / 28	56 / 49	150 / 104	39 / 32	49 / 42	35 / 28	46 / 40	42 / 35	46 / 40	39 / 28	29 / 23	49 / 42
11	28 / 28	56 / 49	150 / 138	39 / 32	49 / 49	35 / 35	40 / 33	42 / 33	46 / 46	35 / 28	29 / 29	42 / 42
12	28 / 28	56 / 56	150 / 150	32 / 24	49 / 49	35 / 35	40 / 40	40 / 33	46 / 46	28 / 21	42 / 29	42 / 35
13	42 / 28	56 / 56	150 / 126	24 / 24	49 / 49	42 / 35	46 / 40	40 / 33	53 / 46	28 / 21	35 / 29	42 / 35
14	35 / 28	64 / 56	150 / 150	32 / 16	49 / 42	46 / 42	46 / 40	40 / 33	53 / 46	42 / 28	35 / 29	58 / 42
15	35 / 28	56 / 56	150 / 150	24 / 24	56 / 49	49 / 42	46 / 40	46 / 40	46 / 46	31 / 21	35 / 35	56 / 35
16	35 / 28	64 / 56	150 / 150	24 / 24	56 / 49	49 / 35	46 / 40	46 / 40	53 / 46	35 / 28	35 / 29	49 / 49
17	35 / 28	64 / 56	150 / 150	32 / 24	49 / 42	42 / 35	46 / 40	46 / 33	87 / 46	35 / 35	35 / 29	56 / 49
18	35 / 28	81 / 56	150 / 138	32 / 25	49 / 42	42 / 35	46 / 40	46 / 40	46 / 40	35 / 35	35 / 29	49 / 49
19	28 / 28	91 / 81	150 / 138	42 / 36	49 / 42	42 / 35	46 / 40	46 / 40	46 / 33	35 / 28	35 / 29	56 / 42
20	35 / 35	100 / 91	150 / 104	42 / 35	42 / 35	42 / 28	46 / 40	46 / 40	40 / 40	35 / 28	35 / 29	56 / 49
21	35 / 28	100 / 91	138 / 126	42 / 35	46 / 42	42 / 42	46 / 40	46 / 40	40 / 40	35 / 28	35 / 29	49 / 49
22	35 / 28	96 / 91	126 / 126	42 / 42	42 / 35	49 / 42	46 / 40	53 / 40	40 / 33	35 / 28	35 / 35	56 / 49
23	35 / 35	100 / 91	138 / 126	42 / 35	35 / 35	42 / 42	46 / 40	46 / 40	40 / 40	42 / 35	35 / 35	49 / 42
24	49 / 28	100 / 91	126 / 126	42 / 28	35 / 28	49 / 36	46 / 40	46 / 40	40 / 33	35 / 35	35 / 35	49 / 35
25	35 / 28	111 / 100	115 / 104	*	42 / 35	42 / 35	46 / 40	61 / 40	33 / 33	42 / 42	35 / 35	56 / 35
26	35 / 35	110 / 100	94 / 94	*	42 / 39	35 / 35	46 / 40	46 / 42	40 / 33	42 / 35	35 / 35	49 / 42
27	35 / 35	122 / 100	104 / 85	*	42 / 35	35 / 35	42 / 40	46 / 46	33 / 28	46 / 35	42 / 35	49 / 35
28	42 / 35	100 / 91	94 / 88	*	42 / 35	35 / 35	81 / 49	46 / 46	28 / 28	49 / 42	35 / 29	49 / 35
29	42 / 42	111 / 100	—	*	56 / 35	49 / 35	49 / 42	46 / 40	28 / 23	49 / 35	35 / 29	42 / 35
30	42 / 35	122 / 91	—	*	64 / 42	35 / 33	56 / 49	46 / 40	28 / 28	49 / 29	35 / 28	42 / 35
31	42 / 42	126 / 104	—	*	—	40 / 28	—	46 / 40	28 / 28	—	42 / 29	—
Mean	37 / 32	78 / 69	141 / 124	45 / 37	49 / 41	40 / 35	45 / 38	46 / 39	45 / 39	38 / 30	35 / 30	48 / 39
Max	49 / 42	126 / 104	193 / 150	77 / 67	64 / 49	49 / 42	81 / 49	61 / 46	87 / 46	49 / 42	49 / 35	58 / 49
Min	28 / 28	42 / 35	94 / 85	24 / 16	35 / 28	35 / 28	33 / 28	40 / 33	28 / 23	28 / 21	29 / 23	39 / 29

Table 17. Daily mean dissolved-oxygen concentrations, Delaware River at Benjamin Franklin Bridge at Philadelphia, Pennsylvania (station number 01467200), April 1 to November 30, 2011.

[U.S. Geological Survey published record. Concentrations are in milligrams per liter. —, not applicable; Max, maximum value; Min, minimum value]

Day	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
1	12.7	9.5	8.1	6.9	4.1	7.3	7.9	9.9
2	12.6	9.7	8.0	6.9	4.0	7.4	8.2	10.1
3	12.6	9.9	8.0	6.9	4.0	7.4	8.5	10.4
4	12.5	9.9	8.0	6.7	3.9	7.4	8.7	10.7
5	12.3	9.8	7.8	6.8	3.8	7.3	9.2	10.9
6	12.0	9.7	7.8	7.2	4.0	7.3	9.4	11.0
7	12.0	9.6	7.9	7.5	4.2	7.8	9.5	11.1
8	11.8	9.6	8.1	7.5	4.4	8.3	9.5	11.1
9	11.5	9.6	8.2	6.8	4.8	8.2	9.4	11.0
10	11.6	9.6	7.8	6.8	4.9	8.1	9.2	10.9
11	11.7	9.6	7.1	7.0	5.2	8.0	9.1	11.0
12	11.8	9.6	6.3	6.9	5.5	7.8	9.0	11.0
13	11.6	9.6	5.9	6.8	5.7	7.8	8.9	11.0
14	11.5	9.5	5.8	6.7	5.8	7.8	8.8	11.0
15	11.2	9.0	5.8	6.6	6.1	7.8	8.9	10.9
16	10.9	8.7	5.7	6.5	5.7	7.8	9.0	10.8
17	10.6	8.5	5.9	6.6	5.8	7.8	9.0	10.6
18	10.7	8.3	6.0	6.6	6.0	7.9	8.9	10.7
19	10.6	8.1	6.0	6.5	5.7	8.1	8.8	10.8
20	10.8	8.1	6.2	6.4	5.8	8.2	8.8	10.9
21	11.1	8.5	6.5	6.2	6.2	8.3	9.2	10.8
22	11.3	8.6	6.9	6.1	5.7	8.3	9.2	10.6
23	11.2	8.6	7.2	5.8	6.0	8.1	9.2	10.4
24	11.1	8.5	7.4	5.6	6.0	7.9	9.0	11.1
25	11.1	8.5	8.0	5.3	5.9	8.1	9.0	10.6
26	11.1	8.5	7.5	4.9	5.6	7.9	9.0	10.6
27	10.9	8.4	7.3	4.8	5.5	7.6	9.0	10.8
28	10.3	8.3	7.2	4.6	6.5	7.5	9.1	10.9
29	9.9	8.3	7.0	4.4	6.4	7.7	9.2	10.9
30	9.5	8.2	6.8	4.2	6.7	7.9	9.4	10.9
31	—	8.2	—	4.2	7.2	—	9.7	—
Mean	11.3	9.0	7.1	6.2	5.4	7.8	9.0	10.8
Max	12.7	9.9	8.2	7.5	7.2	8.3	9.7	11.1
Min	9.5	8.1	5.7	4.2	3.8	7.3	7.9	9.9

Table 18. Daily mean dissolved-oxygen concentrations, Delaware River at Chester, Pennsylvania (station number 01477050), April 1 to November 30, 2011.

[U.S. Geological Survey published record. Concentrations are in milligrams per liter. *, missing data; —, not applicable; Max, maximum value; Min, minimum value]

Day	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
1	*	8.8	9.3	6.8	5.1	6.2	7.3	8.9
2	*	8.6	9.2	6.7	5.2	6.2	7.4	8.9
3	*	8.5	9.2	6.4	5.0	6.2	7.6	9.1
4	*	8.4	9.3	6.1	*	6.3	7.8	9.2
5	11.4	8.5	8.7	5.7	4.9	6.3	7.9	9.5
6	11.3	8.6	8.5	5.5	5.1	6.6	8.0	9.6
7	11.2	8.7	8.2	5.5	5.2	7.5	8.2	9.7
8	10.9	8.8	7.7	5.4	5.3	7.6	8.3	9.7
9	10.7	8.9	7.2	5.4	5.2	7.9	8.4	9.6
10	10.6	9.1	6.6	5.7	5.2	8.0	8.4	9.5
11	10.5	9.3	5.9	6.1	5.6	7.8	8.2	9.7
12	10.3	9.4	5.4	6.3	6.0	7.7	8.2	9.9
13	10.2	9.4	5.1	6.2	6.3	7.5	8.3	10.0
14	10.1	9.1	5.1	6.2	6.1	7.3	8.2	9.9
15	10.0	8.6	5.1	6.3	5.5	7.3	8.2	9.8
16	10.1	8.3	4.9	6.3	5.2	7.4	8.6	9.7
17	9.9	8.1	5.2	6.3	5.2	7.4	8.5	9.5
18	9.8	8.0	5.0	6.4	5.4	7.6	8.4	9.7
19	9.6	7.8	5.0	6.3	5.5	7.7	8.3	9.9
20	9.5	7.6	5.3	5.9	5.5	7.6	8.5	9.9
21	9.5	7.5	5.7	5.7	5.5	7.4	8.6	9.7
22	9.7	7.5	6.0	5.4	5.5	7.3	8.6	9.6
23	9.7	7.7	6.0	5.1	5.6	7.2	8.4	9.6
24	9.7	7.7	6.0	5.0	5.7	7.2	8.4	10.0
25	9.8	7.7	6.1	5.1	5.7	7.3	8.5	10.0
26	9.8	7.7	6.2	5.3	5.5	7.1	8.4	10.2
27	9.7	7.7	6.4	5.1	5.1	7.0	8.2	10.1
28	9.5	*	6.5	5.0	6.4	7.0	8.2	9.8
29	9.2	*	6.6	4.9	6.2	7.1	8.5	9.7
30	9.0	*	6.7	4.8	6.0	7.3	8.9	9.7
31	—	*	—	4.9	6.1	—	8.9	—
Mean	10.1	8.4	6.6	5.7	5.5	7.2	8.3	9.7
Max	11.4	9.4	9.3	6.8	6.4	8.0	8.9	10.2
Min	9.0	7.5	4.9	4.8	4.9	6.2	7.3	8.9

References Cited

Delaware River Basin Commission, 2016, Delaware Estuary Boat Run Monitoring Program: Delaware River Basin Commission web page, accessed August 7, 2018, at https://www.nj.gov/drbc/programs/quality/boat-run.html.

Kauffman, G., Belden, A., and Homsey, A., 2008, Technical summary—State of the Delaware Basin report: West Trenton, N.J., Delaware River Basin Commission, prepared by the University of Delaware, Newark, Del., 195 p., accessed August 7, 2018, at http://udspace.udel.edu/handle/19716/3808.

New York State Department of Environmental Conservation and Pennsylvania Fish and Boat Commission, 2010, Recommended improvements to the Flexible Flow Management Program for coldwater ecosystem protection in the Delaware River tailwaters: Albany, N.Y., New York State Department of Environmental Conservation, and Bellefonte, Pa., Pennsylvania Fish and Boat Commission, 36 p. [Also available at https://webapps.usgs.gov/odrm/ffmp/FFMP_White_Paper_Version_Final_1_12_10.pdf.]

Russell, K.L., Ockerman, D., Krejmas, B.E., Paulachok, G.N., and Mason, R.R., Jr., 2019, Report of the River Master of the Delaware River for the Period December 1, 2009–November 30, 2010: U.S. Geological Survey Open-File Report, 2019–1093, 128 p. [Also available at https://doi.org/10.3133/ofr20191093.]

U.S. Environmental Protection Agency, 2018, Indicators—Conductivity: U.S. Environmental Protection Agency National Aquatic Resource surveys web page, accessed August 7, 2018, at https://www.epa.gov/national-aquatic-resource-surveys/indicators-conductivity.

U.S. Geological Survey, 2010, Water-resources data for the United States—Water year 2010: U.S. Geological Survey Water-Data Report 2010, accessed May 7, 2019, at https://doi.org/10.3133/wdr2010.

U.S. Geological Survey, 2019, USGS water data for the Nation: U.S. Geological Survey National Water Information System database, accessed January 22, 2019, at https://doi.org/10.5066/F7P55KJN.

U.S. Geological Survey, 2020a, Dissolved oxygen and water: U.S. Geological Survey Water Science School web page, accessed April 10, 2020, at http://usgs.gov/special-topic/water-science-school/science/dissolved-oxygen-and-water?qt-science_center_objects=0#qt-science_center_objects.

U.S. Geological Survey, 2020b, pH and water: U.S. Geological Survey Water Science School web page, accessed April 10, 2020, at http://usgs.gov/special-topic/water-science-school/science/ph-and-water?qt-science_center_objects=0#qt-science_center_objects.

U.S. Geological Survey, 2020c, Temperature and water: U.S. Geological Survey Water Science School web page, accessed April 10, 2020, at http://usgs.gov/special-topic/water-science-school/science/temperature-and-water?qt_science_center_objects=0#qt-science_center_objects.

Appendixes 1–4

Appendix 1. Agreement of the Parties to the 1954 U.S. Supreme Court Decree, Effective February 14, 2011

February 14, 2011

Agreement of the Parties to the 1954 U.S. Supreme Court Decree Effective February 14, 2011

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16. PERIODIC EVALUTION AND REVISION
17. TEMPORARY SUSPENSION OR MODIFICATION
18. RESERVATIONS
19. EFFECTIVE DATE
20. RENEWAL AND REVISION
21. TERMINATION AND REVERSION
22. RESCISSION AND NULLIFICATION

February 14, 2011

An Agreement, consented to by the Parties (the State of Delaware (DE), the State of New Jersey (NJ), the State of New York (NY), the Commonwealth of Pennsylvania (PA), and the City of New York (NYC or City); hereafter Decree Parties) to the Amended Decree of the U.S. Supreme Court in New Jersey v. New York, 347 U.S. 995 (1954), (hereafter Decree) and proposing to modify and supercede certain provisions of Delaware River Basin Commission (DRBC) Resolutions D-77-20 CP (Revised) (also referred to as Revision 1) and subsequent revisions, to establish a Flexible Flow Management Program (FFMP) for managing diversions and releases under the Decree. The Parties hereby agree to the following and support adoption of appropriate Delaware River Basin Water Code revisions by the DRBC.

1. FLEXIBLE FLOW MANAGEMENT PROGRAM

a. Program Established

A Flexible Flow Management Program, as described in Sections 2 through 17, herein, is hereby established, whereby the Decree Parties shall manage diversions and releases under the Decree. The FFMP is designed to provide safe and reliable supplies of water essential to serve the needs of over 17 million people who depend on water from the City's Cannonsville, Pepacton and Neversink Reservoirs (City Delaware Basin Reservoirs) and their tailwaters, and the Delaware River; to manage discharges from the City Delaware Basin Reservoirs; to provide flows to help control temperatures in the tailwaters to help sustain cold water fisheries; to assist in mitigating the impacts of flooding; and to provide flows in the main stem and the Delaware Bay to help protect ecological health, support withdrawal and non-withdrawal uses, and repel salinity. The FFMP incorporates the elements provided in Sections 2 through 17, recognizing that various elements may require further study and investigation either prior to or during implementation and that some elements may therefore be implemented prior to others. It is also recognized that other elements may be added in the future, upon unanimous agreement of the Decree Parties, when or if identified. Addition of, or modifications to, elements of the FFMP may require adjustments or modifications to other prior established elements.

b. Criteria For Flexible Flow Management Program Modification

In reviewing proposed modifications to address the purposes of the FFMP, as provided in Sections 15, 16 and 17 herein, the Decree Parties and the DRBC will consider criteria that may include, without any particular priority, but are not limited to, the following:

i. Decree Party equity
ii. Net benefits and costs to environmental and economic resources
iii. Source and sustainability of water available to support modification and the environmental or economic resource(s)
iv. Habitat types—with naturally-occurring habitats receiving consideration over man-made habitats
v. Scientific basis for modification

vi. Impacts to drought management, water supply and flood mitigation, including but not limited to: 1) frequency, duration and seasonal timing of the various levels of drought; and 2) frequency, duration, levels of storage, diversions, releases and flows
vii. Extent to which the diversions and the Montague minimum basic rate of flow provided in the Decree are met
viii. Potential impacts to water quality, existing National and State Pollution Discharge Elimination System permits and the assimilative capacity of the Delaware River
ix. Ease and practicability of operation
x. Consistency with adaptive management principles
xi. Applicability and implementation of water conservation practices
xii. Impacts to salinity

The Decree Parties agree to evaluate these parameters as well as potential additional parameters, and provide a report with recommendations.

2. DIVERSIONS

a. New York City

In accordance with Sections III. A. 3-4 of the Decree, and subject to the limitations provided herein, at no time during any twelve-month period, commencing June 1, shall the aggregate total quantity of water diverted by the City, divided by the number of days elapsed since the preceding May 31, exceed 800 million gallons per day (mgd). The City shall be subject to the releases and flow objectives described herein.

b. New Jersey

In accordance with Section V of the Decree, except with respect to limitations provided herein, the State of New Jersey may divert outside the Delaware River watershed, from the Delaware River or its tributaries in New Jersey, without compensating releases, the equivalent of 100 mgd under the supervision of the Delaware River Master (River Master) established by the Decree and shall be subject to the following conditions and obligations:

i. Until the State of New Jersey builds and utilizes one or more reservoirs to store waters of the Delaware River or its tributaries for the purpose of diverting the same to another watershed, or purchases or leases reallocated water or new storage from an existing or new storage facility, the State of New Jersey may divert not to exceed 100 mgd as a monthly average, with the diversion on any day not to exceed 120 million gallons.

ii. If and when the State of New Jersey has built and is utilizing one or more reservoirs to store waters of the Delaware River or its tributaries for the purpose of diversion to another watershed, it may withdraw water from the Delaware River or its

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tributaries into such impounding reservoirs without limitation except during the months of July, August, September and October of any year, when not more than 100 mgd as a monthly average and not more than 120 million gallons in any day shall be withdrawn. This restriction may be modified upon unanimous consent of the Decree Parties should the State of New Jersey purchase or lease reallocated water or new storage from an existing or new facility.

iii. Regardless of whether the State of New Jersey builds and utilizes storage reservoirs for diversion, its total diversion for use outside of the Delaware River watershed without compensating releases shall not exceed an average of 100 mgd during any calendar year.

3. FLOW OBJECTIVES

a. Montague Flow Objective

In accordance with Section III. B. 1. (b) of the Decree, except with respect to limitations provided herein, releases from the City Delaware Basin Reservoirs shall be in quantities designed to maintain a minimum basic rate of flow during Normal conditions at the gaging station of the United States Geological Survey (U.S.G.S.) at Montague of 1,750 cubic feet per second (cfs) during the period from September 16 through June 14 and 1,850 cfs during the period June 15 through September 15 in accordance with Section 4.c., as directed by the River Master in accordance with Section VII of the Decree.

The Decree Parties agree to evaluate the desirability of and alternatives to the existing Montague flow objective, including consideration of the availability of increased storage, and provide a report with recommendations within three years after the effective date of this Agreement. If a recommendation for change is made, the impact on the Trenton flow objective (see Paragraph b. below) shall be assessed.

b. Trenton Flow Objective

Section 2.5.3 of DRBC's Delaware River Basin Water Code (Water Code) establishes a set of flow objectives at Trenton, NJ to control salinity intrusion in the Delaware Estuary.

Upon the request of one or more of the Decree Parties or the DRBC, the Decree Parties and the DRBC agree to evaluate the desirability of and alternatives to the existing Trenton flow objective, including consideration of the availability of increased storage and the Montague flow objective, and provide a report with recommendations within three years after such request.

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4. RELEASES

a. Conservation Releases from the City Delaware Basin Reservoirs

Conservation releases designed for protection of the ecology in the tailwaters below the City Delaware Basin Reservoirs, including water quality, recreation, and fishery habitat needs, shall be made in quantities described in the Tailwater Habitat Protection and Discharge Mitigation Program (THPDMP) in Section 6 below.

b. Excess Release Quantity

For an interim period ending May 31, 2011, the Decree Parties agree to use the Excess Release Quantity, as defined in the Decree, in support of an Interim Excess Release Quantity as defined in Paragraph c. below.

c. Interim Excess Release Quantity

For an interim period ending May 31, 2011, an Interim Excess Release Quantity (IERQ) shall be provided in conjunction with the NJ increased diversions and elimination of the Drought Emergency salt-front vernier as provided herein, and an increased Montague objective of 1,850 cfs during basinwide Normal conditions. The IERQ is computed as 83 percent of the difference between the highest year's consumption of the NYC water supply system during the past five years of 1,257 mgd and NYC's current estimate of continuous safe yield of the NYC water supply system of 1,290 mgd obtainable without pumping. The continuous safe yield shall be subject to review under the Reassessment provided in Section 15. The IERQ shall be 15,468 cfs-days, except during any leap year the IERQ shall be 17,125 cfs-days.

NYC shall release the IERQ provided for above at rates designed to increase the flow at Montague from 1,750 cfs to 1,850 cfs for the period commencing on June 15 and continuing through September 15, and to maintain a flow at Trenton of 3,000 cfs during basinwide Normal conditions for the period commencing on June 15 and continuing through March 15 referred to as the "seasonal period." The IERQ required to be released in any seasonal period shall in no event exceed 70 billion gallons. In releasing the IERQ, NYC shall not be required to release at rates exceeding the capacity of its release works. NYC shall in each seasonal period continue its temporary releases until the aggregate quantity of the releases from the IERQ is equal to the total quantity of the IERQ as provided above.

The Decree Parties agree to investigate long-term measures including consideration of actions the lower basin states can take that will make adequate water available to support the NJ diversions and NYC detachment of the Montague objective from the salt front vernier during Drought Emergency.

d. Interim Excess Release Quantity Extraordinary Needs Bank

In addition to the hydrologic criteria described in Section 2.5.6 A. of the Delaware River

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Basin Water Code and subject to other provisional uses of the IERQ as provided herein including Section 6.b, the Decree Parties, the DRBC and the Delaware River Master may at any time review extraordinary water needs to support such research, aquatic life or other water-use activity as may be approved by the DRBC. Upon unanimous agreement, the Decree Parties may bank all or a portion of the IERQ remaining at such time, and such portion shall be placed in an "IERQ Extraordinary Needs Bank" and used to provide for such extraordinary water needs. Such quantity as may be so banked shall be deducted from the IERQ.

5. DROUGHT MANAGEMENT

Figure 1 defines five zones of combined reservoir usable storage relative to the existing three drought management curves (Drought Watch, Drought Warning, and Drought Emergency) and one additional curve that divides the existing Normal zone into two zones (L1 and L2).

The following drought stage definitions and procedures will be in effect:

a. Drought Watch (L3)

The seasonally segmented line (shown as dashes) splitting the current "Drought Warning" in Figure 1 of DRBC Resolution No. 83-13 and DRBC Docket No. D-77-20 CP (Revised) is raised by four (4) billion gallons during the entire year. In addition, the upper half of the Drought Warning, previously referred to as DW1, is renamed Drought Watch, with diversions and flow objectives as shown in Table 1.

b. Drought Warning (L4)

The lower half of the Drought Warning (DW2), based upon the rule curves included in DRBC Resolution No. 83-13 and as modified by Paragraph a. above, is designated Drought Warning, with diversions and flow objectives as shown in Table 1.

c. Drought Emergency (L5)

The operation level formerly named "Drought" in accordance with the rule curves included in DRBC Resolution No. 83-13 and Docket D77-20 (Revised) is hereby renamed "Drought Emergency." During Drought Emergency, diversions shall be limited as shown in Table 1. The Montague and Trenton flow objectives are as shown in Tables 1 and 2.

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Table 1
Interstate Operation Formula
For Diversions, Releases And Flow Objectives

NYC Storage Condition	*NYC Diversion (mgd)*	*NJ Diversion (mgd)*	*Montague Flow Objective (cfs)*	*Trenton Flow Objective (cfs)*
Normal (June 15 – Sept 15)	800	100	1,850*	3,000
Normal (Sept 16 – June 14)	800	100	1,750	3,000
Drought Watch (L3)	680	100	1,650	2,700
Drought Warning (L4)	560	85	1,550	2,700
Drought Emergency (L5)	520	85	1,100-1,500**	2,500-2,900***
Severe Drought	(to be negotiated depending upon conditions)			

* To the extent supported by the IERQ pursuant to Section 4.c., otherwise 1,750 cfs

** Varies with time of year, in accordance with Table 2

*** Varies with time of year and location of salt front, in accordance with Table 2

Table 2
Interstate Operation Formula
For Adjusting Montague And Trenton Flow Objectives
During Drought Emergency (L5) Operations

	Flow Objective (cfs)						
	Trenton			*Montague*			
7-Day Average Location of "Salt Front" (river-mile**)*	*Dec 1 - Apr 30*	*May 1 - Aug 31*	*Sep 1 - Nov 30*	*June 1 - June 30*	*July 1 - Nov 30*	*Dec 1 - Dec 31*	*Jan 1 - May 31*
-	-	-	-	1,450	1,500	1,350	1,100
Upstream of R.M. 92.5	2,700	2,900	2,900				
R.M. 87.0 – R.M. 92.5	2,700	2,700	2,700				
R.M. 82.9 – R.M. 87.0	2,500	2,500	2,500				
Downstream of R.M. 82.9	2,500	2,500	2,500				

* Defined as the 250 mg/L isochlor in the Delaware Estuary

** Measured in statute miles along the center of the navigation channel, from the mouth of the Delaware Bay

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d. Entry and Exit Criteria

Criteria for entry into and exit from the various stages of drought operations shall be in accordance with Section 2.5.3.E of the Delaware River Basin Water Code. L2 or higher level releases will be restored when combined storage in the three City Delaware Basin Reservoirs reaches 25 billion gallons above the drought watch level and remains at or above that level for 15 consecutive days.

e. Balancing Adjustment

In order to conserve water, the River Master is requested to utilize a balancing adjustment, based upon procedures agreed upon by the Decree Parties, when calculating the releases to be directed to meet the Montague flow objectives in Tables 1 and 2. Additionally, during Drought Warning, the amount of the conservation releases from the City Delaware Basin Reservoirs that is greater than the basic conservation release rates as set forth in Table 1 of Docket D77-20 (Revised) shall be considered as directed releases for the purpose of calculating the balancing adjustment.

6. TAILWATERS HABITAT PROTECTION and DISCHARGE MITIGATION PROGRAM (THPDMP)

a. Controlled Releases

There is hereby established a Tailwaters Habitat Protection and Discharge Mitigation Program (THPDMP), which consists of conservation releases designed for protection of the ecology in the tailwaters below the City Delaware Basin Reservoirs and discharge mitigation releases, designed to help mitigate the effects of flooding immediately below the City Delaware Basin Reservoirs. The City shall make such controlled releases from the City Delaware Basin Reservoirs in accordance with Figures 1 and 2 and Table 3.

Figure 1 defines five zones of combined reservoir usable storage relative to the existing three drought management curves (Drought Watch, Drought Warning, and Drought Emergency) and one additional curve that divides the existing Normal zone into two zones (L1 and L2). As defined in Table 3, each reservoir has an annual schedule of releases based on seasons, the quantity of combined reservoir usable storage, and the quantity of water available for the THPDMP in accordance with Paragraph b, below. For combined storage Zone L1, Figure 2 defines three zones of reservoir-specific storage (L1-a, L1-b and L1-c) relative to two rule curves for each reservoir. Table 3 further defines discharge mitigation releases based on reservoir-specific storage when combined storage is in Zone 1. When combined storage is below Zone L1, reservoir-specific storage zones as defined in Figure 2 are not relevant, and the releases to be made, as set forth in Table 3, are for conservation purposes only.

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Table 3
Schedule Of Releases (cfs)
With 35 mgd Available

	Winter		Spring		Summer			Fall		
Cannonsville Storage Zone	Dec 1 - 31-Mar	Apr 1 - 30-Apr	May 1 - 20-May	May 21 - 31-May	Jun 1 - 15-Jun	Jun 16 - 30-Jun	Jul 1 - 31-Aug	Sep 1 - 15-Sep	Sep 16 - 30-Sep	Oct 1 - 30-Nov
L1-a	1500	1500	*	*	*	1500	1500	1500	1500	1500
L1-b	250	*	*	*	*	*	350	300	275	250
L1-c	110	110	200	250	275	275	275	275	140	110
L2	80	80	190	240	260	260	260	260	115	80
L3	70	70	100	100	175	175	175	95	95	70
L4	55	55	75	75	130	130	130	55	55	60
L5	50	50	50	50	120	120	120	50	50	50

	Winter		Spring		Summer			Fall		
Pepacton Storage Zone	Dec 1 - 31-Mar	Apr 1 - 30-Apr	May 1 - 20-May	May 21 - 31-May	Jun 1 - 15-Jun	Jun 16 - 30-Jun	Jul 1 - 31-Aug	Sep 1 - 15-Sep	Sep 16 - 30-Sep	Oct 1 - 30-Nov
L1-a	700	700	*	*	*	700	700	700	700	700
L1-b	185	*	*	*	*	*	250	200	200	185
L1-c	85	85	110	130	150	150	150	150	100	85
L2	65	65	100	125	140	140	140	140	85	60
L3	55	55	80	80	100	100	100	55	55	55
L4	45	45	50	50	85	85	85	40	40	40
L5	40	40	40	40	80	80	80	30	30	30

	Winter		Spring		Summer			Fall		
Neversink Storage Zone	Dec 1 - 31-Mar	Apr 1 - 30-Apr	May 1 - 20-May	May 21 - 31-May	Jun 1 - 15-Jun	Jun 16 - 30-Jun	Jul 1 - 31-Aug	Sep 1 - 15-Sep	Sep 16 - 30-Sep	Oct 1 - 30-Nov
L1-a	190	190	*	*	*	190	190	190	190	190
L1-b	100	*	*	*	*	*	125	125	85	95
L1-c	65	65	85	100	110	110	110	110	75	60
L2	45	45	75	90	100	100	100	100	70	45
L3	40	40	50	50	75	75	75	40	40	40
L4	35	35	40	40	60	60	60	30	30	30
L5	30	30	30	30	55	55	55	25	25	25

* Storage zone does not apply during this period. Releases will be made in accordance with zone L1-c.

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Table 3 (Continued)
Schedule Of Releases (cfs)
With 20 mgd Available

	Winter		Spring		Summer			Fall		
Cannonsville Storage Zone	Dec 1 - 31-Mar	Apr 1 - 30-Apr	May 1 - 20-May	May 21 - 31-May	Jun 1 - 15-Jun	Jun 16 - 30-Jun	Jul 1 - 31-Aug	Sep 1 - 15-Sep	Sep 16 - 30-Sep	Oct 1 - 30-Nov
L1-a	1500	1500	*	*	*	1500	1500	1500	1500	1500
L1-b	250	*	*	*	*	*	350	300	275	250
L1-c	110	110	200	250	275	275	275	275	140	110
L2	72	72	165	210	231	231	231	231	103	72
L3	63	63	90	90	158	158	158	86	86	63
L4	50	50	68	68	117	117	117	50	50	54
L5	45	45	45	45	108	108	108	45	45	45

	Winter		Spring		Summer			Fall		
Pepacton Storage Zone	Dec 1 - 31-Mar	Apr 1 - 30-Apr	May 1 - 20-May	May 21 - 31-May	Jun 1 - 15-Jun	Jun 16 - 30-Jun	Jul 1 - 31-Aug	Sep 1 - 15-Sep	Sep 16 - 30-Sep	Oct 1 - 30-Nov
L1-a	700	700	*	*	*	700	700	700	700	700
L1-b	185	*	*	*	*	*	250	200	200	185
L1-c	85	85	110	130	150	150	150	150	100	85
L2	58	58	90	113	124	124	124	124	76	54
L3	50	50	72	72	90	90	90	50	50	50
L4	41	41	45	45	77	77	77	36	36	36
L5	36	36	36	36	72	72	72	27	27	27

	Winter		Spring		Summer			Fall		
Neversink Storage Zone	Dec 1 - 31-Mar	Apr 1 - 30-Apr	May 1 - 20-May	May 21 - 31-May	Jun 1 - 15-Jun	Jun 16 - 30-Jun	Jul 1 - 31-Aug	Sep 1 - 15-Sep	Sep 16 - 30-Sep	Oct 1 - 30-Nov
L1-a	190	190	*	*	*	190	190	190	190	190
L1-b	100	*	*	*	*	*	125	125	85	95
L1-c	65	65	85	100	110	110	110	110	75	60
L2	40	40	65	80	90	90	90	90	63	40
L3	36	36	45	45	68	68	68	36	36	36
L4	32	32	36	36	54	54	54	27	27	27
L5	27	27	27	27	50	50	50	23	23	23

* Storage zone does not apply during this period. Releases will be made in accordance with zone L1-c.

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Table 3 (Continued)
Schedule Of Releases (cfs)
With 10 mgd Available

	Winter		Spring		Summer			Fall		
Cannonsville Storage Zone	Dec 1 - 31-Mar	Apr 1 - 30-Apr	May 1 - 20-May	May 21 - 31-May	Jun 1 - 15-Jun	Jun 16 - 30-Jun	Jul 1 - 31-Aug	Sep 1 - 15-Sep	Sep 16 - 30-Sep	Oct 1 - 30-Nov
L1-a	1500	1500	*	*	*	1500	1500	1500	1500	1500
L1-b	250	*	*	*	*	*	350	300	275	250
L1-c	110	110	200	250	275	275	275	275	140	110
L2	65	65	154	194	212	212	212	212	94	65
L3	57	57	82	82	143	143	143	77	77	57
L4	45	45	61	61	106	106	106	45	45	49
L5	41	41	41	41	98	98	98	41	41	41

	Winter		Spring		Summer			Fall		
Pepacton Storage Zone	Dec 1 - 31-Mar	Apr 1 - 30-Apr	May 1 - 20-May	May 21 - 31-May	Jun 1 - 15-Jun	Jun 16 - 30-Jun	Jul 1 - 31-Aug	Sep 1 - 15-Sep	Sep 16 - 30-Sep	Oct 1 - 30-Nov
L1-a	700	700	*	*	*	700	700	700	700	700
L1-b	185	*	*	*	*	*	250	200	200	185
L1-c	85	85	110	130	150	150	150	150	100	85
L2	53	53	82	103	114	114	114	114	69	49
L3	45	45	65	65	82	82	82	45	45	45
L4	37	37	41	41	69	69	69	33	33	33
L5	33	33	33	33	65	65	65	24	24	24

	Winter		Spring		Summer			Fall		
Neversink Storage Zone	Dec 1 - 31-Mar	Apr 1 - 30-Apr	May 1 - 20-May	May 21 - 31-May	Jun 1 - 15-Jun	Jun 16 - 30-Jun	Jul 1 - 31-Aug	Sep 1 - 15-Sep	Sep 16 - 30-Sep	Oct 1 - 30-Nov
L1-a	190	190	*	*	*	190	190	190	190	190
L1-b	100	*	*	*	*	*	125	125	85	95
L1-c	65	65	85	100	110	110	110	110	75	60
L2	37	37	61	73	82	82	82	82	57	37
L3	33	33	41	41	61	61	61	33	33	33
L4	29	29	33	33	49	49	49	24	24	24
L5	24	24	24	24	45	45	45	20	20	20

* Storage zone does not apply during this period. Releases will be made in accordance with zone L1-c.

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Table 3 (Continued)
Schedule Of Releases (cfs)
With 0 mgd Available

	Winter		Spring		Summer			Fall		
Cannonsville Storage Zone	Dec 1 - 31-Mar	Apr 1 - 30-Apr	May 1 - 20-May	May 21 - 31-May	Jun 1 - 15-Jun	Jun 16 - 30-Jun	Jul 1 - 31-Aug	Sep 1 - 15-Sep	Sep 16 - 30-Sep	Oct 1 - 30-Nov
L1-a	1500	1500	*	*	*	1500	1500	1500	1500	1500
L1-b	250	*	*	*	*	*	350	300	275	250
L1-c	110	110	200	250	275	275	275	275	140	110
L2	58	58	134	175	190	190	190	190	84	58
L3	51	51	73	73	128	128	128	69	69	51
L4	40	40	55	55	95	95	95	40	40	44
L5	37	37	37	37	88	88	88	37	37	37

	Winter		Spring		Summer			Fall		
Pepacton Storage Zone	Dec 1 - 31-Mar	Apr 1 - 30-Apr	May 1 - 20-May	May 21 - 31-May	Jun 1 - 15-Jun	Jun 16 - 30-Jun	Jul 1 - 31-Aug	Sep 1 - 15-Sep	Sep 16 - 30-Sep	Oct 1 - 30-Nov
L1-a	700	700	*	*	*	700	700	700	700	700
L1-b	185	*	*	*	*	*	250	200	200	185
L1-c	85	85	110	130	150	150	150	150	100	85
L2	47	47	73	91	102	102	102	102	62	44
L3	40	40	58	58	73	73	73	40	40	40
L4	33	33	37	37	62	62	62	29	29	29
L5	29	29	29	29	58	58	58	22	22	22

	Winter		Spring		Summer			Fall		
Neversink Storage Zone	Dec 1 - 31-Mar	Apr 1 - 30-Apr	May 1 - 20-May	May 21 - 31-May	Jun 1 - 15-Jun	Jun 16 - 30-Jun	Jul 1 - 31-Aug	Sep 1 - 15-Sep	Sep 16 - 30-Sep	Oct 1 - 30-Nov
L1-a	190	190	*	*	*	190	190	190	190	190
L1-b	100	*	*	*	*	*	125	125	85	95
L1-c	65	65	85	100	110	110	110	110	75	60
L2	33	33	55	66	73	73	73	73	51	33
L3	29	29	37	37	55	55	55	29	29	29
L4	26	26	29	29	44	44	44	22	22	22
L5	22	22	22	22	40	40	40	18	18	18

* Storage zone does not apply during this period. Releases will be made in accordance with zone L1-c.

February 14, 2011

Figure 1
New York City Delaware System Usable Combined Storage
(Cannonsville, Pepacton and Neversink Reservoirs)

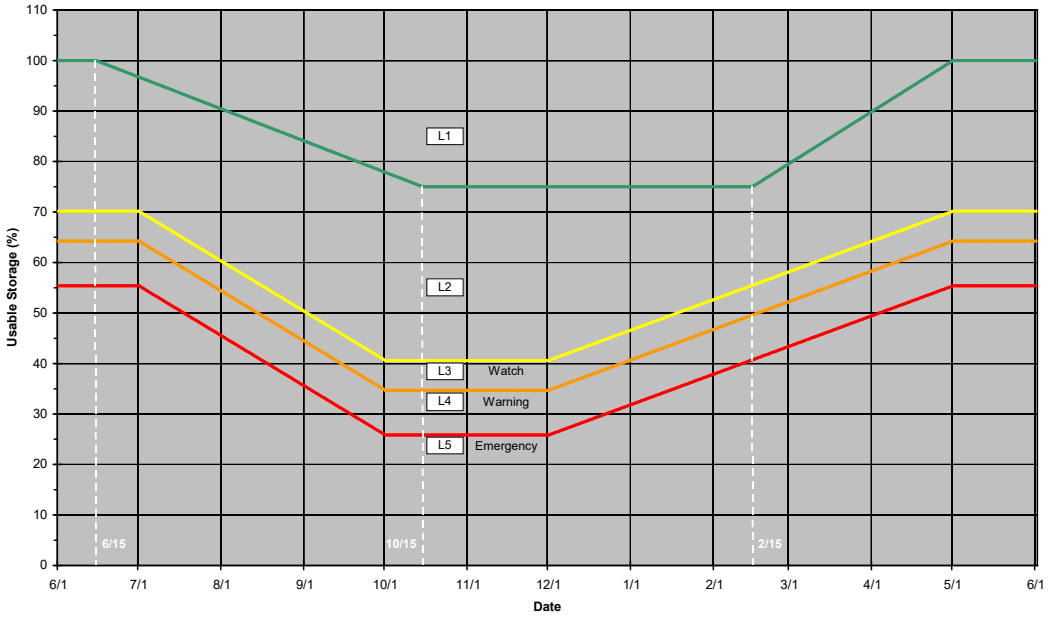
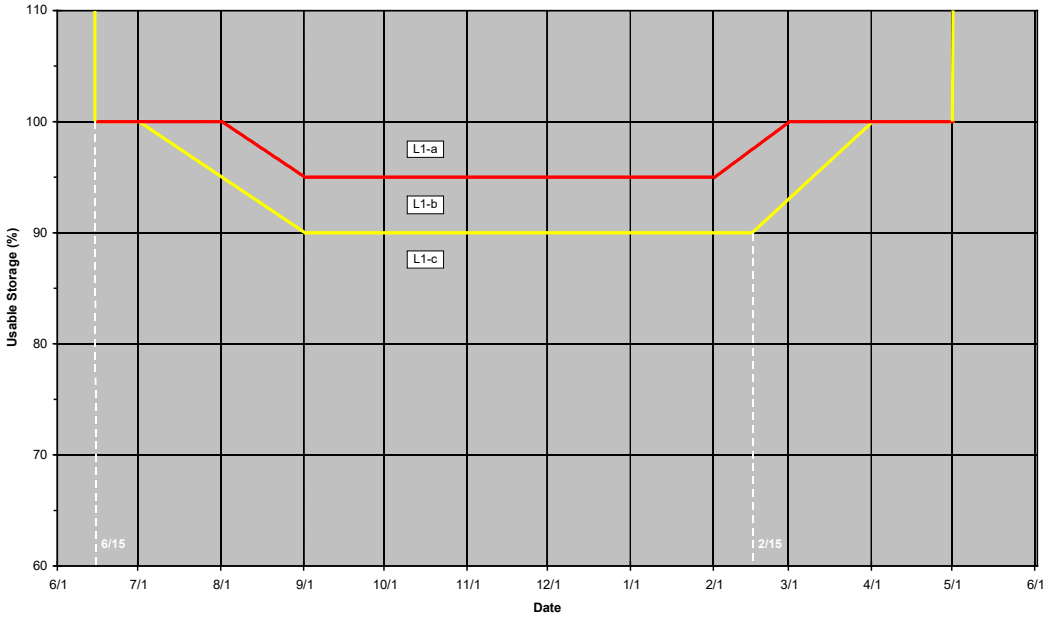


Figure 2
New York City Delaware System Usable Individual Storage
(Cannonsville, Pepacton and Neversink Reservoirs)



The City shall make discharge mitigation releases from the City Delaware Basin Reservoirs in accordance with the following:

i. For the period June 16 through April 30, if combined reservoir usable storage is in Zone L1 in accordance with Figure 1, discharge mitigation releases shall be made based upon individual reservoir usable storage in accordance with Zones L1-a, L1-b and L1-c as provided in Figure 2 and Table 3. During the period October 1 through April 30:

1. Fifty percent (50%) of the water equivalent of snow pack in the watersheds above the reservoirs shall be included in the determination of combined and individual reservoir usable storage in relation to Figures 1 and 2.

2. If, as a result of the combination of current snow pack and predicted meteorological conditions, in the opinion of NYCDEP any reservoir is anticipated to spill within a period of seven (7) days, then upon notification by NYCDEP to the Parties and the River Master, NYCDEP may, in consideration of possible downstream impacts and the stage and discharge thresholds given in Section 6.a. and Table 4, herein, include up to one hundred percent (100%) of the water equivalent of snow pack in the watersheds above the reservoirs in the determination of combined and individual reservoir usable storage in relation to Figures 1 and 2, unless and until any Party shall notify the River Master and NYCDEP of its objection to such inclusion. As soon as practicable, NYCDEP shall transition back to the fifty percent (50%) snow pack water equivalent criterion with notification to the Parties and the River Master.

ii. For the period April 1 through April 30, if combined reservoir usable storage including snow pack is in excess of 100%, discharge mitigation releases shall be made based upon individual reservoir usable storage in accordance with Zone L1-a as provided in Figure 2 and Table 3.

iii. For the period May 1 through June 15, Zones L1-a and L1-b shall not be applicable in accordance with Figure 2, and discharge mitigation releases shall be made in accordance with Zone L1-c as provided in Figure 2 and Table 3.

iv. The NYCDEP and NYSDEC release managers may transfer spills to bottom releases to the extent possible and mutually agreed upon at any reservoir.

v. The current National Weather Service flood stage for the West Branch Delaware River at Hale Eddy is 11 feet. Accordingly, Zone L1discharge mitigation releases will not be made from Cannonsville Reservoir when the river stage for the West Branch Delaware River at Hale Eddy is above 9 feet, or is forecasted to be above 9 feet within 48 hours of a planned discharge mitigation release, and releases shall be made in accordance with Zone L2 through L5 as provided in Table 3. This

guidance may be modified at any time upon unanimous consent by the Decree Parties, if additional information demonstrates that a different cautionary stage should be used to limit the discharge mitigation releases.

vi. The current National Weather Service flood stage for the East Branch Delaware River at Fishs Eddy is 13.0 ft. Accordingly, Zone L1 discharge mitigation releases will not be made from Pepacton Reservoir when the river stage for the East Branch Delaware River at Fishs Eddy is above 11.0 ft. or is forecast to be above 11.0 ft. within 48 hours of a planned discharge mitigation release, and releases shall be made in accordance with Zone L2 through L5 as provided in Table 3. This guidance may be modified at any time upon unanimous consent by the Decree Parties, if additional information demonstrates that a different cautionary stage should be used to limit the discharge mitigation releases.

vii. The current National Weather Service flood stage for the Neversink River at Bridgeville is 13 feet. Accordingly, Zone L1 discharge mitigation releases will not be made from Neversink Reservoir when the river stage for the Neversink River at Bridgeville is above 12 feet, or is forecast to be above 12 feet within 48 hours of a planned discharge mitigation release, and releases shall be made in accordance with Zone L2 through L5 as provided in Table 3. This guidance may be modified at any time upon unanimous consent by the Decree Parties, if additional information demonstrates that a different cautionary stage should be used to limit the discharge mitigation releases.

viii. Discharge mitigation releases may be suspended from the respective reservoir if NYCDEP and NYSDEC in consultation with the National Weather Service determine that ice conditions threaten flood prone areas of the Neversink River below Neversink Reservoir, East Branch Delaware River below Pepacton Reservoir, or West Branch Delaware River below Cannonsville Reservoir.

ix. Discharge mitigation releases will be designed so that the combined discharge from each reservoir's controlled release works and spillway does not exceed the flow rate in Table 4 below. Respective controlled releases will be reduced to L2 releases in Table 3, or lower.

x. To more naturally effect downward or upward transitions between discharge mitigation release rates identified in Table 3, discharge mitigation release rates may be ramped, in cooperation with NYSDEC, generally over a period of three days at Cannonsville and Pepacton Reservoirs or two days at Neversink Reservoir.

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Table 4
Maximum Combined Discharge Rates

Reservoir	*Maximum Combined Discharge Rate (cfs)*
Neversink	3,400
Pepacton	2,400
Cannonsville	4,200

b. Sustainability

The sustainable source of water for releases in accordance with the THPDMP described herein is the possible construction of an additional 13 billion gallons of combined storage at the Cannonsville and Pepacton Reservoirs, the feasibility of which is being evaluated by NYS and the City. This possible additional storage will be constructed for the primary purpose of supporting a sustainable fisheries program. Prior to construction, the Decree Parties shall unanimously agree on any additional purposes for which such storage will be used. In addition, an operating plan covering filling and drawdown of the storage may be prepared, for consideration and unanimous approval by the Decree Parties. With this possible additional storage the releases in Table 3 with 35 MGD shall be applicable. Until such time as the construction of that additional storage is completed, but not later than December 31, 2012, unless a later date is agreed upon by the Decree Parties, an interim source of water for the THPDMP shall be provided from such unused portion of the New York City diversion allocation of 800 million gallons per day under Normal conditions as may be available from year to year and from such portion of the IERQ as may be approved for such use from year to year by all of the Downbasin Parties (DE, NJ and PA) as provided for below.

Each year, the City shall estimate and report to the River Master the anticipated quantity of unused allocation, not to exceed 35 mgd, from the City Delaware Basin Reservoirs for the ensuing year. Such estimated amount shall be available for use for the THPDMP.

In any year in which the City's estimated quantity of unused allocation is less than 35 mgd, the Downbasin Parties may determine and report to the River Master a quantity of the IERQ which may be made available for use for the THPDMP for that year, not to exceed the difference between 35 mgd and the quantity estimated by the City for that year. Such quantity shall be deducted from the IERQ.

In the event that less than 35 mgd combined is available from the City's unused allocation and the portion of the IERQ approved by the Downbasin Parties for this purpose, in any year, or if during any year, an unanticipated emergency renders unavailable a portion or all of the City's unused allocation or the IERQ, the THPDMP releases shall be determined in accordance with Table 3 based upon the quantity of water available. Subsequent to

December 31, 2012, if the proposed additional storage is not completed, then releases shall be made in accordance with Table 3 for 0 MGD, unless otherwise agreed upon by the Decree Parties.

7. DISCHARGE MITIGATION

Discharge mitigation releases designed to reduce discharges from the City Delaware Basin Reservoirs during periods of high flow shall be made in quantities described in the THPDMP.

8. SALINITY REPULSION

The operating objective should be to limit salinity in the Delaware Estuary to a maximum 30-day average of 180 parts per million of chlorides and a maximum 30-day average of 100 parts per million of sodium at River Mile 98 (i.e., one mile upstream of the Walt Whitman Bridge), unless the salinity repulsion flows necessary for estuary and bay ecological health, as addressed in Section12, require a more stringent limit.

9. DWARF WEDGE MUSSELS

The Decree Parties and the DRBC agree to review and evaluate available data during the implementation of this FFMP and will consider any modifications that may be necessary to avoid taking, harming, or adverse effects on Dwarf Wedge Mussels.

10. LAKE WALLENPAUPACK

The Decree Parties and the DRBC agree to evaluate seasonal or snowpack-based discharge mitigation programs, as may be proposed by the operators of Lake Wallenpaupack, and consider any modifications to the Lake Wallenpaupack operations plan (Resolution 2002-33) that may be required to implement such programs, if found feasible.

11. RECREATIONAL BOATING

The Decree Parties and the DRBC agree to evaluate potential release programs, if proposed, for supporting whitewater boating activities and provide a report of potential alternatives and recommendations for such release programs, if found feasible.

12. ESTUARY AND BAY ECOLOGICAL HEALTH

The Decree Parties and the DRBC agree to review and evaluate available data during the implementation of this FFMP and will recommend modifications that may be necessary to maintain the ecological health of the Delaware Estuary and Bay including that of oysters, shellfish and endangered species. The focus of this FFMP element includes the Upper Delaware Estuary, Lower Delaware Estuary, and Delaware Bay, and such modifications shall be considered in accordance with the criteria described in Section 1.b.

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13. WARM-WATER AND MIGRATORY FISH

The Decree Parties and the DRBC agree to review and evaluate available information on the effects of implementation of this FFMP on warm-water fishes that occur in the Delaware River and will consider any modifications to conserve native species of special concern and migratory species. Efforts will be made to improve the knowledge of the populations, habitats, and needs of these species to inform the adaptive management process.

14. MONITORING AND REPORTING

NYSDEC shall, on April 30 of each year, submit to the Decree Parties and to the DRBC annual status reports on the effectiveness of the THPDMP. Discussion of such reports shall be included as an agenda item at annual meetings of the Delaware River Master Advisory Committee.

NYSDEC shall conduct a biological monitoring program in 2009 and thereafter, once every five years, in accordance with the NYSDEC "Monitoring Plan for the Delaware River Tailwaters."

By March 31, 2011, and every 5 years thereafter, NYSDEC shall submit to the Decree Parties and to the DRBC a scientific report describing the effects on the fishery and other aquatic resources resulting from implementation of the THPDMP. Such report shall include an abstract or executive summary, statements of purpose, scope and objectives, procedures, results, conclusions, recommendations for additional work if warranted, and supporting literature, and shall describe effects on the fishery and other aquatic resources resulting from implementation of the THPDMP.

By April 30, 2009 and every two years thereafter, NYSDEC and the City shall submit to the Decree Parties and to the DRBC a status report on the effort by New York State to secure funding and implement the construction of additional storage in the City's Delaware Basin Reservoirs. Such reports shall discuss potential alternative funding sources and include an estimated phased construction schedule for such work and projected completion dates.

15. REASSESSMENT STUDY

In accordance with Section VIII of the "Recommendations of the Parties to the U.S. Supreme Court Decree of 1954 to the Delaware River Basin Commission Pursuant to Commission Resolution 78-20 (with appendices), known as the "Good Faith" agreement" of 1983, whereby the Decree Parties agreed that in consultation with the DRBC, they would periodically review the "Good Faith" agreement and recommend such adjustments or modifications thereto as might be required to respond to changing conditions, the Decree Parties hereby agree to conduct a comprehensive reassessment (Reassessment Study) of the safe yield (to the extent described in this Section) and operations of selected Basin reservoirs and the Delaware and Raritan Canal, including a reassessment of the Montague and Trenton flow objectives, as well as complete detachment of the salt front vernier.

February 14, 2011

The objectives of the Reassessment Study will be: (a) to identify current issues and concerns related to continued operations under the 1983 Good Faith Agreement; (b) to identify alternatives for Basin reservoir operations (NYC and non-NYC impoundments), to optimize the system of usage of waters of the Basin for water supply management under routine and drought conditions and for flood mitigation, fisheries management, and overall ecological protection of the River system, while maintaining Decree Party equity established by the Decree; and (c) to establish recommendations for improved water management planning in the Basin. All of the Decree Parties agree to provide information on current and contemplated use of Basin water.

The Reassessment Study shall also include evaluation of the components used in the calculation of the ERQ as defined in the Decree. NYCDEP will calculate the safe yield of the City Water Supply System based on the most current information available and will calculate the expected annual consumption of the City Water Supply System. The safe yield calculation and its supporting data will be provided by the NYCDEP for purposes of analyses called for in this Agreement. NYCDEP recognizes that this information may be utilized for analyses outside of the scope of this Agreement; such analyses shall not be used or relied upon in connection with the Reassessment Study. The Reassessment Study to be conducted pursuant to this Agreement shall not revise or test other assumptions for the safe yield of New York City's water supply system.

The Reassessment Study should reflect yield and operations based upon existing infrastructure, and should consider opportunities for additional storage, including water storage purchases, infrastructure enhancements, treatment upgrades, water conservation and water reuse. The Reassessment Study also should include a comprehensive review of the current rule curves and the drought recovery criteria as it relates to the resumption of normal diversions, Montague and Trenton flow objectives and conservation releases. However, nothing in this Agreement shall be construed as amending or expressing an intention to amend the existing rights of the Decree Parties contained in the Decree to diversions and releases to meet flow objectives. For each recommendation identified, the associated opportunities/benefits and challenges/detriments should be described. The Reassessment Study should be closely coordinated with activities undertaken in connection with the DRBC Flood Mitigation Task Force Action Plan.

The Decree Parties agree to provide funds to the DRBC to engage an independent contractor to conduct the Reassessment Study, the cost of which shall be equitably shared by the Decree Parties. DRBC shall solicit qualified consultants utilizing a request for proposals (RFP) process. The DRBC Executive Director shall convene a Reassessment Steering Committee, consisting of a representative from each of the Decree Parties and the Federal Government, which shall direct the scope and conduct of the Reassessment Study. The RFP to be utilized in soliciting bids from qualified consultants, including the scope of services, shall be subject to the review and unanimous approval of the Decree Parties, as shall the selection of the consultant chosen to undertake the Study. . Final products of the Reassessment Study are expected within the three-year time frame of this FFMP, but a firm estimate of cost and timeline will be solicited as part of the RFP process. DRBC and the Decree Parties will

provide the contractor with access to all data required for the Reassessment Study. These data shall include but shall not be limited to storage criteria, safety factors, per capita use, seasonal demand patterns, physical limitations on conveyance, secondary augmentation storage, population served, projected demands, reductions in water demand as a result of water conservation efforts or water reuse, expenditures on water conservation measures, the investigation and construction of additional storage, or the purchase of supplemental water sources, and current and expected peak day, peak month, and annual average and conjunctive use constraints, such as water quality and storage levels. Data or information that are sensitive from a security standpoint may be withheld by any Decree Party, unless arrangements acceptable to such Decree Party are put in place to protect the confidentiality of such data or information. The final report shall not include any such sensitive information unless consented to by the Decree Party providing same.

If consensus is reached based on the findings of this Reassessment Study, it is the intention of the Decree Parties to consider and potentially to adopt revisions to operating procedures, revisions to laws and regulations, or other changes to policies or procedures as may be necessary to implement such findings. Where appropriate, such revisions or changes may be incorporated into rules and/or dockets established by the DRBC following public notice and a hearing.

16. PERIODIC EVALUATION AND REVISION

In order to support an adaptive management process and to improve over time the scientific basis for the various elements of the FFMP, periodic evaluation of the elements shall be required of the appropriate Decree Parties or DRBC. Such evaluations shall be conducted in accordance with evaluation plans approved by the Decree Parties and DRBC. Components of the evaluation plans shall include: evaluation need(s), purpose and scope, objectives, approach and methods, evaluation benefits, content of planned reports, evaluation schedule, personnel needs, budget, source of funds and, where appropriate, results of previous investigations.

The Decree Parties and the DRBC shall, at the conclusion of the DRBC rulemaking process, consider whether any revisions to the FFMP should be made on the basis of the public comments received. In addition, the Decree Parties and the DRBC shall annually evaluate the results of the FFMP, relative to the purposes described in Section 1.a and other water uses and considerations as may be deemed appropriate, including consideration of any evaluations that have been completed within the previous year and input from the public. The Decree Parties agree that during the entire effective period of this Agreement, as monitoring, reporting and evaluation may show to be appropriate, the provisions of this agreement specifying triggers for and quantities of releases may be revised through an adaptive management process to further enhance the overall natural resource and economic benefits derived from the releases from the City Delaware Basin Reservoirs. Any resultant action taken shall be subject to the unanimous approval of the Decree Parties.

February 14, 2011

17. TEMPORARY SUSPENSION OR MODIFICATION

From time to time, the Decree Parties and DRBC may agree that emergencies, maintenance and repair operations, short-term needs, or unanticipated effects of the FFMP may require temporary suspension or modification of one or more of the provisions herein. In considering such temporary suspensions or modifications, the Decree Parties and DRBC may estimate probabilities and risks associated with the temporary suspensions or modifications. Any resultant action taken, other than modifications to the releases as provided below, shall be subject to the unanimous approval of the Decree Parties.

The City shall establish the scope of work and the work schedule for maintenance and repair operations and shall provide such information to the Decree Parties and DRBC as early as practicable. In the absence of unanimous approval of a modified release schedule as may be required for purposes of necessary maintenance and repair, the City, acting in cooperation with the NYSDEC, will make releases to the best of its ability for the duration of the maintenance or repair work, provided, however, that releases shall be sufficient to meet the Montague flow objective in effect at the time.

Modifications to releases not to exceed seven consecutive days for purposes of maintenance or repair of immediate necessity, or to avoid unreasonable fluctuations in releases, shall not require Decree Party approval, but shall be done in cooperation with NYSDEC, provided, however, that releases shall be sufficient to meet the Montague flow objective in effect at the time.

18. RESERVATIONS

Nothing contained herein shall be deemed to constitute a waiver or modification of, or limitation on, NYC's right to divert up to an average of 800 mgd, combined, out of the basin from the City Delaware Basin Reservoirs or New Jersey's right to divert up to an average of 100 mgd out of the basin, or the Lower Basin Parties' right to releases from the City Delaware Basin Reservoirs sufficient to maintain the 1,750-cfs Montague flow objective, consistent with the terms of the Decree. This Agreement shall not be cited as precedent of any intention to waive or modify or limit the above-cited rights. Notwithstanding this reservation of rights, the Decree Parties intend to be legally bound by the terms and conditions of this Agreement.

The Decree Parties and DRBC have authorized certain actions, including but not limited to discharge mitigation releases, in this Agreement to assist in mitigating the impacts of flooding immediately below the NYC Delaware Basin Reservoirs. By incorporating flood mitigation as an objective and taking the actions provided herein, the Decree Parties and DRBC do not create or assume any duties or obligations regarding flood mitigation or in any way modify any such duties or obligations that may be otherwise prescribed by law.

February 14, 2011

19. EFFECTIVE DATE

This Agreement shall take effect upon unanimous consent of the Decree Parties and shall expire on May 31, 2011, unless renewed as provided for in Section 20 or the expiration date is revised.

20. RENEWAL AND REVISION

This Agreement may be revised only through the unanimous written agreement of the Decree Parties. The Decree Parties agree to consider the results of the Reassessment identified in Section 15, including possible changes to the Drought Operations Plan as defined under the "Good Faith Agreement" and modified herein, as they become available. Revisions to the Drought Operations Plan based upon such reassessment, may be incorporated into this Agreement through the unanimous approval of the Decree Parties. This Agreement, and any unanimously agreed to revisions, may be renewed for an additional 5-year period beginning June1, 2011 by unanimous written agreement of all the Decree Parties and adoption by DRBC prior to May 31, 2011. If renewed for such additional 5-year period, the Agreement shall thereafter automatically renew in five-year increments, unless terminated as provided for in Section 21. If this Agreement is not renewed for the additional 5-year period, prior to May 31, 2011, the Decree Parties agree to enter into good faith negotiations to determine a course of action in the absence of such renewal.

21. TERMINATION and REVERSION

Any Decree Party may terminate the Agreement on any automatic renewal date, commencing with the June 1, 2016 renewal date, by providing notice to the other Decree Parties, no less than 180 days prior to such renewal date, of its intent to terminate the agreement on such renewal date. If timely notice of intent to terminate is given, the Decree Parties agree to enter into good faith negotiations to determine a course of action in the absence of such renewal. Upon any failure by all Decree Parties to continue this Agreement, and any revisions to this Agreement, in accordance with Section 20, in effect either on June 1, 2011 or any renewal period thereafter, and in the absence of agreement upon a course of action as provided in Section 20 and this section, operations shall revert to those provided in Docket D-77-20 CP (Revised). The Decree Parties agree to use their best efforts to develop by June 1, 2011 appropriate amelioration for fisheries habitat protection in accordance with Article 3 of Resolution 2002-33 (the new PPL Drought Management Plan), to be applied in conjunction with such operations.

In determining the course of action as provided above, the Decree Parties also agree to consider means by which the provisions of Tables 1 and 2, related to the NJ Diversion and the City detachment from the salt front vernier, can be continued under such course of action while preserving the Downbasin Parties' interests.

22. RESCISSION AND NULLIFICATION

The Parties recommend that the DRBC rescind Resolutions and Dockets D-77-20 CP (Revision 2) through D-77-20 CP (Revision 10), to the extent each has not already expired. This Agreement shall be null and void, and of no further force and effect, if such recissions are not effected.

February 14, 2011

STATE OF DELAWARE

The State of Delaware hereby approves this Agreement of the Parties to the U.S. Supreme Court Decree of 1954 for a Flexible Flow Management Program and recommends that this Agreement be submitted to the Delaware River Basin Commission for implementation as appropriate through rules, dockets and/ or resolutions, subject in each instance to the further agreement of the Parties as required by Section 3.3(a) of the Delaware River Basin Compact.

_____

February 14, 2011

STATE OF NEW JERSEY

The State of New Jersey hereby approves this Agreement of the Parties to the U.S. Supreme Court Decree of 1954 for a Flexible Flow Management Program and recommends that this Agreement be submitted to the Delaware River Basin Commission for implementation as appropriate through rules, dockets and/ or resolutions, subject in each instance to the further agreement of the Parties as required by Section 3.3(a) of the Delaware River Basin Compact.

_____

February 14, 2011

CITY OF NEW YORK

The City of New York hereby approves this Agreement of the Parties to the U.S. Supreme Court Decree of 1954 for a Flexible Flow Management Program and recommends that this Agreement be submitted to the Delaware River Basin Commission for implementation as appropriate through rules, dockets and/ or resolutions, subject in each instance to the further agreement of the Parties as required by Section 3.3(a) of the Delaware River Basin Compact.

_____

February 14, 2011

STATE OF NEW YORK

The State of New York hereby approves this Agreement of the Parties to the U.S. Supreme Court Decree of 1954 for a Flexible Flow Management Program and recommends that this Agreement be submitted to the Delaware River Basin Commission for implementation as appropriate through rules, dockets and/ or resolutions, subject in each instance to the further agreement of the Parties as required by Section 3.3(a) of the Delaware River Basin Compact.

_____

February 14, 2011

COMMONWEALTH OF PENNSYLVANIA

The Commonwealth of Pennsylvania hereby approves this Agreement of the Parties to the U.S. Supreme Court Decree of 1954 for a Flexible Flow Management Program and recommends that this Agreement be submitted to the Delaware River Basin Commission for implementation as appropriate through rules, dockets and/ or resolutions, subject in each instance to the further agreement of the Parties as required by Section 3.3(a) of the Delaware River Basin Compact.

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Appendix 2. Agreement for Revised FFMP Language to Address Water Equivalent of Snow Pack, Effective February 15, 2011

AGREEMENT

Effective February 15, 2011

Revised FFMP Language to

Address Water Equivalent of Snow Pack

Item i. of the third paragraph of Section 6.a of the December 10, 2008 FFMP shall be amended to read as follows:

i. For the period June 16 through April 30, if combined reservoir usable storage is in Zone L1 in accordance with Figure 1, discharge mitigation releases shall be made based upon individual reservoir usable storage in accordance with Zones L1-a, L1-b and L1-c as provided in Figure 2 and Table 3. During the period October 1 through April 30:

   1. Fifty percent (50%) of the water equivalent of snow pack in the watersheds above the reservoirs shall be included in the determination of combined and individual reservoir usable storage in relation to Figures 1 and 2.

   2. If, as a result of the combination of current snow pack and predicted meteorological conditions, in the opinion of NYCDEP any reservoir is anticipated to spill within a period of seven (7) days, then upon notification by NYCDEP to the Parties and the River Master, NYCDEP may, in consideration of possible downstream impacts and the stage and discharge thresholds given in Section 6.a. and Table 4, herein, include up to one hundred percent (100%) of the water equivalent of snow pack in the watersheds above the reservoirs in the determination of combined and individual reservoir usable storage in relation to Figures 1 and 2, unless and until any Party shall notify the River Master and NYCDEP of its objection to such inclusion. As soon as practicable, NYCDEP shall transition back to the fifty percent (50%) snow pack water equivalent criterion with notification to the Parties and the River Master.

_____ _____

City of New York Date State of New York Date

_____ _____

State of Delaware Date State of Delaware Date

_____ _____

Commonwealth of Pennsylvania Date State of New Jersey

Appendix 3. Agreement of the Parties to the 1954 U.S. Supreme Court Decree for a Flexible Flow Management Program, Effective June 1, 2011

Agreement of the Parties to the 1954 U.S. Supreme Court Decree Effective June 1, 2011

1. FLEXIBLE FLOW MANAGEMENT PROGRAM
   - a. Program History
   - b. Current Program
   - c. Criteria for Flexible Flow Management Program Modification
2. DIVERSIONS
   - a. New York City
   - b. New Jersey
3. FLOW OBJECTIVES
   - a. Montague Flow Objective
   - b. Trenton Equivalent Flow Objective
4. RELEASES
   - a. Conservation Releases from the City Delaware Basin Reservoirs
   - b. Excess Release Quantity
   - c. Interim Excess Release Quantity
   - d. Interim Excess Release Quantity Extraordinary Needs Bank
5. DROUGHT MANAGEMENT
   - a. Drought Watch
   - b. Drought Warning
   - c. Drought Emergency
   - d. New Jersey Diversion Offset Bank
   - e. Entry and Exit Criteria
   - f. Balancing Adjustment
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11. RECREATIONAL BOATING
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14. MONITORING AND REPORTING
    a. Temperature
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15. REASSESSMENT STUDY
16. PERIODIC EVALUTION AND REVISION
17. TEMPORARY SUSPENSION OR MODIFICATION
18. RESERVATIONS
19. EFFECTIVE DATE
20. RENEWAL AND REVISION
21. REVERSION

An Agreement, consented to by the Parties (the State of Delaware (DE), the State of New Jersey (N.J.), the State of New York (N.Y.), the Commonwealth of Pennsylvania (Pa.), and the City of New York (NYC or City); hereafter Decree Parties) to the Amended Decree of the U.S. Supreme Court in New Jersey v. New York, 347 U.S. 995 (1954), (hereafter Decree) that succeeds for a one-year- period the Flexible Flow Management Program (FFMP) that terminated on May 31, 2011, for managing diversions and releases under the Decree. The Parties hereby agree to support all provisions of this Agreement.

1. FLEXIBLE FLOW MANAGEMENT PROGRAM

a. Program History

On September 26, 2007, the Decree Parties unanimously agreed to implement a Flexible Flow Management Program (FFMP) for operation of the three New York City reservoirs in the Delaware River Basin. The FFMP was designed to provide a more natural flow regime and a more adaptive means than the previous operating regime for managing releases and diversions from New York City's Pepacton, Cannonsville, and Neversink Reservoirs (City Delaware Basin Reservoirs). The FFMP addresses competing needs and uses including safe and reliable water supplies to serve the needs of more than 17 million people; drought management; flood mitigation; protection of the cold water fishery; a diverse array of habitat needs in the mainstem river, estuary, and bay; and salinity repulsion. The Decree, which resolved an interstate dispute related to these reservoirs, made no provision for spill mitigation, conservation, and ecological releases. The initial implementation cycle of the FFMP was from October 1, 2007 to May 31, 2011.

The conceptual framework of the FFMP eliminated the reservoir storage "banks" previously relied upon for habitat protection purposes and instead based releases on reservoir storage levels, resulting in larger releases when water is abundant and smaller releases when storage is at or below Normal levels. The discharge mitigation component of the FFMP was intended to reduce the likelihood that the three reservoirs could be full and spilling coincident with a major storm or thaw.

The FFMP was designed to provide an adaptive framework which allows increased flexibility for program modifications and adjustments compared to the previous operating regime. This framework provides a tool to inform program-management decisions as new scientific and technical information is accumulated. During the initial implementation cycle, notable revisions to the FFMP included the following:

Temporary Modifications – Such modifications have been made in support of increased reservoir releases for maintenance, inspection, and repair of the Delaware Aqueduct and appurtenant infrastructure; increased releases for supplemental flood mitigation; emergency thermal releases for protection of the cold water fishery; and enhanced summer releases through the use of Interim Excess Release Quantity (IERQ) Extraordinary Needs Banks.

Permanent Changes – Such changes have been made to the FFMP agreement to allow for increased reservoir releases for habitat protection needs in late May and early September; to clarify the meaning of "temporary" releases schedules during periods of maintenance and repair of City Delaware Basin Reservoirs and appurtenant infrastructure; to address the issue of storage zone bouncing; and to allow the use of up to 100 percent of the water equivalent of snow pack for the calculation of combined storage to determine reservoir releases rates.

b. Current Program

The original FFMP, effective October 1, 2007 and its subsequent modifications on December 10, 2008 and February 14, 2011, is scheduled to expire on May 31, 2011. Collectively, these programs are referred to herein as the initial implementation cycle FFMP. The current FFMP is a one-year program unanimously approved by the Decree Parties and builds upon the framework of the previous FFMP agreements. The current FFMP shall be effective from June 1, 2011 to May 31, 2012. Although several limited studies and evaluations have been conducted to assess the effectiveness of selected elements of the initial implementation cycle FFMP and suggest opportunities for its improvement, some of which are incorporated in this agreement, additional study is needed prior to the Decree Parties reaching a longer term agreement for managing diversions and releases under the Decree.

The current FFMP is informed by impact assessments of the initial implementation cycle FFMP, information and experience accumulated during the initial implementation cycle, and input from various stakeholder groups and the public. The current FFMP differs from the original FFMP mainly in the following key elements:

- Use of additional tables (i.e., schedules) of reservoir releases rates for the City Delaware Basin Reservoirs, developed on the basis of Forecast-based Available Water (FAW) not needed contemporaneously for New York City's water supply;
- Use of new releases tables that replace releases tables utilized in the initial implementation cycle FFMP;
- Use of new rule curves that replace rule curves utilized in the initial implementation cycle FFMP;
- Use of New York City's Operations Support Tool (OST) to guide selection of appropriate releases tables;
- Releases rates based, in part, upon recommendations provided jointly by the New York State Department of Environmental Conservation and the Pennsylvania Fish and Boat Commission Joint Fisheries Paper (January 12, 2010);
- Drought condition releases rates (L3-L5) that are consistent among the releases tables;

- Modifications to New Jersey's diversion during drought conditions and the establishment of a Diversion Offset Bank for New Jersey;
- Incorporation of the seasonal releases design of the FFMP Temporary Summer 2010 fisheries program;
- Redirection of the IERQ used to support the seasonal flow increment, which was intended to increase the Montague flow objective from 1,750 cfs to 1,850 cfs between June 15 and September 15;
- Use of 6,045 cfs-days of IERQ to increase the base releases rates in the tables;
- Reattachment of the Montague flow objective with the location of the Delaware Estuary salt front (salinity vernier);
- Modified spill mitigation program that endeavors to maintain reservoir levels at the Conditional Storage Objective, creating a high probability of maintaining ten (10) percent void spaces from September 1, 2011 through March 15, 2012; and
- Postponement of a water-resources reassessment study until more information is available.

The additional releases tables and use of OST will facilitate the redirection of spilled water to managed water to benefit downstream interests when water in the City Delaware Basin Reservoirs is forecasted to be available for purposes other than New York City's water supply.

c. Criteria for Flexible Flow Management Program Modification

In reviewing proposed modifications to address the purposes of the FFMP, as provided in Sections 16 and 17 herein, the Decree Parties will consider criteria that may include, without any particular priority, and not limited to, the following:

i. Decree Party equity

ii. Net benefits and costs to environmental and economic resources

iii. Source and sustainability of water available to support modification and the environmental or economic resource(s)

iv. Habitat types—with naturally-occurring habitats receiving consideration over man-made habitats

v. Scientific basis for modification

vi. Impacts to drought management, water supply and flood mitigation, including but not limited to: 1) frequency, duration and seasonal timing of the various levels of drought; and 2) frequency, duration, levels of storage, diversions, releases and flows

vii. Extent to which the diversions and the Montague minimum basic rate of flow provided in the Decree are met

viii. Potential impacts to water quality, existing National and State Pollution Discharge Elimination System permits and the assimilative capacity of the Delaware River

ix. Ease and practicability of operation

x. Consistency with adaptive management principles

xi. Applicability and implementation of water conservation practices

xii. Impacts to salinity

The Decree Parties agree to evaluate these parameters as well as potential additional parameters, when considering modifications to this program.

2. DIVERSIONS

a. New York City

In accordance with Section III.A. of the Decree, and subject to the limitations provided herein, at no time during the twelve-month period, commencing June 1, 2011 shall the aggregate total quantity of water diverted by the City, divided by the number of days elapsed since May 31, 2011 exceed 800 million gallons per day (mgd). The City shall be subject to the conditions and obligations in connection with the diversions, and releases to maintain the Montague flow objective, set forth in Section III.B. of the Decree. For this Agreement, the City shall make releases from its Delaware Basin Reservoirs in accordance with the releases schedules incorporated herein.

b. New Jersey

In accordance with Section V. of the Decree, except with respect to limitations provided herein in Section 5, the State of New Jersey may divert outside the Delaware River watershed, from the Delaware River or its tributaries in New Jersey, without compensating releases, the equivalent of 100 mgd under the supervision of the Delaware River Master (River Master) established by the Decree and shall be subject to the following conditions and obligations:

i. Until the State of New Jersey builds and utilizes one or more reservoirs to store waters of the Delaware River or its tributaries for the purpose of diverting the same to another watershed, or purchases or leases reallocated water or new storage from an existing or new storage facility, the State of New Jersey may divert not to exceed 100 mgd as a monthly average, with the diversion on any day not to exceed 120 million gallons.

ii. If and when the State of New Jersey has built and is utilizing one or more reservoirs to store waters of the Delaware River or its tributaries for the purpose of diversion to another watershed, it may withdraw water from the Delaware River or its tributaries into such impounding reservoirs without limitation except during the months of July, August, September and October of any year, when not more than 100 mgd as a monthly average and not more than 120 million gallons in any day shall be withdrawn. This restriction may be modified upon unanimous consent of the Decree Parties should the State of New Jersey purchase or lease reallocated water or new storage from an existing or new facility.

iii. Regardless of whether the State of New Jersey builds and utilizes storage reservoirs for diversion, its total diversion for use outside of the Delaware River watershed without compensating releases shall not exceed an average of 100 mgd during any calendar year.

3. FLOW OBJECTIVES

a. Montague Flow Objective

Except with respect to limitations provided herein in Section 5, releases from the City Delaware Basin Reservoirs shall be in quantities designed to maintain, during Normal storage conditions, a minimum basic rate of flow at the gaging station of the U.S. Geological Survey (USGS) at Montague, N. J. of 1,750 cubic feet per second (cfs), as directed by the River Master in accordance with Section VII. of the Decree.

During Basinwide Drought Watch, Drought Warning and Drought Emergency, in accordance with Section 5 of this Agreement and Section 2.5.3.B., and Tables 1 and 2, of the Delaware River Basin Water Code (Water Code), the Montague flow objective shall vary based upon the time of year and location of the salt front, and minimum compensating releases shall be made by the City of New York from its reservoirs in the upper Delaware Basin.

The Decree Parties, with the guidance of the Operations Support Tool described herein in Section 6, shall seek to maximize the frequency of the minimum basic rate of 1,750 cfs flows at the USGS gaging station at Montague, N.J. without adversely impacting basin water supplies and other objectives of the FFMP.

b. Trenton Equivalent Flow Objective

Section 2.5.3 of the Water Code establishes a set of equivalent flow objectives at Trenton, N.J. to control salinity intrusion in the Delaware Estuary. One means for salinity management is through releases from Beltzville and Blue Marsh Reservoirs. Blue Marsh Reservoir is located on the Schuylkill River and is downstream of the USGS gaging station at Trenton, N. J. Releases from Blue Marsh Reservoir, as well as bypass flows from Yardley and the Point Pleasant Pumping station, are considered to be as effective at repelling salinity as water entering the estuary from the main stem Delaware River at Trenton. The Trenton Equivalent Flow is computed as the sum of flows at the USGS Trenton gaging station, releases in excess of conservation releases from Blue Marsh Reservoir, and 70 cfs to account for bypass flows via Yardley and the Point Pleasant Pumping Station. This value is compared to the Trenton Equivalent Flow Objective to determine if the flow objective was satisfied.

During Basinwide Drought Watch, Drought Warning, and Drought Emergency, in accordance with Section 5 of this Agreement and Section 2.5.3.B., and Tables 1 and 2, of the Water Code, the Trenton Equivalent Flow Objective shall vary based upon the time of year and location of the salt front, and minimum compensating releases shall be made by the City of New York from its reservoirs in the upper Delaware Basin.

4. RELEASES

a. Conservation Releases from the City Delaware Basin Reservoirs

Conservation releases designed for protection of the ecology in the stream reaches below the City Delaware Basin Reservoirs, including water quality, fisheries, and aquatic habitat needs, shall be made at the rates described in the Habitat Protection Program in Section 6 below.

b. Excess Release Quantity

For the period of the current program, the Decree Parties agree to use the Excess Release Quantity, as defined in the Decree, in support of an Interim Excess Release Quantity (IERQ) as defined in Paragraph c. below.

c. Interim Excess Release Quantity

For the period of the current program, an IERQ equivalent to 15,468 cfs-days shall be provided as computed in the initial implementation cycle of the FFMP based upon 83 percent of the difference between 1,257 mgd, the highest year’s consumption of the NYC water supply system between 2002 and 2006 inclusive and NYC’s estimate of continuous safe yield of the NYC water supply system at that time, of 1,290 mgd obtainable without pumping.

For the current program, 6,045 cfs-days of IERQ is incorporated in the releases tables to enhance base releases from the City Delaware Basin Reservoirs. The IERQ balance of 9,423 cfs-days is reserved and may be used for additional releases to meet the Trenton Equivalent Flow Objective or to establish an Extraordinary Needs Bank as provided for in Section d., below.

Upon request by the Lower Basin States or DRBC, NYC shall release from the IERQ, water in sufficient quantities to maintain a flow at Trenton of 3,000 cfs during basinwide Normal conditions for the period commencing on June 15 and continuing through March 15 (seasonal period). The IERQ required to be released in any seasonal period shall not exceed 70 billion gallons. In releasing the IERQ, NYC shall not be required to release at rates exceeding the capacity of its release works. NYC shall make releases from the IERQ as provided above until May 31, 2012 or until the aggregate quantity of the IERQ is exhausted, whichever occurs first.

d. Interim Excess Release Quantity Extraordinary Needs Bank

In addition to the hydrologic criteria described in Section 2.5.6.A. of the Water Code and subject to other provisional uses of the IERQ as provided herein, the Decree Parties, the DRBC and the River Master may at any time review extraordinary water needs to support such research, aquatic-life, or other water-use activity as may be approved by the DRBC. Upon unanimous agreement, the Decree Parties may bank all or a portion of the IERQ remaining at such time, and such portion shall be placed in an IERQ Extraordinary Needs Bank and used to provide for such extraordinary water needs. Such quantity as may be so banked shall be deducted from the IERQ. Any unused Extraordinary Needs Bank water shall be returned to IERQ.

5. DROUGHT MANAGEMENT

Figure 1 defines six zones of combined reservoir usable storage relative to the three drought management rule curves (Drought Watch, Drought Warning, and Drought Emergency creating Zones L3, L4, and L5) and two additional curves that subdivide the Normal storage zone into three zones (L1, L2-a, and L2-b). The three drought management rule curves are described below. The two Normal conditions rule curves are described in Section 6.

During the effective period of this Agreement, the following drought stage definitions and procedures will be in effect:

a. Drought Watch (L3)

The seasonally segmented line (shown as dashes) dividing the current Drought Warning in Figure 1 of DRBC Resolution No. 83-13 and DRBC Docket No. D-77-20 CP (Revised) is raised by four (4) billion gallons during the entire year. In addition, the upper half of the Drought Warning zone, previously referred to as DW1, is hereby designated Drought Watch, with diversions and flow objectives as shown in Table 1.

b. Drought Warning (L4)

The lower half of the Drought Warning zone (DW2), based upon the rule curves included in DRBC Resolution No. 83-13 and as modified by Paragraph a. above, is hereby designated Drought Warning, with diversions and flow objectives as shown in Table 1.

c. Drought Emergency (L5)

The operation level formerly named Drought in accordance with the rule curves included in DRBC Resolution No. 83-13 and Docket D-77-20 (Revised) is hereby designated Drought Emergency. During Drought Emergency, diversions shall be limited as shown in Table 1. The Montague and Trenton Equivalent Flow Objectives are shown in Tables 1 and 2.

New York City's diversions from the Delaware River Basin shall be in accordance with Table 1 (Interstate Operation Formula for Diversions and Flow Objectives). Minimum releases from the New York City Delaware Basin Reservoirs shall be in accordance with Table 3 (Schedule of Releases during Drought Operations).

New Jersey's maximum average monthly diversion from the Delaware River Basin via the Delaware and Raritan Canal shall be in accordance with Table 1, and shall not exceed 100 mgd, except when the Basin is in Drought Emergency, when said diversion shall not exceed a daily running average of 85 mgd commencing on the day such Drought Emergency becomes effective. Under all City Delaware Basin Reservoir combined storage conditions, New Jersey's diversion on any day shall not exceed 120 million gallons.

d. New Jersey Diversion Offset Bank

There is hereby established a Diversion Offset Bank, not to exceed 2,850 cfs-days of water in the City Delaware Basin Reservoirs, for the purpose of offsetting the increased diversions by New Jersey as provided in Table 1 of this Agreement, during basinwide Drought Watch, Drought Warning, and Drought Emergency conditions. The additional increases are in increments, not to be exceeded on any day, as follows: 0 mgd during Normal conditions; up to 15 mgd during Drought Watch; up to 30 mgd during Drought Warning; and up to 20 mgd during Drought Emergency. The differences in New Jersey's diversion, computed on the basis of Table 1 of the Good Faith Agreement, and the corresponding rates in Table 1 of this Agreement, establish the additional increments for New Jersey's diversion as incorporated herein.

This Diversion Offset Bank shall be created by selective reduced levels of releases in the L2 storage zones from Cannonsville Reservoir, during the periods June 1 to August 31, 2011 and May 21 to May 31, 2012, as provided in Tables 4g (L2-a and L2-b) and 4f (L2-a). Water saved by these reductions shall be accumulated in the Diversion Offset Bank and shall be available to offset New Jersey's incremental increases in diversions through the Delaware and Raritan Canal during drought periods.

If the accumulated incremental increased diversions by New Jersey, at any time, exceed the available water in the Diversion Offset Bank, the Lower Basin Reservoirs in Pennsylvania will provide the additional water to offset New Jersey's increased diversions. At no time shall New Jersey's accumulated incremental increased diversions exceed 2,850 cfs-days.

Any portion of the ERQ/IERQ or uncompensated storage in the downbasin reservoirs in Pennsylvania or in the New York City Delaware Basin Reservoirs which may be used to offset the increased New Jersey drought diversions provided herein is for the term of this agreement only and shall not be cited as precedent of any intention to provide such in future agreements.

Releases from the Diversion Offset Bank shall be at the direction of New Jersey in consultation with DRBC, and will be implemented by the River Master. Releases from the Lower Basin Reservoirs for New Jersey's diversion, if necessary, shall be at the direction of DRBC, in consultation with and at the request of New Jersey.

Releases from the Diversion Offset Bank or the Lower Basin Reservoirs to offset New Jersey's incremental increases in diversions through the Delaware and Raritan Canal shall be in accordance with timing procedures agreed upon by DRBC, New Jersey, and the River Master. No offsetting or accounting for offsetting is required for New Jersey's increased diversions on any day when DRBC determines that no water is required from Lower Basin Reservoirs to meet the current Trenton flow objective.

The River Master's office will maintain the ongoing accounting for releases made from this bank. At no time during the releases year commencing June 1, 2011 shall releases from the Diversion Offset Bank exceed the unused balance of the bank. The Diversion Offset Bank shall terminate automatically on June 1, 2012; provided that it may be terminated at an earlier date and the remaining balance added to the IERQ, by agreement of the Decree Parties.

Figure 1
New York City Delaware System Usable Combined Storage
(Cannonsville, Pepacton, and Neversink Reservoirs)

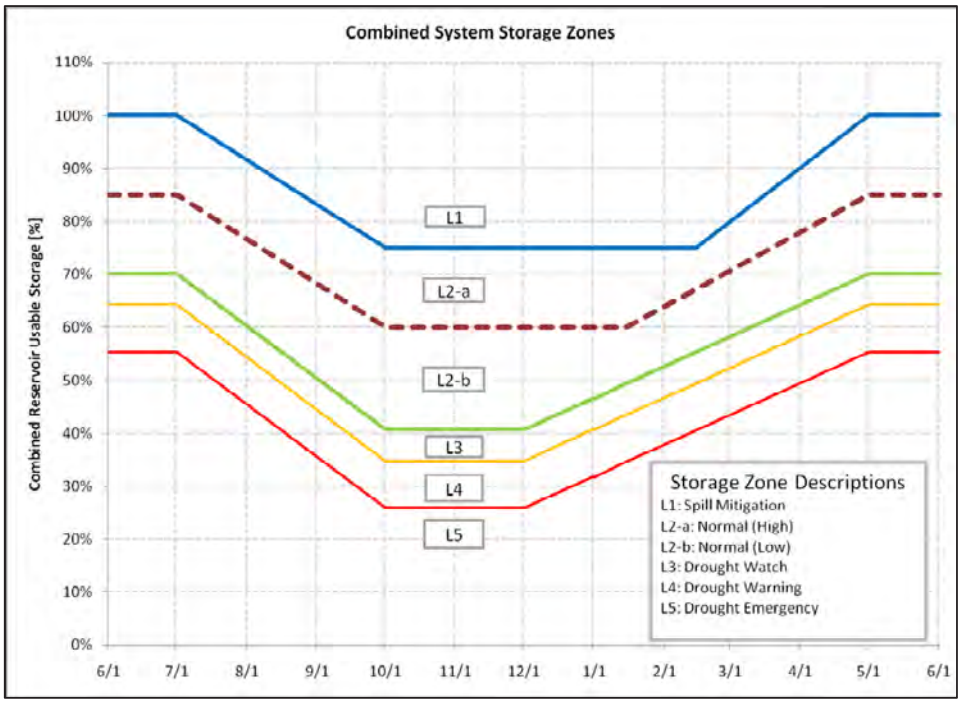


Table 1
Interstate Operation Formula for Diversions and Flow Objectives

NYC Storage Condition	*NYC Diversion (mgd)*	*NJ Diversion (mgd)*	*Montague Flow Objective (cfs)*	*Trenton Flow Objective (cfs)*
Normal (L1, L2)	800	100	1,750	3,000
Drought Watch (L3)	680	100	1,650	2,700
Drought Warning (L4)	560	100	1,550	2,700
Drought Emergency (L5)	520	85	1,100-1,650*	2,500-2,900*
Severe Drought	(to be negotiated depending upon conditions)			

* Varies with time of year and location of salt front, in accordance with Table 2

Table 2
Interstate Operation Formula for Adjusting Montague and Trenton Flow Objectives during Drought Emergency (L5) Operations

	Flow objective, cubic feet per second at:					
	Montague, NJ			Trenton, NJ***		
7-day average location of Salt Front*, River Mile**	Dec-Apr.	May-Aug.	Sept-Nov.	Dec-Apr.	May-Aug.	Sept-Nov.
Upstream of R.M. 92.5	1,600	1,650	1,650	2,700	2,900	2,900
Between R.M. 87.0 and R.M. 92.5	1,350	1,600	1,500	2,700	2,700	2,700
Between R.M. 82.9 and R.M. 87.0	1,350	1,600	1,500	2,500	2,500	2,500
Downstream of R.M. 82.9	1,100	1,100	1,100	2,500	2,500	2,500

* Defined as the 250 milligrams per liter isochlor in the Delaware Estuary

**Measured in statute miles along the navigation channel from the mouth of Delaware Bay.

*** The Trenton Equivalent Flow Objective is achieved if the sum of flows observed at the USGS Trenton gaging station, releases in excess of conservation releases from Blue Marsh Reservoir, and 70 cfs to account for bypass flows via Yardley and the Point Pleasant Pumping Station is greater than the Trenton Flow Objective listed above.

Table 3
Schedule of Releases during Drought Operations

	Winter		Spring		Summer			Fall		
Cannonsville Storage Zone	Dec 1 - 31-Mar	Apr 1 - 30-Apr	May 1 - 20-May	May 21 - 31-May	Jun 1 - 15-Jun	Jun 16 - 30-Jun	Jul 1 - 31-Aug	Sep 1 - 15-Sep	Sep 16 - 30-Sep	Oct 1 - 30-Nov
L3	55	55	85	85	135	135	135	85	85	55
L4	50	50	60	60	100	100	100	50	50	50
L5	40	40	40	40	90	90	90	40	40	40

	Winter		Spring		Summer			Fall		
Pepacton Storage Zone	Dec 1 - 31-Mar	Apr 1 - 30-Apr	May 1 - 20-May	May 21 - 31-May	Jun 1 - 15-Jun	Jun 16 - 30-Jun	Jul 1 - 31-Aug	Sep 1 - 15-Sep	Sep 16 - 30-Sep	Oct 1 - 30-Nov
L3	45	45	60	60	75	75	75	45	45	45
L4	40	40	50	50	65	65	65	40	40	40
L5	35	35	35	35	60	60	60	35	35	35

	Winter		Spring		Summer			Fall		
Neversink Storage Zone	Dec 1 - 31-Mar	Apr 1 - 30-Apr	May 1 - 20-May	May 21 - 31-May	Jun 1 - 15-Jun	Jun 16 - 30-Jun	Jul 1 - 31-Aug	Sep 1 - 15-Sep	Sep 16 - 30-Sep	Oct 1 - 30-Nov
L3	30	30	40	40	55	55	55	30	30	30
L4	25	25	30	30	45	45	45	25	25	25
L5	20	20	20	20	40	40	40	20	20	20

e. Entry and Exit Criteria

Criteria for entry into and exit from the various stages of drought operations shall be in accordance with Section 2.5.3.E. of the Water Code. Normal (L2 or higher) level releases will be restored when combined storage in the City Delaware Basin Reservoirs reaches 25 billion gallons above the L3 curve in Figure 1 and remains at or above that level for 15 consecutive days.

f. Balancing Adjustment

In order to conserve water, the River Master is requested to utilize a balancing adjustment, based upon procedures agreed upon by the Decree Parties, when calculating the releases to be directed to meet the Montague flow objectives in Tables 1 and 2. Additionally, during Drought Warning, the amount of the conservation releases (L4) from the City Delaware Basin Reservoirs that is greater than the basic conservation releases rates as set forth in Table 1 of Docket D-77-20 (Revised) shall be considered as directed releases for the purpose of calculating the balancing adjustment.

6. HABITAT PROTECTION PROGRAM

a. Applicability and Management Objectives

The overall management goal of the Habitat Protection Program (HPP) is to protect the cold water fishery while maintaining aquatic community diversity, structure, and function

through improved ecological flow releases. A series of four categorical protection levels for describing cold water ecosystem management objectives for waters downstream of the City Delaware Basin Reservoirs was developed by New York and Pennsylvania fishery managers and is shown on Plate 1. These protection levels apply in non-drought years and are defined as follows:

Excellent: Excellent year-round cold water aquatic habitat protection. Summer water temperatures are routinely 68ºF or less and only very rarely exceed a daily maximum of 75ºF. Excellent protection level applies to the West Branch Delaware River from Cannonsville Reservoir to the junction with the East Branch Delaware River, the East Branch Delaware River from Pepacton Reservoir to the hamlet of East Branch, N.Y., and Neversink River from Neversink Reservoir to Bridgeville, N.Y.

Good: River section provides cold water aquatic habitat and thermal protection and maintains opportunities for a cold water fishery. Summer water temperatures will occasionally exceed a daily maximum of 75ºF for short periods and water temperatures greater than 68ºF occur more frequently than with the Excellent protection level. Elevated temperatures will occasionally be an issue. Good protection level applies to the Delaware River main stem from the junction of the West and East Branches to Lordville, N.Y. and the Neversink River from Bridgeville, N.Y. to the mouth of Eden Brook near Oakland Valley, N.Y.

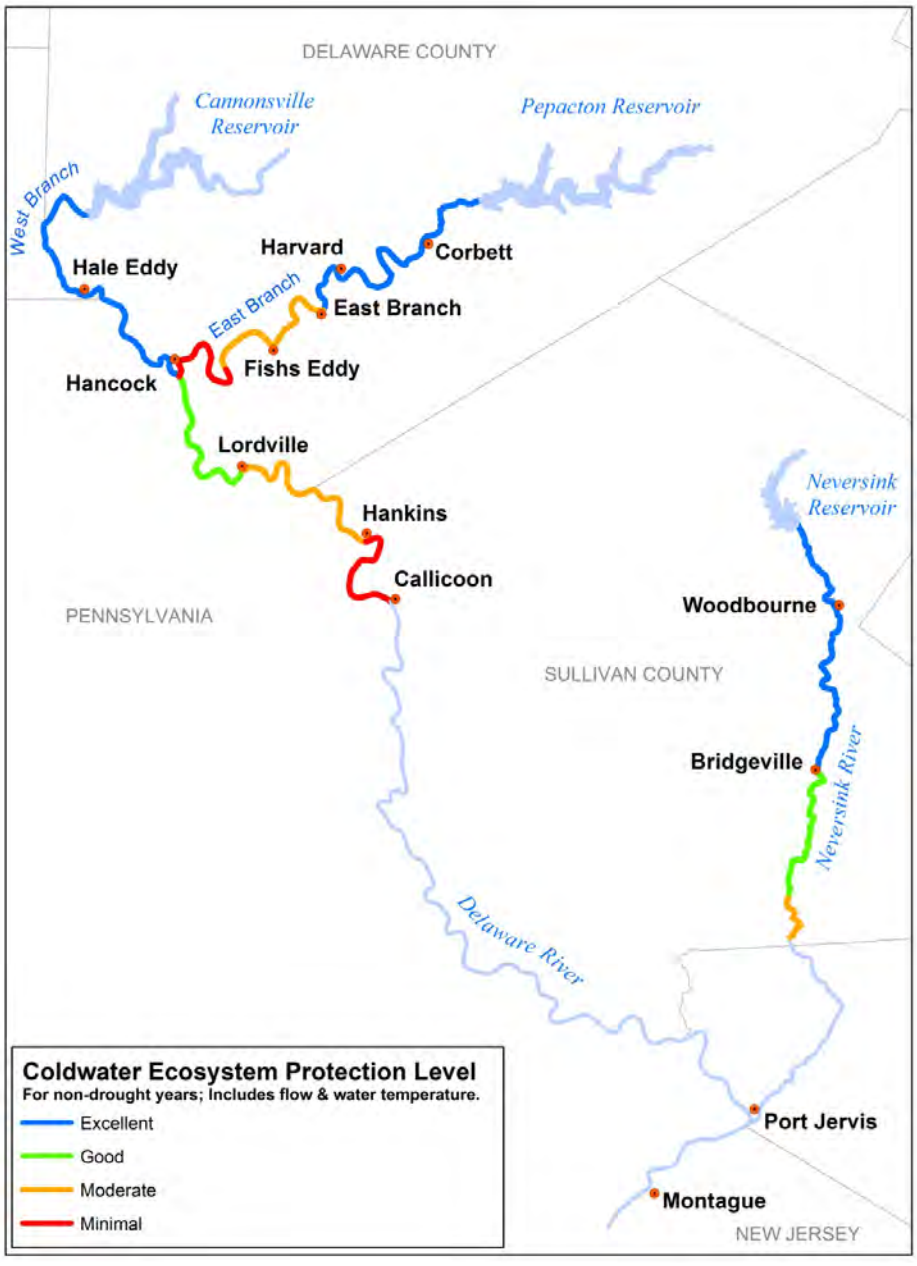
Moderate: River sections will experience adequate flow and some thermal protection for cold water species. Seasonal opportunities for a cold water fishery will occur, but thermal benefits will diminish. Moderate protection level applies to the East Branch Delaware River from East Branch, N.Y. to the mouth of Corn Creek near Peas Eddy, N.Y., the Neversink River from the mouth of Eden Brook near Oakland Valley, N.Y. to the Sullivan/Orange County, N.Y. boundary, and the Delaware River main stem from Lordville, N.Y. to Hankins, N.Y.

Minimal: River sections with this designation will experience adequate flow, but only limited thermal protection. The quality of the fishery will be generally seasonal and will vary from year to year. Flows should be adequate to allow trout to reach cold water refugia and to protect dwarf wedgemussel populations in the vicinity of Callicoon, N.Y.

Minimal protection level applies to the East Branch Delaware River from the mouth of Corn Creek near Peas Eddy, N.Y. to the junction with the West Branch Delaware River, and the Delaware River main stem from Hankins, N.Y. to Callicoon, N.Y.

The Decree Parties recognize that the degree of protection in waters downstream of the City Delaware Basin Reservoirs will vary according to annual fluctuations in precipitation and temperature, reservoir releases rates, distance from the locations of reservoir releases, and tributary influences. Requirements for protection of the federally endangered dwarf wedgemussel are currently under study and are poorly defined.

Plate 1
Extent and Protection Level of the Cold Water Ecosystem



b. Controlled Releases for Habitat Protection Program

There is hereby established a Habitat Protection Program (HPP), which consists of conservation releases designed for the protection of the cold water fishery below the City Delaware Basin Reservoirs.

The HPP is designed to make enhanced releases, above the base releases given in Table 4a, when an assessment by New York City, using its Operations Support (OST), determines that additional water is available for releases and that any risk to the City's water supply is at an acceptable level. The Base Releases table is designed for drought neutral minimum releases, i.e., no additional drought risk relative to DRBC Docket D-77-20 Revised (Rev. 1), which can be maintained under Normal conditions, independent of inflow or the City's demand.

The City is developing OST, a state-of-the-art forecast-driven analysis and decision support tool that will provide the City with probabilistic predictions of future system status. OST will be deployed in phases, as component modules become available, with the final version expected to be fully operational by 2013. In addition to its principal objective of improving operational decision making in providing a reliable supply of high quality drinking water for 9 million people, OST will also provide assurance that the actions taken to support downstream objectives, such as fish habitat, stream ecosystems, and better discharge mitigation, will not adversely impact water supply reliability. It will allow the City to compare different sets of operating scenarios using real-time system information (e.g., reservoir levels, water quality, streamflows) and forecasts (e.g., streamflows, meteorological drivers) to evaluate the impacts on water supply reliability so that objective risk-based decisions can be made quickly and efficiently.

Under this agreement the City will voluntarily make enhanced stream releases using the Forecast-based Available Water (FAW) as determined by an OST assessment and in accordance with Figures 1 and 2 and the appropriate FAW or the base releases shown in Table 4a. When the assessment indicates that no additional water is available, the City shall make releases in accordance with the currently sustainable base releases shown in Table 4a. The City is under no obligation to make enhanced releases beyond the base releases, when the risk to water supply, as determined by the City using its OST assessment, is unacceptable. Tables 4b through 4g present the releases tables under Normal conditions for pre-determined amounts of FAW.

The City will make available to the Decree Parties the inputs to the OST model, the outputs from the model, and the releases table selection guidelines, including the forecasted probabilistic inflows, the status of the City Delaware Reservoirs, and the operational assumptions applicable to OST-based decisions. OST assessments shall be performed as frequently as necessary to confirm confidence in the selected FAW table but generally not less than monthly. Prior to making a releases table change, the City will provide notification, along with a general description of the rationale of such change to the Decree Parties, the River Master, and DRBC. The City shall provide the above information through the River Master's website.

As shown in Tables 4a through 4g, each reservoir has a schedule of seasonal releases based on the quantity of combined reservoir usable storage, and the quantity of water available for the HPP.

Figure 2
New York City Delaware System Usable Individual Storage
(Cannonsville, Pepacton, and Neversink Reservoirs)

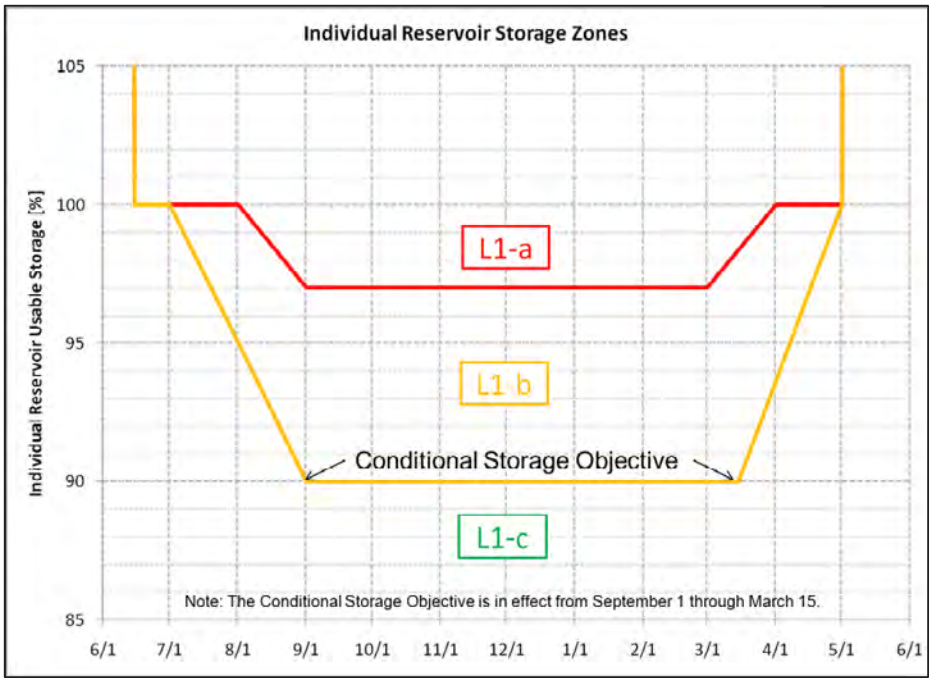


Table 4a
Schedule of Releases during Normal Conditions
Base Releases with no Forecast-based Available Water (FAW)

	Winter		Spring		Summer			Fall		
Cannonsville Storage Zone	Dec 1 - 31-Mar	Apr 1 - 30-Apr	May 1 - 20-May	May 21 - 31-May	Jun 1 - 15-Jun	Jun 16 - 30-Jun	Jul 1 - 31-Aug	Sep 1 - 15-Sep	Sep 16 - 30-Sep	Oct 1 - 30-Nov
L1-a	1500	1500	*	*	*	1500	1500	1500	1500	1500
L1-b	400	400	*	*	*	*	400	400	400	400
L1-c	110	110	200	250	275	275	275	275	175	110
L2-a	75	75	150	200	225	225	225	225	150	75
L2-b	60	60	135	175	190	190	190	190	135	60

	Winter		Spring		Summer			Fall		
Pepacton Storage Zone	Dec 1 - 31-Mar	Apr 1 - 30-Apr	May 1 - 20-May	May 21 - 31-May	Jun 1 - 15-Jun	Jun 16 - 30-Jun	Jul 1 - 31-Aug	Sep 1 - 15-Sep	Sep 16 - 30-Sep	Oct 1 - 30-Nov
L1-a	700	700	*	*	*	700	700	700	700	700
L1-b	300	300	*	*	*	*	300	300	300	300
L1-c	85	85	110	130	150	150	150	150	100	85
L2	50	50	75	90	100	100	100	100	60	50

	Winter		Spring		Summer			Fall		
Neversink Storage Zone	Dec 1 - 31-Mar	Apr 1 - 30-Apr	May 1 - 20-May	May 21 - 31-May	Jun 1 - 15-Jun	Jun 16 - 30-Jun	Jul 1 - 31-Aug	Sep 1 - 15-Sep	Sep 16 - 30-Sep	Oct 1 - 30-Nov
L1-a	190	190	*	*	*	190	190	190	190	190
L1-b	125	110	*	*	*	*	150	150	150	125
L1-c	65	65	85	100	110	110	110	100	75	65
L2	35	35	55	65	75	75	75	65	50	35

* Indicates storage zone not present at this time period; release is entry in cell below.

Table 4b
Schedule of Releases during Normal Conditions
Releases with 10 mgd Forecast-based Available Water (FAW)

	Winter		Spring		Summer			Fall		
Cannonsville Storage Zone	Dec 1 - 31-Mar	Apr 1 - 30-Apr	May 1 - 20-May	May 21 - 31-May	Jun 1 - 15-Jun	Jun 16 - 30-Jun	Jul 1 - 31-Aug	Sep 1 - 15-Sep	Sep 16 - 30-Sep	Oct 1 - 30-Nov
L1-a	1500	1500	*	*	*	1500	1500	1500	1500	1500
L1-b	400	400	*	*	*	*	400	400	400	400
L1-c	125	125	225	300	300	300	300	300	200	125
L2-a	85	85	160	235	245	245	245	235	160	85
L2-b	70	70	140	200	210	210	210	200	140	70

	Winter		Spring		Summer			Fall		
Pepacton Storage Zone	Dec 1 - 31-Mar	Apr 1 - 30-Apr	May 1 - 20-May	May 21 - 31-May	Jun 1 - 15-Jun	Jun 16 - 30-Jun	Jul 1 - 31-Aug	Sep 1 - 15-Sep	Sep 16 - 30-Sep	Oct 1 - 30-Nov
L1-a	700	700	*	*	*	700	700	700	700	700
L1-b	300	300	*	*	*	*	300	300	300	300
L1-c	85	85	110	130	150	150	150	150	110	85
L2	55	55	75	100	110	110	110	100	75	55

	Winter		Spring		Summer			Fall		
Neversink Storage Zone	Dec 1 - 31-Mar	Apr 1 - 30-Apr	May 1 - 20-May	May 21 - 31-May	Jun 1 - 15-Jun	Jun 16 - 30-Jun	Jul 1 - 31-Aug	Sep 1 - 15-Sep	Sep 16 - 30-Sep	Oct 1 - 30-Nov
L1-a	190	190	*	*	*	190	190	190	190	190
L1-b	125	110	*	*	*	*	150	150	150	125
L1-c	70	70	85	100	110	110	110	100	85	70
L2	40	40	60	75	80	80	80	75	60	40

* Indicates storage zone not present at this time period; release is entry in cell below.

Table 4c
Schedule of Releases during Normal Conditions
Releases with 20 mgd Forecast-based Available Water (FAW)

	Winter		Spring		Summer			Fall		
Cannonsville Storage Zone	Dec 1 - 31-Mar	Apr 1 - 30-Apr	May 1 - 20-May	May 21 - 31-May	Jun 1 - 15-Jun	Jun 16 - 30-Jun	Jul 1 - 31-Aug	Sep 1 - 15-Sep	Sep 16 - 30-Sep	Oct 1 - 30-Nov
L1-a	1500	1500	*	*	*	1500	1500	1500	1500	1500
L1-b	500	500	*	*	*	*	500	500	500	500
L1-c	150	200	250	300	325	325	325	325	225	150
L2-a	90	140	175	260	275	275	275	260	170	90
L2-b	80	90	150	220	240	240	240	220	145	80

	Winter		Spring		Summer			Fall		
Pepacton Storage Zone	Dec 1 - 31-Mar	Apr 1 - 30-Apr	May 1 - 20-May	May 21 - 31-May	Jun 1 - 15-Jun	Jun 16 - 30-Jun	Jul 1 - 31-Aug	Sep 1 - 15-Sep	Sep 16 - 30-Sep	Oct 1 - 30-Nov
L1-a	700	700	*	*	*	700	700	700	700	700
L1-b	300	300	*	*	*	*	300	300	300	300
L1-c	100	100	110	130	150	150	150	150	125	100
L2	60	60	85	110	125	125	125	110	85	60

	Winter		Spring		Summer			Fall		
Neversink Storage Zone	Dec 1 - 31-Mar	Apr 1 - 30-Apr	May 1 - 20-May	May 21 - 31-May	Jun 1 - 15-Jun	Jun 16 - 30-Jun	Jul 1 - 31-Aug	Sep 1 - 15-Sep	Sep 16 - 30-Sep	Oct 1 - 30-Nov
L1-a	190	190	*	*	*	190	190	190	190	190
L1-b	125	110	*	*	*	*	150	150	150	125
L1-c	70	70	85	100	110	110	110	100	85	70
L2	45	45	65	80	90	90	90	80	65	45

* Indicates storage zone not present at this time period; release is entry in cell below.

Table 4d
Schedule of Releases during Normal Conditions
Releases with 35 mgd Forecast-based Available Water (FAW)

	Winter		Spring		Summer			Fall		
Cannonsville Storage Zone	Dec 1 - 31-Mar	Apr 1 - 30-Apr	May 1 - 20-May	May 21 - 31-May	Jun 1 - 15-Jun	Jun 16 - 30-Jun	Jul 1 - 31-Aug	Sep 1 - 15-Sep	Sep 16 - 30-Sep	Oct 1 - 30-Nov
L1-a	1500	1500	*	*	*	1500	1500	1500	1500	1500
L1-b	600	600	*	*	*	*	600	600	600	600
L1-c	175	250	300	375	400	400	400	375	275	175
L2-a	110	175	225	300	325	325	325	300	210	110
L2-b	90	115	175	250	275	275	275	250	150	90

	Winter		Spring		Summer			Fall		
Pepacton Storage Zone	Dec 1 - 31-Mar	Apr 1 - 30-Apr	May 1 - 20-May	May 21 - 31-May	Jun 1 - 15-Jun	Jun 16 - 30-Jun	Jul 1 - 31-Aug	Sep 1 - 15-Sep	Sep 16 - 30-Sep	Oct 1 - 30-Nov
L1-a	700	700	*	*	*	700	700	700	700	700
L1-b	300	300	*	*	*	*	300	300	300	300
L1-c	100	100	110	130	150	150	150	150	125	100
L2	70	70	90	125	140	140	140	125	90	70

	Winter		Spring		Summer			Fall		
Neversink Storage Zone	Dec 1 - 31-Mar	Apr 1 - 30-Apr	May 1 - 20-May	May 21 - 31-May	Jun 1 - 15-Jun	Jun 16 - 30-Jun	Jul 1 - 31-Aug	Sep 1 - 15-Sep	Sep 16 - 30-Sep	Oct 1 - 30-Nov
L1-a	190	190	*	*	*	190	190	190	190	190
L1-b	125	110	*	*	*	*	150	150	150	125
L1-c	75	75	100	100	125	125	125	100	100	75
L2	50	50	70	90	100	100	100	90	75	50

* Indicates storage zone not present at this time period; release is entry in cell below.

Table 4e
Schedule of Releases during Normal Conditions
Releases with 50 mgd Forecast-based Available Water (FAW)

	Winter		Spring		Summer			Fall		
Cannonsville Storage Zone	Dec 1 - 31-Mar	Apr 1 - 30-Apr	May 1 - 20-May	May 21 - 31-May	Jun 1 - 15-Jun	Jun 16 - 30-Jun	Jul 1 - 31-Aug	Sep 1 - 15-Sep	Sep 16 - 30-Sep	Oct 1 - 30-Nov
L1-a	1500	1500	*	*	*	1500	1500	1500	1500	1500
L1-b	700	700	*	*	*	*	700	700	700	700
L1-c	200	325	400	400	500	500	500	400	325	200
L2-a	125	200	250	325	400	400	400	325	250	125
L2-b	100	150	200	275	300	300	300	275	150	100

	Winter		Spring		Summer			Fall		
Pepacton Storage Zone	Dec 1 - 31-Mar	Apr 1 - 30-Apr	May 1 - 20-May	May 21 - 31-May	Jun 1 - 15-Jun	Jun 16 - 30-Jun	Jul 1 - 31-Aug	Sep 1 - 15-Sep	Sep 16 - 30-Sep	Oct 1 - 30-Nov
L1-a	700	700	*	*	*	700	700	700	700	700
L1-b	500	500	*	*	*	*	500	500	500	500
L1-c	150	150	150	150	150	150	150	150	150	150
L2	80	80	100	125	140	140	140	140	100	80

	Winter		Spring		Summer			Fall		
Neversink Storage Zone	Dec 1 - 31-Mar	Apr 1 - 30-Apr	May 1 - 20-May	May 21 - 31-May	Jun 1 - 15-Jun	Jun 16 - 30-Jun	Jul 1 - 31-Aug	Sep 1 - 15-Sep	Sep 16 - 30-Sep	Oct 1 - 30-Nov
L1-a	190	190	*	*	*	190	190	190	190	190
L1-b	125	110	*	*	*	*	150	150	150	125
L1-c	75	75	100	100	140	140	140	100	100	75
L2	50	50	75	90	100	100	100	90	75	50

* Indicates storage zone not present at this time period; release is entry in cell below.

Table 4f
Schedule of Releases during Normal Conditions
Releases with 75 mgd Forecast-based Available Water (FAW)

	Winter		Spring		Summer			Fall		
Cannonsville Storage Zone	Dec 1 - 31 Mar	Apr 1 - 30 Apr	May 1 - 20 May	May 21 - 31 May	Jun 1 - 15 Jun	Jun 16 - 30 Jun	Jul 1 - 31 Aug	Sep 1 - 15 Sep	Sep 16 - 30 Sep	Oct 1 - 30 Nov
L1-a	1500	1500	*	*	*	1500	1500	1500	1500	1500
L1-b	700	700	*	*	*	*	700	700	700	700
L1-c	225	475	475	525	600	600	600	475	375	225
L2-a	150	400	400	400/450+	500/525+	500/525+	500/525+	400	300	150
L2-b	100	150	200	275	300	300	300	275	200	100

	Winter		Spring		Summer			Fall		
Pepacton Storage Zone	Dec 1 - 31-Mar	Apr 1 - 30-Apr	May 1 - 20-May	May 21 - 31-May	Jun 1 - 15-Jun	Jun 16 - 30-Jun	Jul 1 - 31-Aug	Sep 1 - 15-Sep	Sep 16 - 30-Sep	Oct 1 - 30-Nov
L1-a	700	700	*	*	*	700	700	700	700	700
L1-b	500	500	*	*	*	*	500	500	500	500
L1-c	150	150	150	150	150	150	150	150	150	150
L2	100	100	100	125	140	140	140	140	100	100

	Winter		Spring		Summer			Fall		
Neversink Storage Zone	Dec 1 - 31-Mar	Apr 1 - 30-Apr	May 1 - 20-May	May 21 - 31-May	Jun 1 - 15-Jun	Jun 16 - 30-Jun	Jul 1 - 31-Aug	Sep 1 - 15-Sep	Sep 16 - 30-Sep	Oct 1 - 30-Nov
L1-a	190	190	*	*	*	190	190	190	190	190
L1-b	125	110	*	*	*	*	150	150	150	125
L1-c	75	75	100	100	140	140	140	100	100	75
L2	55	55	90	90	110	110	110	90	90	55

* Indicates storage zone not present at this time period; release is entry in cell below.
\+ Second entry after slash indicates reduction in release rate for New Jersey Diversion Offset Bank.

Table 4g
Schedule of Releases during Normal Conditions
Releases with 100 mgd Forecast-based Available Water (FAW)

	Winter		Spring		Summer			Fall		
Cannonsville Storage Zone	Dec 1 - 31-Mar	Apr 1 - 30-Apr	May 1 - 20-May	May 21 - 31-May	Jun 1 - 15-Jun	Jun 16 - 30-Jun	Jul 1 - 31-Aug	Sep 1 - 15-Sep	Sep 16 - 30-Sep	Oct 1 - 30-Nov
L1-a	1500	1500	*	*	*	1500	1500	1500	1500	1500
L1-b	700	700	*	*	*	*	700	700	700	700
L1-c	225	475	475	525	600	600	600	475	375	225
L2-a	150	400	400	400/450+	500/525+	500/525+	500/525+	400	300	150
L2-b	150	400	400	400/450+	500/525+	500/525+	500/525+	400	300	150

	Winter		Spring		Summer			Fall		
Pepacton Storage Zone	Dec 1 - 31-Mar	Apr 1 - 30-Apr	May 1 - 20-May	May 21 - 31-May	Jun 1 - 15-Jun	Jun 16 - 30-Jun	Jul 1 - 31-Aug	Sep 1 - 15-Sep	Sep 16 - 30-Sep	Oct 1 - 30-Nov
L1-a	700	700	*	*	*	700	700	700	700	700
L1-b	500	500	*	*	*	*	500	500	500	500
L1-c	150	150	150	150	150	150	150	150	150	150
L2	100	100	100	140	140	140	140	140	100	100

	Winter		Spring		Summer			Fall		
Neversink Storage Zone	Dec 1 - 31-Mar	Apr 1 - 30-Apr	May 1 - 20-May	May 21 - 31-May	Jun 1 - 15-Jun	Jun 16 - 30-Jun	Jul 1 - 31-Aug	Sep 1 - 15-Sep	Sep 16 - 30-Sep	Oct 1 - 30-Nov
L1-a	190	190	*	*	*	190	190	190	190	190
L1-b	125	110	*	*	*	*	150	150	150	125
L1-c	75	75	100	100	140	140	140	100	100	75
L2	55	55	90	90	110	110	110	90	90	55

* Indicates storage zone not present at this time period; release is entry in cell below.
+ Second entry after slash indicates reduction in release rate for New Jersey Diversion Offset Bank.

7. DISCHARGE MITIGATION PROGRAM

In order to enhance flood mitigation provided by the City Delaware Basin Reservoirs, NYC agrees to establish a Conditional Storage Objective (CSO) rule curve in Figure 2. Consistent with good practices for water supply reservoirs, and in order to ensure that sufficient resources are available during an extended dry period to support both lower basin and NYC needs, it is essential to ensure that the City Delaware Basin Reservoirs are filled on or around June 1st every year. To accomplish this, the CSO (boundary between the L1-b and L1-c storage zones in Figure 2 must be limited and ramped. For the duration of the current program NYC shall endeavor, to the maximum extent possible without impacting water supply reliability, to maintain reservoir levels at the CSO, thus creating a high probability of maintaining ten (10) percent void spaces from September 1, 2011 through March 15, 2012 to help mitigate flooding events. In determining the releases needed to maintain the CSO, the following parameters are considered in the OST evaluation: forecasted inflows over the next seven (7) days, FAW table releases in effect over the next seven (7) days, anticipated diversions over the next seven (7) days, snow water equivalent in the watershed ranging from 50 percent to 100 percent as appropriate, and the current usable reservoir storage.. Based on any projected seven (7) day storage surplus, new release rates, above the FAW table releases in effect, are calculated and spread over the upcoming 7-day period, within the limitations of the release works for each reservoir.

Discharge Mitigation Program releases are designed to help mitigate the effects of flooding immediately below the City Delaware Basin Reservoirs. When the combined reservoir usable storage in Figure 1 is in Zone L1, the spill mitigation zone, Figure 2 defines three zones of reservoir-specific storage (L1-a, L1-b and L1-c) relative to two rule curves for each reservoir. Tables 4a through 4g further define spill mitigation releases based on reservoir-specific storage when combined storage is in Zone L1. When combined usable reservoir storage is below Zone L1, reservoir-specific storage zones as defined in Figure 2 are not applicable, and the releases to be made, as set forth in the tables, are for conservation purposes only.

The City shall make discharge mitigation releases from the City Delaware Basin Reservoirs in accordance with the following:

i. For the period June 16 through April 30, if combined reservoir usable storage is in Zone L1 in accordance with Figure 1, discharge mitigation releases shall be made based upon individual reservoir usable storage in accordance with Zones L1-a, L1-b and L1-c as provided in Figure 2 and Tables 4a through 4g. During the period October 1 through April 30:

    a. Fifty percent (50%) of the water equivalent of snow pack in the watersheds above the reservoirs shall be included in the determination of combined and individual reservoir usable storage in relation to Figures 1 and 2.

    b. If, as a result of the combination of current snow pack and predicted meteorological conditions, in the opinion of the New York City Department of Environmental Protection (NYCDEP) any reservoir is anticipated to spill within a period of seven (7) days, then upon notification by NYCDEP to the Decree Parties, the River Master, and DRBC, NYCDEP may, in consideration of possible downstream impacts and the stage and discharge thresholds given in Section 6.b. and Table 5, herein, include up to one hundred percent (100%) of the water equivalent of snow pack in the watersheds above the reservoirs in the determination of combined and individual reservoir usable storage in relation to Figures 1 and 2, unless and until any Decree Party shall notify the NYCDEP, the River Master, and DRBC of its objection to such inclusion. As soon as practicable, NYCDEP shall transition back to the fifty percent (50%) snow pack water equivalent criterion with notification to the Decree Parties, the River Master, and DRBC.

ii. For the period May 1 through June 15, Zones L1-a and L1-b shall not be applicable in accordance with Figure 2, and discharge mitigation releases shall be made in accordance with Zone L1-c as provided in Figure 2 and Tables 4a through 4g.

iii. The NYCDEP and the New York State Department of Environmental Conservation (NYSDEC) reservoir releases managers, upon mutual agreement, may transfer spills to bottom releases to the extent possible at any reservoir.

iv. The current National Weather Service (NWS) flood stage for the West Branch Delaware River at Hale Eddy is 11.0 feet. Accordingly, Zone L1discharge mitigation releases will not be made from Cannonsville Reservoir when the river stage for the West Branch Delaware River at Hale Eddy is above 9.0 feet, or is forecasted to be above 9.0 feet within 48 hours of planned discharge mitigation releases, and releases shall be made in accordance with Zone L2 through L5 as provided in Tables 4a through 4g. This guidance may be modified at any time upon unanimous consent by the Decree Parties, if additional information demonstrates that a different cautionary stage should be used to limit the discharge mitigation releases.

v. The current NWS flood stage for the East Branch Delaware River at Fishs Eddy is 13.0 ft. Accordingly, Zone L1 discharge mitigation releases will not be made from Pepacton Reservoir when the river stage for the East Branch Delaware River at Fishs Eddy is above 11.0 ft. or is forecast to be above 11.0 ft. within 48 hours of planned discharge mitigation releases, and releases shall be made in accordance with Zone L2 through L5 as provided in Tables 4a through 4g. This guidance may be modified at any time upon unanimous consent by the Decree Parties, if additional information demonstrates that a different cautionary stage should be used to limit the discharge mitigation releases.

vi. The current NWS flood stage for the Neversink River at Bridgeville is 13.0 feet. Accordingly, Zone L1 discharge mitigation releases will not be made from Neversink Reservoir when the river stage for the Neversink River at Bridgeville is above 12.0 feet, or is forecast to be above 12.0 feet within 48 hours of planned discharge mitigation releases, and releases shall be made in accordance with Zone L2 through L5 as provided in Tables 4a through 4g. This guidance may be modified at any time upon unanimous consent by the Decree Parties, if additional information demonstrates that a different cautionary stage should be used to limit the discharge mitigation releases.

vii. Discharge mitigation releases may be suspended from the respective reservoir if NYCDEP and NYSDEC, in consultation with the NWS, determine that ice conditions threaten flood prone areas of the West Branch Delaware River below Cannonsville Reservoir, East Branch Delaware River below Pepacton Reservoir, or Neversink River below Neversink Reservoir.

viii. Discharge mitigation releases will be designed so that the combined discharge from each reservoir's controlled release works and spillway does not exceed the maximum rate given in Table 5 below. Respective controlled releases will be reduced to L2 releases in Tables 4a through 4g, or lower.

ix. To more naturally effect downward or upward transitions between discharge mitigation releases rates identified in Tables 4a through 4g, discharge mitigation releases rates may be ramped, in cooperation with NYSDEC, generally over a period of three days at Cannonsville and Pepacton Reservoirs, and two days at Neversink Reservoir.

x. Modifications to the program necessary to accommodate emergencies, maintenance and repair operations or short-term needs are addressed herein in Section 17, Temporary Suspension or Modification.

Table 5
Maximum Combined Discharge Rates

Reservoir	*Maximum Combined Discharge Rate (cfs)*
Neversink	3,400
Pepacton	2,400
Cannonsville	4,200

8. SALINITY REPULSION

New York City will provide releases to protect the lower basin water supply from salt water movement up the Delaware River in accordance with Table 2 of the Interstate Water Management Recommendations of the Parties to the U.S. Supreme Court Decree of 1954 to the Delaware River Basin Commission pursuant to Delaware River Basin Commission Resolution 78-20 (Good Faith Agreement). As stipulated in the Good Faith Agreement and in accordance with Table 2, herein (Interstate Operation Formula For Adjusting Montague And Trenton Flow Objectives During Drought Emergency (L5) Operations), the City shall make releases to meet the Montague flow objectives according to the location of the salt front.

9. DWARF WEDGEMUSSELS

The Decree Parties will consider any modifications to the current program that may be necessary to avoid taking, harming, or adversely affecting dwarf wedgemussels based upon information from the U.S. Fish and Wildlife Service (USFWS). Studies currently underway by the USFWS and the USGS may inform such modifications, as new information becomes available. These studies will attempt to quantify any relationship between surface water discharge and groundwater flow and temperature at known dwarf wedgemussel sites in the upper Delaware during low flow conditions.

10. LAKE WALLENPAUPACK

The Decree Parties and the DRBC will consider any modifications to the Lake Wallenpaupack operations plan (DRBC Resolution 2002-33) proposed by the operators of Lake Wallenpaupack, if deemed feasible.

11. RECREATIONAL BOATING

The Decree Parties and the DRBC will review and evaluate proposed reservoir releases programs for supporting recreational boating activities in the upper basin, if deemed feasible.

12. ESTUARY AND BAY ECOLOGICAL HEALTH

The Decree Parties and the DRBC will review and evaluate available data during the implementation of the current program and will consider any modifications that may be necessary to maintain the ecological health of the Delaware Estuary and Bay including that of oysters, shellfish and endangered species. The focus of this FFMP element includes the upper Delaware Estuary, lower Delaware Estuary, and Delaware Bay, and such modifications shall be considered in accordance with the criteria described in Section 1.c.

13. WARM WATER AND MIGRATORY FISH

The Decree Parties and the DRBC will review and evaluate available information on the effects of implementation of the current program on warm water fishes that are found in the Delaware River and will consider any modifications to conserve native species of special concern and migratory species.

14. MONITORING AND REPORTING

During the term of this Agreement, temperature monitoring and accounting of IERQ use will
be conducted as follows:

a. Temperature:
During the one-year term of the current Agreement, NYSDEC shall monitor water temperatures within the stream reaches defined and categorized in Section 6. NYSDEC will submit to the Decree Parties and to the DRBC, by April 30, 2012, a scientific report summarizing the observed temperatures and assessing biological implications with respect to the stated management goal and defined protection levels of the HPP.

b. IERQ:
In order to assess the extent to which the downbasin parties' rights in the IERQ are preserved under this Agreement, the River Master shall maintain an accounting of the quantity of daily releases from the NYC reservoirs in accordance with Tables 4a through 4g which are attributable to the 6,045 cfs-days IERQ component of the tables.

15. REASSESSMENT STUDY

Decisions on the conduct of a water resources reassessment study will be informed by experience gained during the operation of the current program.

16. PERIODIC EVALUATION AND REVISION

The Decree Parties agree that during the entire effective period of this Agreement, as monitoring, reporting, and evaluation may show to be appropriate, the provisions of this Agreement specifying triggers for, and quantities of, releases may be revised through an adaptive management process to further enhance the overall natural resource and economic benefits derived from the releases from the City Delaware Basin Reservoirs. Any resultant action taken shall be subject to the unanimous approval of the Decree Parties.

New York City will continue to collaborate with the Decree Parties in the development of the OST as a flow management tool.

17. TEMPORARY SUSPENSION OR MODIFICATION

From time to time, the Decree Parties and the DRBC may agree that emergencies, maintenance and repair operations, short-term needs, or unanticipated effects of the FFMP may require temporary suspension or modification of one or more of the provisions herein. In considering such temporary suspensions or modifications, the Decree Parties and the DRBC may estimate probabilities and risks associated with such temporary suspensions or modifications. Any resultant action taken, other than modifications to the releases as provided below, shall require the unanimous approval of the Decree Parties.

The City shall provide reasonable advance notification to the Decree Parties, River Master and DRBC of any planned long-term cessation of diversions and/or changes in releases due to emergencies, maintenance and repair operations including possible tunnel shut downs. The City shall establish the scope of work and the work schedule for maintenance and repair operations and shall inform the Decree Parties and the DRBC of such plans as early as practicable. In the absence of unanimous approval of a modified releases schedule as may be required for purposes of necessary maintenance and repair, the City, acting in cooperation with the NYSDEC, will make releases to the best of its ability for the duration of the maintenance or repair work, provided, however, that releases shall be sufficient to meet the Montague flow objective in effect at the time.

Modifications to releases not to exceed seven (7) consecutive days for purposes of maintenance or repair of immediate necessity, or to avoid unreasonable fluctuations in releases, shall not require Decree Party approval, but shall be done in cooperation with NYSDEC, provided, however, that releases shall be sufficient to meet the Montague flow objective in effect at the time.

18. RESERVATIONS

Nothing contained herein shall be deemed to constitute a waiver or modification of, or limitation on, the Decree Parties rights under the Decree. This Agreement shall not be cited as precedent of any intention to waive or modify or limit such rights.

The Decree Parties have authorized certain actions, including but not limited to discharge mitigation releases, in this Agreement to assist in mitigating the impacts of flooding immediately below the NYC Delaware Basin Reservoirs. By incorporating flood mitigation as an objective and taking the actions provided herein, the Decree Parties do not create or assume any duties or obligations regarding flood mitigation or in any way modify any such duties or obligations that may be otherwise prescribed by law.

19. EFFECTIVE DATE

This Agreement shall take effect upon unanimous approval of the Decree Parties and shall expire on May 31, 2012, unless renewed as provided for in Section 20, or if the expiration date is revised.

20. RENEWAL AND REVISION

This Agreement may be revised only through the unanimous written agreement of the Decree Parties. This Agreement, and any unanimously agreed to revisions, may be renewed for an additional one-year period beginning June 1, 2012 by unanimous written agreement of the Decree Parties. If this Agreement is not renewed for an additional one-year period, prior to May 31, 2012, the Decree Parties agree to enter into good faith negotiations to determine a course of action in the absence of such renewal, as provided in Section 21, below.

21. REVERSION

Upon any failure by all Decree Parties to continue this Agreement, and any revisions to this Agreement, in accordance with Section 20, operations shall revert to those provided in DRBC Docket D-77-20 CP (Revised).

Agreement of the Parties to the 1954 U.S. Supreme Court Decree Effective June 1, 2011

STATE OF DELAWARE

The State of Delaware hereby approves this Agreement of the Parties to the U.S. Supreme Court Decree of 1954 for a Flexible Flow Management Program with Operations Support Tool integration and recommends that this Agreement be submitted to the Delaware River Basin Commission for implementation as appropriate through rules, dockets and/ or resolutions, subject in each instance to the further agreement of the Parties as required by Section 3.3(a) of the Delaware River Basin Compact.

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Agreement of the Parties to the 1954 U.S. Supreme Court Decree Effective June 1, 2011

STATE OF DELAWARE

The State of Delaware hereby approves this Agreement of the Parties to the U.S. Supreme Court Decree of 1954 for a Flexible Flow Management Program with Operations Support Tool integration and recommends that this Agreement be submitted to the Delaware River Basin Commission for implementation as appropriate through rules, dockets and/ or resolutions, subject in each instance to the further agreement of the Parties as required by Section 3.3(a) of the Delaware River Basin Compact.

_____

Agreement of the Parties to the 1954 U.S. Supreme Court Decree Effective June 1, 2011

STATE OF NEW JERSEY

The State of New Jersey hereby approves this Agreement of the Parties to the U.S. Supreme Court Decree of 1954 for a Flexible Flow Management Program with Operations Support Tool integration and recommends that this Agreement be submitted to the Delaware River Basin Commission for implementation as appropriate through rules, dockets and/ or resolutions, subject in each instance to the further agreement of the Parties as required by Section 3.3(a) of the Delaware River Basin Compact.

_____

Agreement of the Parties to the 1954 U.S. Supreme Court Decree Effective June 1, 2011

CITY OF NEW YORK

The City of New York hereby approves this Agreement of the Parties to the U.S. Supreme Court Decree of 1954 for a Flexible Flow Management Program with Operations Support Tool integration and recommends that this Agreement be submitted to the Delaware River Basin Commission for implementation as appropriate through rules, dockets and/ or resolutions, subject in each instance to the further agreement of the Parties as required by Section 3.3(a) of the Delaware River Basin Compact.

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Agreement of the Parties to the 1954 U.S. Supreme Court Decree Effective June 1, 2011

STATE OF NEW YORK

The State of New York hereby approves this Agreement of the Parties to the U.S. Supreme Court Decree of 1954 for a Flexible Flow Management Program with Operations Support Tool integration and recommends that this Agreement be submitted to the Delaware River Basin Commission for implementation as appropriate through rules, dockets and/ or resolutions, subject in each instance to the further agreement of the Parties as required by Section 3.3(a) of the Delaware River Basin Compact.

_____

Agreement of the Parties to the 1954 U.S. Supreme Court Decree Effective June 1, 2011

COMMONWEALTH OF PENNSYLVANIA

The Commonwealth of Pennsylvania hereby approves this Agreement of the Parties to the U.S. Supreme Court Decree of 1954 for a Flexible Flow Management Program with Operations Support Tool integration and recommends that this Agreement be submitted to the Delaware River Basin Commission for implementation as appropriate through rules, dockets and/ or resolutions, subject in each instance to the further agreement of the Parties as required by Section 3.3(a) of the Delaware River Basin Compact.

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Appendix 4. Agreement for Temporary Thermal Releases Program for Fisheries Protection, Effective July 22, 2011

AGREEMENT

Temporary Thermal Releases Program
For Fishery Protection

Unseasonably high air temperatures in the upper Delaware River Basin in mid-July 2011 resulted in rapid and large increases in water temperature in the main stem of the upper Delaware River downstream of the New York City Delaware Basin reservoirs. In response to the extraordinary thermal stress conditions on the cold-water fishery, on July 22, 2011, the Pennsylvania Department of Environmental Protection requested the unanimous approval of the Decree Parties to implement a temporary program of emergency releases from Cannonsville Reservoir to provide additional thermal protection for the main stem of the upper Delaware River.

On July 22, 2011, the Decree Parties agreed by email notification to the River Master's office that during the period from July 22 - 24, 2011, emergency thermal releases would be made from Cannonsville Reservoir as follows:

Release an additional 400 cubic feet per second from Cannonsville Reservoir starting immediately upon receipt of Decree Parties approval and continue the additional release through noon on July 24, 2011. Begin ramping down at noon on July 24, 2011, according to established operational procedures, down to releases called for under the operative OST-FFMP release table.

The Interim Excess Release Quantity shall provide the water required for this temporary program.

_____ _____

State of Delaware Date State of New Jersey Date

_____ _____

State of New York Date Commonwealth of Pennsylvania Date

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City of New York Date

USGS

DiFrenna and others—**Report of the River Master of the Delaware River for the Period December 1, 2010–November 30, 2011**—Open-File Report 2020–1020

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