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Report of the River Master of the Delaware River for the Period December 1, 2012–November 30, 2013

Open-File Report 2022–1068

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

Calendar for Report Year 2013

December 2012

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September 2013

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29	30					

October 2013

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November 2013

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Report of the River Master of the Delaware River for the Period December 1, 2012–November 30, 2013

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

Open-File Report 2022–1068

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

U.S. Geological Survey, Reston, Virginia: 2022

Complete records of some data released in this report are not available because they were provided through unpublished written communications. Contact the National Weather Service, New York City Department of Environmental Protection, PPL Corporation, Eagle Creek Renewable Energy, or Kimberly Clark Chester Operations for more information.

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Acknowledgments

The Office of the Delaware River Master's daily operation records were prepared from hydrologic data collected mainly on a daily basis. Data for these records were collected and computed by the office or were furnished by the following agencies and utilities: data for streamflow of the Delaware River at Montague, New Jersey, and other locations and tributaries by the U.S. Geological Survey (USGS); for the Pepacton, Cannonsville, and Neversink Reservoirs by the New York City Department of Environmental Protection; for Lake Wallenpaupack by the PPL Corporation; and for Rio Reservoir by Eagle Creek Renewable Energy. Contributions from these agencies are greatly appreciated. Quantitative precipitation forecasts and some precipitation data were provided by the National Weather Service offices in Binghamton, New York, and State College, Pennsylvania. Darwin Ockerman, Marie Owens, Margaret Philips, and Amy McHugh, all of the USGS, assisted and contributed to this report by collecting, organizing, and reviewing data.

Contents

Figures

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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)
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
	Area	
square mile (mi^2)	2.590	square kilometer (km^2)
	Volume	
million gallons (Mgal)	3,785	cubic meter (m^3)
billion gallons (Ggal)	3.785	cubic hectometers (hm^3)
cubic foot per second for a day ([ft^3/s]-d)	2,447	cubic meter (m^3)
cubic foot per second (ft^3/s)	0.02832	cubic meter per second (m^3/s)
	Flow rate	
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:

$$°F = (1.8 \times °C) + 32.$$

Datums

Vertical coordinate information is referenced to the Bureau of Water Supply 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
U.S. Geological Survey
415 National Center
Reston, VA 20192

October 27, 2022

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
Kathy Hochul
Governor of New York

The Honorable
Tom Wolf
Governor of Pennsylvania

The Honorable
Eric Adams
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.

To the Chief Justice of the United States:

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 60th Annual Report of the River Master of the Delaware River for the 12-month period from December 1, 2012, to November 30, 2013. In this report, this period is referred to as the River Master report year.

During the 2013 River Master report year, monthly precipitation in the upper Delaware River Basin ranged from 49 percent of the long-term average in October 2013 to 202 percent of the long-term average in June 2013. Precipitation from December to May, when reservoirs typically refill, was 18.10 inches. Precipitation was below normal in January, February, March, April, September, October, and November, and above normal in the other five months.

On December 1, 2012, when the report year began, combined useable storage in the Pepacton, Cannonsville, and Neversink Reservoirs in the upper Delaware River Basin was 203.435 billion gallons, or 75.1 percent of combined storage capacity. Combined storage in the Pepacton, Cannonsville, and Neversink Reservoirs gradually peaked in late May through early July and declined through the remainder of the year. The combined usable storage was 199.171 billion gallons at the end of the report year on November 30, 2013. During the report year, operations in the basin were conducted as stipulated by the Decree and the Flexible Flow Management Program.

On May 20, 2013, the Delaware River Master Advisory Committee met at the Delaware River Basin Commission building in West Trenton, Ewing Township, New Jersey, to sign the 1-year extension of the 2012–13 Flexible Flow Management Program and discuss issues including water-quality concerns, salinity detachment, and diversions. During the report year, the following individuals served as members of the Advisory Committee:

David Wunsch (Delaware)
Michele Siekerka (New Jersey)
Mark Klotz (New York)
Paul Rush (New York City)
Kelly Heffner (Pennsylvania)

During the report year, operations were executed through the U.S. Geological Survey Office of the Delaware River Master located in Milford, Pennsylvania. Marie Stewart, Deputy Delaware River Master, was placed in charge of the office in June 2012. She was assisted by Gary N. Paulachok, U.S. Geological Survey hydrologist. On February 7, 2013, Robert R. Mason, Jr. was named as the Acting Delaware River Master.

Two Flexible Flow Management Plan listening sessions were held on October 1, 2013 in Loch Sheldrake, Town of Fallsburg, New York and October 2, 2012 in Easton, Pennsylvania to solicit feedback on the Flexible Flow Management Plan from a broad cross section of stakeholders. Thirty-seven speakers from the public provided their views on a variety of topics including flooding concerns, year-round voids in the New York City reservoirs, the need for a better thermal stress relief program, and the opportunity to improve the Delaware Basin reservoir operations due to the Croton Water Filtration Plant system coming online.

During the report year, the Office of the River Master participated in a number of water-supply-related meetings of the Delaware River Basin Commission. The Deputy Delaware River Master met periodically with representatives of the Decree Parties (Delaware, New Jersey, New York, New York City, and Pennsylvania) as a member of the Decree Parties Work Group and the Delaware River Basin Commission's Regulated Flow Advisory Committee. In addition to management of reservoir releases and streamflow in the upper Delaware River Basin, an issue of particular interest to the River Master was the impending expiration of the 2012–13 Flexible Flow Management Plan on May 31, 2013. A 1-year extension of the Flexible Flow Management Plan, with minor editorial changes from the previously approved Flexible Flow Management Plan, was unanimously approved by the Decree Parties and was enacted on June 1, 2013.

During the report year, the Office of the Delaware River Master 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 U.S. Geological Survey streamgage at Montague, New Jersey, 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 218.329 billion gallons from the Delaware River Basin and released 130.648 billion gallons from Pepacton, Cannonsville, and Neversink Reservoirs to the Delaware River for conservation purposes. A total of 40.775 billion gallons were spilled from the Pepacton, Cannonsville, and Neversink Reservoirs. The Office of the Delaware River Master directed releases from these reservoirs to the Delaware River that totaled 24.739 billion gallons. The second section of this report describes water quality at various monitoring sites on the Delaware River estuary. It includes basic data on chemical properties and physical characteristics of the water and presents summary statistics on the data.

Throughout the report 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 Office of the Delaware 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 its 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 Office of the Delaware River Master of plans for power generation and furnishing data on reservoir releases and elevations are greatly appreciated.

Sincerely yours,

Kendra Russell, P.E.

Delaware River Master

Abbreviations

DRBC	Delaware River Basin Commission
FFMP	Flexible Flow Management Program
IERQ	Interim Excess Release Quantity
New York City DEP	New York City Department of Environmental Protection
NWIS	National Water Information System (database)
ODRM	Office of the Delaware River Master
USGS	U.S. Geological Survey

Report of the River Master of the Delaware River for the Period December 1, 2012–November 30, 2013

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 60th annual report of the River Master of the Delaware River. It covers the 2013 River Master report year, the period from December 1, 2012 to November 30, 2013.

During the report year, precipitation in the upper Delaware River Basin was 44.50 inches or 100 percent of the long-term average. Combined storage in the Pepacton, Cannonsville, and Neversink Reservoirs remained high until October 2013 when it decreased below 80 percent combined capacity. The lowest combined storage of the report year was 70.2 percent of combined capacity on November 26, 2013. Delaware 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 Montague flow objective for the Delaware River at the Montague, New Jersey streamgage on 71 days during the report year. Interim Excess Release Quantity and 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. An agreement was signed on July 16, 2013 to temporarily increase releases to provide thermal protection below Cannonsville Reservoir.

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

Introduction

An amended Decree of the Supreme Court of the United States, entered June 7, 1954 (available at https://webapps.usgs.gov/odrm/about/decree), which superseded a 1931 Decree, 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 Office of the Delaware River Master (ODRM). 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/publications/publications.

This report documents operations from December 1, 2012, to November 30, 2013, referred to as the 2013 River Master report year. This report also presents information on the quality of water in the Delaware River estuary during the report year.

Since 2007, the Decree Parties (Delaware, New Jersey, New York, New York City, and Pennsylvania) have unanimously approved a series of Flexible Flow Management Program (FFMP) agreements (available at https://webapps.usgs.gov/odrm/ffmp/flexible-flow-management-program) to manage the shared waters of the Delaware River Basin: "The FFMP Agreement effective June 1, 2012 and expiring on May 31, 2013 was a one-year extension of the June 1, 2011 Agreement and was unanimously approved by the Decree Parties. The current FFMP is an extension of the June 1, 2011 Agreement that incorporates the edits from the June 1, 2012 Agreement and shall be effective from June 1, 2013 to May 31, 2014" (appendix 1).

During this period, an additional agreement was signed, effective July 16, 2013, to temporarily release an additional 300 cubic feet per second (ft^3/s) from Cannonsville Reservoir from July 17 to 18, 2013, to provide additional thermal protection for the main stem of the upper Delaware River (appendix 2).

Some hydrologic data presented in this report are records of streamflow and water quality data collected at U.S. Geological Survey (USGS) water-quality streamgages.

These records were collected and computed by the USGS 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 streamgages in the Delaware River Basin are shown in figure 1.

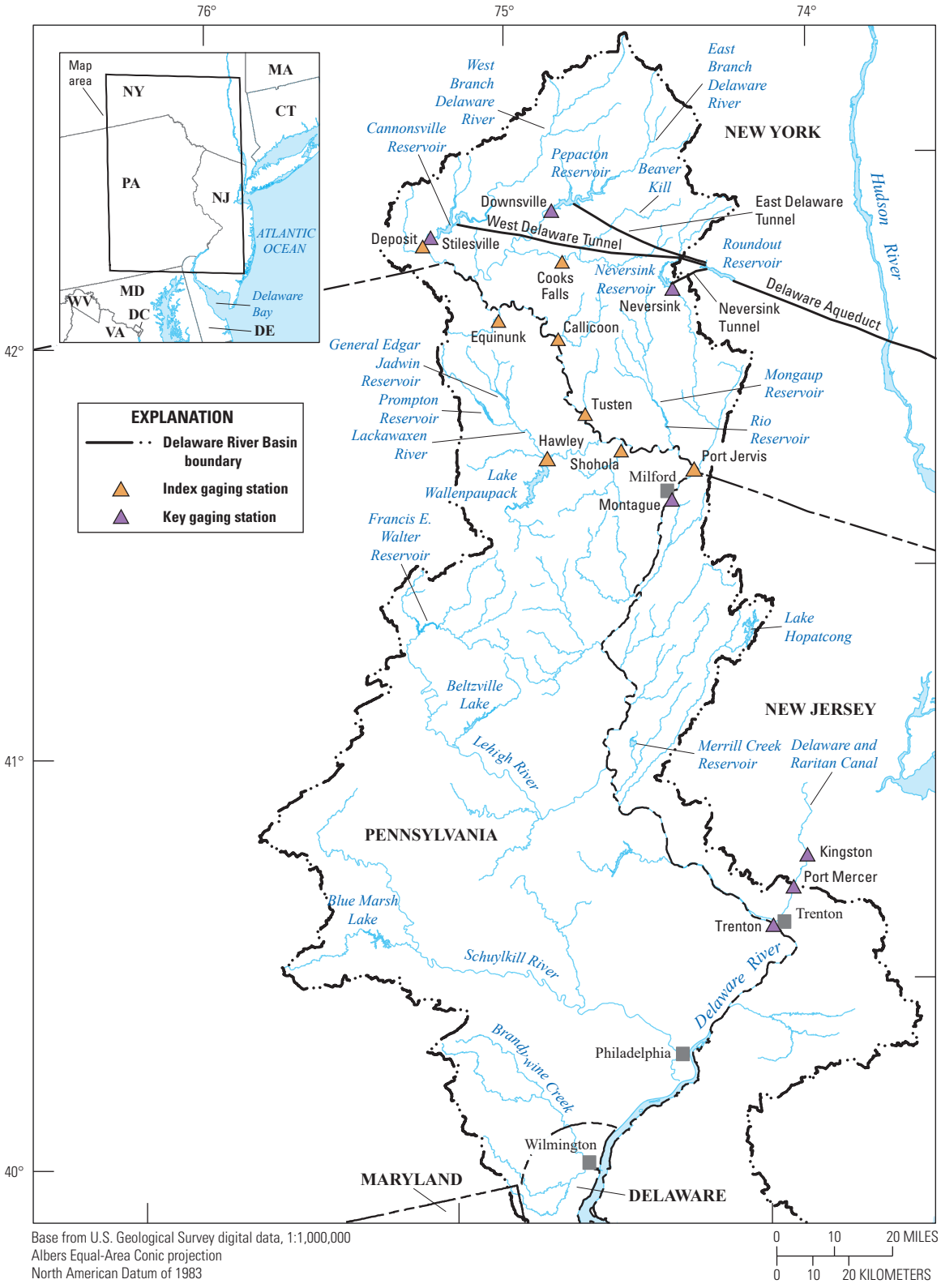

Figure 1. Map showing the Delaware River Basin upstream from Wilmington, Delaware.

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 ODRM to carry out specific responsibilities related to the Montague flow objective. The operational record has two parts: (1) segregating the streamflow components of the current daily mean discharge at the USGS streamgage 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 ODRM directs New York City reservoirs to release water to maintain at minimum the Montague flow objective at the USGS streamgage at Montague, which is defined in appendix 1, table 1.

Segregating Streamflow Components, Delaware River at Montague, New Jersey

Segregation of streamflow at Montague involves determining the components of flow, including releases from New York City reservoirs, releases from Lake Wallenpaupack and Rio Reservoir for generation of hydroelectric power, and uncontrolled runoff. For the segregation of components of daily mean flow at Montague, the following data 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 streamgage at Montague is required. The various traveltimes are used to determine the appropriate time-delayed flow contributions from the previously noted sources. The time-adjusted controlled flows of these sources are subtracted from the total streamflow measured at the Montague streamgage to determine the uncontrolled runoff (including reservoir spills and groundwater) from the drainage area upstream from the Montague streamgage.

Traveltimes were computed from reservoir and powerplant operations data and historical streamflow records. The traveltimes are generally adequate for ODRM 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 the Montague streamgage can be delayed as long as 1.5 days because a substantial amount of water must first fill the channel before a steady flow arrives at the Montague streamgage. During winter, the formation of ice, together with lower streamflow, gradually increases the resistance to water flow, resulting in increased traveltimes. Because ice-affected traveltimes 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 traveltimes during these periods of the report year. The following list gives the average times for the effective travel of water from the various sources of controlled supply to streamgage 01438500 at Montague, New Jersey. These traveltimes, in hours, were used for flow routing during the 2013 report year: Pepacton Reservoir, 60; Cannonsville Reservoir, 48; Neversink Reservoir, 33; Lake Wallenpaupack, 16; and Rio Reservoir, 8.

Forecasting Streamflow, Delaware River at Montague, New Jersey

The releases from New York City's reservoirs necessary to meet the Montague flow objective were computed on the basis of the forecasted streamflow at Montague, exclusive of releases from New York City's Delaware River Basin reservoirs. The flow must be forecast 3 days in advance to account for the longest traveltime needed to New York City from the Pepacton Reservoir.

The electric utilities PPL Corporation and Eagle Creek Renewable Energy furnished daily forecasts of power generation and releases to the Delaware River from Lake Wallenpaupack and Rio Reservoir, respectively, to the ODRM. 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 using a recession procedure. A recession curve of uncontrolled inputs was developed using the discharge at the Montague streamgage and is utilized to forecast the uncontrolled portion of flow at Montague three days in advance.

Forecasted runoff was determined from data provided by the National Weather Service 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 based on 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 River Basin reservoirs, is computed as the sum of forecasted releases from hydroelectric power reservoirs, estimated uncontrolled runoff including conservation releases from Rio Reservoir, and estimated runoff from predicted rainfall. Each of these inputs is adjusted for traveltime. If the computed total flow is less than the Montague flow objective, then the deficiency is made up by releases from New York City's reservoirs, as directed by the ODRM.

A balancing adjustment is applied to the following day's release design based on the previous day's provisional data. The balancing adjustment is computed as 10 percent of the difference between the cumulative directed release and the cumulative directed release required for exact forecasting and limited to a maximum of 50 ft^3/s magnitude. 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. The adjustment calls for less water to be released when previous directed releases were higher than required to meet the Montague flow objective.

When updated forecasts of precipitation or powerplant releases showed appreciable changes after a release was directed, the release required from New York 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

The sum of average monthly precipitation in the Delaware River Basin upstream from Montague, New Jersey, was 44.50 inches (in.) during the 2013 report year and was 100 percent of the long-term (72-year) average (table 1, in back of report). Monthly precipitation ranged from 49 percent of the long-term average in October 2013 to 202 percent of the long-term average in June 2013 (table 1, in back of report). Precipitation data for the 2013 report year were computed from records from 10 geographically distributed precipitation stations operated by the National Weather Service; the New York City Department of Environmental Protection (New York City DEP), Bureau of Water Supply; and the ODRM.

The seasonal period from December to May typically is when surface-water and groundwater reservoirs refill. During this period in 2012–13, total precipitation was 18.10 in., which is about 88 percent of the 72-year long-term average. During the June to November period, total precipitation was 26.40 in., which is 110 percent of the 72-year long-term average.

Reservoir Storage

Table 2 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.

Daily storage in the Pepacton, Cannonsville, and Neversink Reservoirs above the point of maximum depletion, or minimum full-operating level, is given in tables 3, 4, and 5 (all in back of report), respectively, and combined storage during the report year is shown in figure 2. On December 1, 2012, combined useable storage in the three reservoirs was 203.435 billion gallons or 75.1 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, 2013. Combined storage remained high (above 80 percent combined capacity) until October 2013. The lowest combined storage was 190.012 billion gallons or 70.2 percent on November 26, 2013.

The three reservoirs spilled a total of 40.775 billion gallons during the year when reservoirs reached maximum capacity. Pepacton spilled from May 26, 2013, to June 22, 2013. Cannonsville spilled during the following periods: from April 24 to 27, 2013; from May 28 to June 20, 2013; and from June 28 to July 4, 2013. Neversink spilled during the following periods: from December 22 to 25, 2012; from May 25 to 31, 2013; from June 10 to 19, 2013; and from July 2 to 6, 2013. Combined storage reached a maximum for the report year on June 15, 2013, at 276.636 billion gallons. The reservoirs' storage decreased from this point, and the combined storage was 199.171 billion gallons or 73.5 percent of combined capacity on November 30, 2013.

Table 2. Elevation and capacities of structures of the Pepacton, Cannonsville, and Neversink Reservoirs.

[ft, foot; Mgal, million gallons; NA, not available; —, not applicable]

Level	Pepacton Reservoir		Cannonsville Reservoir		Neversink Reservoir	
	Elevation (ft)	Volume (Mgal)	Elevation (ft)	Volume (Mgal)	Elevation (ft)	Volume (Mgal)
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]525
Sill of river outlet tunnel	1,126.50	[4]4,200	1,020.5	[4]1,564	1,314	NA
Dead storage	—	1,800	—	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.

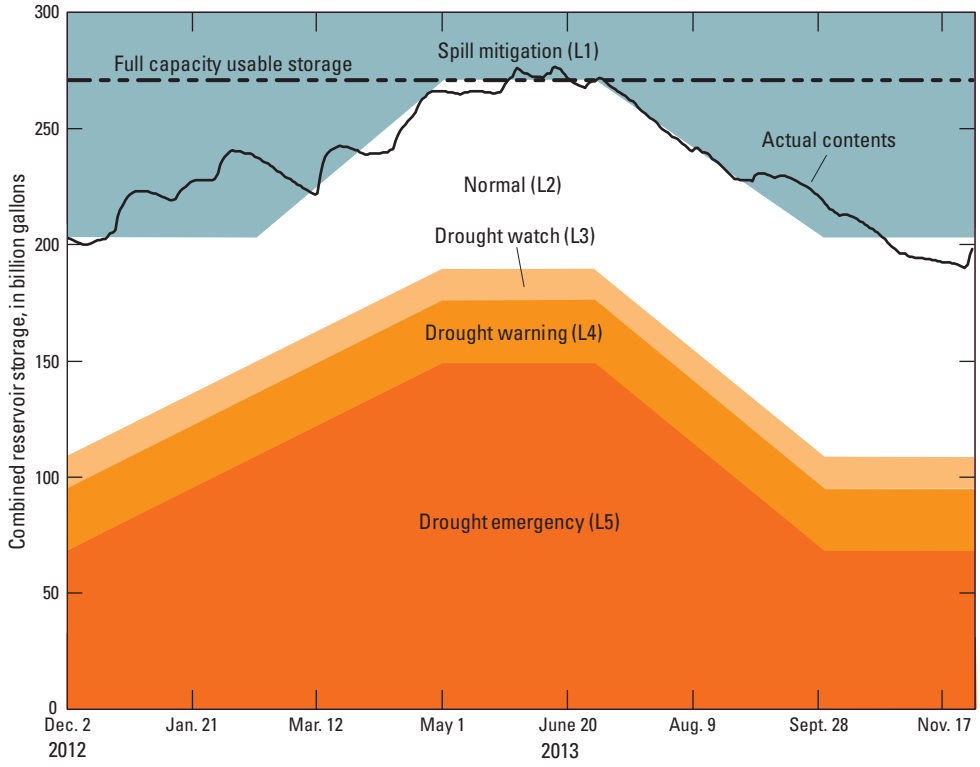

Figure 2. Graph showing rule curves and actual stored water contents for New York City reservoirs in the Delaware River Basin, from December 1, 2012, to November 30, 2013.

Operations

Operations during December 1, 2012, through November 30, 2013, were conducted as described by the FFMP (revised, effective June 1, 2012, and continued for a second year effective June 1, 2013). The allowable diversion to New York City was 800 million gallons per day (Mgal/d) throughout the year. The Montague flow objective was 1,750 ft^3/s. The allowable diversion to New Jersey was 100 Mgal/d monthly average with any day not exceeding 120 Mgal/d.

Conservation releases from New York City reservoirs were made at the rates shown in the 2012 FFMP tables 4a through 4g (DiFrenna and others, 2022) and shown in the June 1, 2013 FFMP (appendix 1), including tables 4f and 4g in December through February, tables 4e through 4g in March, table 4e in early April, tables 4c and 4e in mid-April, tables 4e, 4f, and 4g in late April, tables 4c and 4a in early May, table 4a in mid-May, tables 4f and 4g in early June, tables 4a through 4g in mid- to late June, and tables 4f and 4g in July through November, 2013 (see "Archived OST Summary Data" at https://webapps.usgs.gov/odrm/data/data.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 New York 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 each day to the ODRM. 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 6 (in back of report). A running account of the average rates of combined diversions from the three reservoirs from June 1, 2012, computed as stipulated by the Decree, shown in table 6 (in back of report). A total of 218.329 billion gallons of water were diverted to the New York City water-supply system during the report year with an average of 598 Mgal/d, which is below the maximum diversion rate. The maximum daily diversion from a single reservoir was 605 Mgal on August 12, 2013, from Pepacton Reservoir through the East Delaware Tunnel. The maximum daily combined diversion from all three reservoirs was 1,201 Mgal on August 13, 2013. 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 7 (in back of report).

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 by the totalizer. A current-meter measurement made in 1989 showed that the (assumed constant) rate of leakage is about 12.4 ft^3/s (8.0 Mgal/d). Because the powerplant was not in operation for the equivalent of 68 days during the 2013 report year, the estimated quantity of unmeasured leakage (diverted but not recorded) was about 0.5 billion gallons.

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 occurs that is not recorded by 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 2013 report year, the powerplant operated part of the day on most days and was not operated the equivalent of 194 days. About 2.0 billion gallons of water was diverted but not recorded, according to the leakage rate noted previously 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 part of the Delaware River Basin is in a drought warning period, diversions shall not exceed 85 Mgal/d as a running average.

The USGS streamgage on the Delaware and Raritan Canal at Port Mercer, Lawrence Township, Mercer County, New Jersey (station number 01460440; fig. 1), is used as the official control point for measuring these diversions by New Jersey. Based on data collected by the USGS at this site, the maximum monthly average diversion was 88.3 Mgal/d during April 2013 (table 8, in back of report, U.S. Geological Survey 2019a). The maximum daily mean diversion was 102 Mgal/d on June 28, 2013 (table 8, in back of report). 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 9 (in back of report). If the computed sum of the components is less than the Montague flow objective, then the deficiency is made up by releases from New York City's reservoirs, as directed by the ODRM. Table 10 (in back of report) presents the ODRM daily operations record of reservoir releases and segregation of the various components contributing to the flow of the Delaware River at measured at Montague, New Jersey.

The forecasted flow of the Delaware River at Montague, based on provisional data and exclusive of water released from the New York City reservoirs, was less than the Montague flow objective on 71 days between May 9, 2013 and November 27, 2013, and directed releases were required (table 9, in back of report). On 20 days during the period from September 28, 2013 to November 18, 2013, the observed flow was less than the Montague flow objective (table 11, in back of report). However, 16 of those observed flows were within 10 percent of the Montague flow objective (table 11, in back of report). The lowest observed flow of the report year was 1,430 ft^3/s on October 23, 2013, which was 82 percent of the Montague flow objective (table 11, in back of report, U.S. Geological Survey 2019b).

The components of total flow observed at Montague from July through November 2013 are shown in figure 3. The flow is segregated into the portion derived from the New York City reservoirs, the portion contributed by the power reservoirs, and the uncontrolled runoff from the drainage area below the reservoirs. As described previously, the uncontrolled runoff was computed as the residual of observed flow minus releases, and was subject to errors in observations, transit times, and routings of the various components of flow. The conservation release from Rio Reservoir was included in the uncontrolled runoff component. The effect of these uncertainties is incorporated in the computation of uncontrolled runoff.

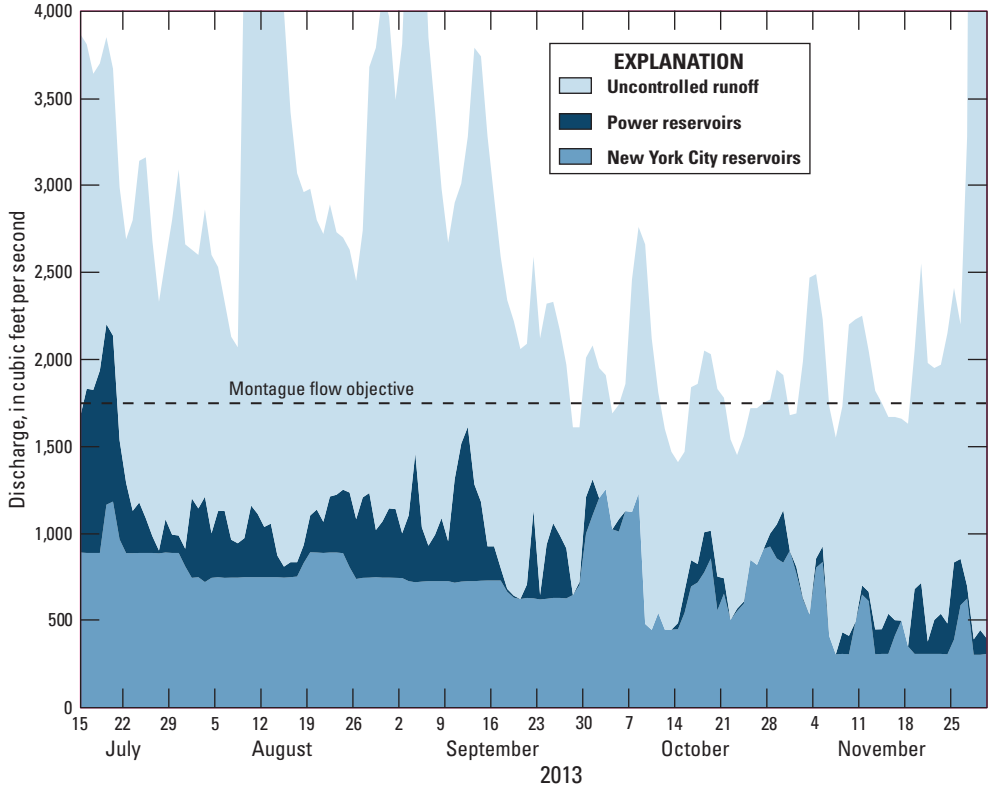

Figure 3. Graph showing components of flow, Delaware River at Montague, New Jersey, from July 15 to November 30, 2013.

Excess Release Quantity and Interim Excess Release Quantity

Per section 4b and 4c of the 2013 FFMP (appendix 1 of this report), the Excess Release Quantity is used in support of the Interim Excess Release Quantity (IERQ). The IERQ is 10.0 billion gallons (15,468 cubic feet per second for a day [(ft^3/s)-d]). The 2013 FFMP specifies that 3.91 billion gallons (6,045 [ft^3/s]-d) of the IERQ is incorporated in the releases tables to enhance base releases from the New York City's Delaware Basin Reservoirs. The remaining IERQ balance of 6.09 billion gallons (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 as provided for in section 4d of the 2013 FFMP. Per section 4c of the 2021 FFMP, upon request by the "Lower Basin States" or the Delaware River Basin Commission (DRBC), New York City is required to release water in sufficient quantities from the remaining IERQ balance to maintain a flow in the Delaware River at the Trenton, New Jersey streamgage of 3,000 ft^3/s during basinwide normal conditions, from June 15 through March 15 (known as the seasonal period). The maximum amount of water required to be released from the remaining IERQ in any seasonal period is 70 billion gallons. New York City is required to make releases from the IERQ until May 31, 2014, or until the aggregate quantity of the IERQ is exhausted, whichever occurs first.

As described in section 4d of the 2013 FFMP, the DRBC and the ODRM 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 in an IERQ Extraordinary Needs Bank which can be used to provide for such extraordinary water needs. Banked quantities are deducted from the IERQ and any unused Extraordinary Needs Bank water is returned to IERQ.

From July 17 to 19, 2013, 650 (ft^3/s)-d was discharged at the request of the New York State Department of Environmental Conservation for water temperature control (see appendix 2). In 2013, no IERQ water was released to maintain flows at the Trenton streamgage.

Tailwaters Habitat Protection and Discharge Mitigation Program

The FFMP established a Tailwaters Habitat Protection and Discharge Mitigation Program, which consists of (1) conservation releases, designed for protection of the ecology in the tailwaters below the New York City reservoirs; and (2) discharge mitigation releases, designed to help mitigate the effects of water spilling from the full Delaware River Basin reservoirs. Controlled releases were made from the New York City Delaware River Basin reservoirs in accordance with the FFMP. From December 1, 2012 to November 30, 2013, 130.648 billion gallons were released from the New York City Delaware River Basin reservoirs in accordance with the Tailwaters Habitat Protection and Discharge Mitigation Program.

Comparison of River Master Operations Data With Other Records

ODRM operations are conducted on a day-to-day basis and, by necessity, use preliminary streamflow data. In this section, records used in ODRM operations are compared to final data published for selected USGS streamgages. 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 Montague flow objective on most days from mid-July through late November 2013 (table 9, in back of report), indicated by directed releases being made. Table 12 computes forecasted and actual flow from hydroelectric power releases and uncontrolled runoff for the period from July 21 to November 30, 2013.

For the July 21 to November 30, 2013 period shown in table 12, actual releases from Lake Wallenpaupack and Rio Reservoir averaged 7.7 and 55 percent more than the forecasted releases, respectively. Power plant forecasted volumes were calculated from columns 1 and 2 in table 9 (in back of report); power plant actual releases were calculated from columns 5 and 6 in table 10 (in back of report). Observed runoff from the uncontrolled (column 10 in table 10, in back of report) area was about 3.3 percent less than forecasted runoff (columns 3 and 4 in table 9, in back of report).

Table 12. Cumulative forecasted and actual release volume from Lake Wallenpaupack, Rio Reservoir, and uncontrolled runoff, from July 21 to November 30, 2013.

[(ft^3/s)-d, cubic foot per second for a day]

Release source	Forecasted volume ([ft^3/s]-d)	Actual volume ([ft^3/s]-d)
Lake Wallenpaupack	12,668	13,649
Rio Reservoir	8,190	12,653
Runoff from uncontrolled area	259,678	251,067

On any given day, forecasted releases and actual releases from Lake Wallenpaupack and Rio Reservoir can differ considerably. The differences between actual daily releases and forecasted daily releases from July 21 to November 30, 2013, are as follows: daily releases at Lake Wallenpaupack varied between 201 ft^3/s-d less than forecasted releases and 459 ft^3/s-d greater than forecasted releases, and daily releases at Rio Reservoir differed by 266 ft^3/s-d less than forecasted releases to 567 ft^3/s-d greater than forecasted releases. Based on measured streamflow at Montague, total directed releases from New York City reservoirs during the report year (column 9 in table 9, in back of report) were about 14.8 percent more than required for exact forecasting (column 11 in table 9, in back of report).

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

Releases from New York City Reservoirs

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

The USGS streamgage on East Branch Delaware River at Downsville, Town of Colchester, 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 streamgage. The drainage area is 371 mi^2 at the dam and 372 mi^2 at the streamgage. The streamgage records are rated "good," which means that about 95 percent of the measured daily mean discharges are within 10 percent of the true discharge.

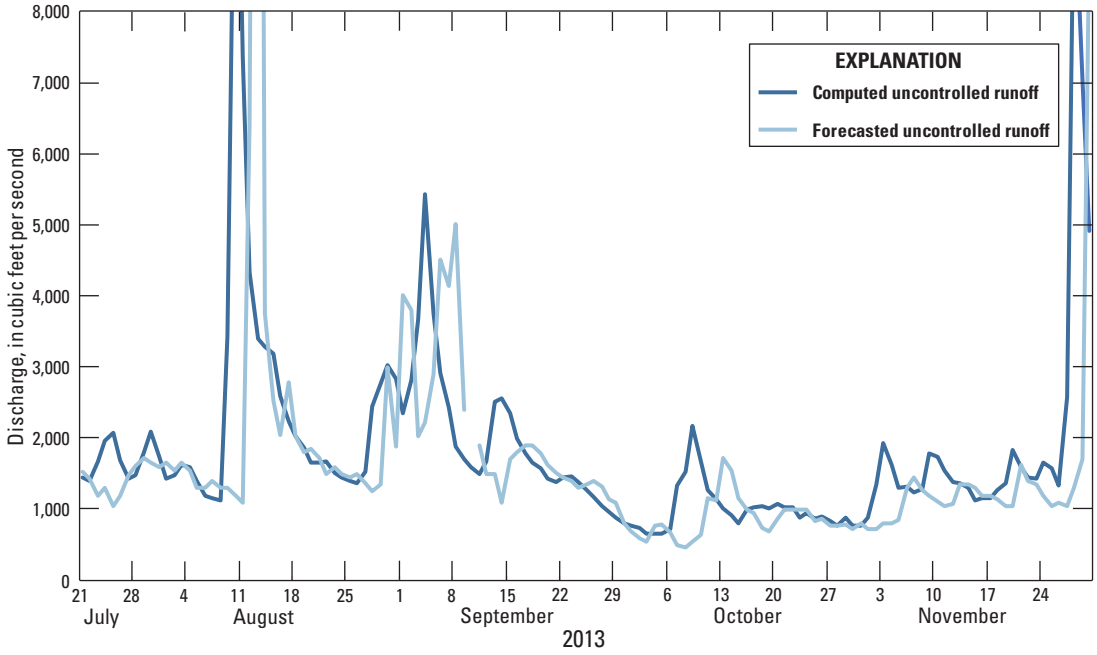

Figure 4. Hydrographs of computed and forecasted uncontrolled runoff components, Delaware River at Montague, New Jersey, from July 21 to November 30, 2013.

Figure 5*A* shows measured flow from Pepacton Reservoir, including spillway, conservation, and directed releases, reported by New York City, compared to the records for the USGS streamgage on East Branch Delaware River at Downsville, New York (table 13, in back of report, U.S. Geological Survey, 2019c) from December 1, 2012, to November 30, 2013. The average difference is 5.8 percent, and 95 percent of the daily differences between the streamgage readings and New York City records are less than 14.1 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 streamgage on West Branch Delaware River at Stilesville, town of Deposit, New York (station number 01425000; fig. 1), is 1.4 mi downstream from Cannonsville Dam. Discharge measured at this station includes releases from Cannonsville Reservoir and runoff from 2 mi^2 of drainage area between the dam and the streamgage. The drainage area is 454 mi^2 at the dam and 456 mi^2 at the streamgage. The streamgage 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 streamgage 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 compared to records for the USGS streamgage on West Branch Delaware River at Stilesville, New York (table 14, in back of report, U.S. Geological Survey, 2019d), from December 1, 2012, to November 30, 2013. The mean difference is 7.9 percent and 95 percent of the daily differences between the streamgage readings and New York City records are less than 19.1 percent. The largest differences between the measured flows are primarily at lower flow rates.

The USGS streamgage on Neversink River at Town of Neversink, New York (station number 01436000), is 1,650 ft downstream from Neversink Dam (fig. 1). Discharge measured at this streamgage includes releases from Neversink Reservoir and, during storms, a small amount of runoff that originates between the dam and the streamgage. The drainage area is 92.5 mi^2 at the dam and 92.6 mi^2 at the streamgage. The streamgage records are rated "good," which means that about 95 percent of the measured 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, compared to the records for the USGS streamgage on Neversink River at Neversink, New York (table 15, in back of report, U.S. Geological Survey, 2019e), from December 1, 2012, to November 30, 2013. The mean difference between the released flow and measured flow is 7.9 percent, and 95 percent of the daily differences between the streamgage readings and New York City records are less than 16.6 percent.

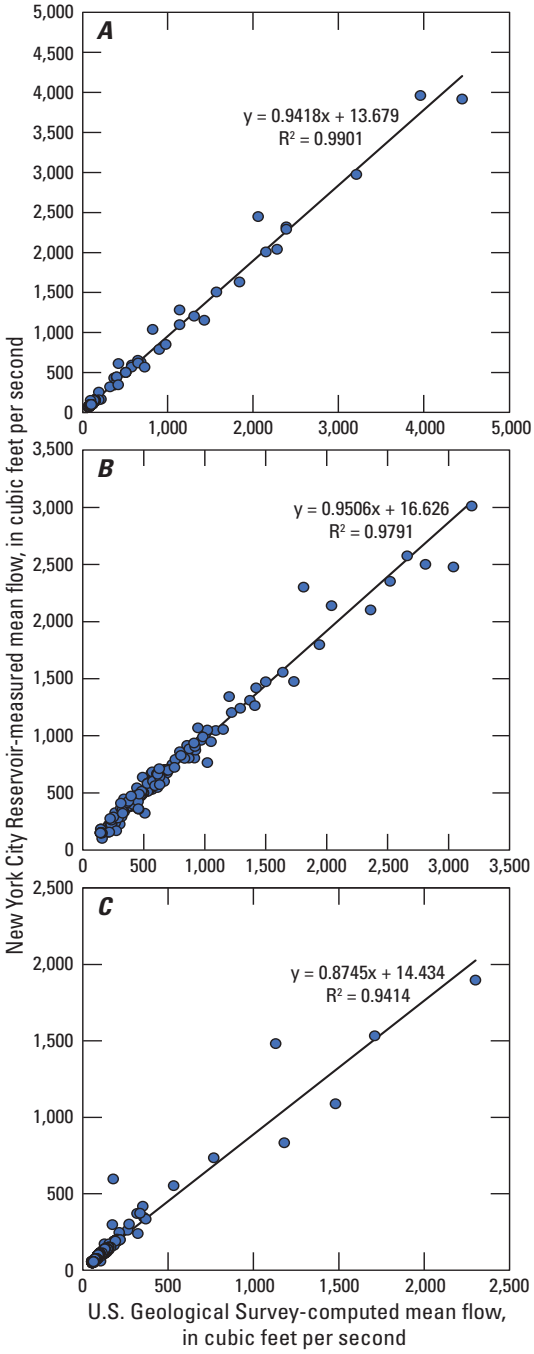

Figure 5. Graphs showing New York City-measured mean flow compared to mean flow records of U.S. Geological Survey gaging stations downstream from their respective reservoirs: *A*, 01417000, East Branch Delaware River at Downsville, Town of Colchester, New York, downstream from Pepacton Reservoir (data from U.S. Geological Survey, 2019c); *B*, 01425000, West Branch Delaware River at Stilesville, town of Deposit, New York, downstream from Cannonsville Reservoir (data from U.S. Geological Survey, 2019d); and *C*, 01436000, Neversink River at Neversink, New York, downstream from Neversink Reservoir (data from U.S. Geological Survey, 2019e), December 1, 2012 through November 30, 2013.

Delaware River at Montague, New Jersey

The ODRM's operations record for the streamgage at Delaware River at Montague, New Jersey (table 10, in back of report), showed 0.56 percent less discharge for the report year than the published USGS record for the streamgage (table 11, in back of report). 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, 2012, to November 30, 2013, operations of the ODRM 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 ODRM to meet the Montague flow objective. During the report year, New York City complied fully with all directives and requests of the ODRM.

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 ODRM.

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

Quality of Water in the Delaware River Estuary

This section describes water-quality monitoring programs for the Delaware River estuary during the 2013 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 River estuary between the streamgages at 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 the Trenton and Reedy Island Jetty streamgages. The DRBC and others use these data to assess water-quality conditions and track the movement of the "salt front" in the Delaware River estuary. Continuous monitor data are processed and stored in the USGS National Water Information System database (NWIS) and are available at https://waterdata.usgs.gov/nwis. Selected monitor data from the 2013 report year are included in this section of the report.

For this report, station number 01467200 is called "Delaware River at Benjamin Franklin Bridge at Philadelphia, PA" because that was the gage name during the report period from December 1, 2012 to November 30, 2013. In order to access data from NWIS for this location, the updated station name of "Delaware River at Penn's Landing, Philadelphia, PA" must be used due to a renaming in January, 2020, when the gage was moved 150 feet upstream.

Delaware River 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 sites on the Delaware River estuary (fig. 6, sites A through W; Delaware River Basin Commission, 2021). 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 River 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 Delaware Estuary Water Quality (Boat Run) Explorer (https://www.nj.gov/drbc/programs/quality/boat-run.html).

Water Quality During the 2013 Report Year

Streamflow

Streamflow has a major effect on the quality of water in the Delaware River 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.

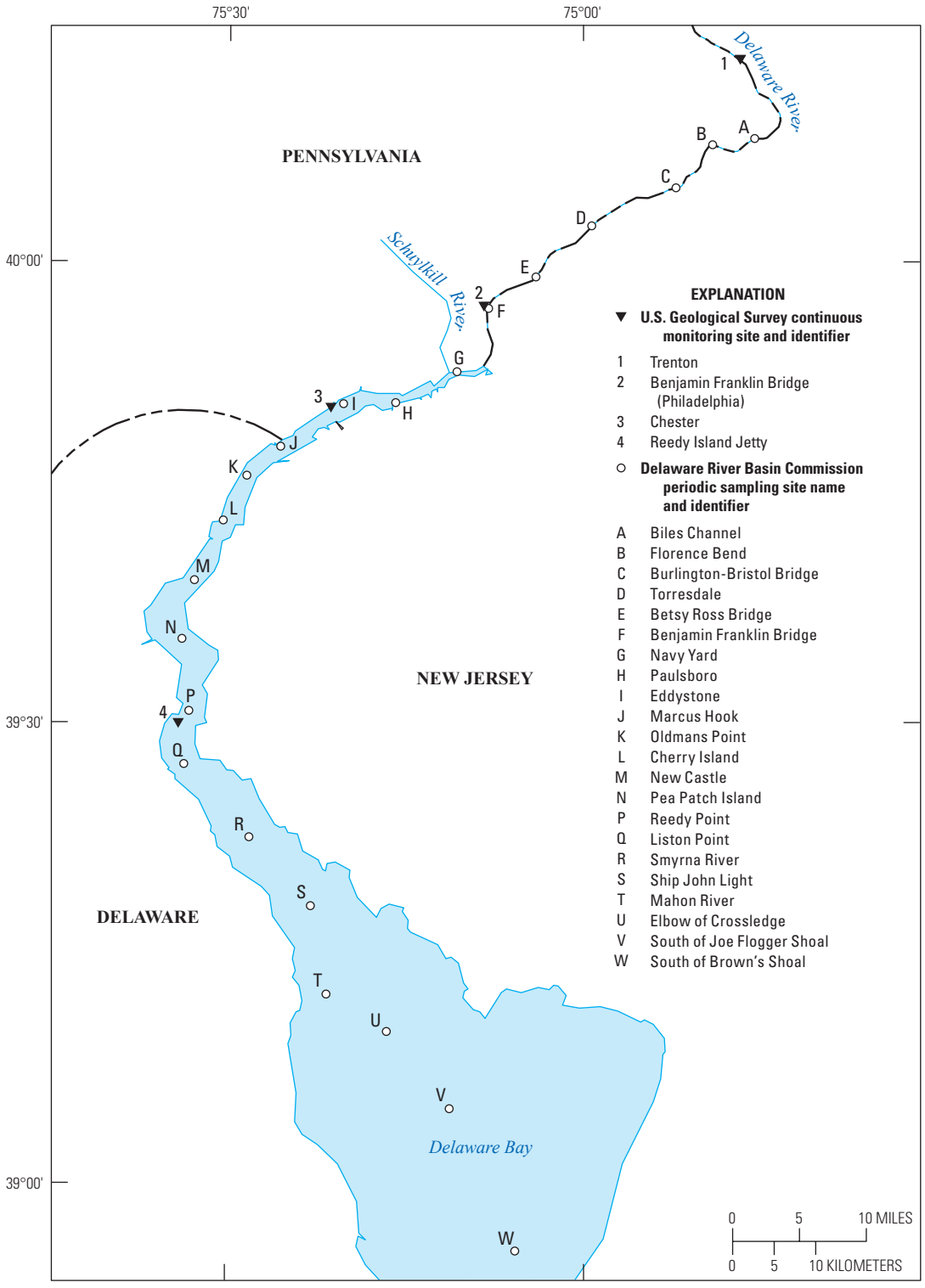

Figure 6. Map showing location of Delaware River Basin Commission water-quality monitoring sites on the Delaware River estuary. Modified from Delaware River Basin Commission (2021).

Streamflow from the Delaware River Basin upstream from the Trenton, New Jersey streamgage is the major source of freshwater inflow to the Delaware River estuary. During the report year, monthly average streamflow measured at the USGS streamgage 01463500, Delaware River at Trenton, New Jersey, was highest during June 2013 (20,811.0 ft^3/s) and lowest during October 2013 (3,702 ft^3/s; table 16, in back of report, U.S. Geological Survey, 2019f). Long-term monthly average streamflow was computed for the period from October 1912 through November 2012. Monthly average streamflows were less than the long-term average monthly streamflows in January 2013, from March through May 2013, and from September through November 2013. The greatest percentage of flow deficiency was in October 2013, when the monthly average streamflow was 40 percent of the long-term average monthly flow. The highest daily mean streamflow during the report year was 53,900 ft^3/s on December 22, 2012 and the lowest daily mean streamflow was 2,860 ft^3/s on October 26, 2013 (table 16, in back of report).

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, 2020a). Generally, increases in water temperature have detrimental effects on water quality by decreasing the saturation level of dissolved oxygen and by increasing the biological activity of aquatic organisms. Although the primary factors that affect water temperature in the Delaware River estuary are climatic, various kinds of water use, especially powerplant cooling, also can have substantial effects.

Water temperature data for the monitor site at the Benjamin Franklin Bridge, Philadelphia, Pennsylvania, were collected almost continuously from April to November 2013. The procedures used to create figure 7 of this report were started for the 2011 report (DiFrenna and others, 2020) and described here. The available long-term average daily temperature data were retrieved from the USGS NWIS database for the months of April through November; and the average value was computed for each month. Long-term average water temperatures were computed using data for the period from 1964 to 2013 (fig. 7). In April, May, July, and October, 2013, the monthly average temperatures were greater than the long-term mean monthly temperature (fig. 7). Monthly average temperatures were less than the respective long-term averages in June, August, September, and November 2013 (fig. 7). The maximum daily mean water temperature of 28.4 degrees Celsius was recorded on July 21 and 22, 2013 (U.S. Geological Survey, 2020b).

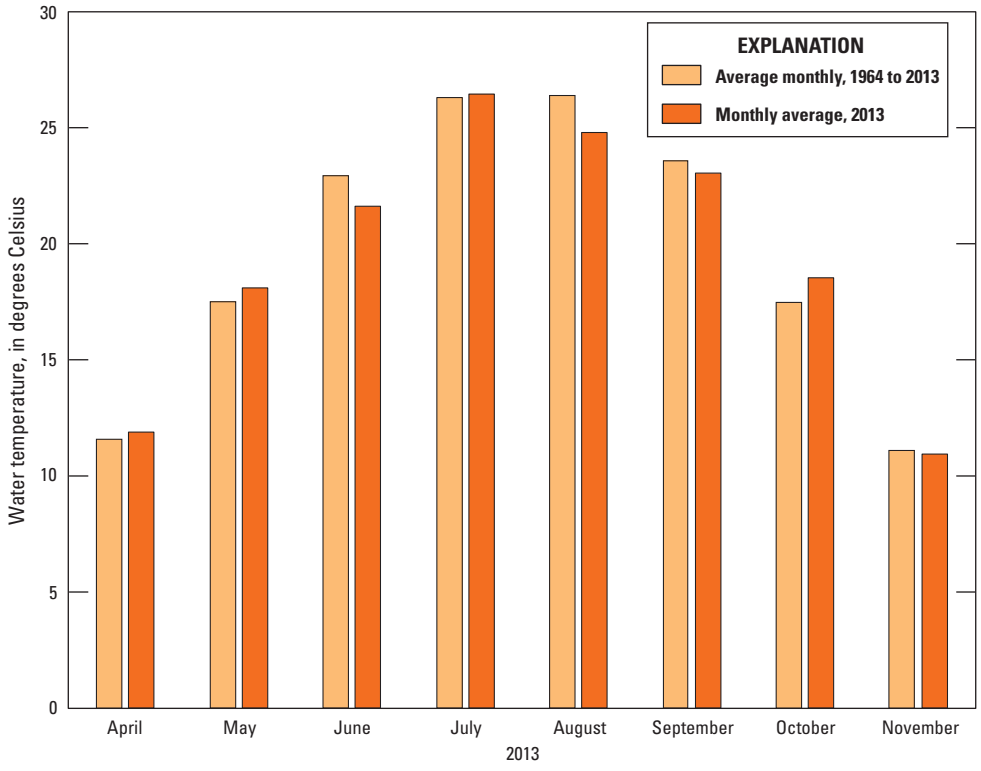

Figure 7. Bar chart showing monthly average water temperatures in 2013 and long-term average monthly water temperatures from 1964 to 2013, for the months of April through November, in the Delaware River estuary at Benjamin Franklin Bridge at Philadelphia, Pennsylvania (data from U.S. Geological Survey, 2020b).

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, 2016). 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, including chloride. Seawater and some artificial 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 River estuary (Kauffman and others, 2009). 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. Chloride concentrations at Chester, Pennsylvania were measured by Kimberly Clark Chester Operations. Those data were provided by the Delaware River Basin Commission and are not derived from specific conductance data.

At Reedy Island Jetty, the greatest daily maximum specific conductance was 23,900 microsiemens per centimeter at 25 degrees Celsius (µS/cm) on November 27, 2013 (table 17, in back of report, U.S. Geological Survey 2020c). Daily maximum specific conductance during the report year exceeded 3,780 µS/cm on approximately 98 percent of the 346 days with measured specific conductance values in report year 2013. The lowest daily minimum specific conductance was 378 µS/cm on July 7, 2013. Daily minimum specific conductance exceeded 3,780 µS/cm on 64 percent of the 346 days with measured specific conductance values in report year 2013.

At Chester, the greatest daily maximum chloride concentration was 420 mg/L on November 20, 2013 (table 18, in back of report). During the report year, daily maximum concentrations exceeded 50 mg/L on about 41 percent of the days. The lowest daily minimum chloride concentration was 20 mg/L on July 9, 2013. Daily minimum concentrations exceeded 50 mg/L on about 24 percent of the days. Chloride concentrations were greater than 50 mg/L on most days in mid-December 2012, the second half of February 2013 through the first week of March 2013, and from late August through the end of November 2013 (table 18, in back of report).

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, 2020d). Fish and many other clean-water species consistently require relatively high dissolved-oxygen concentrations. The major source of dissolved oxygen in the Delaware River 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 River 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, which can lead to reduced dissolved oxygen concentrations because of increasing biological oxygen demand by aerobic bacteria in water. For these stations, the daily mean and minimum daily mean dissolved-oxygen concentrations for the 3-month period of July to September during the 1965–2013 report years are shown in figure 8. Although dissolved-oxygen concentrations have increased considerably over this 49-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 have been used since the 2009–10 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 the daily values were computed over this 3-month period of each report year.

Concentrations of dissolved oxygen in the Delaware River estuary generally are greatest near the Trenton streamgage 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 was 4.6 mg/L on September 13, 2013 (table 19, in back of report, U.S. Geological Survey 2020e). Daily mean concentrations of dissolved oxygen were consistently 6.2 mg/L or greater on all days from April 1 through June 8, 2013, and from October 12 through November 30, 2013. At Chester, the lowest recorded daily mean dissolved-oxygen concentration was 5.0 mg/L on August 11–13, 2013 (table 20, in back of report, U.S. Geological Survey 2020f).

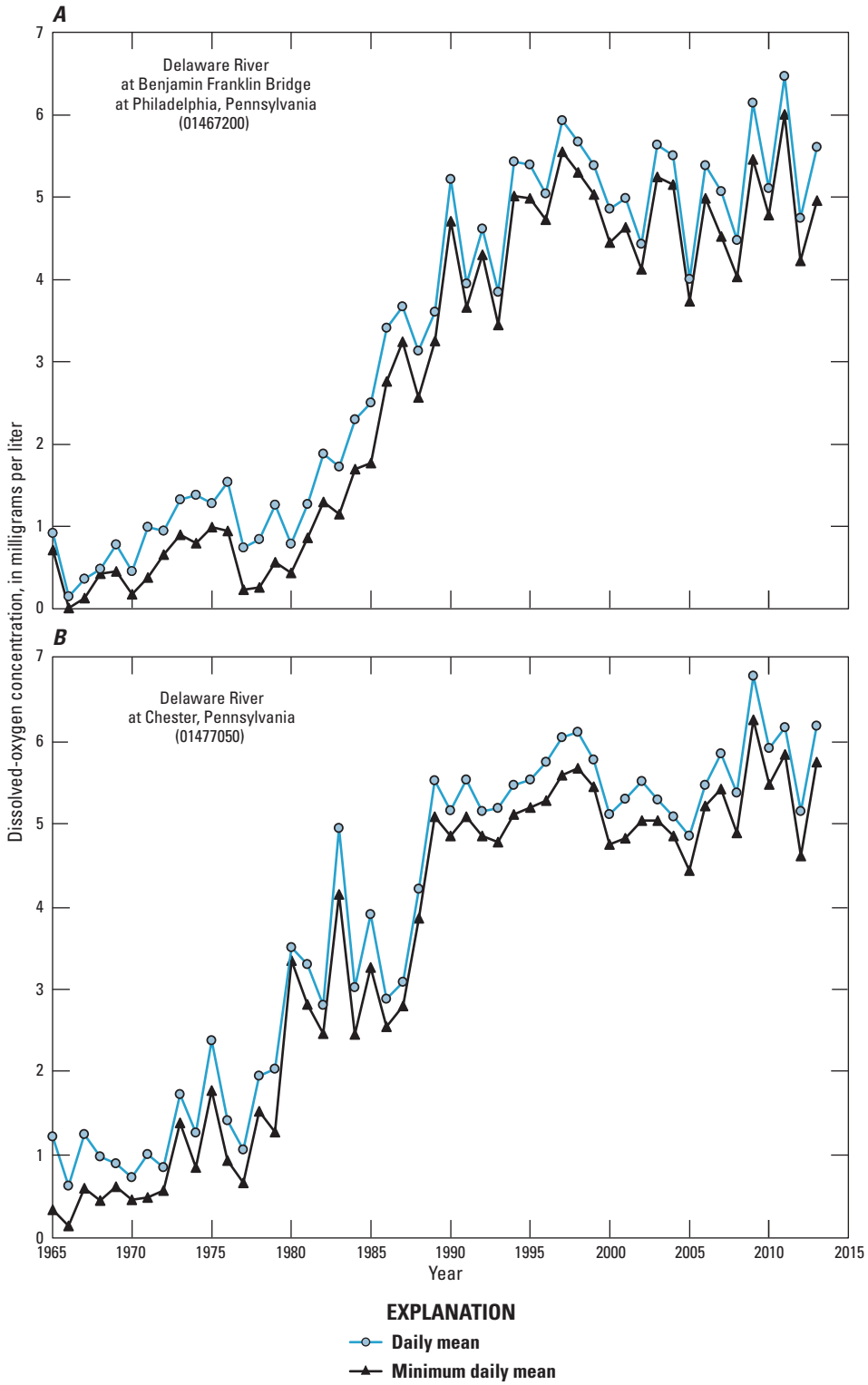

Figure 8. Graphs showing the daily mean and minimum daily mean dissolved-oxygen concentrations averaged from the months of July to September, annually, at two sites on the Delaware River estuary, 1965–2013, at *A*, Delaware River at Benjamin Franklin Bridge at Philadelphia, Pennsylvania (01457200; data from (U.S. Geological Survey, 2020e); and *B*, Delaware River at Chester, Pennsylvania (01477050; data from U.S. Geological Survey, 2020f.)

Histograms of quarter-hourly dissolved-oxygen concentrations during the critical summer period (July 1 through September 30, 2013) at the Benjamin Franklin Bridge and Chester monitoring sites are presented in figure 9. During the 2013 critical summer period, quarter-hourly concentrations at the Benjamin Franklin Bridge and Chester were 3.5–4.0 mg/L on 2 days (2.1 percent of measured days) at the Ben Franklin Bridge and 0 days (0 percent) at Chester (U.S. Geological Survey, 2020g, h).

Hydrogen-Ion Activity (pH)

The pH of a solution is a measure of the effective concentration (activity) of dissolved hydrogen ions. Solutions having pH less than 7 are acidic, whereas solutions with pH greater than 7 are 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, 2020i). 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 are as follows: Benjamin Franklin Bridge, 6.8 to 7.6; Chester, 6.7 to 7.6; and Reedy Island Jetty, 7.1 to 8.0 (U.S. Geological Survey, 2020j, k, l). Generally, the pH of water in the Delaware River estuary is lowest near the Trenton, New Jersey streamgage, and increases (water becomes more alkaline) in the downstream direction. The pH of water in the Delaware River 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.

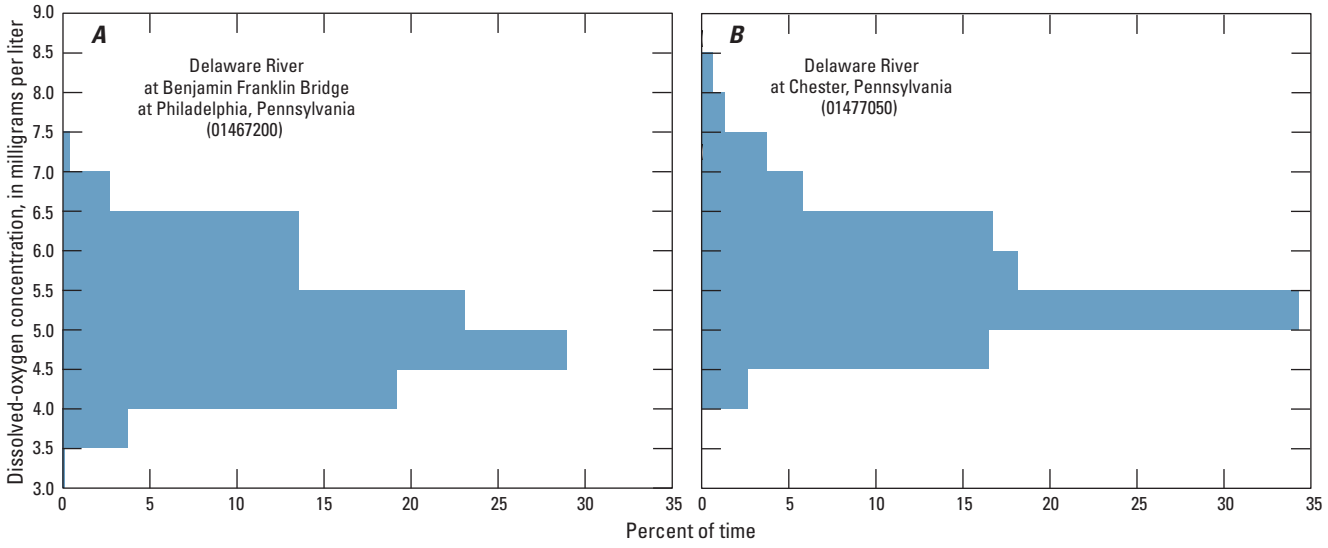

Figure 9. Graphs showing percent distribution of quarter hourly dissolved-oxygen concentrations at two sites on the Delaware River estuary, from July to September 2013, for *A*, Delaware River at Benjamin Franklin Bridge at Philadelphia, Pennsylvania (01467200; data from U.S. Geological Survey, 2020g); and *B*, Delaware River at Chester, Pennsylvania (01477050; data from U.S. Geological Survey, 2020h).

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Tables 1, 3–11, and 13–20

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

[Data from the National Weather Service, New York City Department of Environmental Protection, and Office of the Delaware River Master. in., inches; —, not applicable]

Month	December 1940 to November 2012 monthly average precipitation (in.)	December 2012 to November 2013			
		Precipitation (in.)	Percent of average	Excess or deficit precipitation compared with long-term average (in.)	
				Month	Cumulative
December	3.48	5.04	145	1.56	1.56
January	3.03	2.34	77	−0.69	0.87
February	2.64	1.52	58	−1.12	−0.25
March	3.42	2.06	60	−1.36	−1.61
April	3.78	2.93	78	−0.85	−2.46
May	4.19	4.21	100	0.02	−2.44
June	4.15	8.39	202	4.24	1.80
July	4.17	4.58	110	0.41	2.21
August	4.05	5.63	139	1.58	3.79
September	4.14	2.53	61	−1.61	2.18
October	3.74	1.83	49	−1.91	0.27
November	3.72	3.44	92	−0.28	−0.01
Total	44.51	44.50	100	—	—

Table 3. Storage in Pepacton Reservoir, New York, for report year ending November 30, 2013.

[River Master daily operations record; gage reading at 0800 hours; data provided by New York City. Storage is given in millions of gallons above the elevation of 1,152.00 feet. Add 7,711 million gallons for total contents above the sill of the outlet tunnel at the elevation of 1,126.50 feet. Storage at the spillway level is 140,190 million gallons. —, not applicable; Mgal/d, million gallons per day; ft^3/s, cubic foot per second]

Day	Dec. 2012	Jan. 2013	Feb. 2013	Mar. 2013	Apr. 2013	May 2013	June 2013	July 2013	Aug. 2013	Sept. 2013	Oct. 2013	Nov. 2013
1	100,203	109,932	118,056	118,158	123,325	137,018	141,672	139,436	127,670	120,004	113,914	105,940
2	99,955	109,916	118,816	117,922	123,359	137,273	141,357	139,619	127,706	119,851	113,453	105,844
3	99,722	109,900	119,631	117,635	123,394	137,528	141,227	139,804	127,723	120,276	113,057	105,605
4	99,428	109,819	120,259	117,316	123,428	137,510	141,098	139,840	127,723	120,191	112,958	105,415
5	99,197	109,721	120,770	116,981	123,359	137,419	140,913	139,546	127,688	119,970	112,859	105,304
6	98,921	109,673	121,112	116,646	123,308	137,292	140,765	139,105	127,547	119,631	112,646	105,129
7	98,705	109,608	121,146	116,278	123,273	137,145	140,838	138,811	127,477	119,308	112,299	105,098
8	98,583	109,510	121,248	116,076	123,290	137,000	140,894	138,443	127,460	118,951	112,629	104,970
9	98,568	109,396	121,334	115,859	123,342	137,255	140,708	138,058	127,635	118,529	112,448	104,779
10	98,522	109,251	121,351	115,592	123,687	137,346	140,505	137,601	128,409	118,107	112,415	104,590
11	98,767	109,137	121,402	115,442	124,014	137,328	141,005	137,401	128,585	117,770	112,201	104,431
12	99,044	109,008	121,419	115,608	125,297	137,601	141,468	137,218	128,286	118,158	111,922	104,161
13	99,305	108,992	121,402	118,934	126,202	137,802	141,506	136,981	127,794	118,462	111,611	103,815
14	99,520	109,332	121,385	120,684	126,760	137,966	142,528	136,508	127,565	118,596	111,284	103,531
15	99,753	110,095	121,334	121,660	127,128	138,003	142,845	135,928	127,075	118,562	111,105	103,231
16	99,908	110,941	121,317	122,361	127,811	138,040	142,453	135,602	126,586	118,462	110,892	102,994
17	100,032	111,579	121,231	122,894	128,585	137,966	142,174	135,276	126,079	118,344	110,713	102,743
18	100,466	112,234	121,095	123,256	129,236	137,912	141,764	134,714	125,521	118,158	110,387	102,601
19	100,993	112,761	120,992	123,722	129,377	137,766	141,098	134,120	125,001	117,905	110,063	102,414
20	101,117	113,239	120,787	124,048	130,280	137,638	140,579	133,491	124,447	117,686	109,657	102,210
21	101,680	113,617	120,480	124,187	131,274	137,565	140,394	132,934	123,859	117,417	109,332	101,961
22	104,224	114,031	120,225	124,274	132,308	137,601	140,246	132,326	123,308	117,081	109,089	101,680
23	105,621	114,197	119,936	124,308	133,168	137,912	140,079	131,809	122,739	116,846	108,797	101,523
24	106,708	114,429	119,631	124,291	133,941	138,149	139,914	131,541	122,138	116,528	108,476	101,273
25	107,557	114,595	119,359	124,274	134,588	138,645	139,840	131,060	121,574	116,194	108,088	101,070
26	108,233	114,795	119,070	124,205	135,167	139,730	139,656	130,440	120,992	115,893	107,686	100,823
27	108,830	114,978	118,765	124,153	135,693	140,560	139,308	129,819	120,872	115,575	107,252	101,538
28	109,429	115,177	118,394	124,118	136,181	140,801	139,619	129,183	120,650	115,144	106,884	102,932
29	109,657	115,343	—	123,911	136,581	140,838	139,509	128,831	120,514	114,728	106,644	103,594
30	109,883	115,692	—	123,704	136,854	141,839	139,418	128,409	120,378	114,296	106,372	104,019
31	109,916	116,663	—	123,462	—	141,857	—	128,022	120,157	—	106,100	—
[1]Change	9,713	6,731	338	5,304	13,529	4,839	−2,254	−11,414	−7,513	−5,708	−7,814	−1,921
[2]Equivalent change (Mgal/d)	313.3	217.1	12.1	171.1	451.0	156.1	−75.1	−368.2	−242.4	−190.3	−252.0	−64.0
[3]Equivalent change (ft^3/s)	484.7	335.8	18.7	264.7	697.7	241.5	−116.2	−569.6	−375.0	−294.4	−389.8	−99.0

[1]Change is calculated as the storage on the last day of each month minus the storage on the first day of each month. Net change for the year is 3,816.0 million gallons; minimum and maximum storage for December through May is 98,522 and 141,857 million gallons, respectively; minimum and maximum storage for June through November is 100,823 and 142,845 million gallons, respectively.

[2]Net equivalent for the year is 10.5 million gallons per day.

[3]Net equivalent for the year is 16.2 cubic feet per second.

Table 4. Storage in Cannonsville Reservoir, New York, for report year ending November 30, 2013.

[River Master daily operations record; gage reading at 0800 hours; data provided by New York City. Storage is given in millions of gallons above the elevation of 1,040.00 feet. Add 2,584 million gallons for total contents above the sill of the outlet tunnel at the elevation of 1,020.50 feet. Storage at spillway level is 95,706 million gallons. —, not applicable; Mgal/d, million gallons per day; ft^3/s, cubic foot per second]

Day	Dec. 2012	Jan. 2013	Feb. 2013	Mar. 2013	Apr. 2013	May 2013	June 2013	July 2013	Aug. 2013	Sept. 2013	Oct. 2013	Nov. 2013
1	69,013	78,816	83,403	81,336	85,152	95,189	98,716	96,301	86,438	79,203	76,578	63,332
2	68,775	78,844	84,342	81,206	85,210	95,022	97,943	96,494	86,034	79,286	75,804	63,216
3	68,589	78,802	85,109	81,047	85,253	94,885	97,895	96,752	85,528	80,737	75,099	62,823
4	68,364	78,733	85,803	80,847	85,282	94,763	97,782	96,189	85,036	82,073	74,588	62,505
5	68,179	78,664	86,077	80,654	85,311	94,565	97,412	95,584	84,487	82,550	73,927	62,352
6	68,033	78,595	86,091	80,419	85,326	94,383	96,977	95,022	83,938	82,724	73,305	62,161
7	67,874	78,470	85,990	80,184	85,369	94,200	96,816	94,550	83,359	82,839	72,814	62,021
8	67,808	78,374	85,817	80,004	85,354	94,002	96,784	94,124	82,825	82,998	73,066	62,263
9	67,728	78,235	85,701	79,783	85,398	94,200	96,591	94,079	82,362	83,099	73,172	62,250
10	67,689	78,042	85,441	79,562	85,571	94,170	96,301	93,759	82,406	82,955	73,106	62,072
11	67,808	77,904	85,398	79,396	85,831	94,094	96,301	93,455	82,247	82,825	73,013	61,995
12	68,099	77,752	85,383	79,603	87,117	94,094	96,768	93,105	81,885	82,825	72,881	62,161
13	68,298	77,752	85,282	82,839	88,252	94,002	96,977	92,892	81,481	82,984	72,682	62,275
14	68,470	78,222	85,065	85,167	89,104	93,896	97,878	92,679	82,016	83,027	72,417	62,339
15	68,603	78,996	84,632	86,756	89,773	93,835	98,442	92,481	82,175	82,897	71,993	62,326
16	68,722	79,700	84,227	87,551	90,260	93,759	98,474	92,253	82,030	82,666	71,517	62,212
17	68,815	80,322	83,750	88,071	90,823	93,637	98,007	91,918	81,741	82,463	71,000	62,161
18	69,027	80,765	83,475	88,206	91,401	93,501	97,396	91,462	81,467	82,189	70,589	62,161
19	69,649	81,062	83,273	88,222	91,751	93,348	96,864	91,005	81,148	81,943	70,311	62,224
20	70,112	81,308	83,099	88,222	92,451	93,196	96,350	90,701	80,792	81,539	69,940	62,224
21	70,616	81,481	82,868	88,206	93,592	93,059	95,630	90,427	80,613	81,279	69,689	62,212
22	72,801	81,597	82,637	87,999	94,307	92,907	95,082	90,108	80,226	81,062	69,212	62,173
23	74,298	81,510	82,406	87,739	94,793	93,029	94,763	89,971	79,811	80,874	68,682	62,148
24	75,472	81,365	82,175	87,479	95,234	93,044	94,428	89,788	79,410	80,460	68,152	62,072
25	76,426	81,177	81,943	87,175	95,819	93,333	94,185	89,362	79,231	80,032	67,476	61,830
26	77,213	81,062	81,712	86,843	95,947	94,079	94,109	88,952	78,816	79,562	66,796	61,613
27	77,945	80,917	81,495	86,525	95,899	95,052	94,048	88,419	78,678	79,078	66,159	62,072
28	78,291	80,778	81,409	86,193	95,691	95,722	94,748	87,927	78,774	78,664	65,561	64,147
29	78,498	80,668	—	85,875	95,402	96,398	95,931	87,565	78,788	78,042	64,937	65,243
30	78,692	80,723	—	85,542	95,341	97,508	96,334	87,190	78,982	77,379	64,249	66,019
31	78,788	81,755	—	85,297	—	99,279	—	86,901	79,009	—	63,689	—
[1]Change	9,775	2,939	−1,994	3,961	10,189	4,090	−2,382	−9,400	−7,429	−1,824	−12,889	2,687
[2]Equivalent change (Mgal/d)	315.3	94.8	−71.2	127.8	339.6	131.9	−79.4	−303.2	−239.6	−60.8	−415.8	89.6
[3]Equivalent change (ft^3/s)	487.8	146.7	−110.2	197.7	525.4	204.0	−122.8	−469.0	−370.7	−94.1	−643.2	138.6

[1]Change is calculated as the storage on the last day of each month minus the storage on the first day of each month. Net change for the year is −2,994.0 million gallons; minimum and maximum storage for December through May is 67,689 and 99,279 million gallons, respectively; minimum and maximum storage for June through November is 61,613 and 98,716 million gallons, respectively.

[2]Net equivalent for the year is −8.2 million gallons per day.

[3]Net equivalent for the year is −12.7 cubic feet per second.

Table 5. Storage in Neversink Reservoir, New York, for report year ending November 30, 2013.

[River Master daily operations record; gage reading at 0800 hours; data provided by New York City. Storage is given in millions of gallons above the elevation of 1,319.00 feet. Add 525 million gallons for total contents above the sill of the outlet tunnel at the elevation of 1,314.00 feet. Storage at spillway level is 34,941 million gallons. —, not applicable; Mgal/d, million gallons per day; ft^3/s, cubic foot per second]

Day	Dec. 2012	Jan. 2013	Feb. 2013	Mar. 2013	Apr. 2013	May 2013	June 2013	July 2013	Aug. 2013	Sept. 2013	Oct. 2013	Nov. 2013
1	34,219	34,276	32,848	28,530	30,264	33,659	34,813	34,710	32,283	28,320	27,326	26,642
2	34,160	34,145	33,033	28,263	30,410	33,446	34,710	34,907	32,213	28,311	27,296	26,851
3	34,101	33,974	33,144	27,992	30,487	33,235	34,715	35,031	31,944	28,373	27,253	26,936
4	33,964	33,813	33,230	27,714	30,547	33,264	34,596	35,065	31,639	28,386	27,215	26,988
5	33,813	33,644	33,278	27,524	30,625	33,321	34,448	35,036	31,322	28,271	27,189	27,022
6	33,746	33,485	33,273	27,344	30,707	33,374	34,414	34,996	30,998	28,236	27,180	27,073
7	33,674	33,321	33,158	27,219	30,795	33,413	34,473	34,808	30,680	28,202	27,176	27,098
8	33,606	33,144	33,029	27,107	30,873	33,475	34,695	34,660	30,383	28,176	27,227	27,163
9	33,679	32,981	32,900	26,974	30,993	33,679	34,873	34,601	30,218	28,149	27,236	27,215
10	33,741	32,800	32,747	26,864	31,169	33,809	34,956	34,533	30,670	28,097	27,202	27,253
11	33,784	32,628	32,600	26,749	31,429	33,929	35,404	34,433	30,538	28,080	27,180	27,300
12	33,756	32,472	32,463	26,727	32,137	34,175	35,289	34,286	30,520	27,970	27,163	27,331
13	33,746	32,321	32,302	28,646	32,600	34,224	35,189	34,032	30,305	27,983	27,124	27,365
14	33,713	32,241	32,146	29,168	32,929	34,228	35,503	33,983	30,055	27,957	27,090	27,352
15	33,553	32,279	31,995	29,297	33,158	34,204	35,349	33,969	29,760	27,944	27,064	27,378
16	33,625	32,250	31,813	29,428	33,341	34,155	35,204	33,688	29,468	27,896	27,018	27,404
17	33,693	32,146	31,625	29,566	33,475	34,189	35,145	33,379	29,159	27,870	26,996	27,434
18	33,669	32,036	31,415	29,670	33,563	34,272	35,095	33,216	29,119	27,835	26,974	27,507
19	33,891	31,995	31,220	29,783	33,713	34,355	34,981	33,086	29,079	27,796	26,877	27,638
20	33,910	32,000	31,053	29,892	34,091	34,458	34,887	32,953	29,039	27,757	26,851	27,701
21	33,901	32,009	30,735	29,923	34,414	34,478	34,744	32,895	28,888	27,727	26,812	27,745
22	34,922	31,986	30,415	29,977	34,513	34,438	34,611	32,853	28,747	27,705	26,782	27,813
23	34,996	31,934	30,100	30,050	34,533	34,389	34,492	32,824	28,609	27,675	26,753	27,688
24	35,001	31,868	29,805	30,095	34,473	34,518	34,355	32,795	28,570	27,636	26,706	27,559
25	34,986	31,803	29,518	30,141	34,399	34,715	34,224	32,757	28,522	27,597	26,680	27,567
26	34,917	31,771	29,252	30,164	34,238	34,981	34,214	32,600	28,482	27,546	26,655	27,576
27	34,853	31,742	28,985	30,150	34,150	35,001	34,233	32,543	28,517	27,511	26,626	27,805
28	34,764	31,686	28,782	30,086	34,062	35,016	34,360	32,491	28,455	27,455	26,600	28,637
29	34,660	31,658	—	30,077	33,964	35,110	34,552	32,486	28,508	27,417	26,578	28,964
30	34,557	31,643	—	30,114	33,829	35,115	34,621	32,472	28,438	27,378	26,566	29,133
31	34,423	32,066	—	30,168	—	35,021	—	32,415	28,320	—	26,557	—
[1]Change	204	−2,210	−4,066	1,638	3,565	1,362	−192	−2,295	−3,963	−942	−769	2,491
[2]Equivalent change (Mgal/d)	6.6	−71.3	−145.2	52.8	118.8	43.9	−6.4	−74.0	−127.8	−31.4	−24.8	83.0
[3]Equivalent change (ft^3/s)	10.2	−110.3	−224.6	81.7	183.8	67.9	−9.9	−114.5	−197.7	−48.6	−38.4	128.4

[1]Change is calculated as the storage on the last day of each month minus the storage on the first day of each month. Net change for year is −5,086.0 million gallons; minimum and maximum storage for December through May is 26,727 and 35,115 million gallons, respectively; minimum and maximum storage for June through November is 26,557 and 35,503 million gallons, respectively.

[2]Net equivalent for the year is −13.9 million gallons per day.

[3]Net equivalent for year is −21.6 cubic feet per second.

Table 6. Diversions to New York City water-supply system for report year ending November 30, 2013.

Date	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average from June 1, 2012, to given date
12/1/2012	397	292	0	626
12/2/2012	397	303	3	627
12/3/2012	397	303	108	628
12/4/2012	397	303	108	629
12/5/2012	397	303	106	630
12/6/2012	314	300	104	630
12/7/2012	298	303	104	631
12/8/2012	298	303	0	630
12/9/2012	298	300	4	630
12/10/2012	193	300	106	630
12/11/2012	198	303	104	630
12/12/2012	121	300	104	629
12/13/2012	187	303	107	629
12/14/2012	199	303	207	630
12/15/2012	199	303	0	629
12/16/2012	199	303	1	628
12/17/2012	199	303	208	629
12/18/2012	199	303	107	629
12/19/2012	199	304	107	629
12/20/2012	34	301	166	628
12/21/2012	0	21	157	626
12/22/2012	0	0	157	623
12/23/2012	0	0	158	621
12/24/2012	0	0	158	619
12/25/2012	0	0	157	617
12/26/2012	0	0	157	615
12/27/2012	0	257	158	614
12/28/2012	205	304	158	614
12/29/2012	305	301	159	615
12/30/2012	305	304	157	615
12/31/2012	309	303	158	616
Total	6,244	7,526	3,488	—

Date	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average from June 1, 2012, to given date
1/1/2013	305	304	159	617
1/2/2013	299	301	159	617
1/3/2013	299	304	159	618
1/4/2013	299	304	158	619
1/5/2013	299	304	159	619
1/6/2013	299	304	158	620
1/7/2013	299	304	158	621
1/8/2013	277	304	146	621
1/9/2013	297	301	148	622
1/10/2013	297	304	152	622
1/11/2013	297	304	154	623
1/12/2013	298	304	154	623
1/13/2013	298	304	153	624
1/14/2013	299	304	153	625
1/15/2013	88	305	153	624
1/16/2013	0	305	153	624
1/17/2013	0	305	153	623
1/18/2013	0	300	51	622
1/19/2013	0	303	0	620
1/20/2013	0	304	0	619
1/21/2013	0	304	0	618
1/22/2013	0	304	0	616
1/23/2013	0	304	0	615
1/24/2013	0	304	0	614
1/25/2013	0	303	0	612
1/26/2013	0	300	0	611
1/27/2013	0	303	0	610
1/28/2013	0	300	0	608
1/29/2013	0	303	0	607
1/30/2013	0	4	0	605
1/31/2013	0	0	0	602
Total	4,250	8,801	2,680	—

Table 6. Diversions to New York City water-supply system for report year ending November 30, 2013.—Continued

Date	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average from June 1, 2012, to given date
2/1/2013	0	0	0	600
2/2/2013	0	0	0	597
2/3/2013	0	0	0	595
2/4/2013	0	104	0	593
2/5/2013	1	294	0	592
2/6/2013	251	299	157	592
2/7/2013	248	299	155	593
2/8/2013	248	302	155	593
2/9/2013	249	302	154	594
2/10/2013	249	104	155	593
2/11/2013	249	0	160	593
2/12/2013	249	51	154	592
2/13/2013	249	153	154	592
2/14/2013	249	296	154	592
2/15/2013	249	302	168	593
2/16/2013	249	302	170	593
2/17/2013	249	302	171	594
2/18/2013	249	302	170	594
2/19/2013	253	302	171	595
2/20/2013	396	302	323	596
2/21/2013	396	302	323	598
2/22/2013	396	301	323	600
2/23/2013	400	301	323	601
2/24/2013	396	301	323	603
2/25/2013	396	301	310	604
2/26/2013	440	301	313	606
2/27/2013	450	301	309	607
2/28/2013	445	301	309	609
Total	7,206	6,425	5,104	—

Date	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average from June 1, 2012, to given date
3/1/2013	445	298	317	611
3/2/2013	450	302	318	612
3/3/2013	450	302	318	614
3/4/2013	445	302	214	615
3/5/2013	445	302	199	617
3/6/2013	445	302	157	618
3/7/2013	445	302	149	619
3/8/2013	363	299	149	619
3/9/2013	336	289	143	620
3/10/2013	347	299	149	620
3/11/2013	73	63	31	619
3/12/2013	0	0	0	617
3/13/2013	1	0	1	614
3/14/2013	244	298	149	615
3/15/2013	218	301	45	615
3/16/2013	247	304	0	614
3/17/2013	247	303	0	614
3/18/2013	42	303	0	613
3/19/2013	204	289	0	613
3/20/2013	165	200	0	612
3/21/2013	249	298	0	612
3/22/2013	286	298	0	612
3/23/2013	300	298	0	612
3/24/2013	300	298	0	612
3/25/2013	300	298	0	611
3/26/2013	299	298	0	611
3/27/2013	302	298	127	612
3/28/2013	427	298	23	612
3/29/2013	449	298	0	613
3/30/2013	449	298	0	613
3/31/2013	455	298	0	614
Total	9,428	8,336	2,489	—

Table 6. Diversions to New York City water-supply system for report year ending November 30, 2013.—Continued

Date	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average from June 1, 2012, to given date
4/1/2013	309	302	0	614
4/2/2013	297	302	0	614
4/3/2013	298	302	0	614
4/4/2013	298	302	0	613
4/5/2013	309	302	0	613
4/6/2013	302	302	0	613
4/7/2013	301	302	0	613
4/8/2013	301	302	0	613
4/9/2013	300	302	0	613
4/10/2013	300	302	0	613
4/11/2013	300	13	0	612
4/12/2013	317	214	0	612
4/13/2013	447	302	0	613
4/14/2013	443	302	0	613
4/15/2013	0	299	0	612
4/16/2013	0	302	105	611
4/17/2013	0	303	155	611
4/18/2013	492	303	51	612
4/19/2013	389	303	136	612
4/20/2013	309	302	204	613
4/21/2013	52	303	202	613
4/22/2013	2	303	197	612
4/23/2013	0	195	203	612
4/24/2013	0	124	281	611
4/25/2013	0	299	303	611
4/26/2013	0	427	233	611
4/27/2013	0	484	204	611
4/28/2013	0	484	204	612
4/29/2013	0	306	287	612
4/30/2013	0	303	303	612
Total	5,766	8,891	3,068	—

Date	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average from June 1, 2012, to given date
5/1/2013	0	303	302	612
5/2/2013	0	302	302	612
5/3/2013	269	302	37	612
5/4/2013	302	302	0	612
5/5/2013	298	302	0	611
5/6/2013	297	302	0	611
5/7/2013	298	302	0	611
5/8/2013	87	91	0	610
5/9/2013	226	292	0	610
5/10/2013	300	302	6	610
5/11/2013	297	302	0	610
5/12/2013	165	302	133	610
5/13/2013	149	302	151	610
5/14/2013	232	232	151	610
5/15/2013	330	261	151	610
5/16/2013	346	273	37	610
5/17/2013	349	273	0	610
5/18/2013	350	273	0	610
5/19/2013	346	273	0	610
5/20/2013	260	206	77	610
5/21/2013	82	201	119	610
5/22/2013	0	164	149	609
5/23/2013	0	203	149	608
5/24/2013	0	9	196	607
5/25/2013	0	0	137	606
5/26/2013	95	0	229	605
5/27/2013	282	0	160	604
5/28/2013	296	0	0	604
5/29/2013	190	0	0	602
5/30/2013	272	0	150	602
5/31/2013	21	171	331	602
Total	6,139	6,245	2,967	—

Table 6. Diversions to New York City water-supply system for report year ending November 30, 2013.—Continued

Date	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average from June 1, 2013, to given date
6/1/2013	151	201	223	575
6/2/2013	174	127	125	501
6/3/2013	173	202	202	526
6/4/2013	173	202	202	539
6/5/2013	173	201	25	511
6/6/2013	0	25	0	430
6/7/2013	0	0	0	368
6/8/2013	237	93	0	364
6/9/2013	298	201	0	379
6/10/2013	4	8	0	342
6/11/2013	0	0	0	311
6/12/2013	0	0	0	285
6/13/2013	0	0	0	263
6/14/2013	0	0	0	244
6/15/2013	0	0	0	228
6/16/2013	0	0	0	214
6/17/2013	0	0	0	201
6/18/2013	220	0	185	213
6/19/2013	382	0	199	232
6/20/2013	127	245	198	249
6/21/2013	288	210	199	270
6/22/2013	297	202	199	290
6/23/2013	298	200	199	307
6/24/2013	298	200	199	324
6/25/2013	404	43	50	330
6/26/2013	577	0	0	340
6/27/2013	125	0	0	332
6/28/2013	546	241	0	348
6/29/2013	329	444	0	363
6/30/2013	88	482	0	370
Total	5,362	3,527	2,205	—

Date	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average from June 1, 2013, to given date
7/1/2013	0	0	0	358
7/2/2013	0	0	0	347
7/3/2013	92	271	0	347
7/4/2013	219	301	0	352
7/5/2013	297	301	2	359
7/6/2013	186	301	199	368
7/7/2013	174	301	160	376
7/8/2013	360	36	50	377
7/9/2013	518	191	51	387
7/10/2013	224	202	150	392
7/11/2013	173	219	149	396
7/12/2013	266	50	250	400
7/13/2013	537	0	50	404
7/14/2013	589	0	0	408
7/15/2013	338	0	275	413
7/16/2013	299	0	299	417
7/17/2013	556	0	150	423
7/18/2013	588	0	102	429
7/19/2013	582	0	101	434
7/20/2013	588	0	0	437
7/21/2013	582	0	0	440
7/22/2013	583	0	0	442
7/23/2013	391	178	0	445
7/24/2013	486	218	0	450
7/25/2013	588	164	101	457
7/26/2013	588	226	0	463
7/27/2013	588	223	0	469
7/28/2013	587	223	0	475
7/29/2013	512	222	0	480
7/30/2013	377	55	0	479
7/31/2013	320	258	102	482
Total	12,188	3,940	2,191	—

Table 6. Diversions to New York City water-supply system for report year ending November 30, 2013.—Continued

Date	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average from June 1, 2013, to given date
8/1/2013	18	302	103	481
8/2/2013	0	302	299	483
8/3/2013	0	302	299	485
8/4/2013	0	302	299	487
8/5/2013	87	302	299	490
8/6/2013	0	302	298	491
8/7/2013	0	301	298	493
8/8/2013	0	301	298	495
8/9/2013	0	300	303	496
8/10/2013	0	301	304	498
8/11/2013	419	301	51	501
8/12/2013	605	301	252	510
8/13/2013	602	301	298	520
8/14/2013	600	301	298	529
8/15/2013	599	301	298	538
8/16/2013	597	301	295	546
8/17/2013	591	203	0	549
8/18/2013	591	203	0	552
8/19/2013	591	203	0	555
8/20/2013	591	0	101	557
8/21/2013	591	194	101	561
8/22/2013	590	203	102	565
8/23/2013	590	202	0	568
8/24/2013	590	0	0	568
8/25/2013	590	198	0	571
8/26/2013	440	202	0	571
8/27/2013	428	34	100	571
8/28/2013	338	198	0	571
8/29/2013	302	3	101	569
8/30/2013	303	0	102	567
8/31/2013	280	0	0	564
Total	10,933	6,664	4,899	—

Date	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average from June 1, 2013, to given date
9/1/2013	300	169	0	563
9/2/2013	300	203	0	563
9/3/2013	478	203	0	564
9/4/2013	500	203	101	566
9/5/2013	500	201	0	568
9/6/2013	500	127	0	568
9/7/2013	499	0	0	568
9/8/2013	499	0	0	567
9/9/2013	495	171	0	568
9/10/2013	500	202	0	569
9/11/2013	500	279	102	572
9/12/2013	397	298	0	573
9/13/2013	402	298	34	575
9/14/2013	402	298	0	576
9/15/2013	385	285	0	577
9/16/2013	373	322	0	578
9/17/2013	396	338	0	580
9/18/2013	396	285	0	580
9/19/2013	370	412	0	582
9/20/2013	401	215	0	583
9/21/2013	401	237	0	583
9/22/2013	296	226	0	583
9/23/2013	385	358	0	584
9/24/2013	401	373	0	586
9/25/2013	401	373	0	587
9/26/2013	377	372	0	589
9/27/2013	441	217	0	589
9/28/2013	449	238	0	590
9/29/2013	431	226	0	590
9/30/2013	424	281	0	591
Total	12,599	7,410	237	—

Table 6. Diversions to New York City water-supply system for report year ending November 30, 2013.—Continued

Date	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average from June 1, 2013, to given date
10/1/2013	432	287	0	592
10/2/2013	432	286	0	593
10/3/2013	41	61	0	590
10/4/2013	338	256	0	590
10/5/2013	449	271	0	591
10/6/2013	430	260	0	591
10/7/2013	297	219	0	591
10/8/2013	308	226	0	590
10/9/2013	308	226	0	590
10/10/2013	383	226	0	590
10/11/2013	445	260	0	591
10/12/2013	445	268	0	592
10/13/2013	430	259	0	593
10/14/2013	294	329	0	593
10/15/2013	307	333	0	593
10/16/2013	304	333	0	593
10/17/2013	409	275	0	594
10/18/2013	449	270	105	596
10/19/2013	450	269	0	597
10/20/2013	422	247	0	597
10/21/2013	304	392	0	598
10/22/2013	307	420	0	599
10/23/2013	304	229	0	598
10/24/2013	355	409	0	599
10/25/2013	449	364	0	601
10/26/2013	449	331	0	602
10/27/2013	422	331	0	603
10/28/2013	296	330	0	603
10/29/2013	296	330	0	603
10/30/2013	299	330	0	604
10/31/2013	387	329	0	604
Total	11,241	8,956	105	—

Date	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average from June 1, 2013, to given date
11/1/2013	450	265	0	605
11/2/2013	470	283	0	606
11/3/2013	413	249	0	606
11/4/2013	300	298	0	606
11/5/2013	299	329	0	606
11/6/2013	296	329	0	607
11/7/2013	499	181	0	607
11/8/2013	459	230	0	607
11/9/2013	442	272	0	608
11/10/2013	423	260	0	609
11/11/2013	509	172	0	609
11/12/2013	508	176	0	610
11/13/2013	507	176	0	610
11/14/2013	507	176	0	610
11/15/2013	461	235	0	611
11/16/2013	443	271	0	612
11/17/2013	430	262	0	612
11/18/2013	507	277	0	613
11/19/2013	508	282	0	614
11/20/2013	507	281	0	615
11/21/2013	507	282	0	616
11/22/2013	462	272	203	618
11/23/2013	451	273	198	620
11/24/2013	437	250	0	620
11/25/2013	507	276	0	621
11/26/2013	10	104	0	618
11/27/2013	303	180	0	617
11/28/2013	448	272	0	618
11/29/2013	448	272	0	618
11/30/2013	448	273	0	619
Total	12,959	7,458	401	—

Table 7. Consumption of water by New York City, from 1950 to 2013.

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

Year	Average daily consumption			Annual consumption (in billions of gallons)
	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

Table 7. Consumption of water by New York City, from 1950 to 2013.—Continued

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

Year	Average daily consumption			Annual consumption (in billions of gallons)
	City proper (Mgal/d)	Outside communities (Mgal/d)	Total (Mgal/d)	
1991	1,469.9	123.6	1,593.5	581.6
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	1,236.9	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
2012	1,009.0	116.0	1,125.0	411.8
2013	1,006.1	110.1	1,116.2	407.9

Table 8. Diversions by New Jersey, daily mean discharge, Delaware and Raritan Canal at Port Mercer, Lawrence Township, Mercer County, New Jersey (station number 01460440) for report year ending November 30, 2013.

[Data from U.S. Geological Survey, 2019a. All values except total are in million gallons per day (Mgal/d); total in million gallons (Mgal). —, not applicable]

Day	Dec. 2012	Jan. 2013	Feb. 2013	Mar. 2013	Apr. 2013	May 2013	June 2013	July 2013	Aug. 2013	Sept. 2013	Oct. 2013	Nov. 2013
1	84	81	92	87	89	88	74	83	76	74	90	72
2	81	85	89	85	89	86	72	75	74	72	88	79
3	84	84	90	79	85	86	94	85	74	76	88	79
4	81	78	87	79	86	83	83	84	76	77	85	78
5	85	81	87	80	89	84	71	83	75	78	85	74
6	80	85	89	85	89	85	66	82	75	78	85	78
7	81	84	90	89	89	87	58	79	76	79	80	85
8	86	82	91	89	89	77	−74	79	78	80	81	85
9	85	83	85	80	87	76	50	79	75	79	80	79
10	83	90	85	80	89	95	43	73	75	79	78	81
11	78	88	83	86	91	88	6	74	74	79	76	79
12	85	87	79	84	84	87	56	81	72	80	77	83
13	80	88	83	84	78	87	61	70	64	79	77	78
14	79	89	79	83	85	90	67	40	67	83	79	76
15	76	89	79	85	93	93	72	78	70	82	81	73
16	81	74	87	89	91	92	61	74	72	83	78	74
17	84	84	78	85	94	89	36	70	76	85	76	74
18	84	86	83	85	90	92	45	73	75	81	80	81
19	83	87	86	81	92	95	33	76	75	82	83	76
20	81	86	83	89	90	92	26	76	75	82	87	68
21	64	88	83	85	90	89	75	73	76	82	86	66
22	83	83	80	81	89	89	87	82	76	76	78	67
23	83	83	82	86	90	91	88	65	69	84	76	67
24	81	88	82	87	88	92	87	74	71	88	73	71
25	76	87	84	89	89	87	85	70	74	89	73	69
26	75	70	84	89	89	86	88	72	76	89	72	76
27	35	72	83	89	86	85	93	74	77	89	70	70
28	81	89	85	85	87	87	102	75	78	89	70	78
29	86	96	—	85	87	85	97	68	78	91	72	78
30	81	95	—	88	86	82	84	65	76	92	73	74
31	81	80	—	90	—	78	—	73	76	—	70	—
Total[1]	2,467	2,622	2,368	2,638	2,650	2,703	1,886	2,305	2,301	2,457	2,447	2,268
Mean[2]	79.6	84.6	84.6	85.1	88.3	87.2	62.9	74.3	74.2	81.9	78.9	75.6

[1]The year's total is 29,112 million gallons.

[2]The combined mean is 79.8 million gallons per day.

Table 9. New York City reservoir release design data, for report year ending November 30, 2013.

[River Master daily operations record. The Montague design rate was 1,750 cubic feet per second (ft³/s). Column (col.) 1 was furnished by electric utility PPL Corporation; col. 2 furnished by electric utility Eagle Creek Renewable Energy; col. 3 computed from index stations; col. 4 computed increase in runoff based on 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, directed release amount from the Office of Delaware River Master, = col. 6 + col. 7, when positive, otherwise col. 8 = 0; col. 9 = col. 7 from table 10; col. 10 = summation of col. 9; col. 11 = flow objective − (col. 9 + col. 10 from table 10) 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 ft³/s; cols. 10, 12, 13, and 14 are accumulated from the previous water year starting June 1, 2012, with these values being reset on June 1, 2013; W, miscalculation of balancing adjustment, correct value should have been −37; X, balancing adjustment of −28 was not applied to the design; Y, miscalculation of balancing adjustment, correct value should have been −50; Z, transposed original furnished forecast value of 142 ft³/s; ft³/s, cubic foot per second; (ft³/s)-d, cubic foot per second for a day]

Advance estimate of discharge of Delaware River at Montague New Jersey, exclusive of New York City reservoir releases										Computation of balancing adjustment					
Date of advance estimate	Powerplant release forecasts		Uncontrolled runoff		Montague date	Discharge (ft³/s)	Indicated deficiency	Balancing adjustment	Directed release (ft³/s)	Adjusted directed release		Actual deficiency		Cumulative difference (ft³/s-d)	Balancing adjustment (ft³/s)
	Lake Wallenpaupack (ft³/s)	Rio Reservoir (ft³/s)	Current condition (ft³/s)	Weather adjustment (ft³/s)						Daily (ft³/s)	Cumulative (ft³/s-d)	Daily (ft³/s)	Cumulative (ft³/s-d)		
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12	Col. 13	Col. 14
The estimated Montague discharge was greater than the Montague design rate from 12/01/2012 to 05/05/2013															
5/6/2013	0	106	1,650	58	5/9/2013	1,708	42	22	64	64	34,381	0	34,536	−155	16
The estimated Montague discharge was greater than the Montague design rate from 05/07/2013 to 07/18/2013															
7/18/2013	481	319	1,535	174	7/21/2013	2,509	0	0	0	0	0	0	0	0	0
7/19/2013	481	89	1,437	193	7/22/2013	2,200	0	0	0	0	0	0	0	0	0
7/20/2013	190	0	1,201	75	7/23/2013	1,466	284	0	284	284	284	0	0	284	−28
7/21/2013	190	53	1,301	67	7/24/2013	1,611	139	0	139	139	423	0	0	423	−42
7/22/2013	190	142	1,050	100	7/25/2013	1,482	268	0	268	268	691	0	0	691	−50
7/23/2013	190	142	1,200	64	7/26/2013	1,596	154	0	154	154	845	0	0	845	−50
7/24/2013	119	15	1,475	0	7/27/2013	1,680	70	−28	70−X	70	915	306	306	609	−50
7/25/2013	119	89	1,615	4	7/28/2013	1,708	42	−42	0	0	915	71	377	538	−50
7/26/2013	119	0	1,726	464	7/29/2013	2,309	0	−50	0	0	915	0	377	538	−50
7/27/2013	119	0	1,655	419	7/30/2013	2,193	0	−50	0	0	915	0	377	538	−50
7/28/2013	119	0	1,591	1,092	7/31/2013	2,802	0	−50	0	0	915	0	377	538	−50
7/29/2013	119	142	1,655	0	8/1/2013	1,774	0	−50	0	0	915	0	377	538	−50
7/30/2013	282	213	1,550	323	8/2/2013	2,368	0	−50	0	0	915	0	377	538	−50
7/31/2013	414	230	1,660	424	8/3/2013	2,728	0	−50	0	0	915	0	377	538	−50
8/1/2013	282	0	1,550	619	8/4/2013	2,451	0	−50	0	0	915	0	377	538	−50
8/2/2013	282	0	1,300	175	8/5/2013	1,757	0	−50	0	0	915	0	377	538	−50
8/3/2013	385	106	1,300	10	8/6/2013	1,791	0	−50	0	0	915	165	542	373	−37
8/4/2013	385	0	1,400	3	8/7/2013	1,785	0	−50	0	0	915	367	909	6	−1
8/5/2013	385	0	1,300	71	8/8/2013	1,756	0	−50	0	0	915	427	1,336	−421	42
8/6/2013	202	124	1,300	362	8/9/2013	1,988	0	−50	0	0	915	0	1,336	−421	42
8/7/2013	350	89	1,200	652	8/10/2013	2,291	0	−37	0	0	915	0	1,336	−421	42

Table 9. New York City reservoir release design data, for report year ending November 30, 2013.—Continued

[River Master daily operations record. The Montague design rate was 1,750 cubic feet per second (ft^3/s). Column (col.) 1 was furnished by electric utility PPL Corporation; col. 2 furnished by electric utility Eagle Creek Renewable Energy; col. 3 computed from index stations; col. 4 computed increase in runoff based on 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, directed release amount from the Office of Delaware River Master, = col. 6 + col. 7, when positive, otherwise col. 8 = 0; col. 9 = col. 7 from table 10; col. 10 = summation of col. 9; col. 11 = flow objective − (col. 9 + col. 10 from table 10) 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; cols. 10, 12, 13, and 14 are accumulated from the previous water year starting June 1, 2012, with these values being reset on June 1, 2013; W, miscalculation of balancing adjustment, correct value should have been −37; X, balancing adjustment of −28 was not applied to the design; Y, miscalculation of balancing adjustment, correct value should have been −50; Z, transposed original furnished forecast value of 142 ft^3/s; ft^3/s, cubic foot per second; (ft^3/s)-d, cubic foot per second for a day]

Advance estimate of discharge of Delaware River at Montague New Jersey, exclusive of New York City reservoir releases										Computation of balancing adjustment					
Date of advance estimate	Powerplant release forecasts		Uncontrolled runoff		Montague date	Discharge (ft^3/s)	Indicated deficiency	Balancing adjustment	Directed release (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)		
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12	Col. 13	Col. 14
8/8/2013	202	0	1,100	584	8/11/2013	1,886	0	−1	0	0	915	0	1,336	−421	42
8/9/2013	202	0	6,408	3,564	8/12/2013	10,174	0	42	0	0	915	0	1,336	−421	42
8/10/2013	90	0	27,501	1	8/13/2013	27,592	0	42	0	0	915	0	1,336	−421	42
8/11/2013	90	0	3,747	24	8/14/2013	3,861	0	42	0	0	915	0	1,336	−421	42
8/12/2013	90	0	2,534	142	8/15/2013	2,766	0	42	0	0	915	0	1,336	−421	42
8/13/2013	90	0	2,043	229	8/16/2013	2,362	0	42	0	0	915	0	1,336	−421	42
8/14/2013	90	0	2,783	0	8/17/2013	2,873	0	42	0	0	915	0	1,336	−421	42
8/15/2013	90	0	2,026	0	8/18/2013	2,116	0	42	0	0	915	0	1,336	−421	42
8/16/2013	90	0	1,800	0	8/19/2013	1,890	0	42	0	0	915	0	1,336	−421	42
8/17/2013	81	89	1,850	0	8/20/2013	2,020	0	42	0	0	915	0	1,336	−421	42
8/18/2013	81	89	1,726	0	8/21/2013	1,896	0	42	0	0	915	0	1,336	−421	42
8/19/2013	81	0	1,500	0	8/22/2013	1,581	169	42	211	211	1,126	0	1,336	−210	21
8/20/2013	294	160	1,600	8	8/23/2013	2,062	0	42	0	0	1,126	0	1,336	−210	21
8/21/2013	294	0	1,500	28	8/24/2013	1,822	0	42	0	0	1,126	0	1,336	−210	21
8/22/2013	204	0	1,450	13	8/25/2013	1,667	83	42	125	125	1,251	0	1,326	−75	8
8/23/2013	204	0	1,500	0	8/26/2013	1,704	46	21	67	67	1,318	39	1,365	−47	5
8/24/2013	241	0	1,375	7	8/27/2013	1,623	127	21	148	148	1,466	0	1,365	101	−10
8/25/2013	241	0	1,250	26	8/28/2013	1,517	233	21	254	254	1,720	0	1,365	355	−36
8/26/2013	241	0	1,350	341	8/29/2013	1,932	0	8	0	0	1,720	0	1,365	355	−36
8/27/2013	241	0	3,000	1	8/30/2013	3,242	0	5	0	0	1,720	0	1,365	355	−36
8/28/2013	241	0	1,890	9	8/31/2013	2,140	0	−10	0	0	1,720	0	1,365	355	−36
8/29/2013	241	35	4,000	4	9/1/2013	4,280	0	−36	0	0	1,720	0	1,365	355	−36
8/30/2013	241	0	3,800	16	9/2/2013	4,057	0	−36	0	0	1,720	0	1,365	355	−36
8/31/2013	242	0	2,025	0	9/3/2013	2,267	0	−36	0	0	1,720	0	1,365	355	−36

Table 9. New York City reservoir release design data, for report year ending November 30, 2013.—Continued

[River Master daily operations record. The Montague design rate was 1,750 cubic feet per second (ft³/s). Column (col.) 1 was furnished by electric utility PPL Corporation; col. 2 furnished by electric utility Eagle Creek Renewable Energy; col. 3 computed from index stations; col. 4 computed increase in runoff based on 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, directed release amount from the Office of Delaware River Master, = col. 6 + col. 7, when positive, otherwise col. 8 = 0; col. 9 = col. 7 from table 10; col. 10 = summation of col. 9; col. 11 = flow objective − (col. 9 + col. 10 from table 10) 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 ft³/s; cols. 10, 12, 13, and 14 are accumulated from the previous water year starting June 1, 2012, with these values being reset on June 1, 2013; W, miscalculation of balancing adjustment, correct value should have been −37; X, balancing adjustment of −28 was not applied to the design; Y, miscalculation of balancing adjustment, correct value should have been −50; Z, transposed original furnished forecast value of 142 ft³/s; ft³/s, cubic foot per second; (ft³/s)-d, cubic foot per second for a day]

Advance estimate of discharge of Delaware River at Montague New Jersey, exclusive of New York City reservoir releases										Computation of balancing adjustment					
Date of advance estimate	Powerplant release forecasts		Uncontrolled runoff		Montague date	Discharge (ft³/s)	Indicated deficiency	Balancing adjustment	Directed release (ft³/s)	Adjusted directed release		Actual deficiency		Cumulative difference (ft³/s-d)	Balancing adjustment (ft³/s)
	Lake Wallenpaupack (ft³/s)	Rio Reservoir (ft³/s)	Current condition (ft³/s)	Weather adjustment (ft³/s)						Daily (ft³/s)	Cumulative (ft³/s-d)	Daily (ft³/s)	Cumulative (ft³/s-d)		
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12	Col. 13	Col. 14
9/1/2013	242	0	2,221	334	9/4/2013	2,797	0	−36	0	0	1,720	0	1,365	355	−36
9/2/2013	90	0	2,894	58	9/5/2013	3,042	0	−36	0	0	1,720	0	1,365	355	−36
9/3/2013	90	0	4,500	1	9/6/2013	4,591	0	−36	0	0	1,720	0	1,365	355	−36
9/4/2013	90	71	4,138	0	9/7/2013	4,299	0	−36	0	0	1,720	0	1,365	355	−36
9/5/2013	269	0	5,000	1	9/8/2013	5,270	0	−36	0	0	1,720	0	1,365	355	−36
9/6/2013	90	0	2,400	5	9/9/2013	2,495	0	−36	0	0	1,720	0	1,365	355	−36
9/7/2013	0	230	1,800	0	9/10/2013	2,030	0	−36	0	0	1,720	0	1,365	355	−36
9/8/2013	0	230	1,900	3	9/11/2013	1,903	0	−36	0	0	1,720	0	1,365	355	−36
9/9/2013	0	230	1,502	18	9/12/2013	1,750	0	−36	0	0	1,720	0	1,365	355	−36
9/10/2013	322	213	1,500	158	9/13/2013	2,193	0	−36	0	0	1,720	0	1,365	355	−36
9/11/2013	0	213	1,100	509	9/14/2013	1,822	0	−36	0	0	1,720	0	1,365	355	−36
9/12/2013	0	213	1,700	2,048	9/15/2013	3,961	0	−36	0	0	1,720	0	1,365	355	−36
9/13/2013	0	213	1,800	5	9/16/2013	2,018	0	−36	0	0	1,720	0	1,365	355	−36
9/14/2013	0	195	1,907	8	9/17/2013	2,110	0	−36	0	0	1,720	0	1,365	355	−36
9/15/2013	0	213	1,900	2	9/18/2013	2,115	0	−36	0	0	1,720	76	1,441	279	−28
9/16/2013	0	0	1,788	1	9/19/2013	1,789	0	−36	0	0	1,720	162	1,603	117	−12
9/17/2013	0	0	1,622	0	9/20/2013	1,622	128	−36	92	92	1,812	314	1,917	−105	11
9/18/2013	0	0	1,515	0	9/21/2013	1,515	235	−36	199	199	2,011	290	2,207	−196	20
9/19/2013	326	0	1,450	59	9/22/2013	1,835	0	−28	0	0	2,011	0	2,207	−196	20
9/20/2013	0	0	1,400	322	9/23/2013	1,722	28	−12	16	16	2,027	252	2,459	−432	43
9/21/2013	386	0	1,300	643	9/24/2013	2,329	0	11	0	0	2,027	55	2,514	−487	49
9/22/2013	386	0	1,350	0	9/25/2013	1,736	14	20	34	34	2,061	50	2,564	−503	50
9/23/2013	386	0	1,400	0	9/26/2013	1,786	0	20	0	0	2,061	210	2,774	−713	50
9/24/2013	386	0	1,325	0	9/27/2013	1,711	39	43	82	82	2,143	408	3,182	−1,039	50

Table 9. New York City reservoir release design data, for report year ending November 30, 2013.—Continued

[River Master daily operations record. The Montague design rate was 1,750 cubic feet per second (ft³/s). Column (col.) 1 was furnished by electric utility PPL Corporation; col. 2 furnished by electric utility Eagle Creek Renewable Energy; col. 3 computed from index stations; col. 4 computed increase in runoff based on 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, directed release amount from the Office of Delaware River Master, = col. 6 + col. 7, when positive, otherwise col. 8 = 0; col. 9 = col. 7 from table 10; col. 10 = summation of col. 9; col. 11 = flow objective − (col. 9 + col. 10 from table 10) 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 ft³/s; cols. 10, 12, 13, and 14 are accumulated from the previous water year starting June 1, 2012, with these values being reset on June 1, 2013; W, miscalculation of balancing adjustment, correct value should have been −37; X, balancing adjustment of −28 was not applied to the design; Y, miscalculation of balancing adjustment, correct value should have been −50; Z, transposed original furnished forecast value of 142 ft³/s; ft³/s, cubic foot per second; (ft³/s)-d, cubic foot per second for a day]

Advance estimate of discharge of Delaware River at Montague New Jersey, exclusive of New York City reservoir releases										Computation of balancing adjustment					
Date of advance estimate	Powerplant release forecasts		Uncontrolled runoff		Montague date	Discharge (ft³/s)	Indicated deficiency	Balancing adjustment	Directed release (ft³/s)	Adjusted directed release		Actual deficiency		Cumulative difference (ft³/s-d)	Balancing adjustment (ft³/s)
	Lake Wallenpaupack (ft³/s)	Rio Reservoir (ft³/s)	Current condition (ft³/s)	Weather adjustment (ft³/s)						Daily (ft³/s)	Cumulative (ft³/s-d)	Daily (ft³/s)	Cumulative (ft³/s-d)		
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12	Col. 13	Col. 14
9/25/2013	0	0	1,150	0	9/28/2013	1,150	600	49	649	647	2,790	789	3,971	−1,181	50
9/26/2013	0	0	1,100	0	9/29/2013	1,100	650	50	700	704	3,494	844	4,815	−1,321	50
9/27/2013	0	0	800	0	9/30/2013	800	950	50	1,000	1,000	4,494	740	5,555	−1,061	50
9/28/2013	0	0	700	0	10/1/2013	700	1,050	50	1,100	1,105	5,599	775	6,330	−731	50
9/29/2013	0	0	600	0	10/2/2013	600	1,150	50	1,200	1,204	6,803	1,004	7,334	−531	50
9/30/2013	0	0	550	0	10/3/2013	550	1,200	50	1,250	1,254	8,057	1,094	8,428	−371	37−W
10/1/2013	0	0	775	0	10/4/2013	775	975	50	1,025	1,024	9081	1,084	9,512	−431	43
10/2/2013	0	0	789	0	10/5/2013	789	961	50	1,011	1,011	10,092	1,021	10,533	−441	44
10/3/2013	0	0	671	0	10/6/2013	671	1,079	50	1,129	1,129	11,221	1,019	11,552	−331	33
10/4/2013	0	71	500	60	10/7/2013	631	1,119	7−W	1,126	1,124	12,345	414	11,966	379	−38
10/5/2013	0	0	475	85	10/8/2013	560	1,190	43	1,233	1,231	13,576	221	12,187	1,389	−50
10/6/2013	0	0	550	767	10/9/2013	1,317	433	44	478	481	14,057	0	12,187	1,870	−50
10/7/2013	0	0	650	750	10/10/2013	1,400	350	33	383	384	14,441	77	12,264	2,177	−50
10/8/2013	0	0	1,162	6	10/11/2013	1,168	582	−38	545	544	14,985	484	12,748	2,237	−50
10/9/2013	0	0	1,136	302	10/12/2013	1,438	312	−50	262	262	15,247	598	13,346	1,901	−50
10/10/2013	0	0	1,726	441	10/13/2013	2,167	0	−50	0	0	15,247	728	14,074	1,173	−50
10/11/2013	0	0	1,550	11	10/14/2013	1,561	189	−50	139	139	15,386	781	14,855	531	−50
10/12/2013	0	0	1,162	0	10/15/2013	1,162	588	−50	538	538	15,924	554	15,409	245	−24−Y
10/13/2013	0	0	1,000	0	10/16/2013	1,000	750	−50	700	696	16,620	606	15,475	1,145	−50
10/14/2013	0	0	944	30	10/17/2013	974	776	−50	726	719	17,339	609	16,084	1,255	−50
10/15/2013	0	106	749	68	10/18/2013	923	827	−50	777	777	18,116	477	16,561	1,555	−50
10/16/2013	0	0	700	168	10/19/2013	868	882	−24−Y	858−Y	857	18,973	577	17,138	1,835	−50
10/17/2013	0	106	875	163	10/20/2013	1,144	606	−50	556	558	19,531	478	17,616	1,915	−50
10/18/2013	0	0	1,000	48	10/21/2013	1,048	702	−50	652	654	20,185	624	18,240	1,945	−50

Table 9. New York City reservoir release design data, for report year ending November 30, 2013.—Continued

[River Master daily operations record. The Montague design rate was 1,750 cubic feet per second (ft³/s). Column (col.) 1 was furnished by electric utility PPL Corporation; col. 2 furnished by electric utility Eagle Creek Renewable Energy; col. 3 computed from index stations; col. 4 computed increase in runoff based on 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, directed release amount from the Office of Delaware River Master, = col. 6 + col. 7, when positive, otherwise col. 8 = 0; col. 9 = col. 7 from table 10; col. 10 = summation of col. 9; col. 11 = flow objective − (col. 9 + col. 10 from table 10) 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 ft³/s; cols. 10, 12, 13, and 14 are accumulated from the previous water year starting June 1, 2012, with these values being reset on June 1, 2013; W, miscalculation of balancing adjustment, correct value should have been −37; X, balancing adjustment of −28 was not applied to the design; Y, miscalculation of balancing adjustment, correct value should have been −50; Z, transposed original furnished forecast value of 142 ft³/s; ft³/s, cubic foot per second; (ft³/s)-d, cubic foot per second for a day]

Advance estimate of discharge of Delaware River at Montague New Jersey, exclusive of New York City reservoir releases										Computation of balancing adjustment					
Date of advance estimate	Powerplant release forecasts		Uncontrolled runoff		Montague date	Discharge (ft³/s)	Indicated deficiency	Balancing adjustment	Directed release (ft³/s)	Adjusted directed release		Actual deficiency		Cumulative difference (ft³/s-d)	Balancing adjustment (ft³/s)
	Lake Wallenpaupack (ft³/s)	Rio Reservoir (ft³/s)	Current condition (ft³/s)	Weather adjustment (ft³/s)						Daily (ft³/s)	Cumulative (ft³/s-d)	Daily (ft³/s)	Cumulative (ft³/s-d)		
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12	Col. 13	Col. 14
10/19/2013	0	177	1,000	18	10/22/2013	1,195	555	−50	505	504	20,689	714	18,954	1,735	−50
10/20/2013	0	124	1,000	22	10/23/2013	1,146	604	−50	554	554	21,243	854	19,808	1,435	−50
10/21/2013	0	89	1,000	10	10/24/2013	1,099	651	−50	601	597	21,840	787	20,595	1,245	−50
10/22/2013	0	0	846	2	10/25/2013	848	902	−50	852	849	22,689	879	21,474	1,215	−50
10/23/2013	0	0	873	1	10/26/2013	874	876	−50	826	820	23,509	850	22,324	1,185	−50
10/24/2013	0	0	775	0	10/27/2013	775	975	−50	925	911	24,420	911	23,235	1,185	−50
10/25/2013	0	0	775	0	10/28/2013	775	975	−50	925	925	25,345	905	24,140	1,205	−50
10/26/2013	0	53	792	0	10/29/2013	845	905	−50	855	857	26,202	667	24,807	1,395	−50
10/27/2013	0	142	725	0	10/30/2013	867	883	−50	833	833	27,035	673	25,480	1,555	−50
10/28/2013	0	0	800	0	10/31/2013	800	950	−50	900	901	27,936	971	26,451	1,485	−50
10/29/2013	0	0	730	203	11/1/2013	933	817	−50	767	770	28,706	830	27,281	1,425	−50
10/30/2013	0	0	730	350	11/2/2013	1,080	670	−50	620	620	29,326	380	27,661	1,665	−50
10/31/2013	0	0	800	365	11/3/2013	1,165	585	−50	535	536	29,862	0	27,661	2,201	−50
11/1/2013	0	0	800	100	11/4/2013	900	850	−50	800	804	30,666	64	27,725	2,941	−50
11/2/2013	0	0	850	15	11/5/2013	865	885	−50	835	837	31,503	357	28,082	3,421	−50
11/3/2013	0	0	1,300	0	11/6/2013	1,300	450	−50	400	412	31,915	432	28,514	3,401	−50
11/4/2013	0	0	1,450	1	11/7/2013	1,451	299	−50	249	249	32,164	507	29,021	3,143	−50
11/5/2013	0	124	1,275	53	11/8/2013	1,452	298	−50	248	248	32,412	329	29,350	3,062	−50
11/6/2013	0	89	1,200	146	11/9/2013	1,435	315	−50	265	265	32,677	0	29,350	3,327	−50
11/7/2013	0	0	1,105	103	11/10/2013	1,203	547	−50	497	494	33,171	14	29,364	3,807	−50
11/8/2013	0	0	1,050	0	11/11/2013	1,050	700	−50	650	649	33,820	149	29,513	4,307	−50
11/9/2013	0	0	1,075	11	11/12/2013	1,086	664	−50	614	613	34,433	313	29,826	4,607	−50
11/10/2013	0	142	1,350	24	11/13/2013	1,498	252	−50	202	202	34,635	237	30,063	4,572	−50
11/11/2013	0	106	1,350	13	11/14/2013	1,469	281	−50	231	231	34,866	309	30,372	4,494	−50

Table 9. New York City reservoir release design data, for report year ending November 30, 2013.—Continued

[River Master daily operations record. The Montague design rate was 1,750 cubic feet per second (ft³/s). Column (col.) 1 was furnished by electric utility PPL Corporation; col. 2 furnished by electric utility Eagle Creek Renewable Energy; col. 3 computed from index stations; col. 4 computed increase in runoff based on 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, directed release amount from the Office of Delaware River Master, = col. 6 + col. 7, when positive, otherwise col. 8 = 0; col. 9 = col. 7 from table 10; col. 10 = summation of col. 9; col. 11 = flow objective − (col. 9 + col. 10 from table 10) 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 ft³/s; cols. 10, 12, 13, and 14 are accumulated from the previous water year starting June 1, 2012, with these values being reset on June 1, 2013; W, miscalculation of balancing adjustment, correct value should have been −37; X, balancing adjustment of −28 was not applied to the design; Y, miscalculation of balancing adjustment, correct value should have been −50; Z, transposed original furnished forecast value of 142 ft³/s; ft³/s, cubic foot per second; (ft³/s)-d, cubic foot per second for a day]

Advance estimate of discharge of Delaware River at Montague New Jersey, exclusive of New York City reservoir releases										Computation of balancing adjustment					
Date of advance estimate	Powerplant release forecasts		Uncontrolled runoff		Montague date	Discharge (ft³/s)	Indicated deficiency	Balancing adjustment	Directed release (ft³/s)	Adjusted directed release		Actual deficiency		Cumulative difference (ft³/s-d)	Balancing adjustment (ft³/s)
	Lake Wallenpaupack (ft³/s)	Rio Reservoir (ft³/s)	Current condition (ft³/s)	Weather adjustment (ft³/s)						Daily (ft³/s)	Cumulative (ft³/s-d)	Daily (ft³/s)	Cumulative (ft³/s-d)		
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12	Col. 13	Col. 14
11/12/2013	0	124−Z	1,300	1	11/15/2013	1,425	325	−50	275	275	35,141	389	30,761	4,380	−50
11/13/2013	0	89	1,200	0	11/16/2013	1,289	461	−50	411	414	35,555	494	31,255	4,300	−50
11/14/2013	0	0	1,200	0	11/17/2013	1,200	550	−50	500	500	36,055	590	31,845	4,210	−50
11/15/2013	0	0	1,150	200	11/18/2013	1,350	400	−50	350	351	36,406	472	32,317	4,089	−50
11/16/2013	0	372	1,050	350	11/19/2013	1,772	0	−50	0	0	36,406	9	32,326	4,080	−50
11/17/2013	0	496	1,050	394	11/20/2013	1,940	0	−50	0	0	36,406	0	32,326	4,080	−50
11/18/2013	0	124	1,625	4	11/21/2013	1,753	0	−50	0	0	36,406	79	32,405	4,001	−50
11/19/2013	0	355	1,400	0	11/22/2013	1,755	0	−50	0	0	36,406	109	32,514	3,892	−50
11/20/2013	0	479	1,350	27	11/23/2013	1,856	0	−50	0	0	36,406	89	32,603	3,803	−50
11/21/2013	0	231	1,200	69	11/24/2013	1,500	250	−50	200	200	36,606	0	32,603	4,003	−50
11/22/2013	0	213	1,050	48	11/25/2013	1,311	439	−50	389	391	36,997	0	32,603	4,394	−50
11/23/2013	0	0	1,100	11	11/26/2013	1,111	639	−50	589	589	37,586	139	32,742	4,844	−50
11/24/2013	0	0	1,050	25	11/27/2013	1,075	675	−50	625	626	38,212	0	32,742	5,470	−50
11/25/2013	0	0	1,300	4,514	11/28/2013	5,814	0	−50	0	0	38,212	0	32,742	5,470	−50
11/26/2013	0	142	1,700	2,825	11/29/2013	4,667	0	−50	0	0	38,212	0	32,742	5,470	−50
11/27/2013	0	89	9,000	550	11/30/2013	9,639	0	−50	0	0	38,212	0	32,742	5,470	−50

Table 10. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey, for report year ending November 30, 2013.

[River Master daily operations record. All provided measurements are the mean discharge in cubic feet per second for 24 hours. Column (col.) 1 = actual release by New York City in response to directed release ordered by the Office of the Delaware River Master; col. 2 = 24 hours beginning 1200 of date shown; col. 3 = 24 hours ending 2400 one day later; col. 4 = 24 hours beginning 1500 one 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 = IERQ bank releases. IERQ, Interim Excess Release Quantity; Th, thermal release; —, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow, Delaware River at Montague, New Jersey					
Directed								Controlled Releases					
Date	Amount	Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	New York City reservoirs		Powerplants	Computed uncontrolled	Total	IERQ bank releases
									Directed	Other				
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6		Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
11/28/2012	0	150	226	189	11/30/2012	276	0	12/1/2012	0	565	276	1,959	2,800	0
11/29/2012	0	150	227	187	12/1/2012	0	0	12/2/2012	0	564	0	1,906	2,470	0
11/30/2012	0	150	227	190	12/2/2012	0	0	12/3/2012	0	567	0	1,963	2,530	0
12/1/2012	0	149	229	189	12/3/2012	0	0	12/4/2012	0	567	0	2,163	2,730	0
12/2/2012	0	149	229	190	12/4/2012	0	0	12/5/2012	0	568	0	2,142	2,710	0
12/3/2012	0	150	229	156	12/5/2012	0	0	12/6/2012	0	535	0	2,065	2,600	0
12/4/2012	0	144	179	53	12/6/2012	0	0	12/7/2012	0	376	0	2,114	2,490	0
12/5/2012	0	101	150	56	12/7/2012	0	0	12/8/2012	0	307	0	2,183	2,490	0
12/6/2012	0	101	150	56	12/8/2012	0	71	12/9/2012	0	307	71	2,732	3,110	0
12/7/2012	0	99	149	56	12/9/2012	79	0	12/10/2012	0	304	79	3,107	3,490	0
12/8/2012	0	101	152	56	12/10/2012	495	0	12/11/2012	0	309	495	3,346	4,150	0
12/9/2012	0	101	150	56	12/11/2012	409	89	12/12/2012	0	307	498	4,195	5,000	0
12/10/2012	0	101	150	56	12/12/2012	476	106	12/13/2012	0	307	582	3,811	4,700	0
12/11/2012	0	101	150	56	12/13/2012	484	124	12/14/2012	0	307	608	3,455	4,370	0
12/12/2012	0	101	150	56	12/14/2012	387	71	12/15/2012	0	307	458	3,185	3,950	0
12/13/2012	0	101	152	56	12/15/2012	11	0	12/16/2012	0	309	11	3,070	3,390	0
12/14/2012	0	101	152	56	12/16/2012	0	106	12/17/2012	0	309	106	3,105	3,520	0
12/15/2012	0	101	152	56	12/17/2012	0	213	12/18/2012	0	309	213	4,448	4,970	0
12/16/2012	0	101	152	56	12/18/2012	0	213	12/19/2012	0	309	213	7,938	8,460	0
12/17/2012	0	101	152	56	12/19/2012	110	213	12/20/2012	0	309	323	7,048	7,680	0
12/18/2012	0	101	152	76	12/20/2012	551	213	12/21/2012	0	329	764	16,007	17,100	0
12/19/2012	0	104	193	190	12/21/2012	1,429	426	12/22/2012	0	487	1,855	31,658	34,000	0
12/20/2012	0	150	227	190	12/22/2012	1,564	426	12/23/2012	0	567	1,990	18,243	20,800	0
12/21/2012	0	150	231	190	12/23/2012	1,564	426	12/24/2012	0	571	1,990	12,139	14,700	0
12/22/2012	0	150	231	190	12/24/2012	1,567	426	12/25/2012	0	571	1,993	9,436	12,000	0
12/23/2012	0	150	229	190	12/25/2012	1,567	426	12/26/2012	0	569	1,993	7,738	10,300	0
12/24/2012	0	150	227	190	12/26/2012	1,170	266	12/27/2012	0	567	1,436	6,987	8,990	0

Table 10. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey, for report year ending November 30, 2013.—Continued

[River Master daily operations record. All provided measurements are the mean discharge in cubic feet per second for 24 hours. Column (col.) 1 = actual release by New York City in response to directed release ordered by the Office of the Delaware River Master; col. 2 = 24 hours beginning 1200 of date shown; col. 3 = 24 hours ending 2400 one day later; col. 4 = 24 hours beginning 1500 one 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 = IERQ bank releases. IERQ, Interim Excess Release Quantity; Th, thermal release; —, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow, Delaware River at Montague, New Jersey					
Directed								Controlled Releases					
Date	Amount	Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	New York City reservoirs		Powerplants	Computed uncontrolled	Total	IERQ bank releases
									Directed	Other				
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6		Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
12/25/2012	0	150	226	190	12/27/2012	1,143	266	12/28/2012	0	566	1,409	6,175	8,150	0
12/26/2012	0	150	226	190	12/28/2012	731	426	12/29/2012	0	566	1,157	5,507	7,230	0
12/27/2012	0	150	226	190	12/29/2012	630	426	12/30/2012	0	566	1,056	5,068	6,690	0
12/28/2012	0	150	226	190	12/30/2012	483	426	12/31/2012	0	566	909	4,425	5,900	0
12/29/2012	0	150	226	190	12/31/2012	350	426	1/1/2013	0	566	776	4,238	5,580	0
12/30/2012	0	150	226	189	1/1/2013	90	248	1/2/2013	0	565	338	3,857	4,760	0
12/31/2012	0	150	224	189	1/2/2013	361	266	1/3/2013	0	563	627	3,630	4,820	0
1/1/2013	0	150	224	189	1/3/2013	408	177	1/4/2013	0	563	585	3,362	4,510	0
1/2/2013	0	150	223	189	1/4/2013	432	266	1/5/2013	0	562	698	3,310	4,570	0
1/3/2013	0	150	224	190	1/5/2013	444	230	1/6/2013	0	564	674	3,282	4,520	0
1/4/2013	0	150	226	190	1/6/2013	674	532	1/7/2013	0	566	1,206	3,048	4,820	0
1/5/2013	0	150	223	190	1/7/2013	759	550	1/8/2013	0	563	1,309	2,758	4,630	0
1/6/2013	0	150	224	189	1/8/2013	728	532	1/9/2013	0	563	1,260	2,707	4,530	0
1/7/2013	0	150	224	190	1/9/2013	745	355	1/10/2013	0	564	1,100	2,506	4,170	0
1/8/2013	0	150	226	190	1/10/2013	732	496	1/11/2013	0	566	1,228	2,616	4,410	0
1/9/2013	0	150	226	190	1/11/2013	524	496	1/12/2013	0	566	1,020	2,814	4,400	0
1/10/2013	0	150	226	190	1/12/2013	0	514	1/13/2013	0	566	514	3,640	4,720	0
1/11/2013	0	150	226	190	1/13/2013	10	514	1/14/2013	0	566	524	5,620	6,710	0
1/12/2013	0	150	226	190	1/14/2013	349	514	1/15/2013	0	566	863	8,381	9,810	0
1/13/2013	0	149	227	190	1/15/2013	625	372	1/16/2013	0	566	997	7,967	9,530	0
1/14/2013	0	150	224	190	1/16/2013	566	408	1/17/2013	0	564	974	6,852	8,390	0
1/15/2013	0	150	227	190	1/17/2013	791	408	1/18/2013	0	567	1,199	6,024	7,790	0
1/16/2013	0	150	226	190	1/18/2013	1,048	461	1/19/2013	0	566	1,509	4,995	7,070	0
1/17/2013	0	150	224	190	1/19/2013	928	443	1/20/2013	0	564	1,371	4,755	6,690	0
1/18/2013	0	150	224	192	1/20/2013	711	443	1/21/2013	0	566	1,154	4,440	6,160	0
1/19/2013	0	150	224	190	1/21/2013	572	550	1/22/2013	0	564	1,122	3,954	5,640	0
1/20/2013	0	150	224	190	1/22/2013	693	691	1/23/2013	0	564	1,384	3,402	5,350	0

Table 10. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey, for report year ending November 30, 2013.—Continued

[River Master daily operations record. All provided measurements are the mean discharge in cubic feet per second for 24 hours. Column (col.) 1 = actual release by New York City in response to directed release ordered by the Office of the Delaware River Master; col. 2 = 24 hours beginning 1200 of date shown; col. 3 = 24 hours ending 2400 one day later; col. 4 = 24 hours beginning 1500 one 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 = IERQ bank releases. IERQ, Interim Excess Release Quantity; Th, thermal release; —, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow, Delaware River at Montague, New Jersey					
Directed								Controlled Releases					
Date	Amount	Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	New York City reservoirs		Powerplants	Computed uncontrolled	Total	IERQ bank releases
									Directed	Other				
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6		Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
1/21/2013	0	150	224	190	1/23/2013	688	443	1/24/2013	0	564	1,131	2,815	4,510	0
1/22/2013	0	150	226	190	1/24/2013	675	461	1/25/2013	0	566	1,136	2,608	4,310	0
1/23/2013	0	150	224	190	1/25/2013	728	230	1/26/2013	0	564	958	3,028	4,550	0
1/24/2013	0	150	224	190	1/26/2013	701	461	1/27/2013	0	564	1,162	3,284	5,010	0
1/25/2013	0	150	224	190	1/27/2013	571	301	1/28/2013	0	564	872	3,464	4,900	0
1/26/2013	0	150	224	190	1/28/2013	394	390	1/29/2013	0	564	784	3,092	4,440	0
1/27/2013	0	150	224	190	1/29/2013	308	266	1/30/2013	0	564	574	3,592	4,730	0
1/28/2013	0	150	224	190	1/30/2013	731	177	1/31/2013	0	564	908	14,028	15,500	0
1/29/2013	0	150	224	190	1/31/2013	768	301	2/1/2013	0	564	1,069	19,567	21,200	0
1/30/2013	0	150	224	190	2/1/2013	685	337	2/2/2013	0	564	1,022	11,714	13,300	0
1/31/2013	0	150	226	190	2/2/2013	697	266	2/3/2013	0	566	963	8,671	10,200	0
2/1/2013	0	150	227	190	2/3/2013	656	355	2/4/2013	0	567	1,011	7,242	8,820	0
2/2/2013	0	150	226	190	2/4/2013	419	426	2/5/2013	0	566	845	5,729	7,140	0
2/3/2013	0	150	347	190	2/5/2013	751	443	2/6/2013	0	687	1,194	5,139	7,020	0
2/4/2013	0	150	528	190	2/6/2013	706	390	2/7/2013	0	868	1,096	4,326	6,290	0
2/5/2013	0	150	529	190	2/7/2013	755	390	2/8/2013	0	869	1,145	3,996	6,010	0
2/6/2013	0	150	531	190	2/8/2013	673	408	2/9/2013	0	871	1,081	3,778	5,730	0
2/7/2013	0	150	531	190	2/9/2013	654	355	2/10/2013	0	871	1,009	3,380	5,260	0
2/8/2013	0	150	534	190	2/10/2013	574	355	2/11/2013	0	874	929	3,487	5,290	0
2/9/2013	0	150	526	190	2/11/2013	648	372	2/12/2013	0	866	1,020	3,584	5,470	0
2/10/2013	0	150	589	190	2/12/2013	682	301	2/13/2013	0	929	983	3,388	5,300	0
2/11/2013	0	150	698	190	2/13/2013	750	230	2/14/2013	0	1,038	980	3,182	5,200	0
2/12/2013	0	150	699	189	2/14/2013	745	230	2/15/2013	0	1,038	975	3,057	5,070	0
2/13/2013	0	150	701	190	2/15/2013	525	106	2/16/2013	0	1,041	631	3,068	4,740	0
2/14/2013	0	150	698	189	2/16/2013	438	0	2/17/2013	0	1,037	438	2,995	4,470	0
2/15/2013	0	150	699	189	2/17/2013	456	124	2/18/2013	0	1,038	580	2,572	4,190	0
2/16/2013	0	150	480	190	2/18/2013	453	89	2/19/2013	0	820	542	2,118	3,480	0

Table 10. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey, for report year ending November 30, 2013.—Continued

[River Master daily operations record. All provided measurements are the mean discharge in cubic feet per second for 24 hours. Column (col.) 1 = actual release by New York City in response to directed release ordered by the Office of the Delaware River Master; col. 2 = 24 hours beginning 1200 of date shown; col. 3 = 24 hours ending 2400 one day later; col. 4 = 24 hours beginning 1500 one 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 = IERQ bank releases. IERQ, Interim Excess Release Quantity; Th, thermal release; —, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow, Delaware River at Montague, New Jersey					
Directed								Controlled Releases					
Date	Amount	Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	New York City reservoirs		Powerplants	Computed uncontrolled	Total	IERQ bank releases
									Directed	Other				
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6		Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
2/17/2013	0	150	224	184	2/19/2013	442	124	2/20/2013	0	558	566	2,416	3,540	0
2/18/2013	0	150	224	152	2/20/2013	425	124	2/21/2013	0	526	549	2,235	3,310	0
2/19/2013	0	150	226	125	2/21/2013	355	18	2/22/2013	0	501	373	2,076	2,950	0
2/20/2013	0	150	226	125	2/22/2013	372	18	2/23/2013	0	501	390	2,169	3,060	0
2/21/2013	0	150	224	118	2/23/2013	0	18	2/24/2013	0	492	18	2,280	2,790	0
2/22/2013	0	149	226	90	2/24/2013	0	18	2/25/2013	0	465	18	2,337	2,820	0
2/23/2013	0	150	224	76	2/25/2013	161	230	2/26/2013	0	450	391	2,089	2,930	0
2/24/2013	0	150	224	76	2/26/2013	213	230	2/27/2013	0	450	443	2,327	3,220	0
2/25/2013	0	150	224	76	2/27/2013	220	230	2/28/2013	0	450	450	3,490	4,390	0
2/26/2013	0	150	224	76	2/28/2013	163	230	3/1/2013	0	450	393	4,197	5,040	0
2/27/2013	0	150	224	76	3/1/2013	87	106	3/2/2013	0	450	193	3,737	4,380	0
2/28/2013	0	150	224	76	3/2/2013	0	106	3/3/2013	0	450	106	3,114	3,670	0
3/1/2013	0	150	224	76	3/3/2013	0	0	3/4/2013	0	450	0	2,870	3,320	0
3/2/2013	0	150	224	76	3/4/2013	145	0	3/5/2013	0	450	145	2,635	3,230	0
3/3/2013	0	150	226	76	3/5/2013	206	0	3/6/2013	0	452	206	2,502	3,160	0
3/4/2013	0	150	224	76	3/6/2013	214	0	3/7/2013	0	450	214	2,476	3,140	0
3/5/2013	0	150	224	76	3/7/2013	249	106	3/8/2013	0	450	355	2,505	3,310	0
3/6/2013	0	150	223	76	3/8/2013	304	0	3/9/2013	0	449	304	2,557	3,310	0
3/7/2013	0	150	223	76	3/9/2013	0	0	3/10/2013	0	449	0	2,631	3,080	0
3/8/2013	0	150	223	73	3/10/2013	78	142	3/11/2013	0	446	220	2,934	3,600	0
3/9/2013	0	144	213	76	3/11/2013	284	266	3/12/2013	0	433	550	4,397	5,380	0
3/10/2013	0	150	223	76	3/12/2013	239	390	3/13/2013	0	449	629	19,422	20,500	0
3/11/2013	0	150	224	76	3/13/2013	0	496	3/14/2013	0	450	496	15,454	16,400	0
3/12/2013	0	150	226	76	3/14/2013	66	532	3/15/2013	0	452	598	10,650	11,700	0
3/13/2013	0	150	227	76	3/15/2013	655	337	3/16/2013	0	453	992	8,015	9,460	0
3/14/2013	0	150	260	76	3/16/2013	681	213	3/17/2013	0	486	894	6,880	8,260	0
3/15/2013	0	150	364	76	3/17/2013	691	266	3/18/2013	0	590	957	5,953	7,500	0

Table 10. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey, for report year ending November 30, 2013.—Continued

[River Master daily operations record. All provided measurements are the mean discharge in cubic feet per second for 24 hours. Column (col.) 1 = actual release by New York City in response to directed release ordered by the Office of the Delaware River Master; col. 2 = 24 hours beginning 1200 of date shown; col. 3 = 24 hours ending 2400 one day later; col. 4 = 24 hours beginning 1500 one 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 = IERQ bank releases. IERQ, Interim Excess Release Quantity; Th, thermal release; —, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow, Delaware River at Montague, New Jersey					
Directed								Controlled Releases					
Date	Amount	Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	New York City reservoirs		Powerplants	Computed uncontrolled	Total	IERQ bank releases
									Directed	Other				
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6		Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
3/16/2013	0	150	582	76	3/18/2013	1,053	355	3/19/2013	0	808	1,408	5,304	7,520	0
3/17/2013	0	150	704	76	3/19/2013	519	408	3/20/2013	0	930	927	4,953	6,810	0
3/18/2013	0	150	704	76	3/20/2013	274	479	3/21/2013	0	930	753	4,617	6,300	0
3/19/2013	0	150	704	76	3/21/2013	1,141	319	3/22/2013	0	930	1,460	4,190	6,580	0
3/20/2013	0	150	704	76	3/22/2013	1,425	230	3/23/2013	0	930	1,655	3,775	6,360	0
3/21/2013	0	150	701	76	3/23/2013	1,173	230	3/24/2013	0	927	1,403	3,420	5,750	0
3/22/2013	0	150	701	76	3/24/2013	832	284	3/25/2013	0	927	1,116	3,457	5,500	0
3/23/2013	0	150	701	76	3/25/2013	500	355	3/26/2013	0	927	855	3,398	5,180	0
3/24/2013	0	150	698	76	3/26/2013	0	372	3/27/2013	0	924	372	3,504	4,800	0
3/25/2013	0	150	699	76	3/27/2013	0	213	3/28/2013	0	925	213	3,472	4,610	0
3/26/2013	0	150	699	76	3/28/2013	0	160	3/29/2013	0	925	160	3,485	4,570	0
3/27/2013	0	150	699	76	3/29/2013	0	160	3/30/2013	0	925	160	3,375	4,460	0
3/28/2013	0	150	667	76	3/30/2013	0	160	3/31/2013	0	893	160	3,237	4,290	0
3/29/2013	0	150	543	76	3/31/2013	0	230	4/1/2013	0	769	230	3,551	4,550	0
3/30/2013	0	150	446	76	4/1/2013	0	284	4/2/2013	0	672	284	4,244	5,200	0
3/31/2013	0	150	347	73	4/2/2013	0	337	4/3/2013	0	570	337	4,183	5,090	0
4/1/2013	0	149	291	59	4/3/2013	0	337	4/4/2013	0	499	337	3,684	4,520	0
4/2/2013	0	110	226	53	4/4/2013	0	337	4/5/2013	0	389	337	3,434	4,160	0
4/3/2013	0	80	200	51	4/5/2013	0	301	4/6/2013	0	331	301	3,258	3,890	0
4/4/2013	0	80	200	50	4/6/2013	0	230	4/7/2013	0	330	230	3,160	3,720	0
4/5/2013	0	80	200	50	4/7/2013	0	266	4/8/2013	0	330	266	3,074	3,670	0
4/6/2013	0	80	200	50	4/8/2013	0	337	4/9/2013	0	330	337	2,963	3,630	0
4/7/2013	0	80	200	50	4/9/2013	0	408	4/10/2013	0	330	408	3,022	3,760	0
4/8/2013	0	80	195	50	4/10/2013	0	426	4/11/2013	0	325	426	4,129	4,880	0
4/9/2013	0	73	176	50	4/11/2013	0	408	4/12/2013	0	299	408	6,083	6,790	0
4/10/2013	0	70	176	50	4/12/2013	0	319	4/13/2013	0	296	319	7,315	7,930	0
4/11/2013	0	70	176	50	4/13/2013	0	230	4/14/2013	0	296	230	6,824	7,350	0

Table 10. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey, for report year ending November 30, 2013.—Continued

[River Master daily operations record. All provided measurements are the mean discharge in cubic feet per second for 24 hours. Column (col.) 1 = actual release by New York City in response to directed release ordered by the Office of the Delaware River Master; col. 2 = 24 hours beginning 1200 of date shown; col. 3 = 24 hours ending 2400 one day later; col. 4 = 24 hours beginning 1500 one 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 = IERQ bank releases. IERQ, Interim Excess Release Quantity; Th, thermal release; —, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow, Delaware River at Montague, New Jersey					
Directed								Controlled Releases					
Date	Amount	Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	New York City reservoirs		Powerplants	Computed uncontrolled	Total	IERQ bank releases
									Directed	Other				
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6		Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
4/12/2013	0	68	176	50	4/14/2013	0	230	4/15/2013	0	294	230	5,586	6,110	0
4/13/2013	0	70	176	50	4/15/2013	0	230	4/16/2013	0	296	230	4,864	5,390	0
4/14/2013	0	70	184	50	4/16/2013	31	266	4/17/2013	0	304	297	4,559	5,160	0
4/15/2013	0	80	200	50	4/17/2013	33	266	4/18/2013	0	330	299	4,661	5,290	0
4/16/2013	0	80	198	50	4/18/2013	0	337	4/19/2013	0	328	337	4,255	4,920	0
4/17/2013	0	80	198	50	4/19/2013	0	408	4/20/2013	0	328	408	6,324	7,060	0
4/18/2013	0	80	200	50	4/20/2013	0	142	4/21/2013	0	330	142	8,718	9,190	0
4/19/2013	0	80	200	50	4/21/2013	0	266	4/22/2013	0	330	266	6,744	7,340	0
4/20/2013	0	80	200	50	4/22/2013	0	266	4/23/2013	0	330	266	5,704	6,300	0
4/21/2013	0	80	258	56	4/23/2013	0	372	4/24/2013	0	394	372	5,274	6,040	0
4/22/2013	0	97	399	56	4/24/2013	23	372	4/25/2013	0	552	395	4,563	5,510	0
4/23/2013	0	101	215	56	4/25/2013	0	408	4/26/2013	0	372	408	4,170	4,950	0
4/24/2013	0	101	402	56	4/26/2013	0	266	4/27/2013	0	559	266	3,785	4,610	0
4/25/2013	0	101	404	56	4/27/2013	0	124	4/28/2013	0	561	124	3,415	4,100	0
4/26/2013	0	101	404	56	4/28/2013	20	18	4/29/2013	0	561	38	3,251	3,850	0
4/27/2013	0	101	401	56	4/29/2013	27	124	4/30/2013	0	558	151	3,241	3,950	0
4/28/2013	0	101	401	56	4/30/2013	0	0	5/1/2013	0	558	0	3,282	3,840	0
4/29/2013	0	101	399	65	5/1/2013	0	230	5/2/2013	0	565	230	2,935	3,730	0
4/30/2013	0	101	399	79	5/2/2013	0	124	5/3/2013	0	579	124	2,607	3,310	0
5/1/2013	0	99	289	50	5/3/2013	0	0	5/4/2013	0	438	0	2,402	2,840	0
5/2/2013	0	80	227	70	5/4/2013	0	142	5/5/2013	0	377	142	2,231	2,750	0
5/3/2013	0	88	223	70	5/5/2013	22	18	5/6/2013	0	381	40	2,109	2,530	0
5/4/2013	0	90	223	68	5/6/2013	18	89	5/7/2013	0	381	107	2,022	2,510	0
5/5/2013	0	90	193	65	5/7/2013	13	0	5/8/2013	0	348	13	2,139	2,500	0
5/6/2013	64	85	173	65	5/8/2013	0	106	5/9/2013	64	259	106	3,941	4,370	0
5/7/2013	0	85	173	65	5/9/2013	0	230	5/10/2013	0	323	230	4,327	4,880	0
5/8/2013	0	85	167	60	5/10/2013	0	124	5/11/2013	0	312	124	3,654	4,090	0

Table 10. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey, for report year ending November 30, 2013.—Continued

[River Master daily operations record. All provided measurements are the mean discharge in cubic feet per second for 24 hours. Column (col.) 1 = actual release by New York City in response to directed release ordered by the Office of the Delaware River Master; col. 2 = 24 hours beginning 1200 of date shown; col. 3 = 24 hours ending 2400 one day later; col. 4 = 24 hours beginning 1500 one 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 = IERQ bank releases. IERQ, Interim Excess Release Quantity; Th, thermal release; —, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow, Delaware River at Montague, New Jersey					
Directed								Controlled Releases					
Date	Amount	Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	New York City reservoirs		Powerplants	Computed uncontrolled	Total	IERQ bank releases
									Directed	Other				
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6		Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
5/9/2013	0	76	159	60	5/11/2013	0	0	5/12/2013	0	295	0	4,825	5,120	0
5/10/2013	0	74	159	60	5/12/2013	18	142	5/13/2013	0	293	160	5,347	5,800	0
5/11/2013	0	74	159	60	5/13/2013	430	160	5/14/2013	0	293	590	4,297	5,180	0
5/12/2013	0	74	156	56	5/14/2013	440	248	5/15/2013	0	286	688	3,626	4,600	0
5/13/2013	0	74	152	56	5/15/2013	354	35	5/16/2013	0	282	389	3,359	4,030	0
5/14/2013	0	74	152	56	5/16/2013	256	0	5/17/2013	0	282	256	3,082	3,620	0
5/15/2013	0	74	152	56	5/17/2013	120	160	5/18/2013	0	282	280	2,738	3,300	0
5/16/2013	0	74	152	56	5/18/2013	0	0	5/19/2013	0	282	0	2,518	2,800	0
5/17/2013	0	74	152	56	5/19/2013	15	71	5/20/2013	0	282	86	2,442	2,810	0
5/18/2013	0	74	152	56	5/20/2013	248	213	5/21/2013	0	282	461	2,367	3,110	0
5/19/2013	0	74	152	59	5/21/2013	256	106	5/22/2013	0	285	362	2,203	2,850	0
5/20/2013	0	77	184	65	5/22/2013	315	0	5/23/2013	0	326	315	2,249	2,890	0
5/21/2013	0	88	198	65	5/23/2013	177	71	5/24/2013	0	351	248	3,611	4,210	0
5/22/2013	0	88	198	65	5/24/2013	0	89	5/25/2013	0	351	89	4,570	5,010	0
5/23/2013	0	90	198	65	5/25/2013	0	142	5/26/2013	0	353	142	4,495	4,990	0
5/24/2013	0	90	200	65	5/26/2013	0	71	5/27/2013	0	355	71	4,234	4,660	0
5/25/2013	0	90	200	65	5/27/2013	25	0	5/28/2013	0	355	25	3,760	4,140	0
5/26/2013	0	90	201	65	5/28/2013	148	195	5/29/2013	0	356	343	3,951	4,650	0
5/27/2013	0	90	203	73	5/29/2013	346	195	5/30/2013	0	366	541	5,003	5,910	0
5/28/2013	0	93	231	101	5/30/2013	423	284	5/31/2013	0	425	707	6,608	7,740	0
5/29/2013	0	127	251	101	5/31/2013	431	124	6/1/2013	0	479	555	7,856	8,890	0
5/30/2013	0	42	407	104	6/1/2013	460	71	6/2/2013	0	553	531	7,176	8,260	0
5/31/2013	0	133	995	110	6/2/2013	329	106	6/3/2013	0	1238	435	5,167	6,840	0
6/1/2013	0	150	456	110	6/3/2013	312	177	6/4/2013	0	716	489	4,645	5,850	0
6/2/2013	0	150	278	111	6/4/2013	271	195	6/5/2013	0	539	466	4,265	5,270	0
6/3/2013	0	150	330	127	6/5/2013	333	0	6/6/2013	0	607	333	3,750	4,690	0
6/4/2013	0	150	480	139	6/6/2013	562	106	6/7/2013	0	769	668	3,693	5,130	0

Table 10. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey, for report year ending November 30, 2013.—Continued

[River Master daily operations record. All provided measurements are the mean discharge in cubic feet per second for 24 hours. Column (col.) 1 = actual release by New York City in response to directed release ordered by the Office of the Delaware River Master; col. 2 = 24 hours beginning 1200 of date shown; col. 3 = 24 hours ending 2400 one day later; col. 4 = 24 hours beginning 1500 one 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 = IERQ bank releases. IERQ, Interim Excess Release Quantity; Th, thermal release; —, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow, Delaware River at Montague, New Jersey					
Directed								Controlled Releases					
Date	Amount	Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	New York City reservoirs		Powerplants	Computed uncontrolled	Total	IERQ bank releases
									Directed	Other				
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6		Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
6/5/2013	0	150	605	139	6/7/2013	297	160	6/8/2013	0	894	457	5,759	7,110	0
6/6/2013	0	150	605	139	6/8/2013	0	106	6/9/2013	0	894	106	5,180	6,180	0
6/7/2013	0	150	606	139	6/9/2013	8	177	6/10/2013	0	895	185	4,420	5,500	0
6/8/2013	0	150	603	139	6/10/2013	430	248	6/11/2013	0	892	678	13,430	15,000	0
6/9/2013	0	150	605	139	6/11/2013	1,104	851	6/12/2013	0	894	1,955	14,251	17,100	0
6/10/2013	0	150	603	131	6/12/2013	1,600	851	6/13/2013	0	884	2,451	11,665	15,000	0
6/11/2013	0	150	603	62	6/13/2013	676	638	6/14/2013	0	815	1,314	29,371	31,500	0
6/12/2013	0	82	605	139	6/14/2013	1,279	638	6/15/2013	0	826	1,917	28,857	31,600	0
6/13/2013	0	88	606	139	6/15/2013	1,079	851	6/16/2013	0	833	1,930	20,037	22,800	0
6/14/2013	0	60	606	155	6/16/2013	992	851	6/17/2013	0	821	1,843	15,036	17,700	0
6/15/2013	0	60	809	190	6/17/2013	887	851	6/18/2013	0	1,059	1,738	11,603	14,400	0
6/16/2013	0	60	1,433	190	6/18/2013	621	319	6/19/2013	0	1,683	940	8,977	11,600	0
6/17/2013	0	178	1,499	190	6/19/2013	984	337	6/20/2013	0	1,867	1,321	6,692	9,880	0
6/18/2013	0	659	1,497	190	6/20/2013	836	408	6/21/2013	0	2,346	1,244	4,670	8,260	0
6/19/2013	0	699	1,499	190	6/21/2013	471	372	6/22/2013	0	2,388	843	3,539	6,770	0
6/20/2013	0	699	1,417	147	6/22/2013	520	230	6/23/2013	0	2,263	750	2,407	5,420	0
6/21/2013	0	472	913	110	6/23/2013	399	124	6/24/2013	0	1,495	523	2,692	4,710	0
6/22/2013	0	326	702	110	6/24/2013	466	426	6/25/2013	0	1,138	892	2,520	4,550	0
6/23/2013	0	314	596	110	6/25/2013	516	319	6/26/2013	0	1,020	835	2,435	4,290	0
6/24/2013	0	144	501	110	6/26/2013	443	319	6/27/2013	0	755	762	2,673	4,190	0
6/25/2013	0	141	501	110	6/27/2013	396	851	6/28/2013	0	752	1,247	12,101	14,100	0
6/26/2013	0	141	501	110	6/28/2013	1,523	53	6/29/2013	0	752	1,576	17,772	20,100	0
6/27/2013	0	141	501	110	6/29/2013	1,267	177	6/30/2013	0	752	1,444	10,104	12,300	0
6/28/2013	0	141	503	110	6/30/2013	1,296	248	7/1/2013	0	754	1,544	13,902	16,200	0
6/29/2013	0	141	504	110	7/1/2013	1,560	851	7/2/2013	0	755	2,411	16,834	20,000	0
6/30/2013	0	141	504	111	7/2/2013	1,560	851	7/3/2013	0	756	2,411	14,533	17,700	0
7/1/2013	0	141	600	150	7/3/2013	1,560	851	7/4/2013	0	891	2,411	10,398	13,700	0

Table 10. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey, for report year ending November 30, 2013.—Continued

[River Master daily operations record. All provided measurements are the mean discharge in cubic feet per second for 24 hours. Column (col.) 1 = actual release by New York City in response to directed release ordered by the Office of the Delaware River Master; col. 2 = 24 hours beginning 1200 of date shown; col. 3 = 24 hours ending 2400 one day later; col. 4 = 24 hours beginning 1500 one 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 = IERQ bank releases. IERQ, Interim Excess Release Quantity; Th, thermal release; —, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow, Delaware River at Montague, New Jersey					
Directed								Controlled Releases					
Date	Amount	Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	New York City reservoirs		Powerplants	Computed uncontrolled	Total	IERQ bank releases
									Directed	Other				
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6		Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
7/2/2013	0	149	1064	189	7/4/2013	1,560	851	7/5/2013	0	1,402	2,411	7,287	11,100	0
7/3/2013	0	286	1204	190	7/5/2013	780	496	7/6/2013	0	1,680	1,276	5,304	8,260	0
7/4/2013	0	467	1145	189	7/6/2013	598	355	7/7/2013	0	1,801	953	4,066	6,820	0
7/5/2013	0	503	869	189	7/7/2013	517	355	7/8/2013	0	1,561	872	3,647	6,080	0
7/6/2013	0	500	710	179	7/8/2013	482	496	7/9/2013	0	1,389	978	3,233	5,600	0
7/7/2013	0	498	636	150	7/9/2013	452	284	7/10/2013	0	1,284	736	3,130	5,150	0
7/8/2013	0	297	600	150	7/10/2013	452	496	7/11/2013	0	1,047	948	2,785	4,780	0
7/9/2013	0	150	602	150	7/11/2013	463	390	7/12/2013	0	902	853	2,565	4,320	0
7/10/2013	0	150	602	150	7/12/2013	418	284	7/13/2013	0	902	702	2,426	4,030	0
7/11/2013	0	150	602	149	7/13/2013	359	124	7/14/2013	0	901	483	2,286	3,670	0
7/12/2013	0	150	602	139	7/14/2013	548	230	7/15/2013	0	891	778	2,201	3,870	0
7/13/2013	0	150	600	139	7/15/2013	516	426	7/16/2013	0	889	942	1,979	3,810	0
7/14/2013	0	150	600	139	7/16/2013	510	426	7/17/2013	0	889	936	1,815	3,640	0
7/15/2013	0	150	599	139	7/17/2013	623	426	7/18/2013	0	888	1,049	1,763	3,700	0
7/16/2013	0	150	877	139	7/18/2013	682	355	7/19/2013	0	1,166	1,037	1,647	3,850	277, Th
7/17/2013	0	150	894	139	7/19/2013	634	319	7/20/2013	0	1,183	953	1,534	3,670	294, Th
7/18/2013	0	149	679	139	7/20/2013	517	53	7/21/2013	0	967	570	1,453	2,990	79, Th
7/19/2013	0	149	599	139	7/21/2013	280	124	7/22/2013	0	887	404	1,399	2,690	0
7/20/2013	284	149	599	139	7/22/2013	119	124	7/23/2013	284	603	243	1,670	2,800	0
7/21/2013	139	150	599	139	7/23/2013	131	160	7/24/2013	139	749	291	1,961	3,140	0
7/22/2013	268	150	599	139	7/24/2013	93	106	7/25/2013	268	620	199	2,073	3,160	0
7/23/2013	154	150	599	139	7/25/2013	44	53	7/26/2013	154	734	97	1,695	2,680	0
7/24/2013	70	150	597	139	7/26/2013	17	0	7/27/2013	70	816	17	1,427	2,330	0
7/25/2013	0	150	602	139	7/27/2013	102	89	7/28/2013	0	891	191	1,488	2,570	0
7/26/2013	0	150	600	138	7/28/2013	88	18	7/29/2013	0	888	106	1,806	2,800	0
7/27/2013	0	150	602	136	7/29/2013	101	0	7/30/2013	0	888	101	2,101	3,090	0
7/28/2013	0	150	554	108	7/30/2013	101	0	7/31/2013	0	812	101	1,747	2,660	0

Table 10. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey, for report year ending November 30, 2013.—Continued

[River Master daily operations record. All provided measurements are the mean discharge in cubic feet per second for 24 hours. Column (col.) 1 = actual release by New York City in response to directed release ordered by the Office of the Delaware River Master; col. 2 = 24 hours beginning 1200 of date shown; col. 3 = 24 hours ending 2400 one day later; col. 4 = 24 hours beginning 1500 one 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 = IERQ bank releases. IERQ, Interim Excess Release Quantity; Th, thermal release; —, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow, Delaware River at Montague, New Jersey					
Directed								Controlled Releases					
Date	Amount	Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	New York City reservoirs		Powerplants	Computed uncontrolled	Total	IERQ bank releases
									Directed	Other				
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6		Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
7/29/2013	0	139	497	110	7/31/2013	315	142	8/1/2013	0	746	457	1,427	2,630	0
7/30/2013	0	139	500	110	8/1/2013	165	230	8/2/2013	0	749	395	1,456	2,600	0
7/31/2013	0	105	506	110	8/2/2013	385	106	8/3/2013	0	721	491	1,648	2,860	0
8/1/2013	0	132	503	110	8/3/2013	256	0	8/4/2013	0	745	256	1,599	2,600	0
8/2/2013	0	139	503	108	8/4/2013	273	106	8/5/2013	0	750	379	1,401	2,530	0
8/3/2013	0	139	498	108	8/5/2013	280	106	8/6/2013	0	745	386	1,199	2,330	0
8/4/2013	0	139	500	108	8/6/2013	217	0	8/7/2013	0	747	217	1,166	2,130	0
8/5/2013	0	139	498	110	8/7/2013	197	0	8/8/2013	0	747	197	1,126	2,070	0
8/6/2013	0	139	500	111	8/8/2013	223	0	8/9/2013	0	750	223	3,427	4,400	0
8/7/2013	0	139	501	110	8/9/2013	287	124	8/10/2013	0	750	411	12,239	13,400	0
8/8/2013	0	139	501	110	8/10/2013	115	248	8/11/2013	0	750	363	7,357	8,470	0
8/9/2013	0	139	501	110	8/11/2013	164	124	8/12/2013	0	750	288	4,332	5,370	0
8/10/2013	0	139	501	110	8/12/2013	94	213	8/13/2013	0	750	307	3,393	4,450	0
8/11/2013	0	139	501	110	8/13/2013	18	106	8/14/2013	0	750	124	3,286	4,160	0
8/12/2013	0	139	498	110	8/14/2013	63	0	8/15/2013	0	747	63	3,190	4,000	0
8/13/2013	0	139	501	110	8/15/2013	85	0	8/16/2013	0	750	85	2,585	3,420	0
8/14/2013	0	139	501	113	8/16/2013	83	0	8/17/2013	0	753	83	2,234	3,070	0
8/15/2013	0	139	552	139	8/17/2013	103	0	8/18/2013	0	830	103	2,027	2,960	0
8/16/2013	0	150	603	139	8/18/2013	123	89	8/19/2013	0	892	212	1,876	2,980	0
8/17/2013	0	150	602	139	8/19/2013	87	160	8/20/2013	0	891	247	1,662	2,800	0
8/18/2013	0	150	600	139	8/20/2013	107	71	8/21/2013	0	889	178	1,653	2,720	0
8/19/2013	211	150	602	139	8/21/2013	198	124	8/22/2013	211	680	322	1,677	2,890	0
8/20/2013	0	150	602	139	8/22/2013	279	53	8/23/2013	0	891	332	1,507	2,730	0
8/21/2013	0	150	602	135	8/23/2013	365	0	8/24/2013	0	887	365	1,448	2,700	0
8/22/2013	125	150	546	110	8/24/2013	253	177	8/25/2013	125	681	430	1,394	2,630	0
8/23/2013	67	139	490	110	8/25/2013	343	0	8/26/2013	67	672	343	1,368	2,450	0
8/24/2013	148	139	497	110	8/26/2013	338	124	8/27/2013	148	598	462	1,532	2,740	0

Table 10. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey, for report year ending November 30, 2013.—Continued

[River Master daily operations record. All provided measurements are the mean discharge in cubic feet per second for 24 hours. Column (col.) 1 = actual release by New York City in response to directed release ordered by the Office of the Delaware River Master; col. 2 = 24 hours beginning 1200 of date shown; col. 3 = 24 hours ending 2400 one day later; col. 4 = 24 hours beginning 1500 one 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 = IERQ bank releases. IERQ, Interim Excess Release Quantity; Th, thermal release; —, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow, Delaware River at Montague, New Jersey					
Directed								Controlled Releases					
Date	Amount	Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	New York City reservoirs		Powerplants	Computed uncontrolled	Total	IERQ bank releases
									Directed	Other				
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6		Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
8/25/2013	254	139	498	110	8/27/2013	415	71	8/28/2013	254	493	486	2,447	3,680	0
8/26/2013	0	139	500	110	8/28/2013	271	0	8/29/2013	0	749	271	2,770	3,790	0
8/27/2013	0	139	498	110	8/29/2013	270	53	8/30/2013	0	747	323	3,030	4,100	0
8/28/2013	0	139	498	110	8/30/2013	291	106	8/31/2013	0	747	397	2,826	3,970	0
8/29/2013	0	139	497	110	8/31/2013	341	53	9/1/2013	0	746	394	2,350	3,490	0
8/30/2013	0	139	498	107	9/1/2013	257	0	9/2/2013	0	744	257	2,809	3,810	0
8/31/2013	0	141	484	101	9/2/2013	273	106	9/3/2013	0	726	379	3,675	4,780	0
9/1/2013	0	150	469	101	9/3/2013	174	567	9/4/2013	0	720	741	5,419	6,880	0
9/2/2013	0	150	473	101	9/4/2013	188	124	9/5/2013	0	724	312	3,754	4,790	0
9/3/2013	0	150	476	101	9/5/2013	79	124	9/6/2013	0	727	203	2,920	3,850	0
9/4/2013	0	150	476	101	9/6/2013	88	177	9/7/2013	0	727	265	2,438	3,430	0
9/5/2013	0	150	475	101	9/7/2013	273	89	9/8/2013	0	726	362	1,892	2,980	0
9/6/2013	0	150	476	101	9/8/2013	105	124	9/9/2013	0	727	229	1,714	2,670	0
9/7/2013	0	150	467	101	9/9/2013	365	230	9/10/2013	0	718	595	1,587	2,900	0
9/8/2013	0	150	473	101	9/10/2013	455	337	9/11/2013	0	724	792	1,494	3,010	0
9/9/2013	0	150	476	101	9/11/2013	459	426	9/12/2013	0	727	885	1,668	3,280	0
9/10/2013	0	150	475	101	9/12/2013	184	372	9/13/2013	0	726	556	2,508	3,790	0
9/11/2013	0	150	478	101	9/13/2013	134	319	9/14/2013	0	729	453	2,558	3,740	0
9/12/2013	0	150	480	101	9/14/2013	0	195	9/15/2013	0	731	195	2,354	3,280	0
9/13/2013	0	150	480	101	9/15/2013	0	195	9/16/2013	0	731	195	2,004	2,930	0
9/14/2013	0	150	480	101	9/16/2013	0	71	9/17/2013	0	731	71	1,788	2,590	0
9/15/2013	0	150	415	101	9/17/2013	16	0	9/18/2013	0	666	16	1,658	2,340	0
9/16/2013	0	150	381	101	9/18/2013	11	0	9/19/2013	0	632	11	1,577	2,220	0
9/17/2013	92	150	373	101	9/19/2013	0	0	9/20/2013	92	532	0	1,436	2,060	0
9/18/2013	199	150	379	101	9/20/2013	78	0	9/21/2013	199	431	78	1,382	2,090	0
9/19/2013	0	150	377	101	9/21/2013	311	195	9/22/2013	0	628	506	1,456	2,590	0
9/20/2013	16	150	371	101	9/22/2013	7	18	9/23/2013	16	606	25	1,473	2,120	0

Table 10. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey, for report year ending November 30, 2013.—Continued

[River Master daily operations record. All provided measurements are the mean discharge in cubic feet per second for 24 hours. Column (col.) 1 = actual release by New York City in response to directed release ordered by the Office of the Delaware River Master; col. 2 = 24 hours beginning 1200 of date shown; col. 3 = 24 hours ending 2400 one day later; col. 4 = 24 hours beginning 1500 one 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 = IERQ bank releases. IERQ, Interim Excess Release Quantity; Th, thermal release; —, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow, Delaware River at Montague, New Jersey					
Directed								Controlled Releases					
Date	Amount	Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	New York City reservoirs		Powerplants	Computed uncontrolled	Total	IERQ bank releases
									Directed	Other				
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6		Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
9/21/2013	0	150	374	101	9/23/2013	312	0	9/24/2013	0	625	312	1,383	2,320	0
9/22/2013	34	150	379	101	9/24/2013	430	0	9/25/2013	34	596	430	1,270	2,330	0
9/23/2013	0	150	379	101	9/25/2013	361	0	9/26/2013	0	630	361	1,179	2,170	0
9/24/2013	82	150	377	101	9/26/2013	287	0	9/27/2013	82	546	287	1,055	1,970	0
9/25/2013	647	150	396	101	9/27/2013	0	0	9/28/2013	647	0	0	963	1,610	0
9/26/2013	704	150	453	101	9/28/2013	17	0	9/29/2013	704	0	17	889	1,610	0
9/27/2013	1,000	150	749	101	9/29/2013	33	177	9/30/2013	1,000	0	210	800	2,010	0
9/28/2013	1,105	150	854	101	9/30/2013	12	195	10/1/2013	1,105	0	207	768	2,080	0
9/29/2013	1,204	150	961	93	10/1/2013	0	0	10/2/2013	1,204	0	0	746	1,950	0
9/30/2013	1,254	150	1030	74	10/2/2013	0	0	10/3/2013	1,254	0	0	656	1,910	0
10/1/2013	1,024	150	800	74	10/3/2013	0	0	10/4/2013	1,024	0	0	666	1,690	0
10/2/2013	1,011	150	787	74	10/4/2013	0	71	10/5/2013	1,011	0	71	658	1,740	0
10/3/2013	1,129	150	905	74	10/5/2013	0	0	10/6/2013	1,129	0	0	731	1,860	0
10/4/2013	1,124	150	900	74	10/6/2013	0	0	10/7/2013	1,124	0	0	1,336	2,460	0
10/5/2013	1,231	150	1,007	74	10/7/2013	0	0	10/8/2013	1,231	0	0	1,529	2,760	0
10/6/2013	481	150	257	74	10/8/2013	0	0	10/9/2013	481	0	0	2,179	2,660	0
10/7/2013	384	150	223	74	10/9/2013	0	0	10/10/2013	384	63	0	1,673	2,120	0
10/8/2013	544	147	323	74	10/10/2013	0	0	10/11/2013	544	0	0	1,266	1,810	0
10/9/2013	262	150	224	74	10/11/2013	0	0	10/12/2013	262	186	0	1,152	1,600	0
10/10/2013	0	150	224	74	10/12/2013	0	0	10/13/2013	0	448	0	1,022	1,470	0
10/11/2013	139	150	227	74	10/13/2013	0	35	10/14/2013	139	312	35	924	1,410	0
10/12/2013	544	150	320	74	10/14/2013	0	124	10/15/2013	544	0	124	802	1,470	0
10/13/2013	696	150	472	74	10/15/2013	27	124	10/16/2013	696	0	151	993	1,840	0
10/14/2013	719	150	495	74	10/16/2013	0	106	10/17/2013	719	0	106	1,035	1,860	0
10/15/2013	777	149	554	74	10/17/2013	0	230	10/18/2013	777	0	230	1,043	2,050	0
10/16/2013	857	150	633	74	10/18/2013	0	160	10/19/2013	857	0	160	1,013	2,030	0
10/17/2013	558	150	334	74	10/19/2013	0	195	10/20/2013	558	0	195	1,077	1,830	0

Table 10. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey, for report year ending November 30, 2013.—Continued

[River Master daily operations record. All provided measurements are the mean discharge in cubic feet per second for 24 hours. Column (col.) 1 = actual release by New York City in response to directed release ordered by the Office of the Delaware River Master; col. 2 = 24 hours beginning 1200 of date shown; col. 3 = 24 hours ending 2400 one day later; col. 4 = 24 hours beginning 1500 one 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 = IERQ bank releases. IERQ, Interim Excess Release Quantity; Th, thermal release; —, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow, Delaware River at Montague, New Jersey					
Directed								Controlled Releases					
Date	Amount	Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	New York City reservoirs		Powerplants	Computed uncontrolled	Total	IERQ bank releases
									Directed	Other				
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6		Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
10/18/2013	654	150	430	74	10/20/2013	0	89	10/21/2013	654	0	89	1,037	1,780	0
10/19/2013	504	150	280	74	10/21/2013	0	0	10/22/2013	504	0	0	1,036	1,540	0
10/20/2013	554	150	330	74	10/22/2013	15	0	10/23/2013	554	0	15	881	1,450	0
10/21/2013	597	150	373	74	10/23/2013	13	0	10/24/2013	597	0	13	950	1,560	0
10/22/2013	849	150	625	74	10/24/2013	0	0	10/25/2013	849	0	0	871	1,720	0
10/23/2013	820	150	596	74	10/25/2013	0	0	10/26/2013	820	0	0	900	1,720	0
10/24/2013	911	150	687	74	10/26/2013	0	0	10/27/2013	911	0	0	839	1,750	0
10/25/2013	925	150	705	70	10/27/2013	40	35	10/28/2013	925	0	75	770	1,770	0
10/26/2013	857	150	651	56	10/28/2013	0	195	10/29/2013	857	0	195	888	1,940	0
10/27/2013	833	141	636	56	10/29/2013	0	301	10/30/2013	833	0	301	776	1,910	0
10/28/2013	901	101	744	56	10/30/2013	0	0	10/31/2013	901	0	0	779	1,680	0
10/29/2013	770	101	613	56	10/31/2013	37	0	11/1/2013	770	0	37	883	1,690	0
10/30/2013	620	101	463	56	11/1/2013	11	0	11/2/2013	620	0	11	1,359	1,990	0
10/31/2013	536	101	379	56	11/2/2013	0	0	11/3/2013	536	0	0	1,934	2,470	0
11/1/2013	804	101	644	59	11/3/2013	0	53	11/4/2013	804	0	53	1,633	2,490	0
11/2/2013	837	105	676	56	11/4/2013	0	89	11/5/2013	837	0	89	1,304	2,230	0
11/3/2013	412	101	255	56	11/5/2013	0	0	11/6/2013	412	0	0	1,318	1,730	0
11/4/2013	249	101	150	56	11/6/2013	0	0	11/7/2013	249	58	0	1,243	1,550	0
11/5/2013	248	101	152	56	11/7/2013	0	124	11/8/2013	248	61	124	1,297	1,730	0
11/6/2013	265	101	150	56	11/8/2013	0	106	11/9/2013	265	42	106	1,787	2,200	0
11/7/2013	494	101	337	56	11/9/2013	0	0	11/10/2013	494	0	0	1,736	2,230	0
11/8/2013	649	101	492	56	11/10/2013	0	53	11/11/2013	649	0	53	1,548	2,250	0
11/9/2013	613	101	456	56	11/11/2013	0	53	11/12/2013	613	0	53	1,384	2,050	0
11/10/2013	202	101	150	56	11/12/2013	0	142	11/13/2013	202	105	142	1,371	1,820	0
11/11/2013	231	101	152	56	11/13/2013	0	142	11/14/2013	231	78	142	1,299	1,750	0
11/12/2013	275	101	152	56	11/14/2013	0	230	11/15/2013	275	34	230	1,131	1,670	0
11/13/2013	414	101	257	56	11/15/2013	0	89	11/16/2013	414	0	89	1,167	1,670	0

Table 10. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey, for report year ending November 30, 2013.—Continued

[River Master daily operations record. All provided measurements are the mean discharge in cubic feet per second for 24 hours. Column (col.) 1 = actual release by New York City in response to directed release ordered by the Office of the Delaware River Master; col. 2 = 24 hours beginning 1200 of date shown; col. 3 = 24 hours ending 2400 one day later; col. 4 = 24 hours beginning 1500 one 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 = IERQ bank releases. IERQ, Interim Excess Release Quantity; Th, thermal release; —, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow, Delaware River at Montague, New Jersey					
Directed								Controlled Releases					
Date	Amount	Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	New York City reservoirs		Powerplants	Computed uncontrolled	Total	IERQ bank releases
									Directed	Other				
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6		Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
11/14/2013	500	101	343	56	11/16/2013	0	0	11/17/2013	500	0	0	1,160	1,660	0
11/15/2013	352	101	195	56	11/17/2013	0	0	11/18/2013	352	0	0	1,278	1,630	0
11/16/2013	0	101	152	56	11/18/2013	0	372	11/19/2013	0	309	372	1,369	2,050	0
11/17/2013	0	101	152	56	11/19/2013	0	408	11/20/2013	0	309	408	1,833	2,550	0
11/18/2013	0	101	152	56	11/20/2013	0	71	11/21/2013	0	309	71	1,600	1,980	0
11/19/2013	0	101	152	56	11/21/2013	0	195	11/22/2013	0	309	195	1,446	1,950	0
11/20/2013	0	101	152	56	11/22/2013	0	230	11/23/2013	0	309	230	1,431	1,970	0
11/21/2013	200	101	150	56	11/23/2013	0	177	11/24/2013	200	107	177	1,666	2,150	0
11/22/2013	391	101	234	56	11/24/2013	0	443	11/25/2013	391	0	443	1,576	2,410	0
11/23/2013	589	101	432	56	11/25/2013	0	266	11/26/2013	589	0	266	1,345	2,200	0
11/24/2013	626	101	469	56	11/26/2013	0	71	11/27/2013	626	0	71	2,583	3,280	0
11/25/2013	0	101	147	56	11/27/2013	0	89	11/28/2013	0	304	89	9,907	10,300	0
11/26/2013	0	101	147	56	11/28/2013	0	142	11/29/2013	0	304	142	7,024	7,470	0
11/27/2013	0	101	152	56	11/29/2013	0	89	11/30/2013	0	309	89	4,902	5,300	0
Monthly totals														
Dec. 2012	0	3,908	5,901	3,858	—	15,126	5,359	—	0	13,667	20,485	188,418	223,470	0
Jan. 2013	0	4,649	6,968	5,887	—	17,336	12,621	—	0	17,504	29,957	134,069	181,530	0
Feb. 2013	0	4,199	11,239	4,629	—	14,223	6,488	—	0	20,067	20,711	122,412	163,190	0
Mar. 2013	0	4,644	13,163	2,353	—	10,979	6,915	—	0	20,160	17,894	153,116	191,170	0
Apr. 2013	0	2,772	7,791	1,630	—	134	8,545	—	0	12,193	8,679	138,038	158,910	0
May 2013	64	2,617	6,377	1,973	—	3,624	3,245	—	64	10,903	6,869	106,934	124,770	0
June 2013	0	6,216	21,613	3,990	—	19,492	10,936	—	0	31,819	30,428	272,743	334,990	0
July 2013	915	6,261	20,946	4,494	—	17,163	9,841	—	915	30,786	27,004	122,155	180,860	650
Aug. 2013	805	4,345	16,200	3,607	—	6,663	2,533	—	805	24,152	9,196	80,282	113,630	0
Sept. 2013	2,774	4,469	13,536	3,045	—	5,238	3,899	—	2,774	18,276	9,137	59,453	89,640	0
Oct. 2013	23,448	4,588	17,587	2,282	—	107	1,860	—	23,448	1,009	1,967	30,996	57,420	0
Nov. 2013	10,277	3,034	8,507	1,683	—	48	3,634	—	10,277	2,947	3,682	61,514	78,420	0

Table 11. Daily mean discharge, Delaware River at Montague, New Jersey (station number 01438500), for report year ending November 30, 2013.

[Data from U.S. Geological Survey, 2019b. All values except the year's total discharge volume are in cubic feet per second (ft^3/s). The total volume discharged is given in cubic feet per second for a day ([ft^3/s]-d). —, not applicable]

Day	Dec. 2012	Jan. 2013	Feb. 2013	Mar. 2013	Apr. 2013	May 2013	June 2013	July 2013	Aug. 2013	Sept. 2013	Oct. 2013	Nov. 2013
1	2,800	5,580	21,200	5,040	4,550	3,840	8,890	16,700	2,440	3,120	2,120	1,670
2	2,470	4,760	13,300	4,380	5,200	3,730	8,260	20,400	2,400	3,420	2,000	1,960
3	2,530	4,820	10,200	3,670	5,090	3,310	6,840	18,100	2,620	4,350	1,970	2,450
4	2,730	4,510	8,820	3,320	4,520	2,840	5,850	13,900	2,310	6,440	1,760	2,470
5	2,710	4,570	7,140	3,230	4,160	2,750	5,270	11,100	2,270	4,360	1,820	2,210
6	2,600	4,520	7,020	3,160	3,890	2,530	4,710	8,180	2,120	3,440	1,950	1,710
7	2,490	4,820	6,290	3,140	3,720	2,510	5,170	6,660	1,910	3,030	2,600	1,530
8	2,490	4,630	6,010	3,310	3,670	2,500	7,200	6,010	1,840	2,850	2,930	1,700
9	3,110	4,530	5,730	3,310	3,630	4,370	6,250	5,650	4,190	2,540	2,840	2,180
10	3,490	4,170	5,260	3,080	3,760	4,880	5,550	5,170	13,700	2,760	2,290	2,210
11	4,150	4,410	5,290	3,600	4,880	4,090	15,300	4,780	8,370	2,880	1,980	2,230
12	5,000	4,400	5,470	5,380	6,790	5,120	17,600	4,310	5,140	3,150	1,760	2,100
13	4,700	4,720	5,300	20,500	7,930	5,800	15,400	4,000	4,200	3,660	1,640	1,870
14	4,370	6,710	5,200	16,400	7,350	5,180	31,800	3,620	3,890	3,600	1,590	1,800
15	3,950	9,810	5,070	11,700	6,110	4,600	31,900	3,830	3,730	3,150	1,660	1,710
16	3,390	9,530	4,740	9,460	5,390	4,030	23,200	3,750	3,150	2,800	1,830	1,710
17	3,520	8,390	4,470	8,260	5,160	3,620	18,200	3,570	2,800	2,460	1,850	1,700
18	4,970	7,790	4,190	7,500	5,290	3,300	14,800	3,630	2,670	2,210	2,050	1,670
19	8,460	7,070	3,480	7,520	4,920	2,800	11,800	3,770	2,690	2,090	2,020	2,100
20	7,680	6,690	3,540	6,810	7,060	2,810	10,100	3,580	2,510	1,940	1,820	2,620
21	17,100	6,160	3,310	6,300	9,190	3,110	8,400	2,880	2,430	1,970	1,770	2,030
22	34,000	5,640	2,950	6,580	7,340	2,850	6,860	2,580	2,590	2,460	1,520	2,000
23	20,800	[1]4,500	3,060	6,360	6,300	2,890	5,470	2,670	2,430	1,990	1,430	2,020
24	14,700	[1]3,560	2,790	5,750	6,040	4,210	4,740	3,010	2,400	2,190	1,540	2,200
25	12,000	[1]3,640	2,820	5,500	5,510	5,010	4,570	3,020	2,320	2,200	1,710	2,470
26	10,300	[1]3,760	2,930	5,180	4,950	4,990	4,300	2,530	2,140	2,050	1,710	2,260
27	8,990	[1]3,830	3,220	4,800	4,610	4,660	4,200	2,180	2,410	1,950	1,740	3,410
28	8,150	[1]4,490	4,390	4,610	4,100	4,140	14,300	2,410	3,320	1,600	1,750	10,700
29	7,230	4,440	—	4,570	3,850	4,650	20,500	2,630	3,430	1,610	1,920	7,820
30	6,690	4,730	—	4,460	3,950	5,910	12,600	2,910	3,720	2,030	1,880	5,560
31	5,900	15,500	—	4,290	—	7,740	—	2,480	3,590	—	1,660	—
Total[2]	223,470	[1]176,680	163,190	191,170	158,910	124,770	340,030	180,010	105,730	84,300	59,110	80,070
Mean[3]	7,209	[1]5,699	5,828	6,167	5,297	4,025	11,344	5,807	3,411	2,810	1,907	2,669

[1]Estimated.

[2]The year's total is 1,887,440 cubic feet per second for a day.

[3]The combined mean is 5,181 cubic feet per second.

Table 13. Daily mean discharge, East Branch Delaware River at Downsville, Town of Colchester, New York (station number 01417000), for report year ending November 30, 2013.

[Data from U.S. Geological Survey, 2019c. All values except the year's total discharge volume are in cubic feet per second (ft^3/s). The total volume discharge is given in cubic feet per second for a day ([ft^3/s]-d). —, not applicable]

Day	Dec. 2012	Jan. 2013	Feb. 2013	Mar. 2013	Apr. 2013	May 2013	June 2013	July 2013	Aug. 2013	Sept. 2013	Oct. 2013	Nov. 2013
1	148	147	147	147	147	103	1,840	138	93	126	132	97
2	148	147	147	147	125	91	1,310	142	132	129	132	98
3	148	147	147	147	93	88	1,140	192	132	129	133	98
4	149	147	147	147	82	94	899	402	132	129	133	98
5	121	148	147	147	82	94	684	507	132	129	134	98
6	103	147	147	147	82	92	577	507	132	129	135	96
7	103	148	147	147	82	90	650	507	130	129	135	95
8	103	148	147	146	82	90	652	421	129	129	133	95
9	103	148	147	146	80	86	424	193	129	129	134	95
10	103	147	147	145	72	80	399	147	129	129	135	95
11	103	147	147	145	71	80	1,140	147	129	130	135	95
12	103	147	146	146	71	79	1,570	147	129	130	136	97
13	103	147	147	147	72	79	2,060	147	129	130	136	98
14	102	148	147	146	73	79	3,960	147	129	131	136	98
15	102	148	147	147	77	78	4,450	147	126	131	135	98
16	101	149	147	147	84	78	3,210	147	131	131	135	98
17	101	149	146	146	85	79	2,390	147	135	131	136	98
18	102	149	147	147	84	80	2,150	147	135	131	136	101
19	101	148	147	147	84	80	1,430	147	135	131	136	101
20	125	147	147	147	83	80	976	148	135	131	136	101
21	147	147	147	147	83	90	731	150	135	131	136	101
22	147	147	147	147	91	95	374	150	134	132	136	101
23	147	148	147	147	103	95	324	147	126	132	137	103
24	147	148	147	147	103	95	219	147	122	132	136	103
25	147	149	147	147	103	95	137	147	122	132	137	103
26	147	148	147	147	103	100	137	147	122	132	138	103
27	147	148	147	147	103	371	137	147	122	132	137	104
28	147	147	147	147	103	580	137	147	122	132	106	104
29	147	147	—	147	103	825	136	141	122	132	94	106
30	147	147	—	147	103	2,390	137	134	121	132	95	106
31	147	147	—	147	—	2,280	—	132	119	—	95	—
Total[1]	3,889	4,576	4,114	4,548	2,709	8,716	34,380	6,216	3,950	3,913	4,040	2,983
Mean[2]	125.5	147.6	146.9	146.7	90.3	281.2	1,146.0	200.5	127.4	130.4	130.3	99.4

[1]The year's total is 84,036 cubic feet per second for a day.

[2]The combined mean is 231 cubic feet per second.

Table 14. Daily mean discharge, West Branch Delaware River at Stilesville, town of Deposit, New York (station number 01425000), for report year ending November 30, 2013.

[Data from U.S. Geological Survey, 2019d. All values except the year's total discharge volume are in cubic feet per second (ft^3/s). The total volume discharge is given in cubic feet per second for a day ([ft^3/s]-d). —, not applicable]

Day	Dec. 2012	Jan. 2013	Feb. 2013	Mar. 2013	Apr. 2013	May 2013	June 2013	July 2013	Aug. 2013	Sept. 2013	Oct. 2013	Nov. 2013
1	250	248	251	244	338	394	3,040	687	497	479	1,050	372
2	251	247	253	244	289	302	1,730	942	494	468	833	626
3	253	248	248	242	235	243	1,500	1,420	493	471	802	629
4	252	248	336	242	213	238	1,370	1,290	490	471	920	273
5	208	247	519	244	212	238	1,220	1,150	486	470	911	150
6	165	247	519	244	213	215	1,090	869	486	471	1,020	144
7	165	247	519	241	213	193	1,000	682	487	471	265	149
8	167	248	520	241	213	196	968	603	488	459	228	311
9	165	250	519	241	213	189	853	567	492	465	317	460
10	167	250	517	241	196	177	732	567	486	471	236	457
11	172	250	567	242	196	177	795	567	486	472	231	157
12	172	250	696	248	196	176	1,020	567	486	474	232	144
13	172	250	700	250	196	173	1,200	567	490	473	310	145
14	170	253	700	248	194	162	2,040	567	486	471	451	249
15	170	253	699	272	201	162	2,520	567	486	471	481	325
16	172	253	700	360	217	162	2,660	569	531	409	528	215
17	173	253	507	560	217	162	2,810	906	577	374	611	148
18	178	251	241	686	216	164	2,360	923	577	368	330	149
19	174	250	241	679	218	166	1,940	666	577	372	411	146
20	210	249	240	677	218	166	1,640	568	577	370	288	149
21	267	250	241	676	218	200	1,410	569	577	365	322	146
22	259	248	241	676	263	223	914	576	577	366	363	147
23	258	247	241	676	392	224	675	579	529	370	605	223
24	256	247	241	676	237	225	569	576	478	371	573	395
25	255	248	241	677	385	226	478	577	485	370	694	454
26	253	248	241	676	420	228	478	577	495	385	698	156
27	252	247	242	676	407	225	480	579	494	441	627	146
28	250	249	244	676	397	247	495	587	496	757	612	143
29	251	250	—	648	394	489	565	541	494	872	750	143
30	250	250	—	523	394	1,810	689	486	487	983	591	143
31	250	254	—	428	—	3,190	—	490	492	—	452	—
Total[1]	6,607	7,730	11,424	13,654	7,911	11,342	39,241	21,381	15,776	14,230	16,742	7,494
Mean[2]	213.1	249.4	408.0	440.5	263.7	365.9	1,308.0	689.7	508.9	474.3	540.1	249.8

[1]The year's total is 173,532 cubic feet per second for a day.

[2]The combined mean is 476 cubic feet per second.

Table 15. Daily mean discharge, Neversink River at Town of Neversink, New York (station number 01436000), for report year ending November 30, 2013.

[Data from U.S. Geological Survey, 2019e. All values except the year's total discharge volume are in cubic feet per second (ft^3/s). The total volume discharge is given in cubic feet per second for a day ([ft^3/s]-d). —, not applicable]

Day	Dec. 2012	Jan. 2013	Feb. 2013	Mar. 2013	Apr. 2013	May 2013	June 2013	July 2013	Aug. 2013	Sept. 2013	Oct. 2013	Nov. 2013
1	185	186	186	81	81	83	100	130	111	94	86	54
2	187	187	187	81	71	67	102	155	111	91	81	54
3	188	187	187	81	60	62	102	318	110	91	82	53
4	187	187	186	80	58	75	110	335	113	91	82	54
5	105	187	187	81	56	74	123	271	114	91	82	54
6	55	187	187	82	55	72	130	219	114	91	82	54
7	58	187	187	82	56	70	130	191	116	91	82	54
8	59	187	187	82	56	70	130	163	118	91	83	54
9	57	187	188	82	56	66	130	151	119	91	82	54
10	57	186	191	82	57	63	178	151	117	91	82	54
11	57	187	191	82	57	64	1,710	151	117	91	83	54
12	57	187	191	84	57	64	1,180	151	117	91	83	54
13	58	187	191	83	57	62	1,130	145	118	91	83	56
14	58	188	191	81	57	59	2,300	141	114	91	83	57
15	59	187	191	83	57	60	1,480	140	114	91	84	57
16	59	187	191	84	59	60	767	141	123	91	83	57
17	59	187	189	82	58	58	533	140	130	91	83	58
18	59	187	191	83	57	59	369	140	130	91	82	58
19	57	188	177	83	56	59	218	141	130	91	82	57
20	127	189	144	83	55	59	201	141	130	91	82	58
21	192	187	130	84	55	65	184	142	130	91	83	59
22	323	187	131	83	58	67	141	142	130	90	82	59
23	263	187	113	82	62	69	126	143	113	90	82	57
24	214	186	89	84	62	69	127	143	99	90	74	59
25	201	187	81	84	62	78	126	143	99	90	70	63
26	187	187	82	83	62	153	126	144	99	90	71	64
27	205	187	82	83	62	96	128	144	99	91	58	64
28	189	187	83	83	61	173	128	144	99	91	54	62
29	187	187	—	84	61	352	128	125	99	91	54	63
30	192	188	—	84	61	358	129	108	99	91	54	64
31	187	187	—	83	—	140	—	109	100	—	54	—
Total[1]	4,128	5,799	4,511	2,559	1,782	2,926	12,466	5,002	3,532	2,728	2,388	1,719
Mean[2]	133	187	161	82	59	94	416	161	114	91	77	57

[1]The year's total is 49,541 cubic feet per second for a day.

[2]The combined mean 136 cubic feet per second.

Table 16. Daily mean discharge, Delaware River at Trenton, New Jersey (station number 01463500), for report year ending November 30, 2013.

[Data from U.S. Geological Survey, 2019f. All values except the year's total discharge volume are in cubic feet per second (ft^3/s). The total volume discharge is given in cubic feet per second for a day ([ft^3/s]-d). —, not applicable]

Day	Dec. 2012	Jan. 2013	Feb. 2013	Mar. 2013	Apr. 2013	May 2013	June 2013	July 2013	Aug. 2013	Sept. 2013	Oct. 2013	Nov. 2013
1	6,280	12,800	44,800	11,700	9,710	8,980	10,800	27,800	6,240	7,310	3,280	3,300
2	6,010	12,000	36,500	11,800	9,790	8,320	12,100	34,800	6,390	9,490	3,770	3,240
3	5,630	10,700	26,200	10,900	9,980	7,830	11,900	39,100	6,120	9,680	3,640	3,300
4	5,550	9,970	21,000	9,640	9,960	7,530	10,700	32,000	5,910	8,310	3,540	3,400
5	5,760	9,730	18,100	8,800	9,200	6,780	9,210	25,000	5,790	9,520	3,510	3,780
6	5,870	9,270	15,800	8,460	8,560	6,270	8,340	19,600	5,240	8,070	3,370	3,770
7	5,700	9,130	14,700	8,160	8,100	6,120	12,000	15,200	4,840	6,540	3,550	3,490
8	5,800	9,190	13,400	7,980	7,680	6,000	24,600	13,300	4,630	5,830	4,500	3,100
9	5,990	9,270	12,700	8,000	7,440	7,680	18,600	12,100	5,190	5,570	5,230	2,920
10	6,630	8,930	12,100	7,890	7,350	9,390	17,800	11,100	15,400	4,910	5,080	3,150
11	7,710	8,600	11,300	7,420	9,520	11,600	29,500	10,300	21,800	4,820	5,070	3,520
12	8,220	9,260	12,200	9,270	11,000	12,200	38,200	9,750	15,800	5,030	5,080	3,390
13	8,680	10,100	12,600	28,100	15,600	10,200	34,300	9,530	14,000	5,860	4,670	3,300
14	8,640	10,200	12,000	37,700	14,800	10,700	37,500	9,810	13,700	6,240	4,730	3,190
15	8,000	13,200	11,700	28,500	13,500	9,720	53,200	8,520	10,700	6,260	4,060	3,020
16	7,640	20,100	11,700	22,700	11,900	8,900	45,400	7,480	9,240	5,770	3,500	3,030
17	6,990	19,100	11,300	19,600	10,800	8,090	34,500	7,260	7,810	5,200	3,460	3,070
18	7,810	16,500	10,100	17,100	10,100	7,310	28,300	6,790	6,940	4,710	3,540	3,070
19	10,000	14,800	9,180	17,300	10,100	6,890	24,300	6,370	6,520	4,270	3,380	3,090
20	13,500	13,600	9,450	17,700	14,700	6,550	19,900	6,420	6,150	4,010	3,600	2,990
21	29,700	12,800	8,640	15,900	17,400	6,050	17,000	6,400	5,800	3,850	3,520	3,320
22	53,900	12,100	8,250	14,300	17,400	6,050	14,600	[1]6,260	5,550	4,220	3,330	3,800
23	50,300	[1]10,100	7,380	13,600	14,800	6,060	12,700	[1]8,900	5,680	4,480	3,240	3,260
24	34,400	[1]8,690	7,710	13,000	13,500	9,360	11,100	[1]9,290	5,750	4,380	3,050	3,150
25	28,300	[1]7,980	7,740	12,300	12,500	11,300	9,900	6,930	5,530	3,860	2,870	3,070
26	24,400	[1]8,070	7,360	12,000	11,800	11,400	9,240	6,160	5,250	3,910	2,860	3,290
27	26,000	[1]7,910	9,100	11,500	10,700	10,200	9,040	5,600	4,970	3,820	2,980	7,570
28	21,100	[1]8,520	11,200	10,700	9,810	9,160	10,600	5,130	4,860	3,680	3,010	9,990
29	17,700	[1]9,330	—	10,400	9,180	8,660	22,200	8,500	9,210	3,600	3,050	14,100
30	15,500	10,500	—	9,950	8,850	9,230	26,800	8,400	7,760	3,290	3,060	11,800
31	14,100	28,400	—	9,750	—	9,680	—	6,820	7,550	—	3,230	—
Total[1]	461,810	360,850	394,210	432,120	335,730	264,210	624,330	390,620	246,320	166,490	114,760	128,470
Mean[2]	14,897	11,640	14,079	13,939	11,191	8,523	20,811	12,601	7,946	5,550	3,702	4,282

[1]Estimated.

[2]The year's total is 3,919,920 cubic feet per second for a day.

[3]The combined mean is 10,763 cubic feet per second.

Table 17. Daily maximum and minimum specific conductance, Delaware River at Reedy Island Jetty, Delaware (station number 01482800), for report year ending November 30, 2013.

[Data from U.S. Geological Survey, 2020c. Specific conductance measurements provided in microsiemens per centimeter at 25 degrees Celsius. *, missing data; —, not applicable; max, maximum; min, minimum]

Day	Dec. 2012		Jan. 2013		Feb. 2013		Mar. 2013		Apr. 2013		May 2013		June 2013		July 2013		Aug. 2013		Sept. 2013		Oct. 2013		Nov. 2013	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
1	17,400	8,390	8,050	1,560	3,420	1,490	14,900	8,360	15,700	8,110	9,420	3,550	12,100	5,000	4,690	1,580	11,200	4,140	14,300	4,910	19,300	10,600	19,600	12,500
2	18,400	8,460	9,890	1,790	5,430	1,080	15,600	7,590	13,400	7,800	9,110	3,470	11,700	4,830	2,760	1,030	11,700	3,940	14,300	4,790	19,800	10,600	19,100	11,100
3	15,700	8,380	8,900	2,180	5,310	923	14,100	6,710	13,800	6,520	10,500	3,700	11,600	4,310	2,600	587	12,700	3,850	14,300	5,670	*	*	19,700	12,000
4	16,200	8,480	8,240	2,100	4,460	839	14,000	6,650	13,000	5,850	11,200	4,110	12,200	4,230	1,730	534	14,400	4,390	14,200	5,390	*	*	20,700	12,800
5	15,300	8,480	8,040	1,600	5,600	750	14,800	6,190	14,900	6,100	11,900	4,270	13,100	4,180	2,580	417	14,800	4,520	14,300	5,560	*	*	21,200	12,600
6	16,800	8,380	10,300	1,560	8,380	806	17,700	6,930	14,100	5,990	10,800	4,020	13,100	4,710	3,290	387	15,300	5,020	14,800	5,570	*	*	20,700	12,800
7	17,500	8,790	11,500	2,440	9,360	854	21,300	10,300	12,900	6,410	10,400	4,270	13,400	5,340	4,350	378	15,400	6,280	14,900	6,170	*	*	20,300	12,500
8	17,400	8,800	12,800	3,080	9,180	1,470	21,300	10,200	12,700	5,900	11,000	4,280	12,400	3,330	5,560	416	14,700	5,600	14,100	6,120	*	*	18,900	12,300
9	17,500	8,740	11,200	3,320	9,180	1,550	23,300	11,300	12,800	5,490	10,600	4,050	9,040	2,320	6,100	522	13,300	5,000	15,200	6,030	*	*	20,200	12,300
10	18,100	8,910	10,600	3,000	11,200	1,650	21,800	11,500	12,500	5,400	10,500	3,990	7,830	2,350	7,920	820	12,200	4,510	13,800	6,570	*	*	17,500	12,400
11	16,200	9,130	11,000	2,960	9,600	2,220	19,000	11,300	12,900	5,340	10,100	3,860	8,060	1,530	7,780	1,120	12,600	4,440	13,800	6,300	*	*	19,300	11,100
12	16,700	8,780	12,100	3,590	6,930	2,010	17,800	11,200	12,800	5,820	9,860	3,270	5,470	1,300	7,840	1,370	12,000	4,570	14,100	6,080	*	*	17,800	11,100
13	17,100	8,750	12,300	3,990	7,040	1,960	15,100	8,940	13,000	5,400	8,950	3,110	5,740	1,290	9,220	1,370	10,600	4,520	14,300	6,040	*	*	19,700	11,800
14	17,000	8,150	9,880	4,060	8,000	1,950	13,600	6,640	11,100	5,230	10,100	3,150	8,250	871	7,340	1,470	10,500	3,270	15,800	6,120	*	*	19,900	12,100
15	15,400	8,250	9,720	3,700	7,760	1,960	10,800	5,180	10,700	4,720	11,000	3,160	9,170	751	6,290	1,520	11,600	2,890	15,800	6,650	*	*	18,700	10,900
16	16,400	8,420	9,430	3,270	6,570	1,900	10,100	4,920	9,720	4,770	11,300	3,420	8,350	1,020	9,010	1,690	13,000	3,190	15,200	6,820	*	*	20,400	11,300
17	16,800	8,770	6,840	2,890	8,390	1,960	12,000	4,480	8,130	3,900	11,200	3,500	8,540	895	11,100	1,860	13,700	3,520	16,300	6,740	*	*	20,500	11,600
18	15,700	8,810	7,160	2,500	7,740	1,980	10,600	4,520	8,570	3,910	11,600	4,490	8,940	1,280	11,800	2,600	13,300	3,890	16,300	7,580	*	*	19,400	13,100
19	13,200	8,400	8,300	2,440	9,190	2,840	12,000	4,040	9,180	4,340	11,800	4,700	10,200	1,440	12,800	3,050	13,400	4,270	15,900	7,780	*	*	17,700	11,800
20	16,100	8,020	4,000	2,050	10,500	3,660	11,400	4,230	5,800	3,160	11,500	4,570	9,780	1,530	12,800	3,340	13,500	4,420	15,300	7,710	*	*	20,300	12,100
21	20,400	8,490	7,480	1,540	12,500	2,620	13,500	5,100	8,340	2,550	12,300	4,540	9,670	1,680	13,300	3,590	12,700	4,640	15,700	8,010	*	*	20,000	11,700
22	9,530	4,300	6,670	2,300	16,200	3,890	17,900	7,010	11,200	3,100	13,300	4,820	9,670	1,740	13,700	3,930	13,400	4,800	15,000	7,790	17,600	10,700	20,200	11,900
23	8,300	2,680	10,000	1,520	17,600	7,160	17,600	7,890	13,000	4,170	12,500	4,970	9,440	1,870	14,400	4,110	12,100	4,740	15,200	7,600	18,900	10,900	19,900	11,900
24	9,440	2,250	12,400	3,420	17,800	8,000	19,800	7,850	13,000	3,920	12,700	4,250	8,330	1,920	12,100	3,810	12,400	4,960	15,400	7,620	18,600	11,400	16,400	10,700
25	8,670	1,750	12,600	3,480	16,300	7,900	19,600	9,440	9,820	3,420	10,300	3,770	8,210	1,970	11,400	3,740	12,500	5,260	15,700	7,590	18,200	10,800	20,200	11,100
26	12,900	2,150	14,200	4,110	17,200	8,060	20,000	8,870	10,300	3,520	13,400	4,140	8,410	2,080	12,600	4,240	11,100	5,450	16,500	7,600	18,800	10,500	20,900	11,600
27	11,600	2,000	13,600	4,020	18,100	8,630	18,600	9,350	10,900	3,400	13,000	4,530	8,550	2,210	11,500	4,320	11,300	4,680	16,300	8,720	17,600	10,000	23,900	12,700
28	9,210	1,820	13,500	4,200	17,300	8,720	16,700	8,340	11,000	3,380	13,100	4,720	8,660	2,380	11,200	4,350	13,300	5,040	16,700	9,830	20,100	10,400	18,200	11,200
29	12,300	2,410	12,500	3,860	—	—	17,400	8,190	10,800	3,820	13,100	5,190	7,590	2,280	9,570	3,920	14,200	5,320	18,000	10,100	20,800	11,200	18,900	9,340
30	7,500	1,730	12,600	4,710	—	—	17,600	7,540	10,400	3,570	12,900	5,050	5,730	1,930	10,500	3,690	14,500	6,150	19,400	10,400	20,600	12,200	20,300	9,750
31	8,240	1,670	11,900	1,950	—	—	16,200	8,330	—	—	12,200	4,970	—	—	11,700	3,610	12,600	5,310	—	—	19,900	12,500	—	—
Mean	14,484	6,534	10,248	2,877	10,223	3,173	16,326	7,713	11,549	4,834	11,343	4,125	9,441	2,419	8,695	2,238	12,903	4,599	15,363	6,995	19,183	10,983	19,683	11,736
Max	20,400	9,130	14,200	4,710	18,100	8,720	23,300	11,500	15,700	8,110	13,400	5,190	13,400	5,340	14,400	4,350	15,400	6,280	19,400	10,400	20,800	12,500	23,900	13,100
Min	7,500	1,670	4,000	1,520	3,420	750	10,100	4,040	5,800	2,550	8,950	3,110	5,470	751	1,730	378	10,500	2,890	13,800	4,790	17,600	10,000	16,400	9,340

Table 18. Daily maximum and minimum chloride concentrations, Delaware River at Chester, Pennsylvania (station number 01477050), for report year ending November 30, 2013.

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

Day	Dec. 2012		Jan. 2013		Feb. 2013		Mar. 2013		Apr. 2013		May 2013		June 2013		July 2013		Aug. 2013		Sept. 2013		Oct. 2013		Nov. 2013	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
1	42	35	35	35	49	49	78	61	49	42	83	49	49	49	35	28	42	35	51	*	57	49	182	90
2	49	39	35	28	49	49	78	61	49	42	49	42	49	49	35	35	49	28	*	*	65	57	155	90
3	49	45	35	35	49	49	78	61	49	42	49	42	49	49	35	35	42	35	*	*	65	49	142	90
4	42	35	42	35	49	42	69	53	53	49	49	42	49	49	35	28	42	35	*	*	65	49	231	99
5	42	35	35	35	42	42	69	61	49	49	49	42	49	42	49	35	49	42	44	38	65	57	182	109
6	35	28	38	35	49	42	78	61	53	49	49	42	49	49	35	28	42	35	44	38	74	65	214	119
7	49	42	42	35	42	42	57	49	49	49	49	42	49	42	35	28	42	42	44	38	93	65	249	119
8	49	42	35	35	49	42	49	49	57	49	49	42	49	42	28	28	42	42	44	38	227	83	214	109
9	42	42	42	42	49	49	49	49	57	49	49	42	49	28	28	20	42	42	44	38	138	83	249	130
10	56	42	42	42	49	49	49	49	49	49	49	42	49	28	28	28	42	35	51	44	245	93	214	130
11	56	56	42	35	65	49	57	49	57	49	49	42	42	35	28	28	42	42	44	44	194	90	214	130
12	56	49	45	42	65	57	57	49	47	42	49	42	42	35	28	28	42	42	51	44	109	99	142	99
13	56	56	49	42	49	49	57	49	49	42	49	42	42	35	28	28	42	42	51	44	90	90	155	109
14	56	56	49	42	57	49	49	42	49	42	49	42	28	28	28	28	42	42	44	44	90	90	155	119
15	56	42	49	42	57	49	49	42	57	49	49	35	35	28	35	28	42	42	51	51	99	81	130	119
16	56	49	49	45	57	49	49	42	57	49	49	42	28	28	35	28	35	35	51	49	90	81	312	119
17	56	49	49	42	57	49	49	42	65	49	49	42	35	28	35	28	42	35	51	44	90	81	312	142
18	56	56	49	42	57	49	49	42	57	49	49	42	28	26	42	28	42	35	51	44	99	81	336	155
19	56	42	49	42	65	57	49	42	49	49	49	42	28	26	49	35	49	42	51	44	90	81	249	142
20	56	56	49	42	65	65	49	42	49	42	49	42	28	28	35	35	49	42	51	51	81	81	420	168
21	60	56	42	42	83	74	49	42	57	46	49	49	28	28	42	35	58	51	51	51	142	99	290	182
22	56	49	42	42	74	57	42	42	57	49	49	42	28	28	42	35	51	44	49	49	99	81	312	155
23	49	35	42	42	65	65	42	35	49	49	49	42	28	28	42	35	46	44	57	49	182	81	290	156
24	35	35	42	42	65	57	49	42	49	42	49	49	35	28	35	34	44	44	57	49	142	81	290	130
25	35	28	42	42	74	64	42	42	49	40	49	42	35	28	42	35	51	44	57	42	119	81	231	142
26	28	28	42	42	78	69	42	42	49	49	49	49	28	28	42	42	51	44	65	49	130	90	197	168
27	28	28	49	42	87	69	49	42	83	49	57	49	42	28	42	42	51	51	65	49	109	90	214	138
28	28	28	49	42	78	69	49	49	49	49	57	35	35	35	49	35	51	44	74	49	155	81	151	114
29	35	35	57	42	—	—	49	42	49	42	49	35	35	35	49	42	51	44	65	49	130	81	151	83
30	35	35	49	49	—	—	49	42	49	42	57	49	35	35	42	42	51	44	83	57	168	81	103	83
31	35	35	57	49	—	—	49	42	—	—	49	49	—	—	42	35	51	51	—	—	119	90	—	—
Mean	46	42	44	40	60	54	54	47	53	46	50	44	38	34	37	32	46	41	53	46	117	79	223	125
Max	60	56	57	49	87	49	78	61	83	49	83	49	49	49	49	42	58	51	83	57	245	99	420	182
Min	28	28	35	28	49	42	49	35	47	42	49	35	28	26	28	20	35	28	44	38	57	49	103	83

Table 19. Daily mean dissolved-oxygen concentration, Delaware River at Benjamin Franklin Bridge at Philadelphia, Pennsylvania (now Delaware River at Penn's Landing, Philadelphia, Pennsylvania; station number 01467200), from April 1 to November 30, 2013.

[Data from U.S. Geological Survey, 2020e. Concentrations are in milligrams per liter. *, missing data; —, not applicable]

Day	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
1	11.7	9.6	9.1	5.7	4.9	5.4	5.6	7.4
2	11.6	9.9	9.1	5.8	4.9	5.2	5.6	7.3
3	11.6	10.1	8.7	6.1	4.9	5.0	5.7	7.4
4	11.5	10.1	8.2	6.3	5.0	4.9	5.6	7.7
5	11.4	9.9	7.8	6.5	5.2	4.9	5.6	7.8
6	11.3	9.5	7.2	6.6	5.3	5.0	5.4	7.8
7	11.2	9.0	6.5	6.5	5.2	5.0	5.3	7.8
8	11.0	8.5	6.2	6.3	5.1	4.9	5.3	7.9
9	10.9	8.0	5.9	6.1	5.1	5.0	5.6	8.0
10	10.7	7.6	5.6	5.9	5.2	4.9	5.9	8.1
11	10.4	7.1	5.7	5.8	5.9	4.8	6.1	8.4
12	10.1	6.8	6.4	5.7	6.5	4.7	6.3	8.6
13	9.6	6.8	6.5	5.3	6.7	4.6	6.8	8.7
14	9.4	6.6	6.6	5.1	6.8	4.9	6.8	9.0
15	9.0	6.6	7.1	5.2	6.7	5.0	6.7	9.1
16	8.5	6.4	7.6	5.4	6.6	5.0	6.6	9.0
17	7.9	6.5	7.8	5.8	6.5	5.3	6.3	8.9
18	7.6	6.6	7.7	6.2	6.4	5.4	6.4	8.8
19	7.6	6.4	7.5	6.8	6.2	5.4	6.5	9.0
20	7.8	6.2	7.5	7.2	6.0	5.4	6.4	9.1
21	8.4	6.4	7.4	7.1	5.9	5.4	6.6	9.1
22	8.6	6.8	7.3	6.9	5.7	5.4	6.6	9.0
23	8.8	7.3	7.1	6.3	5.5	5.5	6.5	9.0
24	8.7	7.3	6.9	5.9	5.5	5.6	6.7	9.5
25	8.8	7.7	6.7	5.6	5.5	5.7	7.1	9.7
26	8.8	8.1	6.6	5.2	5.6	5.6	7.3	9.8
27	9.0	8.6	6.4	5.2	5.7	5.6	7.5	9.8
28	9.2	8.7	6.2	5.2	5.4	5.6	7.3	10.2
29	9.2	8.7	6.2	5.0	5.2	5.7	7.4	10.5
30	9.2	9.0	6.1	5.0	5.2	5.7	7.3	10.7
31	—	9.1	—	5.1	5.4	—	7.2	—
Mean	9.7	7.9	7.1	5.9	5.7	5.2	6.4	8.8
Maximum	11.7	10.1	9.1	7.2	6.8	5.7	7.5	10.7
Minimum	7.6	6.2	5.6	5	4.9	4.6	5.3	7.3

Table 20. Daily mean dissolved-oxygen concentration, Delaware River at Chester, Pennsylvania (station number 01477050), from April 1 to November 30, 2013.

[Data from U.S. Geological Survey, 2020f. Concentrations are in milligrams per liter. *, missing data; —, not applicable]

Day	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
1	11.1	9.1	7.5	5.9	*	*	6.8	8.5
2	11.2	8.9	7.4	5.5	*	*	6.7	8.2
3	11.2	8.7	7.2	5.5	*	*	6.6	8.1
4	11.3	8.6	6.8	5.3	*	*	6.3	8.3
5	11.2	8.5	6.6	5.6	*	5.6	6.1	8.5
6	11.1	8.3	6.4	5.8	5.5	5.8	6.1	8.3
7	11.1	8.2	6.3	6.2	5.5	5.9	6.3	8.3
8	11.0	8.0	6.1	6.4	5.5	5.9	6.2	8.3
9	10.8	7.7	5.4	6.6	5.5	6.0	6.5	8.5
10	10.6	7.4	5.2	6.7	5.3	6.1	7.2	8.7
11	10.4	7.2	5.7	7.0	5.0	6.0	7.7	8.9
12	10.1	7.1	5.6	6.8	5.0	6.0	7.8	9.1
13	9.8	7.3	5.3	6.9	5.0	5.9	8.0	9.2
14	9.6	7.3	5.6	7.1	5.2	6.0	7.9	9.5
15	9.5	7.5	5.7	7.6	5.5	6.3	7.6	9.5
16	9.3	7.3	5.8	7.9	5.8	6.2	7.5	9.5
17	9.2	7.2	6.2	8.1	6.1	6.4	7.3	9.4
18	9.0	7.2	6.4	8.1	6.1	6.7	7.3	9.4
19	9.1	6.9	6.5	7.8	6.0	6.7	7.2	9.5
20	9.1	6.5	6.5	7.4	6.0	6.6	7.4	9.6
21	9.2	6.3	6.4	6.8	6.0	6.7	7.5	9.6
22	9.5	6.3	6.4	6.3	5.9	6.7	7.5	9.6
23	9.5	6.4	6.2	6.0	5.6	6.5	7.5	9.5
24	9.5	6.4	6.1	5.5	5.6	6.6	7.7	9.8
25	9.5	6.8	6.0	5.5	5.7	6.8	7.9	10.1
26	9.6	7.4	6.0	5.6	6.1	6.8	8.3	10.4
27	9.7	7.7	6.1	5.7	6.2	6.8	8.6	10.5
28	9.7	7.8	6.4	5.8	6.0	6.8	8.6	10.4
29	9.5	7.6	6.5	5.8	5.8	7.0	8.6	10.3
30	9.2	7.6	6.4	5.9	5.7	6.9	8.6	10.3
31	—	7.6	—	5.9	5.7	—	8.4	—
Mean	10.0	7.5	6.2	6.4	5.7	6.4	7.4	9.3
Maximum	11.3	9.1	7.5	8.1	6.2	7.0	8.6	10.5
Minimum	9.0	6.3	5.2	5.3	5.0	5.6	6.1	8.1

Glossary

The following definitions apply to various terms and procedures used in the operations documented in this report.

balancing adjustment An operating procedure used by the Office of the Delaware River Master to correct for inaccuracies inherent in the design of releases from New York City reservoirs to meet the Montague flow objective at U.S. Geological Survey streamgage 01438500 at Montague, New Jersey. 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. This adjustment calls for less water to be released when previous directed releases were higher than required to meet the Montague flow objective. The balancing adjustment, based on provisional data, 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 flow at the Montague streamgage.

capacity Total useable 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 the Pepacton, Cannonsville, and Neversink Reservoirs in New York that are designed to maintain specified minimum flows in stream channels immediately below the reservoirs (tailwaters). The following conservation release rate zones are defined in the June 1, 2013 Flexible Flow Management Plan:

L1—Spill mitigation when New York City combined reservoir storage is in the spill mitigation (L1) storage zone.

L2—Conservation releases when New York City combined reservoir storage is in the normal (L2) storage zone.

L3—Conservation releases when New York City combined reservoir storage is in the drought watch (L3) storage zone.

L4—Conservation releases when New York City combined reservoir storage is in the drought warning (L4) storage zone.

L5—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 Office of the Delaware River Master to meet the Montague flow objective.

discharge mitigation release These are releases designed to help mitigate the effects of spilling immediately below the Delaware River Basin reservoirs. The 2013 Flexible Flow Management Program details the releases in section 7 (appendix 1).

diversions The out-of-basin transfer of water by New York City from Pepacton, Cannonsville, and Neversink Reservoirs of New York State in the upper Delaware River Basin through the East Delaware, West Delaware, and Neversink Tunnels, respectively, to New York 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 Canals.

excess quantity As defined by the Decree, the excess quantity of water is "equal to 83 per cent [sic] of the amount by which the estimated consumption during such year is less than the City's estimate of the continuous safe yield during such year of all its sources obtainable without pumping." The excess quantity shall not exceed 70 billion gallons, and the seasonal period for release of the excess quantity begins on June 15 and concludes on the following March 15.

Flexible Flow Management Program (FFMP) 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 and unanimously agreed to by the Decree Parties (Delaware, New Jersey, New York, New York City, and Pennsylvania).

index gaging stations Specific sites on tributaries of the upper Delaware River where systematic observations of gage height and discharge are made.

Interim Excess Release Quantity An Interim Excess Release Quantity (IERQ) was defined in the Flexible Flow Management Program (appendix 1). 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 million gallons per day) and New York City's current estimate of continuous safe yield of the New York City water-supply system of 1,290 million gallons per day, obtainable without pumping. During the 2013 report year, the IERQ available for release was 15,468 cubic feet per second for a day. The amount of 6,045 cubic feet per second for a day of the IERQ is incorporated in the releases tables to enhance base releases from the New York City Delaware River Basin reservoirs.

Interim Excess Release Quantity Extraordinary Needs Bank From the 2013 Flexible Flow Management Program (appendix 1): "In addition to the hydrologic criteria described in Section 2.5.6.A. [sic] of the Water Code and subject to other provisional uses of the IERQ as provided herein, the Decree Parties [Delaware, New Jersey, New York State, New York City, and Pennsylvania], 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."

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. Data from these stations are used on a year-round basis in Office of the Delaware 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 elevation is also referred to as minimum full-operating level.

Montague flow objective In section 3a of the June 1, 2013 Flexible Flow Management Program (appendix 1), "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 * * * at Montague, N. J. of 1,750 cubic feet per second (cfs), as directed by the River Master in accordance with Section VII. [sic] 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. [sic] and Tables 1 and 2 of the Delaware River Basin 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 Delaware River Basin Water Code can be found in Delaware River Basin Commission (2013).

rate of flow Mean discharge for a specified 24-hour period, measured in cubic feet per second for a day ([ft^3/s]-d) or million gallons per day (Mgal/d).

rate of flow at Montague Daily mean discharge of the Delaware River at Montague, New Jersey, computed on a calendar-day basis.

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 River 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 River estuary and a factor affecting the Montague and Trenton flow objectives during drought emergencies.

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 10 and a 25-hour day on November 3.

Trenton flow objective In section 3b of the June 1, 2013 Flexible Flow Management Program (appendix 1), "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. * * * During Basinwide Drought Watch, Drought Warning, and Drought Emergency, in accordance with Section 5 of this Agreement and Section 2.5.3.B. [sic] 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." The Delaware River Basin Water Code can be found in Delaware River Basin Commission (2013).

uncontrolled runoff at Montague Runoff from the 3,480-square-mile drainage area above Montague, New Jersey, excluding the drainage area above the Pepacton, Cannonsville, and Neversink Reservoirs; Lake Wallenpaupack; and Rio Reservoir, but including spillway overflow at these dams.

Appendix 1. Agreement of the Parties to the 1954 U.S. Supreme Court Decree, Effective June 1, 2013

Agreement of the Parties to the
1954 U.S. Supreme Court Decree
Effective June 1, 2013

10. LAKE WALLENPAUPACK
11. RECREATIONAL BOATING
12. ESTUARY AND BAY ECOLOGICAL HEALTH
13. WARM WATER AND MIGRATORY FISH
14. MONITORING AND REPORTING
    a. Temperature
    b. IERQ
15. REASSESSMENT STUDY
16. PERIODIC EVALUATION 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 (Del.), 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, 2013, for managing diversions and releases under the Decree. The Decree 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, expired on May 31, 2011. Collectively, these programs are referred to herein as the Initial Implementation Cycle FFMP. The subsequent FFMP Agreement, effective June 1, 2011 and expired on May 31, 2012, was a one-year program unanimously approved by the Decree Parties and built upon the framework of the previous FFMP agreements. The FFMP Agreement effective June 1, 2012 and expiring on May 31, 2013 was a one-year extension of the June 1, 2011 Agreement and was unanimously approved by the Decree Parties. The current FFMP is an extension of the June 1, 2011 Agreement that incorporates the edits from the June 1, 2012 Agreement and shall be effective from June 1, 2013 to May 31, 2014. 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 were incorporated in the June 1, 2011 Agreement, additional analyses and studies are 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 previous FFMP Agreements, information and experience accumulated during the previous programs, and input from various stakeholder groups and the public. The current FFMP differs from the Initial Implementation Cycle 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 3.91 billion gallons (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, 2013 through March 15, 2014; 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.

The June 1, 2012 FFMP Agreement differed from the previous FFMP Agreement in the following elements:

- Section, 1.b., Current Program, was updated to reflect the June 1, 2012 FFMP one-year extension;
- The dates were revised to correspond to the effective term of the June 1, 2012 FFMP Agreement;
- Additional units of measurement for water volume were provided; and
- The State of Delaware had one party signing the current FFMP Agreement, as opposed to two.

The June 1, 2013 FFMP (current) Agreement is an extension of, and incorporates herein the same terms as, the June 1, 2011 Agreement, as well as the aforementioned edits made in the 2012 FFMP Agreement.

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, 2013 shall the aggregate total quantity of water diverted by the City, divided by the number of days elapsed since May 31, 2013 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*.

* This paragraph was in the original text of this Agreement, effective June 1, 2011, but was inadvertently omitted from the extended Agreement, effective June 1, 2012. It has been reinserted into this (current) extension of the Agreement.

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 10.0 billion gallons (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, 3.91 billion gallons (6,045 cfs-days) of the IERQ is incorporated in the releases tables to enhance base releases from the City Delaware Basin Reservoirs. The IERQ balance of 6.09 billion gallons (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, 2014 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, respectively) 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 1.84 billion gallons (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, 2013 and May 21 to May 31, 2014 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 1.84 billion gallons (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, 2013 shall releases from the Diversion Offset Bank exceed the unused balance of the bank. The Diversion

Offset Bank shall terminate automatically on June 1, 2014; 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)

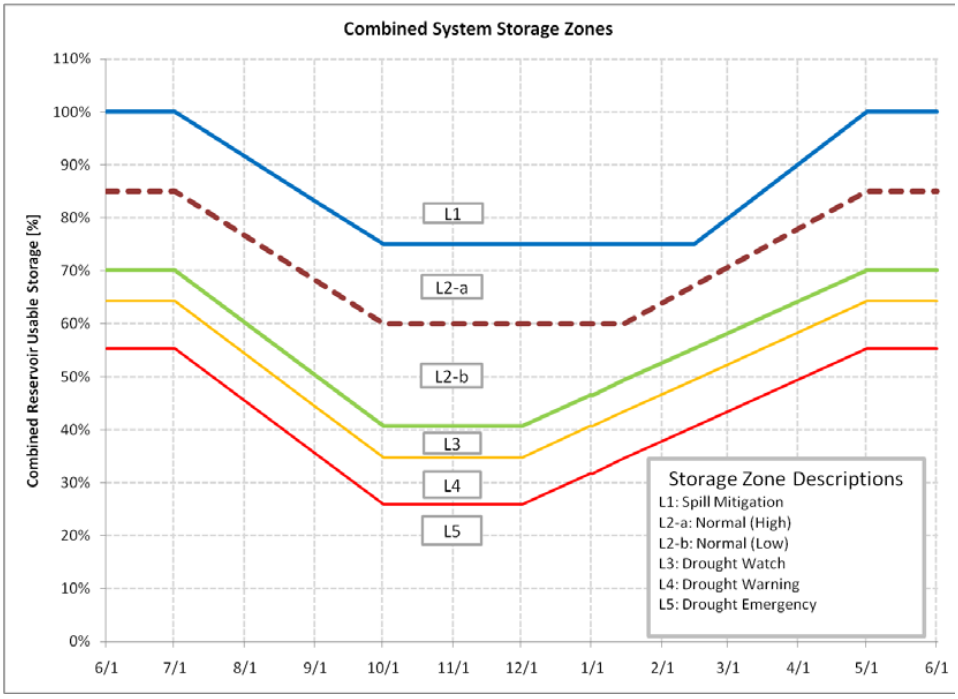


Table 1
Interstate Operation Formula for Diversions and Flow Objectives

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 (cfs) 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

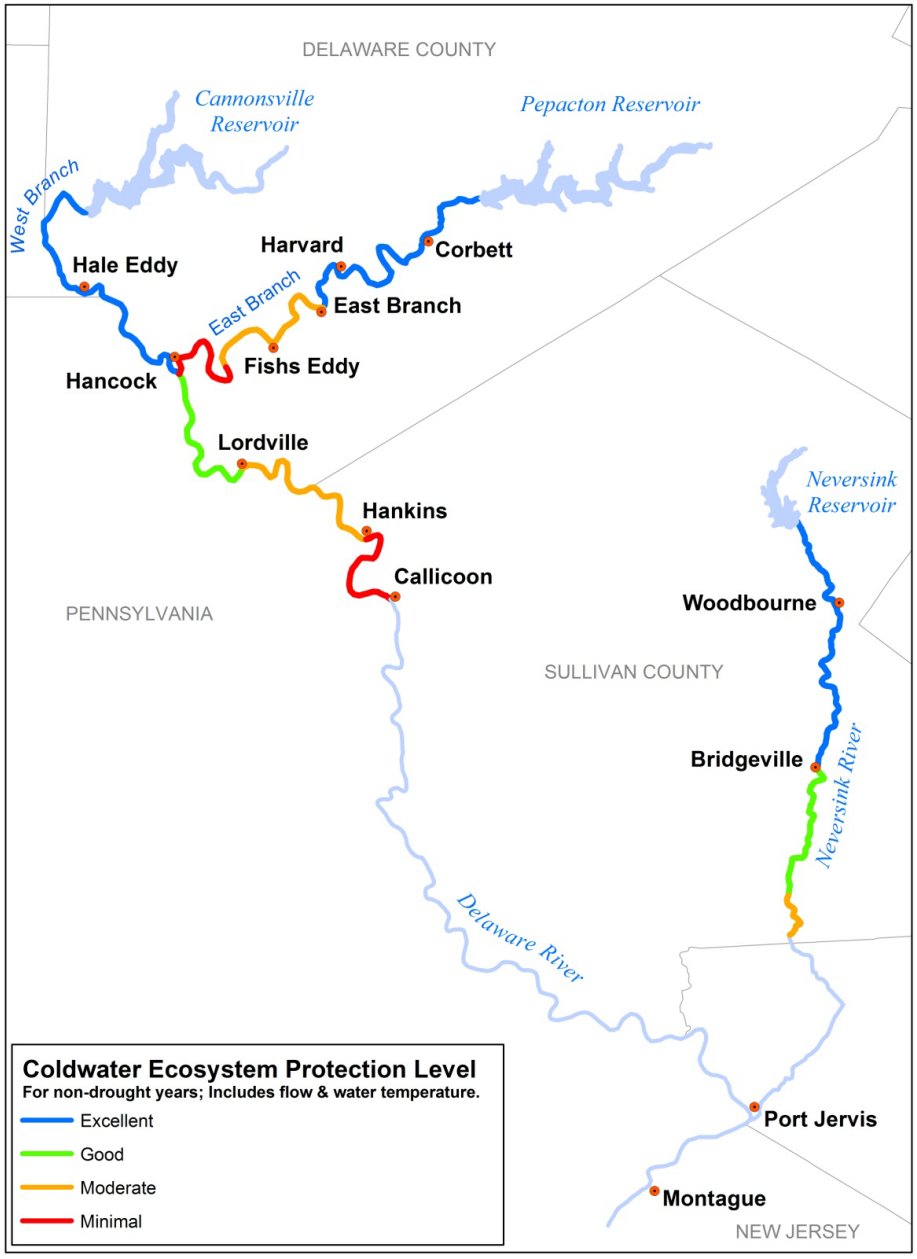
protection level applies to the Delaware River main stem from the junction of the West and East Branches to Lordville, N.Y. and the Neversink River from Bridgeville, N.Y. to the mouth of Eden Brook near Oakland Valley, N.Y.

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 Tool (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)

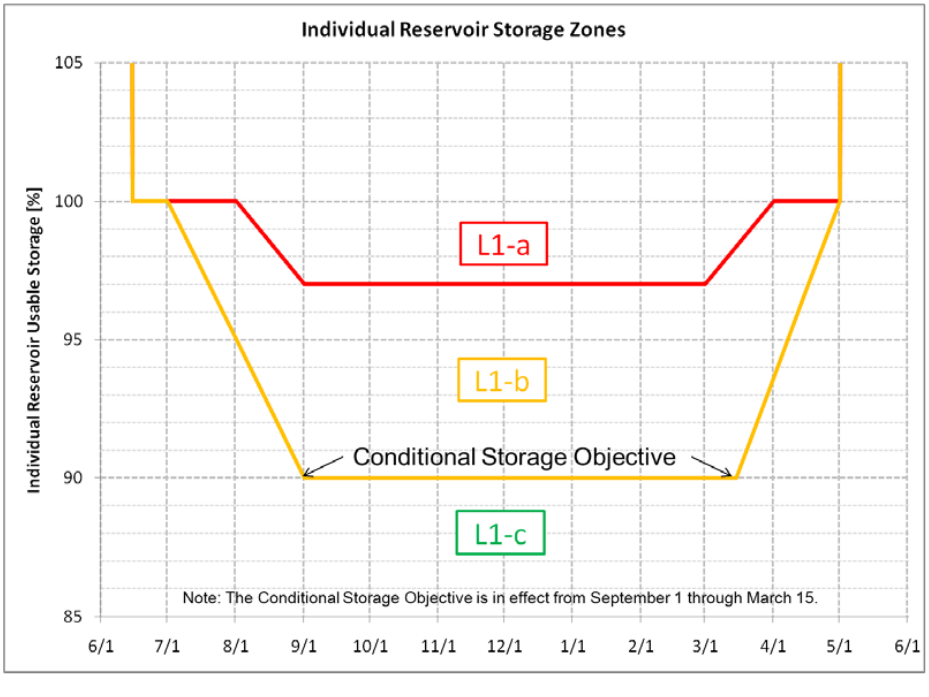


Table 4a
Schedule of Releases (cfs) during Normal Conditions
Base Releases with no Forecast-based Available Water (FAW)

	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 (cfs) 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 (cfs) 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 (cfs) 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 (cfs) 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 (cfs) 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 (cfs) 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, 2013 through March 15, 2014 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.a. 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, 2014, 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 3.91 billion gallons (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, 2014, 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, 2014 by unanimous written agreement of the Decree Parties. If this Agreement is not renewed for an additional one-year period, prior to May 31, 2014, 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, 2013

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, 2013

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.

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Agreement of the Parties to the 1954 U.S. Supreme Court Decree Effective June 1, 2013

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, 2013

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.

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Agreement of the Parties to the 1954 U.S. Supreme Court Decree Effective June 1, 2013

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 2. Temporary Thermal Releases Program for Fishery Protection

AGREEMENT

Temporary Thermal Releases Program
For Fishery Protection

Unseasonably high air temperatures in the upper Delaware River Basin in mid-July 2013 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 16, 2013, 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 16, 2013, the Decree Parties unanimously agreed that during the period July 17 - 18, 2013, emergency thermal releases would be made from Cannonsville Reservoir as follows:

Release an additional 300 cubic feet per second from Cannonsville Reservoir starting at midnight July 16/17 and continue the additional release through midnight July 18/19, 2013. Begin ramping down at midnight on July 18/19, 2013, 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 releases program.

Evaluation of Temporary Thermal Releases Program

A study should be performed in conjunction with the Temporary Thermal Releases Program (TTRP) of July 17-18, 2013 to evaluate the effectiveness of the Program. This study may also identify potential improvements that could increase the effectiveness of future programs. Since the water used in the TTRP will be allocated out of the limited resources of the IERQ, it is essential that this allocation is justified.

Past evaluations have been made by NYSDEC and PFBC for the Temporary Thermal Release Programs that were approved for July 7-10, 2010 and June 20-21, 2012. These evaluations simulated the water temperatures that would have occurred at West Branch and Mainstem locations in the absence of special releases and compared them to the observed temperatures during the special release period.

USGS stream gages measure the temperature at several sites on the West Branch (Hale Eddy), East Branch (Harvard and Fishs Eddy), and Mainstem (Hancock, Lordville, Callicoon) of the Delaware River as well as the Neversink River (Bridgeville). Data collected from these sites will be analyzed along with air temperature and other meteorological data to assess the effectiveness of the TTRP. The results should be compared to past programs to explore whether the effectiveness of a cold water pulse is diminished as the rate of base releases and unregulated flow increases.

If possible, the time of travel of the enhanced cold water plume to the downstream nodes will also be analyzed with the goal of improving special release programs that may potentially be made in the future.

The Office of the Delaware River Master will direct the administration of the study. Data used for this study should be reliable and have professional quality controls.

_____	_____
State of Delaware Date	State of New Jersey Date
_____	_____
State of New York Date	Commonwealth of Pennsylvania Date
_____	
City of New York Date	

For more information about this report, contact:

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