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# Report of the River Master of the Delaware River for the Period December 1, 2016–November 30, 2017

Open-File Report 2024–1022

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

## Calendar for Report Year 2017

December 2016

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April 2017

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September 2017

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October 2017

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November 2017

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# Report of the River Master of the Delaware River for the Period December 1, 2016–November 30, 2017

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

Open-File Report 2024–1022

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

U.S. Geological Survey, Reston, Virginia: 2024

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# River Master Letter of Transmittal and Special Report

Office of the Delaware River Master
U.S. Geological Survey
415 National Center
Reston, VA 20192

July 24, 2024

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
Josh Shapiro
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 hereby transmit the 64th Annual Report of the River Master of the Delaware River for December 1, 2016, to November 30, 2017. In this report, this period is referred to as the River Master "report year."

During the 2017 River Master report year, monthly precipitation in the upper Delaware River Basin ranged from 30 percent of the long-term average in November 2017 to 167 percent of the long-term average in October 2017. Precipitation from December to May, when reservoirs typically refill, was 23.37 inches. Precipitation was below normal in December, June, September, and November and above normal in the other 8 months.

When the report year began on December 1, 2016, combined useable storage in the New York City reservoirs in the upper Delaware River Basin was 110.115 billion gallons or 40.7 percent of combined storage capacity. The reservoirs were at about 100 percent of useable capacity on May 31, 2017. The combined usable storage was 193.463 billion gallons (71.4 percent of storage at spillway levels) at the end of the report year on November 30, 2017. A lower basin drought watch issued by the Delaware River Basin Commission (DRBC) extended from the beginning of the report year to January 18, 2017. The drought watch was ended due to increased precipitation during December 2016. During the report year, operations in the basin were conducted as stipulated by the Decree and the 2016 and 2017 Flexible Flow Management Programs (FFMPs).

During the report year, the following individuals served as members of the Advisory Committee:

| Decree Party affiliation | Committee member |
|---|---|
| Delaware | David Wunsch |
| New Jersey | Daniel Kennedy |
| New York | Mark Klotz |
| New York City | Paul Rush |
| Pennsylvania | Kelly Heffner and Lisa Daniels |

In addition to the management of releases from the New York City-owned reservoirs and streamflow in the upper Delaware River Basin, an issue of particular interest to the River Master was the expiration of the 2016 FFMP on May 31, 2017. Upon expiration of the FFMP without a unanimously approved successor agreement to guide River Master operations, requirements for flow targets and diversions reverted to those specified by the Decree, and reservoir conservation release requirements reverted to the lower flows established by provisions in the Delaware River Basin Commission (DRBC) Docket No. D–77–20 CP (Revised). The Montague flow target continued as 1,750 cubic feet per second ($ft^3/s$), and, beginning June 15—as specified by the Decree (paragraph III–B–1 (d))—was increased to incorporate the excess quantity based on data provided by New York City.

As required by the Decree (paragraph III–B–1 (c)), New York City estimated its anticipated consumption of water from all sources during 2017 as 597.676 billion gallons, and the safe yield from all sources obtainable without pumping as 607.725 billion gallons. The excess release quantity was computed as 8.341 billion gallons, and the excess release rate was computed as 108 $ft^3/s$. The increased Montague flow target was set as 1,858 $ft^3/s$ from June 15, 2017, to March 15, 2018, or until the excess release quantity was reached, and 1,750 $ft^3/s$ thereafter, absent a new FFMP.

While the reservoir conservation release requirements reverted to lesser flows established by provisions included in DRBC Docket No. D–77–20 CP (Revised), New York City, at its discretion,

continued a program of releases consistent with the 2016 FFMP conservation release requirements through September 5, 2017, when it began ramping down the conservation releases to those required of DRBC Docket No. D–77–20 CP (Revised).

Throughout the summer of 2017, the Decree Party Principals, aided by the River Master and staff from the DRBC, continued efforts to draft a new FFMP. Those discussions resulted in a proposed 10-year, two-part agreement. The advisory committee, staff of the DRBC, and the River Master met on September 5, 2017, to finalize the draft. The draft was briefed to the DRBC Regulated Flow Advisory Committee by the River Master at a public meeting in Trenton, New Jersey (N.J.), on September 28, 2017. Subsequently, the Decree Parties signed the new FFMP for 2017 (FFMP2017), which went into effect on October 23, 2017. Upon approval of the FFMP2017, releases of the excess release quantity terminated, the Montague flow target reverted to 1,750 $ft^3/s$, and the reservoir conservation release requirements were set to levels required in the FFMP2017. The FFMP2017 expires May 31, 2023, or, pending successful execution of some of its various provisions, May 31, 2028.

River Master operations were executed through the U.S. Geological Survey (USGS) Office of the Delaware River Master (ODRM) in Milford, Pennsylvania. Robert R. Mason, Jr., the Delaware River Master, was in charge of the office and was assisted by hydrologist Vincent DiFrenna.

During the year, the ODRM 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 the New York City reservoirs to the Delaware River, diversions to the New York City water supply system, reservoir contents, daily segregation of flow of the Delaware River at the USGS streamgaging site at Montague, N.J., and diversions by the State of New Jersey. The reports were distributed to members of the Advisory Committee and other parties interested in Delaware River operations. A monthly summary of hydrologic conditions was also provided to Advisory Committee members. The weekly hydrologic reports are available through the ODRM website (https://webapps.usgs.gov/odrm/data/data.html).

The first section of this report documents Delaware River operations during the report year. During the year, New York City diverted 184.156 billion gallons from the Delaware River Basin and released 133.710 billion gallons from the Pepacton, Cannonsville, and Neversink Reservoirs to the Delaware River. A total of 67.096 billion gallons was spilled from the Pepacton, Cannonsville, and Neversink Reservoirs. The ODRM directed releases from these reservoirs to the Delaware River that totaled 28.815 billion gallons. The second section of this report describes water quality at various monitoring sites on the Delaware River estuary and includes basic data on chemical properties and the physical characteristics of the water and presents summary statistics.

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

The River Master and staff are grateful for the continued cooperation and support of the Decree Parties. Also, the contributions of Brookfield Renewable U.S. and Eagle Creek Renewable Energy, LLC, in informing the ODRM of plans for power generation and providing data on reservoir releases and elevations are greatly appreciated.

Sincerely yours,

/Signed/

Kendra Russell, P.E.

Delaware River Master

## Acknowledgments

The Office of the Delaware River Master's (ODRM) daily operation records were prepared from hydrologic data collected daily. Data for these records were collected and computed by the ODRM or provided by the following agencies and utilities. Data for streamflow of the Delaware River at Montague, New Jersey, and other locations and tributaries were provided by the U.S. Geological Survey (USGS). Data for the Pepacton, Cannonsville, and Neversink Reservoirs were provided by the New York City Department of Environmental Protection. Data for Lake Wallenpaupack were provided by Brookfield Renewable U.S. Data for Rio Reservoir were provided by Eagle Creek Renewable Energy, LLC. The National Weather Service offices in Binghamton, New York, and State College, Pennsylvania, provided quantitative precipitation forecasts and some precipitation data. Amy Shallcross of the Delaware River Basin Commission provided information about 2017 activities, including the lower basin drought watch. Amy McHugh of the USGS contributed to this report by collecting, organizing, and reviewing data.

# Contents



## Figures

## Tables

# 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 ($mi^2$) | 259.0 | hectare (ha) |
| square mile ($mi^2$) | 2.590 | square kilometer ($km^2$) |
| | Volume | |
| million gallons (Mgal) | 3,785 | cubic meter ($m^3$) |
| billion gallons | 3.785 | cubic hectometer ($hm^3$) |
| cubic foot per second accumulated daily ([$ft^3/s$]-d) | 2,447 | cubic meter per second accumulated daily ([$m^3/s$]-d) |
| 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 °F = (1.8 × °C) + 32.

## Datums

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

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

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

## Supplemental Information

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

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

# Abbreviations

| | |
|---|---|
| BWS | Bureau of Water Supply |
| Del. | Delaware |
| DRBC | Delaware River Basin Commission |
| FFMP | Flexible Flow Management Program |
| FFMP2017 | 2017 Flexible Flow Management Program |
| ft | foot |
| $ft^3/s$ | cubic foot per second |
| $(ft^3/s)$-d | cubic foot per second accumulated daily |
| IERQ | Interim Excess Release Quantity |
| in. | inch |
| Mgal | million gallons |
| Mgal/d | million gallons per day |
| mg/L | milligram per liter |
| mi | mile |
| $mi^2$ | square mile |
| NAD 83 | North American Datum of 1983 |
| N.J. | New Jersey |
| N.Y. | New York |
| NYCDEP | New York City Department of Environmental Protection |
| NWIS | National Water Information System [database] |
| ODRM | Office of the Delaware River Master |
| OST | Operational Support Tool |
| Pa. | Pennsylvania |
| THPDMP | Tailwaters Habitat Protection and Discharge Mitigation Program |
| USGS | U.S. Geological Survey |
| µS/cm at 25 °C | microsiemens per centimeter at 25 degrees Celsius |

# Report of the River Master of the Delaware River for the Period December 1, 2016–November 30, 2017

By Kendra L. Russell,[1] William J. Andrews,[1] Vincent J. DiFrenna,[1] J. Michael Norris,[2] and Robert R. Mason, Jr.[2]

## Executive Summary

A Decree of the Supreme Court of the United States, entered June 7, 1954 (*New Jersey* v. *New York*, 347 U.S. 995), established the position of Delaware River Master within the U.S. Geological Survey. In addition, the Decree authorizes the diversion of water from the Delaware River Basin and requires compensating releases from certain reservoirs owned by New York City be made under the supervision and direction of the River Master. The Decree stipulates that the River Master provide reports to the Court, not less frequently than annually. This report is the 64th annual report of the River Master of the Delaware River. The report covers the 2017 River Master report year, from December 1, 2016, to November 30, 2017.

During the report year, precipitation in the upper Delaware River Basin was 47.85 inches or 108 percent of the long-term average. On December 1, 2016, combined useable storage in the New York City reservoirs in the upper Delaware River Basin was 110.115 billion gallons or 40.7 percent of combined storage capacity, the lowest combined storage of the 2017 report year. The reservoirs were at about 100 percent of useable capacity on May 31, 2017. Combined storage remained above 80 percent of combined capacity until September 2017.

A lower basin drought watch issued by the Delaware River Basin Commission in 2016 extended from the beginning of this report year to January 18, 2017. The drought watch was ended on January 18, 2017, due to increased precipitation in December 2016. River Master operations during the year were conducted as stipulated by the Decree and the Flexible Flow Management Programs.

Diversions from the Delaware River Basin by New York City and New Jersey fully complied with the Decree. Reservoir releases were made as directed by the River Master at rates designed to meet the flow objective for the Delaware River at Montague, New Jersey (N.J.), on 52 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 made during the report year. Excess Release Quantity and Interim Excess Release Quantity Bank releases were also made during the report year.

The water quality in the Delaware River estuary between the streamgages at Trenton, N.J., and Reedy Island Jetty, Delaware, was monitored at various locations. The 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 (*New Jersey* v. *New York*, 347 U.S. 995; available at https://webapps.usgs.gov/odrm/about/decree), which superseded a 1931 Decree, authorizes the 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 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, 2016, to November 30, 2017, or the 2017 River Master report year, hereafter referred to as the "report year." This report also presents information on water quality 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 June 1, 2016, FFMP was an extension of the June 1, 2011, Agreement and incorporates

[1]U.S. Geological Survey.

[2]U.S. Geological Survey, retired.

the edits from the previous four extensions of the 2011 Agreement (2012–16), with no additional program modifications other than dates (Russell and others, 2024).

On May 31, 2017, the 2016 FFMP expired without a unanimously approved successor agreement to guide ODRM operations. Upon the expiration of the 2016 FFMP, operational requirements for flow targets and diversions reverted to those specified by the Decree, and reservoir conservation releases reverted to the lower flows established by provisions included in Delaware River Basin Commission (DRBC) Docket No. D–77–20 CP (Revised) (DRBC, 2023). Under the Decree, the Montague flow target continued as 1,750 cubic feet per second ($ft^3/s$) and, beginning June 15, 2017, as specified by the Decree (paragraph III–B–1 (d)), was increased to incorporate the excess quantity based on data provided by New York City. As required by the Decree (Paragraph III–B–1 (c)), New York City estimated its anticipated consumption of water from all sources during the 2017 report year as 597.676 billion gallons, and the safe yield from all sources obtainable without pumping as 607.725 billion gallons (Paul V. Rush, New York City Department of Environmental Protection [NYCDEP], written commun., 2017). The excess release quantity was computed as 8.341 billion gallons, and the excess release rate, based on a release spanning 120 days, was computed as 108 $ft^3/s$. The increased Montague flow target was set as 1,858 $ft^3/s$ from June 15, 2017, to March 15, 2018, or until the accumulated excess release quantity was reached, and 1,750 $ft^3/s$ thereafter, absent a new FFMP.

When the reservoir conservation release requirements reverted to the lesser flows established by provisions of DRBC Docket No. D–77–20 CP (Revised), New York City, at its discretion, continued a program of releases consistent with the 2016 FFMP conservation release requirements (app. 1) through September 5, 2017, when it began ramping down the conservation releases to those required under DRBC Docket No. D–77–20 CP (Revised) (DRBC, 2023).

Throughout the summer of 2017, the Decree party principals, aided by the ODRM and the DRBC, continued efforts to draft a new FFMP. Those discussions resulted in a proposed 10-year, two-part agreement. The advisory committee, staff of the DRBC, and the ODRM met on September 5, 2017, to finalize the draft. The draft was briefed to the DRBC Regulated Flow Advisory Committee by the River Master at a public meeting in Trenton, New Jersey (N.J.) on September 28, 2017. Subsequently, the new FFMP for 2017 (FFMP2017; app. 2) was signed by all Decree Parties by October 23, 2017. Upon approval of the FFMP2017, release of the excess release quantity was terminated, the Montague flow target reverted to 1,750 $ft^3/s$, and the reservoir conservation release requirements were set to the levels required in FFMP2017 (which were the same as those established in the 2016 FFMP). FFMP2017 expires on May 31, 2023, or, pending successful execution of some of its provisions, on May 31, 2028.

Some hydrologic data in this report are records of streamflow and water quality data collected at U.S. Geological Survey (USGS) water-quality streamgages. The USGS collected and computed these data 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 streamgaging sites in the Delaware River Basin, are shown in figure 1.

## Method to Determine Directed Releases From New York City Reservoirs

The data and computations of the various streamflow components form the operational record used by the ODRM to carry out specific responsibilities related to the Montague flow objective (app. 2). The operational record has two parts: (1) segregating the streamflow components of the current daily mean discharge at the USGS streamgage at Montague, N.J. (site 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 the Montague site with adequate advance time to direct releases. The forecasting process determines whether the ODRM directs the New York City reservoirs to release water to maintain, at a minimum, the Montague flow objective at the Montague site, which is defined in table 1 of appendix 2.

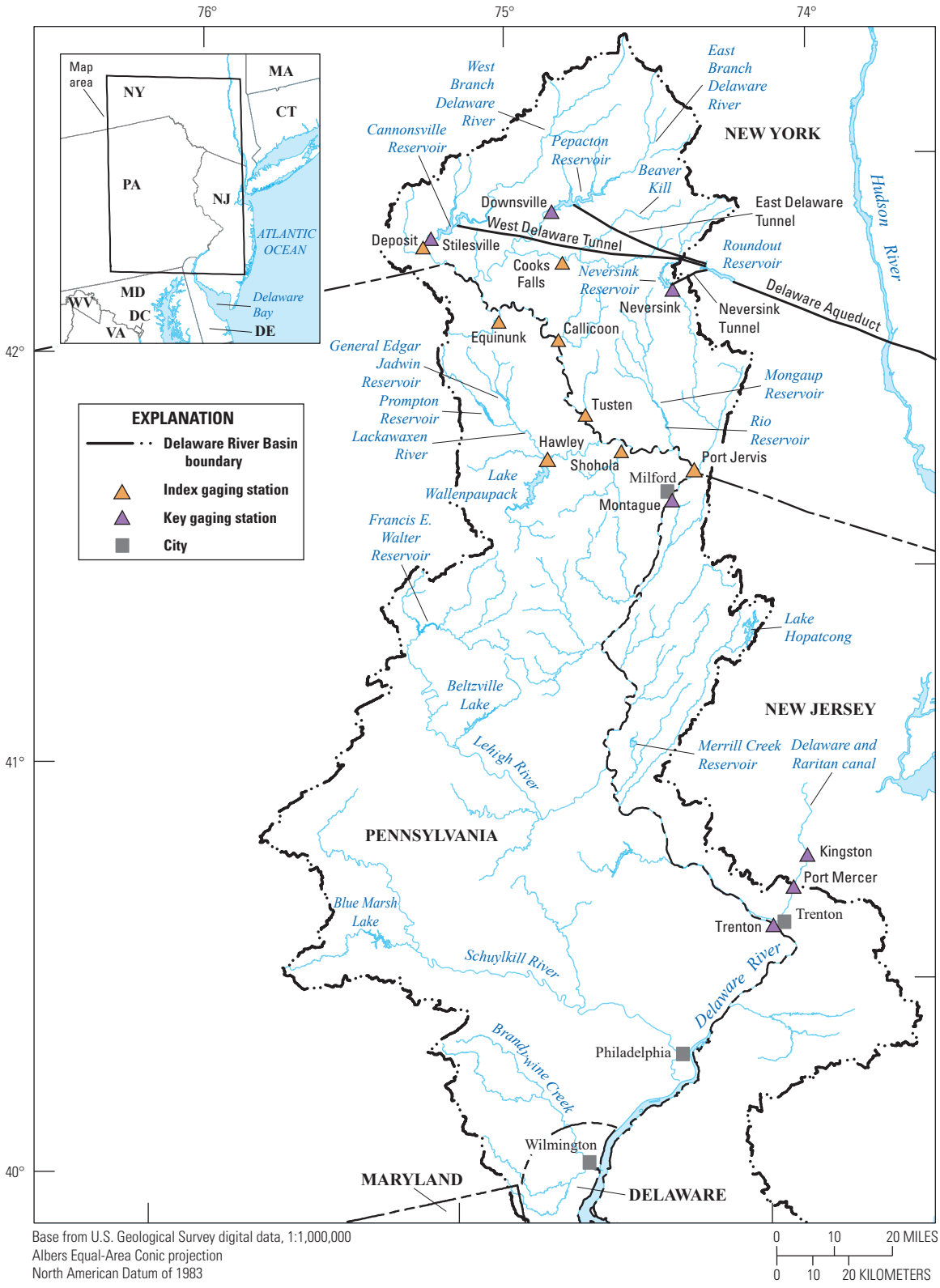


**Figure 1.** Map showing the Delaware River Basin upstream from Wilmington, Delaware. The Delaware River Basin boundary is shown along with "key gaging stations" and "index gaging stations;" refer to the "Glossary" section for definitions.

## Segregating Streamflow Components—Delaware River at Montague, New Jersey

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

The traveltimes were computed from the reservoir and powerplant operations data and historical streamflow records. The traveltimes are adequate for ODRM operations. Occasionally, however, significant exceptions are observed. For example, during a large increase in a directed release from the Cannonsville Reservoir, the arrival time of the water at the Montague site 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 site. During winter, ice formation and lower streamflow gradually increase the resistance to water flow, resulting in increased traveltimes. Because ice-affected traveltimes increase gradually across several days and releases were not directed to meet the Montague flow objective during periods of ice, no adjustments were made to compensate for these increased traveltimes during the report year.

The following list gives the average times for the effective travel of water from the various sources of controlled supply to the Montague site. These traveltimes, in hours, were used for flow routing during the 2017 report year: Pepacton Reservoir, 60; Cannonsville Reservoir, 48; Neversink Reservoir, 33; Lake Wallenpaupack, 24; and Rio Reservoir, 8. The traveltime used for Lake Wallenpaupack controlled releases, in 2016, changed from 16 hours to 24 hours based on data from Brookfield Renewable U.S.

## Forecasting Streamflow—Delaware River at Montague, New Jersey

The releases from New York City's reservoirs necessary for meeting the Montague flow objective were computed based on the forecasted streamflow at the Montague site, 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 for the flow to reach the Montague site from the New York City reservoirs.

The electric utilities Brookfield Renewable U.S. and Eagle Creek Renewable Energy, LLC, provided daily forecasts of power generation and releases to the Delaware River from Lake Wallenpaupack and Rio Reservoir, respectively, to the ODRM. Because the hydroelectric powerplants were primarily used 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, demands for power outside of the local service area can unexpectedly affect power-generation schedules. Consequently, the actual use of water for power generation can differ from the forecasts used in the design of reservoir releases.

For computational purposes during periods of low flow, estimates of uncontrolled runoff at the Montague site 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 site and is used to forecast the uncontrolled portion of flow at the Montague site 3 days in advance. Forecasted runoff was determined from data provided by the National Weather Service office in Binghamton, New York (N.Y.), which provided quantitative forecasts of average precipitation and air temperatures for the 3,480-square-mile ($mi^2$) drainage basin upstream from Montague, N.J. 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 the Montague site, 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, the deficiency comprises releases from New York City's reservoirs, as directed by the ODRM.

The 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 is 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 a 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 significant changes after a release was directed, the release required from New York City's reservoirs was recomputed based on updated forecasts. Commonly, this procedure resulted in a reduced release requirement for the New York City reservoirs that day. Only the final values for releases from the New York City reservoirs are presented in this report.

# Hydrologic Conditions

## Precipitation

The sum of the average monthly precipitation in the Delaware River Basin upstream from Montague, N.J., was 47.85 inches (in.) during the 2017 report year and was 108 percent of the long-term (76-year) average (table 1, in back of report). Monthly precipitation ranged from 30 percent of the long-term average in November 2017 to 167 percent of the long-term average in October 2017 (table 1). Precipitation data for the report year were computed from records from eight geographically distributed stations operated by the National Weather Service; the New York City Department of Environmental Protection (NYCDEP) Bureau of Water Supply; and the ODRM.

The seasonal period from December to May is typically when surface-water and groundwater reservoirs refill. During this period for 2016–2017, total precipitation was 23.37 in., which is 115 percent of the 76-year long-term average. During the June–November period, total precipitation was 24.48 in., which is about 102 percent of the 76-year long-term average.

## Reservoir Storage

Table 2 summarizes the "point of maximum depletion" and other pertinent levels and contents of the Pepacton, Cannonsville, and Neversink Reservoirs. This information was provided by the NYCDEP.

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, 2016, combined useable storage in the three reservoirs was 110.115 billion gallons or 40.7 percent of combined capacity. From December to May, inflow to the New York City reservoirs typically exceeds outflow, consequently increasing storage. Combined storage increased during the first half of the report year, and the reservoirs were at about 100 percent of usable capacity on May 31, 2017. Combined storage remained high (above 80 percent combined capacity) until September 2017. The lowest combined storage was 110.115 billion gallons (40.7 percent) on December 1, 2016.

The three reservoirs spilled a total of 67.096 billion gallons during the year when reservoirs reached maximum capacity. The Pepacton Reservoir spilled during the following periods: April 6–15, 2017; April 23–26, 2017; May 1–23, 2017; May 27, 2017; May 30–June 2, 2017; June 5–12, 2017; and June 19–20, 2017. The Cannonsville Reservoir spilled during the following periods: April 4–29, 2017; and May 1–June 12, 2017. The Neversink Reservoir spilled during the following periods: April 6–14, 2017; April 25–26, 2017; May 4–7, 2017; May 11–16, 2017; May 29–30, 2017; June 1–13, 2017; and June 19–20, 2017.

The combined storage reached a maximum for the report year on April 8, 2017, at 278.287 billion gallons. The reservoirs' storage decreased from that point, and the combined storage was 193.463 billion gallons (71.43 percent of combined capacity) on November 30, 2017.

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

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

| Level | Pepacton Reservoir | | Cannonsville Reservoir | | Neversink Reservoir | |
|---|---|---|---|---|---|---|
| | Elevation | Content | Elevation | Content | Elevation | Content |
| 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 | — |
| Dead storage | — | 1,800 | — | 328 | — | 1,680 |

[1]This quantity is stored between the full pool or spillway crest and the point of maximum depletion.

[2]This quantity is stored between the point of maximum depletion and the sill of the diversion tunnel.

[3]This elevation is at the mouth of the inlet channel of the diversion works.

[4]This quantity is stored between the sill of the diversion tunnel and the sill of the river outlet tunnel.

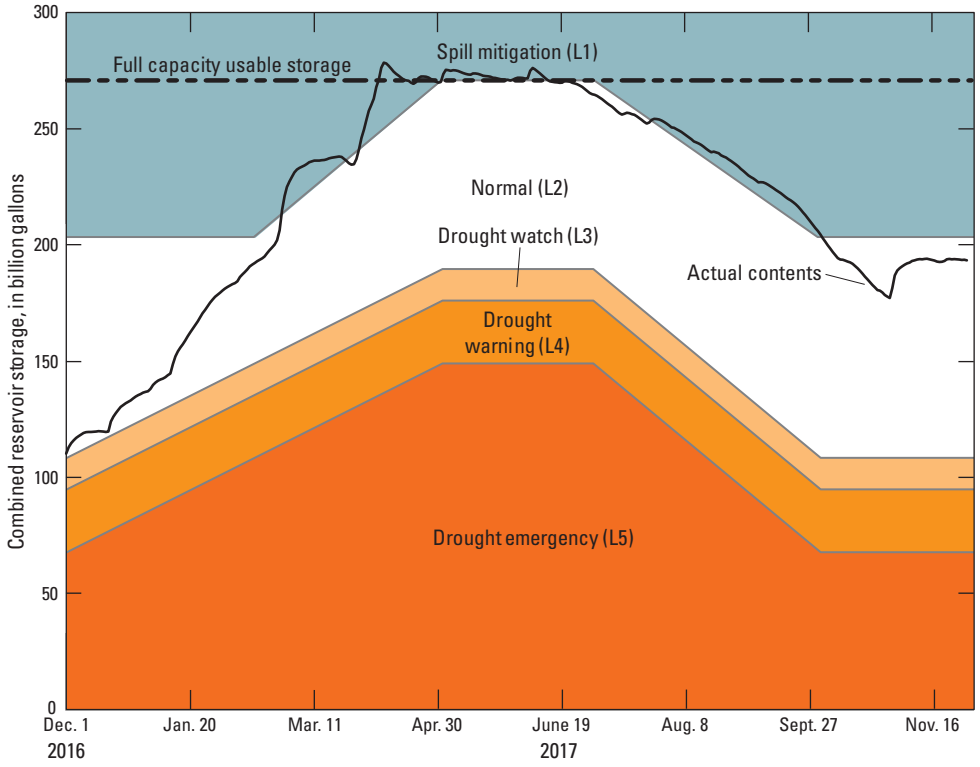


**Figure 2.** Graph showing rule curves and actual stored water for New York City reservoirs in the Delaware River Basin from December 1, 2016, to November 30, 2017. Full capacity usable storage line and the five conservation release rate zones (L1–5) are shown. The conservation release rate zones are defined in the "conservation release" definition in the "Glossary" section.

# Operations

Operations from December 1, 2016, through November 30, 2017, were conducted as described by the FFMPs (revised, effective June 1, 2016–May 31, 2017, and October 23, 2017–November 30, 2017), and interim operations absent a signed FFMP as defined by DRBC Docket No. D–77–20 CP (Revised) (DRBC, 2023). The allowable diversion to New York City was 800 million gallons per day (Mgal/d) throughout the year. The allowable diversion to New Jersey was 100 Mgal/d monthly, with an average not exceeding 120 Mgal/d.

The DRBC issued a lower basin drought watch on November 23, 2016, for the portion of the watershed downstream from Montague, N.J. (DRBC, 2016). During the drought watch, the Trenton flow objective was decreased from 3,000 $ft^3/s$ to 2,700 $ft^3/s$. The Montague flow objective was reduced to 1,650 $ft^3/s$ on December 1, 2016, and remained so until January 18, 2017, when the drought watch was ended. Increased precipitation in December 2016 led to termination of the drought watch on January 18, 2017. The Montague flow objective was 1,750 $ft^3/s$ from January 19, 2017, until June 15, 2017, when the flow objective was increased to 1,858 $ft^3/s$ to account for excess release flows. The Montague flow objective returned to 1,750 $ft^3/s$ on October 23, 2017, when FFMP2017 became effective. Conservation releases from New York City reservoirs were made at the rates shown in tables 4a–g in the June 1, 2016, FFMP (app. 1 in Russell and others, 2024) and FFMP2017 (app. 2 of this report). The following tables were used: table 4a of both FFMPs from December 2016 through early February 2017, table 4c in mid-February, tables 4f and 4g for late February–March, tables 4a–d in April, tables 4f and 4g in early May, table 4c in mid-May, table 4e for June–August, and table 4g for October–November 2017 (see "Archived OST [Operational Support Tool] 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.

The records of daily diversions through the East Delaware, West Delaware, and Neversink Tunnels (fig. 1) were provided to the ODRM by the NYCDEP. These records were obtained from calibrated instruments belonging to

New York City that were connected to Venturi meters installed in the tunnel conduits. The flow measurements were transmitted electronically on a 15-second interval to New York City computers; 5-minute interval release and diversion quantities for the preceding 5-minute period were computed 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 daily to the ODRM. Each week, the computed diversion values were checked against the flow-meter totalizer readings by the NYCDEP and corrected when necessary.

Daily diversions during the report year from the 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, 2016, computed as stipulated by the Decree, is shown in table 6. A total of 184.157 billion gallons of water was diverted to New York City water supply system during the year ending May 31, 2016, with an average of 505 Mgal/d, which is below the maximum diversion rate. The maximum daily diversion from a single reservoir was 474 million gallons (Mgal) on March 7, 2017, from the Cannonsville Reservoir. The maximum daily combined diversion from all three reservoirs was 905 Mgal on November 16, 2017. The diversions by New York City did not exceed the limits stipulated by the Decree and the FFMPs. The 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 the Pepacton Reservoir to the 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 operating, some water leaked through the wicket gates and was not recorded on the totalizer. A current-meter measurement made in 1989 showed that the (assumed constant) rate of leakage is about 12.4 $ft^3/s$ (8.0 Mgal/d). Because the powerplant was not in operation for the equivalent of 63 days during the 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 the Cannonsville Reservoir to Rondout Reservoir. When the valves were closed, an inspection of the channel below the outlet revealed 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 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 report year, the powerplant operated part of the day on most days and was not operated for the equivalent of 222 days. About 2.3 billion gallons of water was diverted but not recorded, according to the leakage rate noted above and records of powerplant operation.

## Diversions by New Jersey

The Decree authorizes New Jersey to divert water from the Delaware River and its tributaries in New Jersey to areas outside of the Delaware River Basin without compensating releases. Under the FFMPs, 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 emergency, diversions shall not exceed 85 Mgal/d as a running average. The Delaware River Basin was in drought watch from December 1, 2016, to January 18, 2017 (DRBC, 2017).

The USGS streamgage on the Delaware and Raritan Canal at Port Mercer, N.J. (site 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 diversions were 102.1 Mgal/d during October and 103.6 Mgal/d in November 2017 (table 8, in back of report) (USGS, 2019e). The maximum daily mean diversions were 107 million gallons (Mgal/d) on October 8 and 21, 2017 (table 8). The data in this report are the approved gage data rather than the provisional data used for real-time decisions. Diversions by New Jersey exceeded the limits stipulated by the FFMP in October and November 2017 based on the approved data. However, the diversions fell within the allowable limits based on provisional data at the time of operation and, therefore, did not exceed the limits stipulated by the FFMP.

## Montague Flow Objective

The components of forecasted flow at the Montague site during low flow—forecasted releases from hydroelectric power reservoirs, estimated uncontrolled runoff including conservation releases from Rio Reservoir, and forecasted increases 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 the Montague site.

The Montague flow objective was reduced to 1,650 $ft^3/s$ on December 1, 2016, and remained so until January 18, 2017, when the drought watch was ended. The Montague flow objective was 1,750 $ft^3/s$ from January 19, 2017, until June 15, 2017, when the flow objective was increased to 1,858 $ft^3/s$ to account for the excess release flows. The Montage flow objective returned to 1,750 $ft^3/s$ on October 23, 2017, when FFMP2017 became effective.

The forecasted flow of the Delaware River at the Montague site, based on provisional data and exclusive of water released from the New York City reservoirs, was greater than the flow objective on all days from December 1, 2016, to August 8, 2017, after which the forecasted flow of the Delaware River at the Montague site was less than the flow objective for 55 days from early August through late October, and the ODRM directed releases for 52 of those days (table 9). The observed daily mean discharge at the Montague site was greater than the applicable flow objectives on all days of the report year, except for September 2 and 3, September 20–23, October 14–16, and October 22, 2017 (table 11, in back of report) (USGS, 2019d). Only two of those observed daily mean flows—1,660 $ft^3/s$ on September 22, and 1,600 $ft^3/s$ on October 15—were less than 90 percent of the flow objective (table 11) (USGS, 2019d).

The components of the total flow observed at the Montague site from August 1 through October 31, 2017, are shown in figure 3. The flow is segregated into the portion derived from the New York City reservoirs, the portion contributed by the powerplant reservoirs, and the uncontrolled runoff from the drainage area below the reservoirs. As previously described, the uncontrolled runoff was computed as the residual of observed flow minus releases and was subject to errors in the observations, transit times, and routings of the flow components. The conservation release from Rio Reservoir was included in the uncontrolled runoff component. The effect of these uncertainties is incorporated into the computation of uncontrolled runoff.

## Excess Release Quantity and Interim Excess Release Quantity

In the absence of an FFMP, the calculation of the excess release quantity and its use, as specified by the Decree (paragraph III–B–1 (c) and (d)), became effective. New York City estimated its anticipated consumption of water from all of its sources during 2017 as 597.676 billion gallons, and the safe yield from all sources obtainable without pumping as 607.725 billion gallons (Paul V. Rush, New York City Department of Environmental Protection, written commun., 2017). The excess release quantity was computed to be 8.341 billion gallons, and based on a release spanning 120 days, the excess release rate was computed to be 108 $ft^3/s$, yielding a Montague flow target of 1,858 $ft^3/s$. The flow target was applied for June 15–October 23, 2017, when FFMP2017 became effective. The total daily excess release credits accumulated for June 15–October 23, 2017, was 7.385 billion gallons, or 11,425 cubic feet per second accumulated daily ([$ft^3/s$]-d) (table 10, column 14).

A total of 6,000 ($ft^3/s$)-d of special thermal stress releases are allowed per DRBC Docket No. D–77–20 CP (Revised), "Reservoir Release Program, Section C—Special Thermal Stress Releases" (DRBC, 2023). Calls for releases occurred between June 12, 2017, and October 21, 2017, which resulted in a total use of 4,947 ($ft^3/s$)-d (table 10, column 12). The reported values are the portion of reservoir releases greater than the conservation release rates established in D–77–20 CP (Revised), on days when a request for additional water was made.

On October 23, 2017, when FFMP2017 became effective, the Interim Excess Release Quantity (IERQ) Banks were established (app. 2). The Rapid Flow Mitigation Bank was used on October 22, 26, and 27, 2017. A total of 634 ($ft^3/s$)-d was used, and a remaining volume of 366 ($ft^3/s$)-d was still available. No other FFMP2017 IERQ Banks were used during the report year.

## Tailwaters Habitat Protection and Discharge Mitigation Program

The FFMP established a Tailwaters Habitat Protection and Discharge Mitigation Program (THPDMP), which consists of (1) conservation releases designed to protect the ecology in the tailwaters below the New York City reservoirs and (2) discharge mitigation releases designed to help mitigate the effects of spilling immediately below the New York City reservoirs. Controlled releases were made from the New York City Delaware River Basin reservoirs under the FFMP until it expired on May 31, 2017. From December 1, 2016, through May 31, 2017, the total of reservoir conservation-releases from the Pepacton, Cannonsville, and Neversink Reservoirs was 75.502 billion gallons. The reservoir conservation-release requirements reverted to lesser flows established by provisions of DRBC Docket No. D–77–20 CP (Revised); New York City, at its discretion, continued a program of releases consistent with the 2016 FFMP conservation-release requirements through September 5, 2017, when it began ramping down the conservation releases to those required of Dockett No. D–7 7–20 CP (Revised) (DRBC, 2023). From June 1, 2017, when the 2016 FFMP expired, through October 23, 2017, when FFMP2017 was signed, the total of conservation releases from the Pepacton, Cannonsville, and Neversink Reservoirs was 48.568 billion gallons. On October 23, 2017, the New York City reservoirs began making controlled releases for the THPDMP under FFMP2017. The total of conservation releases from the Pepacton, Cannonsville, and Neversink Reservoirs from October 24 through November 30, 2017, was 6.033 billion gallons.

A total of 130.103 billion gallons was released from the New York City Delaware River Basin reservoirs, under the THPDMP, from December 1, 2016, to November 30, 2017.

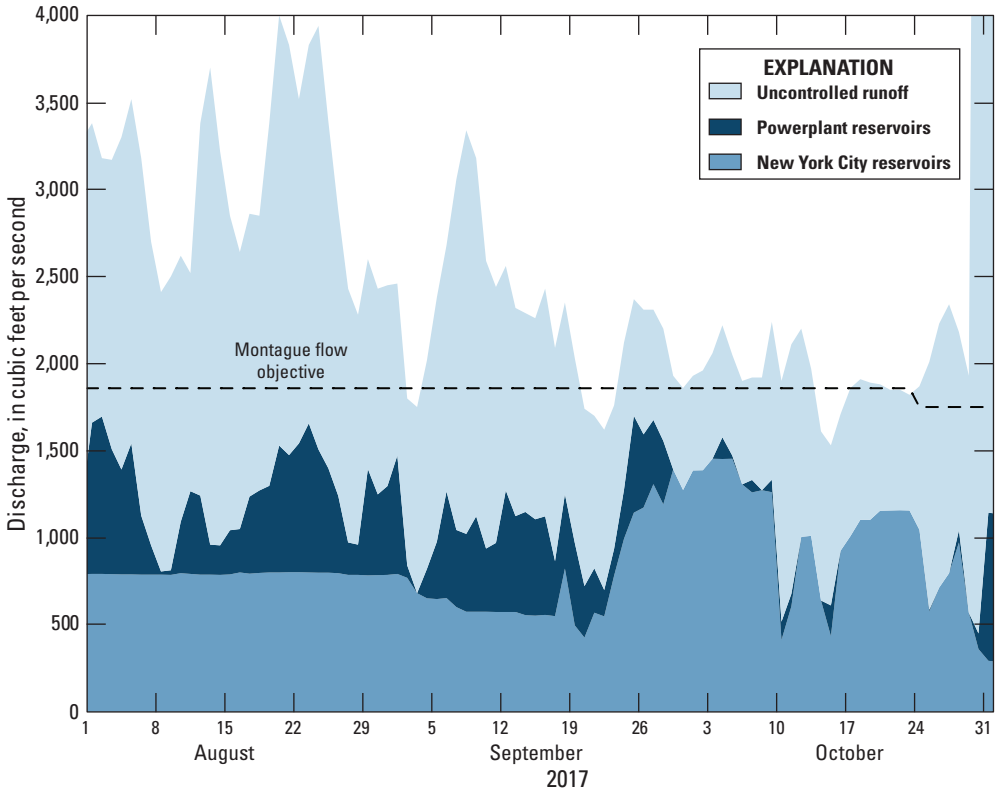


**Figure 3.** Graph showing flow components—uncontrolled runoff, powerplant reservoirs, and New York City reservoirs—for the Delaware River at Montague, New Jersey, August 1–October 31, 2017. The Montague flow objective is also shown.

## Comparison of River Master Operations Data With Other Records

The ODRM operations are conducted on a daily basis and, by necessity, use preliminary data on streamflow. This section compares records used in the ODRM operations with the final data published for selected USGS streamgages. The data on releases were reported in million gallons per day and converted to cubic feet per second for comparisons.

## Analysis of Forecasts

Based on anticipated contributions from the flow components described previously but excluding releases from New York City reservoirs, the forecasted streamflow at the Montague site differed from observed flow on most days. Occasionally, variations in the components were partially compensating, and observed flows are comparable to forecasted flows.

The forecasted flow of the Delaware River at the Montague site, exclusive of releases from the New York City reservoirs, was less than the flow objective on 55 days from early August through late October 2017; directed releases were made on 52 of those days (table 9). Table 12 compares forecasted and actual flow from hydroelectric powerplant releases for August 7–October 31, 2017.

For August 7–October 31, 2017, as shown in table 12, actual releases from Lake Wallenpaupack and Rio Reservoir averaged 2.4 and 165 percent more, respectively, than the forecasted releases. Powerplant forecasted volumes were calculated from columns 1 and 2 in table 9; powerplant actual releases were calculated from columns 5 and 6 in table 10. Observed runoff (column 10 in table 10) from the uncontrolled area was about 17 percent more than the forecasted runoff (columns 3 and 4 in table 9).

Forecasted and actual releases from Lake Wallenpaupack and Rio Reservoir can differ considerably on any given day. The differences between the actual and forecasted daily releases from August 7 to October 31, 2017, are as follows: actual releases at Lake Wallenpaupack differed from forecasted releases by 839 $ft^3/s$ less than forecasted releases to 461 $ft^3/s$ greater than forecasted releases, and daily releases at Rio Reservoir differed by 106 $ft^3/s$ less than forecasted releases to 851 $ft^3/s$ greater than forecasted releases. Based on the measured streamflow at the Montague site, total directed releases from the New York City reservoirs during the report year (column 9 in table 9) were about 9 percent more than required for exact forecasting (column 11 in table 9).

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

## Releases From New York City Reservoirs

The ODRM operations data on controlled releases from the Pepacton, Cannonsville, and Neversink Reservoirs to the Delaware River were provided by the NYCDEP 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 the East Branch Delaware River at Downsville, N.Y. (site number 01417000; fig. 1), is 0.5 miles (mi) downstream from Downsville Dam. Discharge measured at this site 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 this site. The streamgage's records are rated "good," meaning that about 95 percent of the measured daily mean discharges are within 10 percent of the actual discharge.

Figure 5*A* shows the measured flow from the Pepacton Reservoir, including spillway, conservation, and directed releases reported by New York City compared with records for the USGS streamgage on the East Branch Delaware River at Downsville, N.Y. (table 13, in back of report) (USGS, 2019a), from December 1, 2016, to November 30, 2017. The average difference is 7.7 percent, and 95 percent of the daily differences between the streamgage readings and New York City records are within 17.3 percent of the actual discharge. Larger differences rarely occur and can be due to rainfall. Instruments connected to Venturi meters were recalibrated periodically by New York City to improve the accuracy of the recorded flow data.

The USGS streamgage on the West Branch Delaware River at Stilesville, N.Y. (site number 01425000; fig. 1), is 1.4 mi downstream from the Cannonsville Dam. The discharge measured at this site includes releases from the 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 actual 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 the Cannonsville Reservoir (including spillway, conservation, and directed releases) reported by New York City compared with records for the USGS streamgage on the West Branch Delaware River at Stilesville, N.Y. (table 14, in back of report) (USGS, 2019b), from December 1, 2016, to November 30, 2017. The mean difference is 11.8 percent, and 95 percent of the daily differences between the streamgage readings and New York City records are within 29.2 percent of the actual discharge. The largest differences between the released and measured flow are primarily at lower flow rates.

The USGS streamgage on the Neversink River at Neversink, N.Y. (site number 01436000; fig. 1), is 1,650 feet (ft) downstream from Neversink Dam. The discharge measured at this site includes releases from Neversink Reservoir and, during storms, a small amount of runoff that originates from 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," meaning that about 95 percent of the measured daily mean discharges are within 10 percent of the actual discharge.

Figure 5*C* shows releases from the Neversink Reservoir, including spillway, conservation, and directed releases reported by New York City compared with the records for the USGS streamgage on the Neversink River at Neversink, N.Y. (table 15, in back of report) (USGS, 2019c), from December 1, 2016, to November 30, 2017. The mean difference between the released flow and measured flow is 7.4 percent, and 95 percent of the daily differences between the streamgage readings and New York City records are within 19 percent of the actual discharge.

**Table 12.** Cumulative forecasted and actual release volume from Lake Wallenpaupack, Rio Reservoir, and uncontrolled runoff from August 7 to October 31, 2017.

[$(ft^3/s)$-d, cubic foot per second accumulated daily]

| Release source | Forecasted volume ($[ft^3/s]$-d) | Actual volume ($[ft^3/s]$-d) |
|---|---|---|
| Lake Wallenpaupack | 19,856 | 20,330 |
| Rio Reservoir | 1,062 | 2,811 |
| Runoff from uncontrolled area | 114,281 | 133,286 |

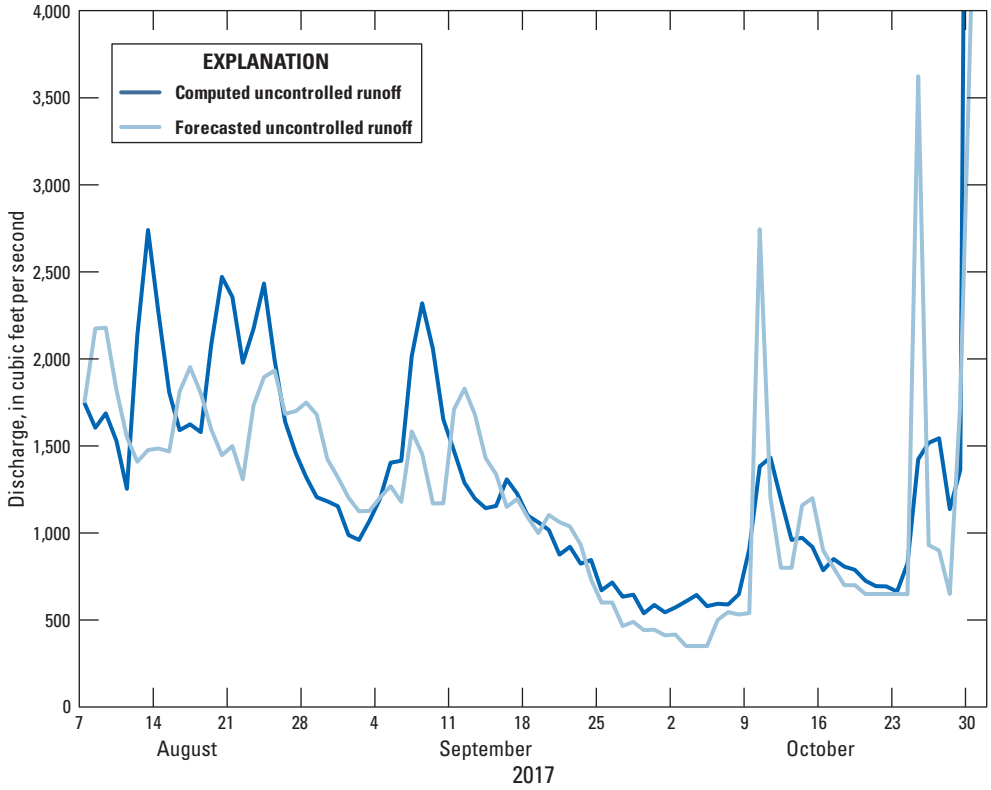


**Figure 4.** Hydrographs of computed and forecasted uncontrolled runoff components, Delaware River at Montague, New Jersey (U.S. Geological Survey site number 01460440), from August 7 to October 31, 2017. Discharge is shown in cubic feet per second.

### Delaware River at Montague, New Jersey

The ODRM's operations record for the streamgage at the Delaware River at Montague, N.J. (table 10), showed about 0.96 percent less discharge for the report year than the published USGS record for the streamgage (table 11). 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 Supreme Court of the United States Entered June 7, 1954

From December 1, 2016, to November 30, 2017, operations of the ODRM were conducted as stipulated by the Decree and the FFMPs. The diversions from the Delaware River Basin to the New York City water supply system did not exceed those the Decree and the FFMPs authorized. New York City released water from its reservoirs at rates directed by the ODRM to meet the applicable Montague flow objectives. 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 and excess release quantity were used under the FFMPs 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 report year. Selected data are presented, and water-quality conditionsare summarized.

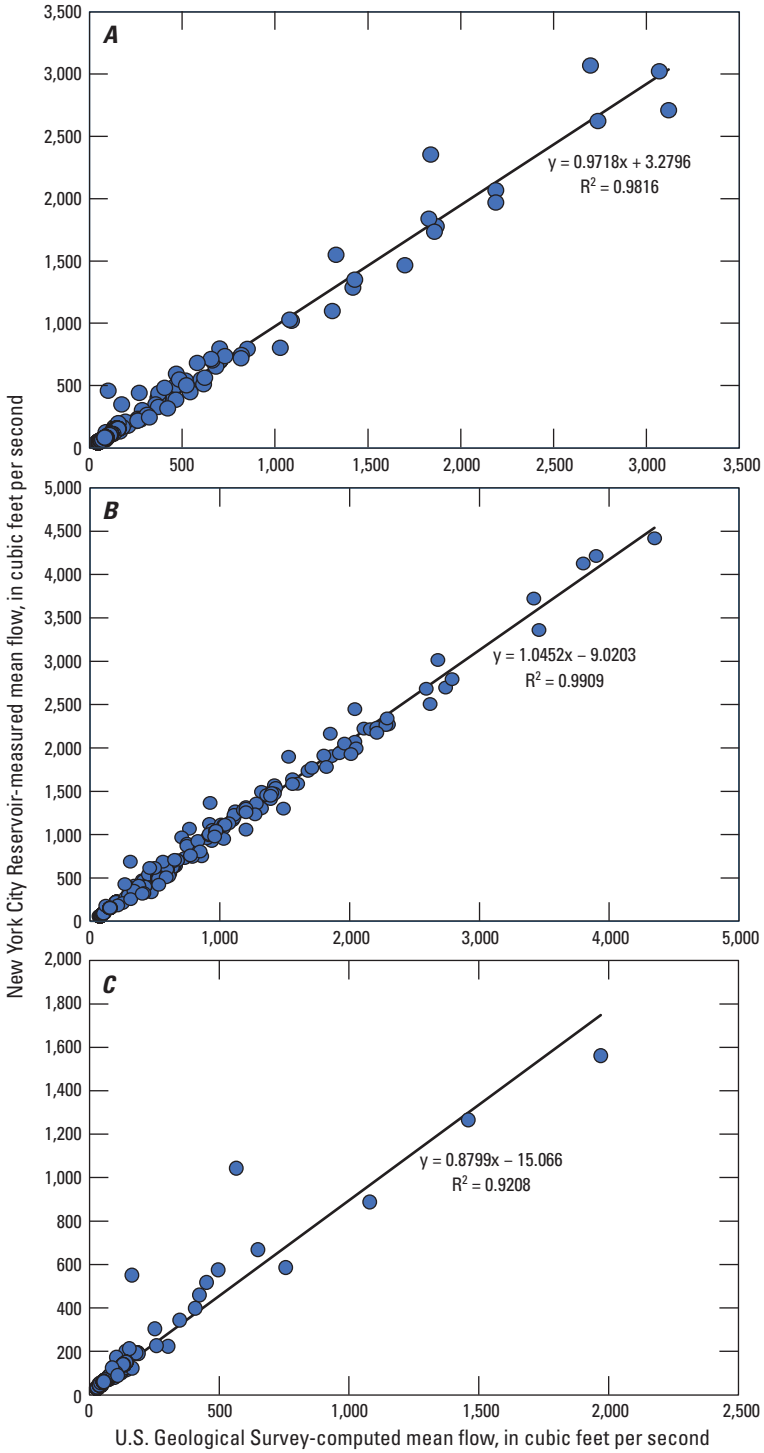


**Figure 5.** Graphs showing New York City-measured mean flow, in cubic feet per second, compared with computed mean flow records for U.S. Geological Survey (USGS) streamgaging sites downstream from their respective reservoirs: (*A*) East Branch Delaware River at Downsville, New York (N.Y.) (site number 01417000), downstream from Pepacton Reservoir (data from USGS, 2019a); (*B*) West Branch Delaware River at Stilesville, N.Y. (site number 01425000), downstream from Cannonsville Reservoir (data from USGS, 2019b); and (*C*) Neversink River at Neversink, N.Y. (site number 01436000), downstream from Neversink Reservoir (data from USGS, 2019c), for December 1, 2016–November 30, 2017.

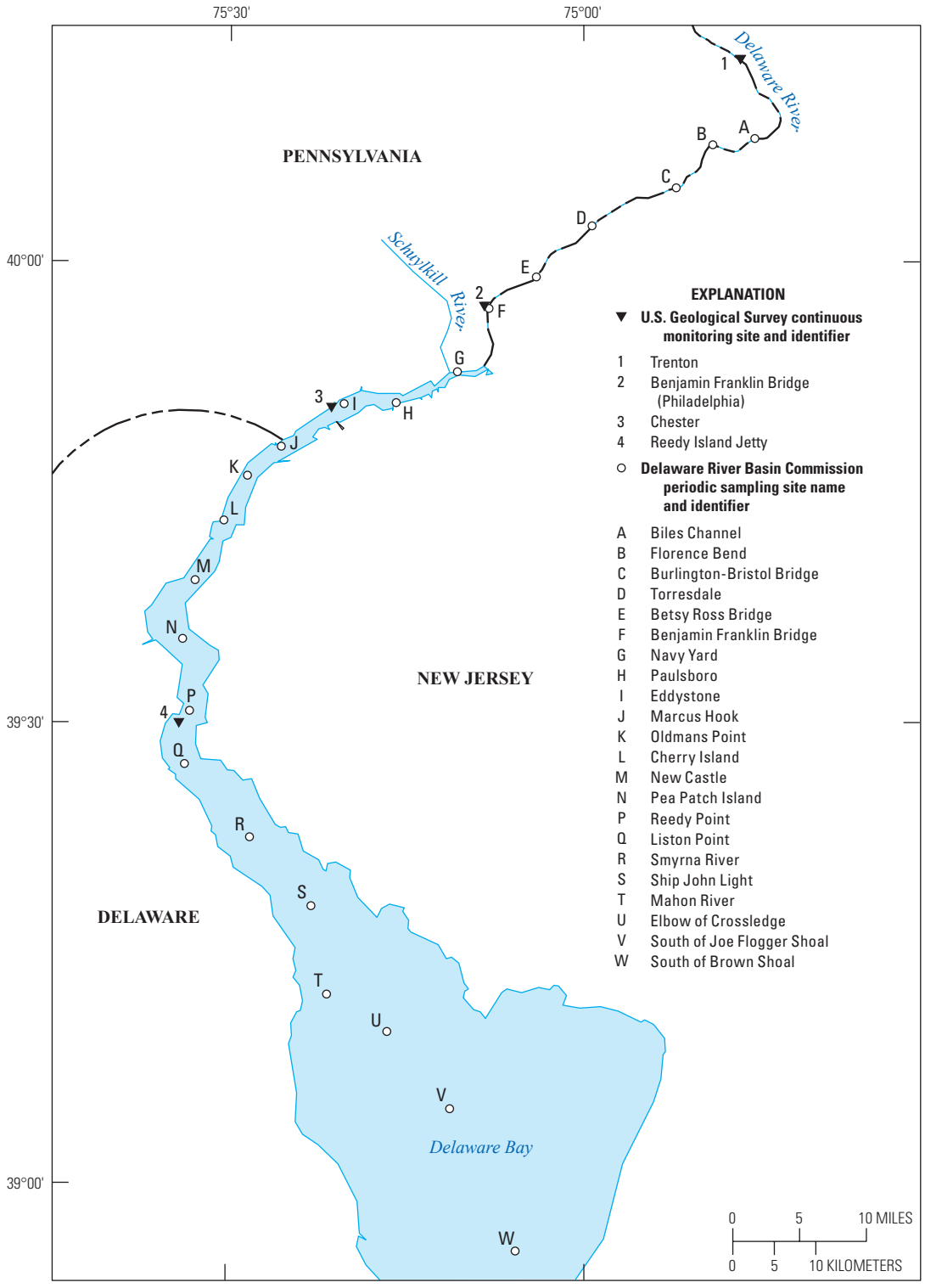


**Figure 6.** Map showing location of water-quality monitoring sites on the Delaware River estuary. U.S. Geological Survey streamgaging sites (1–4) and Delaware River Basin Commission (DRBC) sampling sites (A–N, P–W) are listed. Modified from DRBC (2021).

## 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 Trenton, N.J., and Reedy Island Jetty, Delaware (Del.) (fig. 6).

Continuous water temperature, specific conductance, dissolved oxygen, and pH data were collected at four USGS monitoring sites: the Delaware River at Trenton, N.J. (site number 01463500); the Delaware River at Benjamin Franklin Bridge at Philadelphia, Pennsylvania (Pa.) (site number 01467200); the Delaware River at Chester, Pa. (site number 01477050); and the Delaware River at Reedy Island Jetty, Del. (site number 01482800). Continuous turbidity data were also collected at the Trenton and Reedy Island Jetty sites. The DRBC and others use these data to assess water-quality conditions and track the "salt front" movement in the Delaware River estuary. Continuous monitoring data are processed and stored in the USGS National Water Information System web database (NWIS; https://waterdata.usgs.gov/nwis). Selected monitoring data from the report year are included in this section.

For this report, USGS site number 01467200 is referred to as "Delaware River at Benjamin Franklin Bridge at Philadelphia, Pa." The gage was located there during the report period (from December 1, 2016, to November 30, 2017). In January 2020, the gage was moved 150 ft upstream and renamed "Delaware River at Penn's Landing, Philadelphia, Pa." The updated name is used in the "References Cited" section to refer to the data listed in the NWIS database at the time of publication.

### 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 locations in the Delaware River estuary from Biles Channel to South Brown Shoal (fig. 6, sites A–N, P–W; DRBC, 2021). Samples are collected monthly from April to October. This program intends to provide accurate, precise, and defensible estimates of the surface-water quality of the Delaware River estuary and allow assessments of compliance with the water-quality criteria. Sample analyses include routine and bacterial parameters, nutrients, heavy metals, chlorophyll-*a*, dissolved silica, and volatile organics. This report does not present water-quality data for these DBRC sampling sites, but the data are accessible from the DRBC Boat Run Water Quality Data Explorer (https://www.nj.gov/drbc/programs/quality/boat-run.html).

## Water Quality During the 2017 Report Year

### Streamflow

Streamflow significantly affects water quality in the Delaware River estuary. High freshwater inflows commonly result in improved water quality by limiting the upstream movement of seawater and reducing the concentration of dissolved substances. High inflows also aid in maintaining lower water temperatures during warm weather and support 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 algae levels.

Streamflow from the Delaware River Basin upstream from the Trenton site is the primary source of freshwater inflow to the Delaware River estuary. During the report year, monthly mean streamflow measured at the USGS streamgage at the Delaware River at Trenton, N.J. (site number 01463500), was highest during April 2017 (27,900 $ft^3/s$) and lowest during October 2017 (4,576 $ft^3/s$; table 16, in back of report) (USGS, 2019f). Long-term monthly mean streamflow was computed for October 1912–November 2016. Monthly average streamflows were less than the long-term mean monthly flows from December 2016 through March 2017, May 2017, and from September through November 2017. The greatest percentage of flow deficiency was in December 2016, when monthly average streamflow was about 50 percent of the long-term average monthly flow. The highest daily mean streamflow during the report year was 54,500 $ft^3/s$ on April 1, 2017, and the lowest was 3,170 $ft^3/s$ on October 23, 2017 (table 16).

### Water Temperature

Water temperature influences water quality, as it affects various physical, chemical, and biological properties of water (USGS, 2020c). Increases in water temperature usually have detrimental effects on water quality by decreasing the saturation level of dissolved oxygen and by increasing the biological activity, such as aerobic respiration, 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, can also have substantial effects.

Water temperature data for the site at the Benjamin Franklin Bridge, Philadelphia, Pa., were collected almost continuously from April to November 2017. The procedures used to create figure 7 of this report were started for the 2011 report (DiFrenna and others, 2020). The available long-term average daily temperature data were retrieved from the USGS NWIS database for April through November; the average value was computed for each month from 1964 to 2016 (fig. 7). The monthly average temperatures were greater than the long-term average monthly temperature in April,

July, October, and November 2017 (fig. 7). Monthly average temperatures were less than the respective long-term averages in May, June, August, and September 2017 (fig. 7). The maximum daily mean water temperature of 28.0 degrees Celsius was recorded on July 22 and 23, 2017 (USGS, 2020d).

## 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, the 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 essential 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 Reedy Island Jetty site. Chloride concentrations at Chester, Pa., were measured by Kimberly-Clark Chester Operations. The DRBC provided these data, which are not derived from specific conductance data.

At the Reedy Island Jetty site, the greatest daily maximum specific conductance was 23,400 microsiemens per centimeter at 25 degrees Celsius (µS/cm at 25 °C) on December 7, 2017 (table 17, in back of report) (USGS, 2020h). Daily maximum specific conductance during the report year exceeded 3,780 uS/cm at 25 °C on approximately 97 percent of the 365 days with measured specific conductance values in the report year. The lowest daily minimum specific conductance was 466 µS/cm at 25 °C on April 16, 2017. Daily minimum specific conductance exceeded 3,780 uS/cm at 25 °C on 66 percent of the 365 days with measured specific conductance values in the report year.

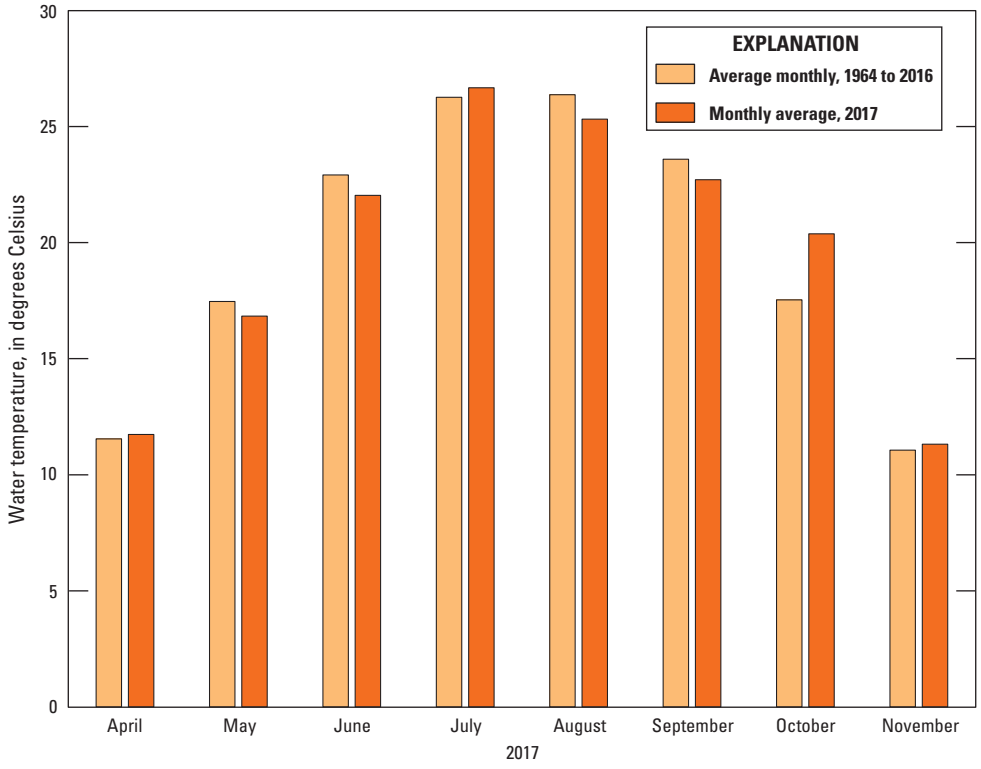


**Figure 7.** Bar chart showing monthly average water temperatures in 2017 and long-term average monthly water temperatures from 1964 to 2016, for April through November, in the Delaware River estuary at Benjamin Franklin Bridge at Philadelphia, Pennsylvania (data from USGS, 2020d). Water temperatures are given in degrees Celsius.

The data measured by Kimberly-Clark Chester Operations at Chester, Pa., indicates the greatest daily maximum chloride concentration was 651 mg/L on December 1 and 2, 2016 (table 18, in back of report). During the report year, daily maximum concentrations exceeded 50 mg/L on about 73 percent of the 358 days on which measurements were made. The lowest daily minimum chloride concentration was 14 mg/L on December 19, 2016. Daily minimum concentrations exceeded 50 mg/L on about 69 percent of the 358 days on which measurements were made. Daily maximum chloride concentrations exceeded 50 mg/L on most days from December 1, 2016, to early April 2017 and from late August to mid-November 2017 (table 18).

## Dissolved Oxygen

Dissolved oxygen in water is necessary for the respiratory processes of aquatic organisms and chemical reactions in aquatic environments (USGS, 2020a). The primary source of dissolved oxygen in the Delaware River estuary is diffusion from the atmosphere and, to a lesser extent, the 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, the Delaware River at Benjamin Franklin Bridge at Philadelphia, Pa., and the Delaware River at Chester, Pa., 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 sites, the daily mean and minimum daily mean dissolved-oxygen concentrations for July–September during the 1965–2017 report years are shown in figure 8. Although dissolved-oxygen concentrations have increased over this 53-year period, mean concentrations can vary substantially from year to year. Due to technological changes and other factors, the process used to calculate mean dissolved-oxygen concentrations and those data values has changed over time. The procedures used to create figure 8 of this report have been used since the 2009–2010 Delaware 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 July, August, and September, and the average mean and average minimum dissolved-oxygen concentrations of all those daily values were computed over those 3 months in each report year.

Dissolved-oxygen concentrations in the Delaware River estuary are usually greatest near the Trenton site and decrease in a downstream direction. Concentrations commonly reach minimum levels in an area just downstream from the Benjamin Franklin Bridge site. During the report year, the lowest recorded daily mean concentration was 5.0 mg/L on July 15 and 16, 2017 (table 19, in back of report) (USGS, 2020d). Daily mean dissolved-oxygen concentrations were consistently 6.0 mg/L or greater from April 1 through July 5, 2017, and October 1 through November 30, 2017. At the Chester site, the lowest recorded daily mean dissolved-oxygen concentration was 5.0 mg/L on August 16, 2017 (table 20, in back of report) (USGS, 2020f).

Histograms of quarter-hourly dissolved-oxygen concentrations during the critical summer period (July 1–September 30, 2017) at the Benjamin Franklin Bridge and Chester sites are presented in figure 9. During the 2017 critical summer period, quarter-hourly dissolved-oxygen concentrations were 4 mg/L or less on no days (0 percent) at the Benjamin Franklin Bridge and Chester sites (USGS, 2020e, g).

## Hydrogen-Ion Activity (pH)

The pH of a solution is a measure of the effective concentration (activity) of dissolved hydrogen ions. Solutions with a pH less than 7 are considered acidic, whereas solutions with a pH greater than 7 are considered basic or alkaline. The pH of uncontaminated surface water 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 considerably affect pH. The pH of water determines the solubility (the amount that can be dissolved in the water) and biological availability (the amount that can be used by aquatic life) of chemical constituents such as nutrients (for example, phosphorus, nitrogen, and carbon) and heavy metals (for example, lead, copper, and cadmium) (USGS, 2020b).

During the report year, pH was measured seasonally (April–November) at the Benjamin Franklin Bridge and Chester sites and continuously at the Reedy Island Jetty site. During these periods, the ranges of daily median pH measured at these sites are as follows: Benjamin Franklin Bridge, 7.0–7.4; Chester, 7.0–7.7; and Reedy Island Jetty, 7.2–7.9 (USGS, 2020d, f, h). The pH of water in the Delaware River estuary is lowest near the Trenton site 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 sites was not a limiting factor for aquatic health or other beneficial water uses during the report year.

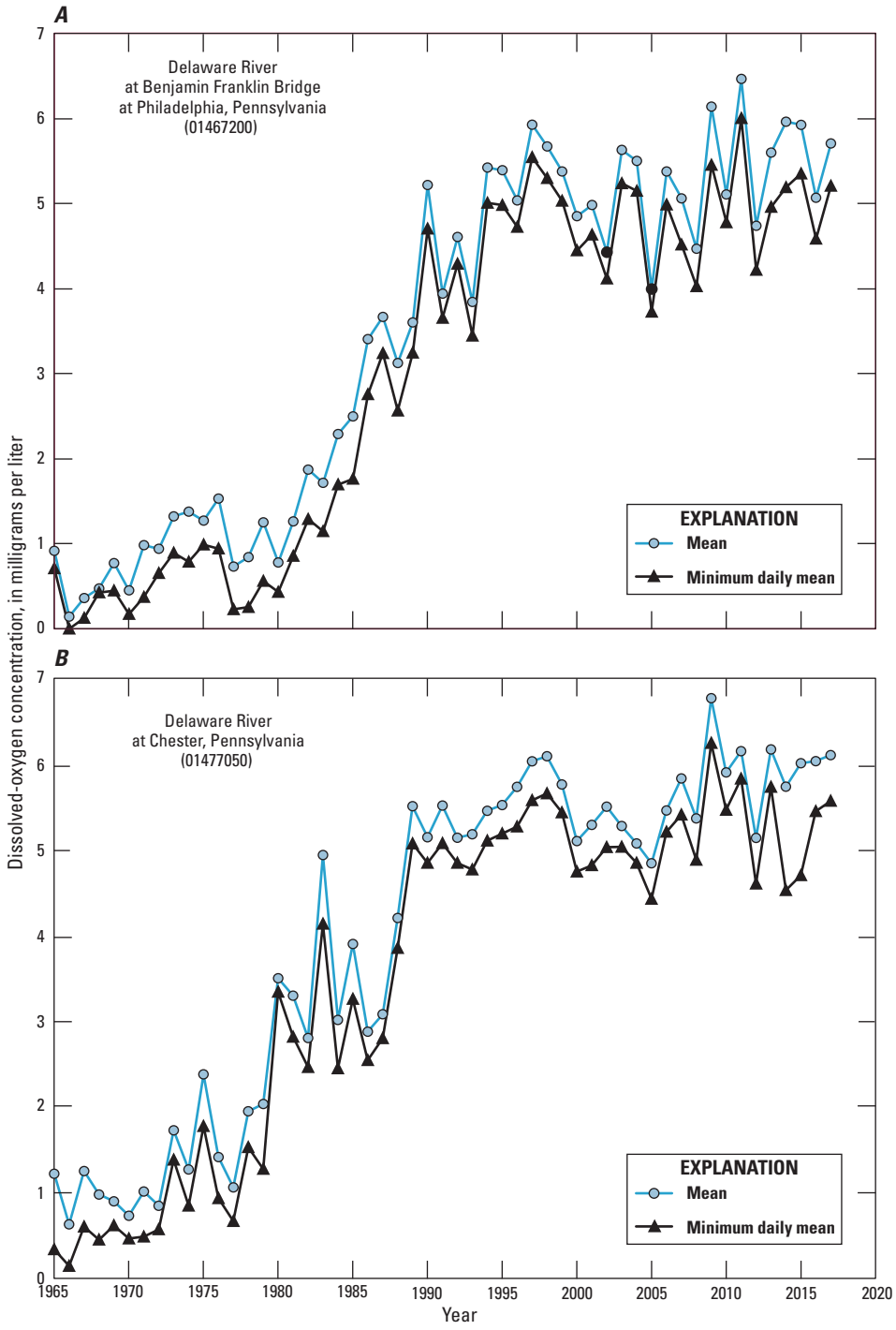


**Figure 8.** Graphs showing the daily mean and minimum daily mean dissolved-oxygen concentrations (in milligrams per liter) averaged for July–September annually at two U.S Geological Survey (USGS) streamgaging sites on the Delaware River estuary, 1965–2017: (*A*) Delaware River at Benjamin Franklin Bridge at Philadelphia, Pennsylvania (Pa.) (site number 01457200; data from USGS, 2020d); and (*B*) Delaware River at Chester, Pa. (site number 01477050; data from USGS, 2020f).

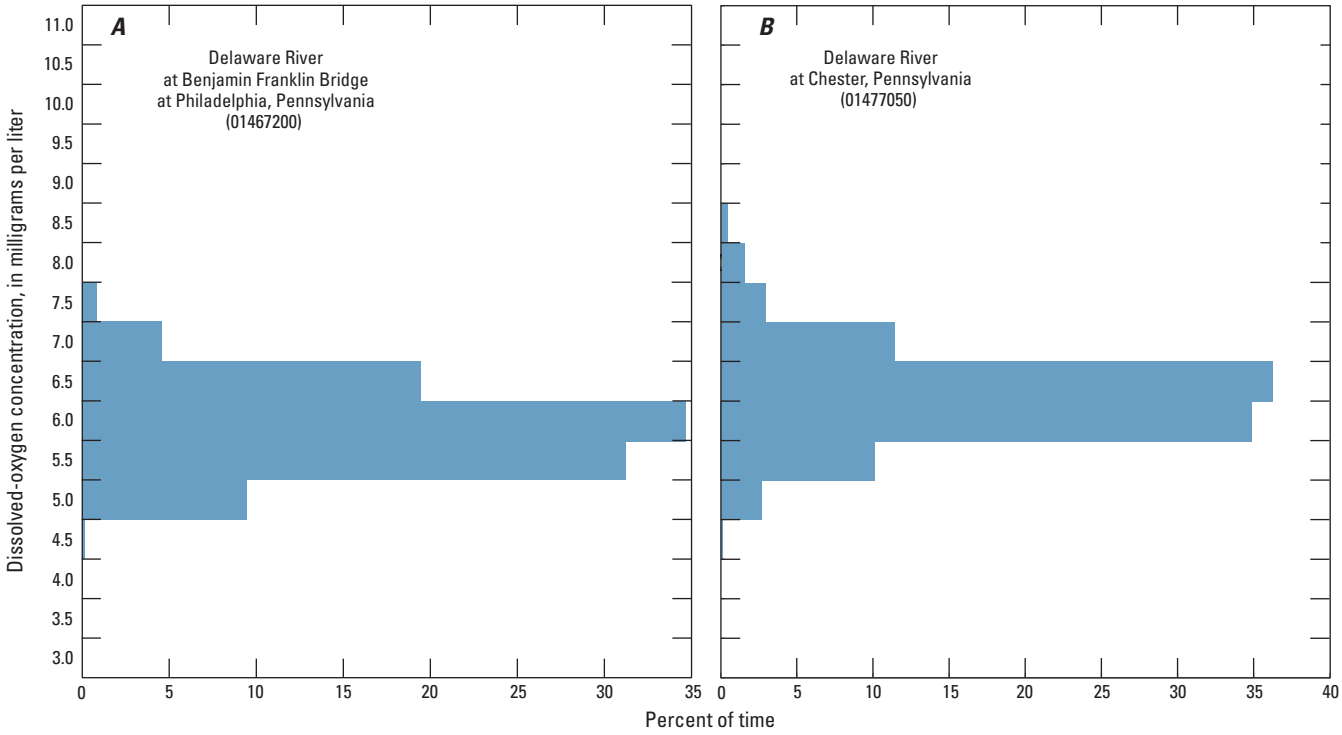


**Figure 9.** Graphs showing percent distribution of quarter-hourly dissolved-oxygen concentrations (in milligrams per liter) at two U.S. Geological Survey (USGS) streamgaging sites on the Delaware River estuary, from July to September 2017 at (*A*) Delaware River at Benjamin Franklin Bridge at Philadelphia, Pennsylvania (Pa.) (site number 01467200; data from USGS, [2020e]); and (*B*) Delaware River at Chester, Pa. (site number 91477050; data from USGS, [2020g]).

# 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 Delaware River Master. in., inches; —, not applicable]

| Month | December 1940–November 2016 monthly average precipitation (in.) | December 2016–November 2017 | | | |
|---|---|---|---|---|---|
| | | Precipitation (in.) | Percent of average | Excess (+) or deficit (–) precipitation compared with long-term average | |
| | | | | Month | Cumulative |
| December | 3.50 | 3.41 | 97 | –0.09 | –0.09 |
| January | 2.99 | 3.20 | 107 | 0.21 | 0.12 |
| February | 2.65 | 2.87 | 108 | 0.22 | 0.34 |
| March | 3.34 | 4.04 | 121 | 0.70 | 1.04 |
| April | 3.74 | 4.79 | 128 | 1.05 | 2.09 |
| May | 4.16 | 5.06 | 122 | 0.90 | 2.99 |
| June | 4.26 | 3.81 | 89 | –0.45 | 2.54 |
| July | 4.24 | 6.45 | 152 | 2.21 | 4.75 |
| August | 4.05 | 4.55 | 112 | 0.50 | 5.25 |
| September | 4.06 | 2.36 | 58 | –1.70 | 3.55 |
| October | 3.72 | 6.22 | 167 | 2.50 | 6.05 |
| November | 3.67 | 1.09 | 30 | –2.58 | 3.47 |
| **Total** | **44.38** | **47.85** | **108** | — | — |

**Table 3.** Storage in Pepacton Reservoir, New York, for report year ending November 30, 2017.

[Delaware 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 sill of outlet tunnel at the elevation of 1,126.50 feet. Storage at spillway level is 140,190 million gallons. —, not applicable; Mgal/d, million gallons per day; $ft^3/s$, cubic foot per second]

| Day | Dec. 2016 | Jan. 2017 | Feb. 2017 | Mar. 2017 | Apr. 2017 | May 2017 | June 2017 | July 2017 | Aug. 2017 | Sept. 2017 | Oct. 2017 | Nov. 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 70,613 | 81,540 | 98,860 | 116,746 | 131,594 | 139,785 | 140,431 | 137,492 | 132,058 | 122,104 | 112,613 | 112,662 |
| 2 | 71,725 | 81,678 | 99,213 | 117,501 | 132,791 | 141,913 | 140,301 | 137,492 | 131,630 | 121,677 | 112,135 | 113,057 |
| 3 | 72,419 | 81,815 | 99,551 | 118,090 | 133,707 | 142,322 | 140,153 | 137,419 | 131,702 | 121,334 | 111,710 | 113,322 |
| 4 | 72,886 | 82,232 | 99,831 | 118,445 | 134,768 | 141,931 | 139,951 | 137,176 | 131,487 | 121,112 | 111,235 | 113,535 |
| 5 | 73,250 | 82,788 | 100,048 | 118,579 | 136,763 | 141,598 | 139,969 | 136,981 | 131,202 | 120,770 | 110,827 | 113,601 |
| 6 | 73,497 | 83,165 | 100,249 | 118,714 | 138,351 | 141,672 | 141,172 | 136,708 | 130,901 | 120,378 | 110,404 | 113,568 |
| 7 | 73,745 | 83,443 | 100,342 | 118,934 | 141,116 | 141,468 | 141,524 | 136,417 | 130,546 | 120,633 | 109,965 | 113,683 |
| 8 | 73,953 | 83,625 | 100,683 | 119,175 | 142,285 | 141,246 | 141,283 | 136,127 | 130,191 | 120,787 | 109,559 | 113,486 |
| 9 | 73,967 | 83,780 | 101,382 | 119,444 | 142,230 | 141,023 | 140,987 | 135,964 | 129,784 | 120,667 | 109,251 | 113,420 |
| 10 | 74,006 | 83,948 | 101,758 | 119,665 | 141,968 | 140,783 | 140,746 | 135,674 | 129,430 | 120,395 | 109,283 | 113,239 |
| 11 | 74,084 | 84,257 | 102,101 | 120,038 | 141,524 | 140,653 | 140,449 | 135,312 | 129,007 | 120,123 | 109,251 | 113,090 |
| 12 | 74,202 | 84,524 | 102,523 | 120,344 | 141,172 | 140,542 | 140,264 | 134,949 | 128,743 | 119,834 | 109,218 | 112,909 |
| 13 | 74,281 | 86,423 | 103,058 | 120,667 | 140,727 | 140,560 | 140,153 | 134,678 | 128,462 | 119,495 | 109,202 | 112,695 |
| 14 | 74,426 | 87,825 | 103,294 | 120,872 | 140,560 | 140,931 | 140,024 | 134,787 | 128,093 | 119,240 | 109,202 | 112,481 |
| 15 | 74,439 | 88,792 | 103,515 | 121,060 | 140,246 | 140,894 | 139,969 | 134,986 | 127,741 | 119,002 | 109,202 | 112,250 |
| 16 | 74,413 | 89,491 | 103,815 | 121,180 | 139,978 | 140,820 | 139,877 | 134,841 | 127,407 | 118,630 | 109,234 | 112,070 |
| 17 | 74,439 | 90,074 | 104,019 | 121,248 | 139,877 | 140,671 | 139,877 | 134,606 | 127,006 | 118,276 | 109,234 | 111,808 |
| 18 | 74,596 | 90,878 | 104,304 | 121,334 | 139,693 | 140,486 | 139,840 | 134,354 | 126,586 | 117,905 | 109,218 | 111,710 |
| 19 | 76,702 | 91,688 | 104,638 | 121,351 | 139,308 | 140,431 | 139,914 | 133,977 | 126,447 | 117,585 | 109,170 | 111,710 |
| 20 | 77,816 | 92,501 | 105,193 | 121,368 | 139,050 | 140,449 | 140,394 | 133,617 | 126,184 | 117,216 | 109,154 | 111,792 |
| 21 | 78,600 | 93,155 | 105,701 | 121,626 | 139,271 | 140,375 | 140,135 | 133,293 | 125,888 | 116,830 | 109,137 | 112,053 |
| 22 | 79,100 | 93,737 | 106,180 | 121,899 | 139,822 | 140,264 | 139,859 | 132,952 | 125,504 | 116,478 | 109,121 | 112,119 |
| 23 | 79,442 | 94,261 | 106,580 | 121,951 | 140,171 | 140,190 | 139,564 | 132,611 | 125,313 | 116,026 | 109,105 | 112,021 |
| 24 | 79,673 | 94,920 | 107,476 | 122,053 | 140,357 | 140,043 | 139,455 | 132,952 | 125,175 | 115,608 | 108,765 | 112,021 |
| 25 | 79,891 | 95,508 | 109,251 | 122,121 | 140,412 | 140,006 | 139,289 | 133,491 | 124,846 | 115,160 | 108,653 | 111,971 |
| 26 | 80,069 | 96,114 | 112,250 | 122,207 | 140,227 | 140,098 | 139,032 | 133,617 | 124,515 | 114,728 | 108,395 | 111,906 |
| 27 | 80,178 | 96,765 | 114,379 | 122,722 | 139,987 | 140,209 | 138,756 | 133,527 | 124,153 | 114,263 | 108,056 | 111,808 |
| 28 | 80,574 | 97,343 | 115,876 | 124,118 | 139,804 | 140,171 | 138,314 | 133,365 | 123,756 | 113,782 | 107,750 | 111,988 |
| 29 | 80,878 | 97,816 | — | 126,149 | 139,656 | 139,987 | 137,912 | 133,114 | 123,359 | 113,354 | 107,428 | 112,119 |
| 30 | 81,154 | 98,260 | — | 128,339 | 139,546 | 140,209 | 137,547 | 132,791 | 122,929 | 113,024 | 109,640 | 112,316 |
| 31 | 81,374 | 98,552 | — | 129,890 | — | 140,486 | — | 132,434 | 122,481 | — | 111,873 | — |
| Change[1] | +10,761 | +17,012 | +17,016 | +13,144 | +7,952 | +701 | –2,884 | –5,058 | –9,577 | –9,080 | –740 | –346 |
| Equivalent change[2] (Mgal/d) | +347 | +549 | +608 | +424 | +265 | +22.6 | –96.1 | –163 | –309 | –303 | –23.9 | –11.5 |
| Equivalent change[3] ($ft^3/s$) | +537 | +849 | +940 | +656 | +410 | +35.0 | –149 | –252 | –478 | –468 | –37.0 | –17.8 |

[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 +41,703 million gallons; minimum and maximum storage for December through May are 70,613 and 142,322 million gallons, respectively. Minimum and maximum storage for June through November are 107,428 and 141,524 million gallons, respectively.

[2]The net equivalent for the year is +114.3 million gallons per day.

[3]The net equivalent for the year is +177 cubic feet per second.

**Table 4.** Storage in Cannonsville Reservoir, New York, for report year ending November 30, 2017.

[Delaware 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 sill of 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. 2016 | Jan. 2017 | Feb. 2017 | Mar. 2017 | Apr. 2017 | May 2017 | June 2017 | July 2017 | Aug. 2017 | Sep. 2017 | Oct. 2017 | Nov. 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 19,493 | 33,626 | 53,879 | 80,004 | 89,758 | 95,706 | 96,494 | 93,348 | 86,669 | 77,559 | 62,033 | 45,968 |
| 2 | 20,821 | 33,765 | 54,358 | 81,322 | 91,979 | 96,848 | 96,543 | 93,059 | 86,323 | 77,075 | 60,964 | 46,668 |
| 3 | 21,958 | 33,883 | 54,766 | 82,478 | 93,333 | 98,056 | 96,591 | 92,694 | 86,048 | 76,675 | 59,914 | 47,180 |
| 4 | 22,855 | 34,320 | 55,115 | 83,374 | 94,550 | 98,233 | 96,575 | 92,283 | 85,759 | 76,274 | 58,876 | 47,636 |
| 5 | 23,621 | 35,152 | 55,420 | 84,039 | 96,543 | 98,184 | 96,607 | 91,736 | 85,456 | 75,873 | 57,936 | 48,025 |
| 6 | 24,241 | 35,706 | 55,750 | 84,632 | 97,637 | 98,458 | 98,184 | 91,203 | 85,109 | 75,486 | 56,983 | 48,325 |
| 7 | 24,881 | 36,112 | 56,080 | 84,935 | 99,585 | 98,555 | 99,215 | 90,655 | 84,718 | 75,196 | 56,043 | 48,726 |
| 8 | 25,494 | 36,380 | 56,532 | 85,152 | 100,743 | 98,523 | 99,086 | 90,108 | 84,371 | 74,892 | 55,176 | 49,107 |
| 9 | 26,038 | 36,528 | 57,521 | 85,441 | 100,550 | 98,378 | 98,555 | 89,591 | 83,981 | 74,561 | 54,848 | 49,422 |
| 10 | 26,302 | 36,954 | 58,217 | 85,513 | 99,874 | 98,152 | 97,959 | 88,967 | 83,576 | 74,188 | 54,591 | 49,679 |
| 11 | 26,430 | 37,410 | 58,790 | 85,542 | 99,118 | 97,927 | 97,251 | 88,465 | 83,143 | 73,795 | 54,171 | 49,924 |
| 12 | 26,541 | 37,757 | 59,413 | 85,441 | 98,201 | 97,685 | 96,398 | 88,071 | 82,810 | 73,410 | 53,797 | 50,169 |
| 13 | 26,549 | 39,369 | 60,060 | 85,282 | 97,637 | 97,508 | 95,706 | 87,840 | 82,478 | 73,000 | 53,482 | 50,367 |
| 14 | 26,524 | 40,871 | 60,610 | 85,210 | 97,138 | 97,589 | 95,295 | 88,115 | 82,175 | 72,629 | 52,980 | 50,554 |
| 15 | 26,455 | 41,922 | 61,091 | 85,065 | 96,671 | 97,669 | 95,265 | 88,313 | 81,813 | 72,245 | 52,210 | 50,449 |
| 16 | 26,302 | 42,720 | 61,587 | 85,152 | 96,301 | 97,669 | 95,113 | 88,252 | 81,423 | 71,848 | 51,394 | 50,297 |
| 17 | 26,132 | 43,309 | 61,995 | 85,383 | 96,189 | 97,557 | 95,113 | 88,071 | 81,163 | 71,384 | 50,542 | 50,157 |
| 18 | 26,064 | 44,066 | 62,390 | 85,759 | 96,205 | 97,396 | 94,915 | 88,100 | 80,961 | 71,000 | 49,667 | 50,017 |
| 19 | 27,579 | 44,889 | 62,797 | 85,875 | 95,931 | 97,283 | 94,839 | 87,941 | 81,134 | 70,775 | 48,770 | 49,924 |
| 20 | 28,430 | 45,556 | 63,433 | 86,005 | 95,770 | 97,154 | 95,189 | 87,666 | 81,221 | 70,364 | 47,892 | 49,982 |
| 21 | 29,023 | 46,346 | 64,173 | 85,831 | 96,269 | 96,977 | 95,478 | 87,363 | 81,177 | 70,046 | 46,991 | 50,297 |
| 22 | 29,821 | 47,102 | 64,784 | 85,326 | 97,186 | 96,752 | 95,539 | 87,002 | 80,847 | 69,477 | 46,135 | 50,367 |
| 23 | 30,590 | 47,880 | 65,497 | 84,400 | 97,347 | 96,671 | 95,539 | 86,684 | 80,737 | 68,775 | 45,367 | 50,309 |
| 24 | 31,053 | 48,626 | 66,516 | 83,316 | 97,202 | 96,559 | 95,569 | 86,785 | 80,599 | 68,033 | 44,900 | 50,251 |
| 25 | 31,434 | 49,375 | 68,351 | 82,305 | 96,929 | 96,285 | 95,584 | 87,334 | 80,308 | 67,254 | 44,500 | 50,146 |
| 26 | 31,795 | 50,029 | 73,040 | 81,452 | 96,671 | 96,092 | 95,356 | 87,623 | 79,991 | 66,452 | 43,811 | 50,052 |
| 27 | 32,203 | 50,717 | 76,315 | 81,076 | 96,414 | 95,963 | 95,006 | 87,666 | 79,617 | 65,663 | 43,130 | 49,971 |
| 28 | 32,582 | 51,546 | 78,387 | 81,640 | 96,108 | 95,899 | 94,641 | 87,623 | 79,244 | 64,784 | 42,689 | 50,006 |
| 29 | 32,926 | 52,246 | — | 83,215 | 95,787 | 95,803 | 94,215 | 87,479 | 78,830 | 63,942 | 42,331 | 49,866 |
| 30 | 33,130 | 52,864 | — | 85,499 | 95,523 | 95,787 | 93,653 | 87,262 | 78,401 | 63,064 | 42,573 | 50,029 |
| 31 | 33,269 | 53,401 | — | 87,305 | — | 96,076 | — | 86,973 | 77,987 | — | 44,934 | — |
| Change[1] | +13,776 | +19,775 | +24,508 | +7,301 | +5,765 | +370 | –2,841 | –6,375 | –8,682 | –14,494 | –17,099 | +4,061 |
| Equivalent change[2] (Mgal/d) | +444 | +638 | +875 | +236 | +192 | +11.9 | –94.7 | –206 | –280 | –483 | –552 | +135 |
| Equivalent change[3] ($ft^3/s$) | +687 | +987 | +1,354 | +364 | +297 | +18.4 | –147 | –318 | –433 | –747 | –853 | +209 |

[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 +30,536 million gallons; minimum and maximum storage for December through May are 19,493 and 100,743 million gallons, respectively. Minimum and maximum storage for June through November are 42,331 and 99,215 million gallons, respectively.

[2]The net equivalent for the year is +83.7 million gallons per day.

[3]The net equivalent for the year is +130 cubic feet per second.

**Table 5.** Storage in Neversink Reservoir, New York, for year ending November 30, 2017.

[Delaware 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 sill of 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. 2016 | Jan. 2017 | Feb. 2017 | Mar. 2017 | Apr. 2017 | May 2017 | June 2017 | July 2017 | Aug. 2017 | Sept. 2017 | Oct. 2017 | Nov. 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 20,009 | 21,089 | 26,591 | 30,401 | 32,439 | 34,518 | 34,907 | 33,843 | 32,600 | 31,090 | 29,715 | 30,227 |
| 2 | 20,238 | 21,169 | 26,693 | 30,296 | 32,747 | 34,660 | 34,956 | 33,906 | 32,491 | 31,039 | 29,692 | 30,209 |
| 3 | 20,205 | 21,253 | 26,727 | 30,510 | 33,024 | 34,843 | 34,966 | 33,910 | 32,486 | 31,017 | 29,652 | 30,150 |
| 4 | 20,090 | 21,443 | 26,799 | 30,510 | 33,427 | 34,931 | 34,912 | 33,896 | 32,405 | 31,035 | 29,620 | 30,191 |
| 5 | 19,957 | 21,641 | 26,877 | 30,350 | 34,433 | 35,016 | 34,981 | 33,867 | 32,453 | 31,012 | 29,593 | 30,296 |
| 6 | 19,792 | 21,784 | 26,945 | 30,186 | 34,966 | 34,951 | 35,394 | 33,848 | 32,491 | 30,957 | 29,477 | 30,410 |
| 7 | 19,635 | 21,876 | 26,992 | 30,204 | 35,438 | 34,946 | 35,234 | 33,824 | 32,468 | 31,072 | 29,468 | 30,538 |
| 8 | 19,464 | 21,953 | 26,996 | 30,383 | 35,259 | 34,936 | 35,065 | 33,799 | 32,410 | 31,132 | 29,464 | 30,630 |
| 9 | 19,275 | 22,028 | 27,154 | 30,533 | 35,180 | 34,853 | 34,981 | 33,775 | 32,405 | 31,159 | 29,509 | 30,726 |
| 10 | 19,079 | 22,093 | 27,236 | 30,657 | 35,135 | 34,848 | 34,917 | 33,736 | 32,373 | 31,155 | 29,647 | 30,822 |
| 11 | 18,875 | 22,182 | 27,257 | 30,552 | 35,120 | 34,936 | 34,981 | 33,630 | 32,264 | 31,141 | 29,710 | 30,698 |
| 12 | 18,689 | 22,236 | 27,344 | 30,405 | 35,095 | 34,996 | 35,031 | 33,534 | 32,382 | 31,081 | 29,710 | 30,781 |
| 13 | 18,715 | 22,752 | 27,464 | 30,232 | 35,080 | 35,026 | 35,011 | 33,473 | 32,557 | 31,039 | 29,710 | 30,845 |
| 14 | 18,771 | 23,155 | 27,451 | 30,218 | 34,976 | 35,100 | 34,956 | 33,422 | 32,605 | 31,012 | 29,531 | 30,675 |
| 15 | 18,786 | 23,389 | 27,447 | 30,314 | 34,853 | 35,075 | 34,858 | 33,480 | 32,529 | 30,928 | 29,347 | 30,721 |
| 16 | 18,811 | 23,569 | 27,498 | 30,387 | 34,730 | 34,971 | 34,907 | 33,485 | 32,449 | 30,841 | 29,159 | 30,795 |
| 17 | 18,843 | 23,641 | 27,481 | 30,451 | 34,601 | 34,897 | 34,843 | 33,465 | 32,311 | 30,836 | 28,879 | 30,744 |
| 18 | 18,917 | 23,813 | 27,438 | 30,273 | 34,567 | 34,788 | 34,873 | 33,441 | 32,216 | 30,818 | 28,592 | 30,813 |
| 19 | 19,544 | 23,987 | 27,507 | 30,319 | 34,443 | 34,769 | 34,927 | 33,336 | 32,435 | 30,693 | 28,289 | 30,975 |
| 20 | 19,752 | 24,173 | 27,632 | 30,392 | 34,340 | 34,823 | 35,065 | 33,173 | 32,216 | 30,670 | 28,001 | 31,206 |
| 21 | 19,909 | 24,319 | 27,727 | 30,451 | 34,340 | 34,902 | 34,912 | 32,991 | 32,236 | 30,538 | 27,727 | 31,304 |
| 22 | 20,042 | 24,523 | 27,805 | 30,492 | 34,640 | 34,837 | 34,725 | 32,843 | 32,047 | 30,429 | 27,417 | 31,391 |
| 23 | 20,157 | 24,842 | 27,892 | 30,529 | 34,788 | 34,868 | 34,538 | 32,800 | 31,850 | 30,305 | 27,107 | 31,382 |
| 24 | 20,253 | 25,246 | 27,957 | 30,570 | 34,759 | 34,873 | 34,306 | 32,800 | 31,658 | 30,278 | 26,821 | 31,461 |
| 25 | 20,376 | 25,562 | 28,486 | 30,634 | 34,873 | 34,887 | 34,140 | 32,853 | 31,545 | 30,250 | 27,068 | 31,551 |
| 26 | 20,488 | 25,750 | 29,652 | 30,712 | 34,991 | 34,863 | 34,081 | 32,876 | 31,512 | 30,073 | 27,146 | 31,611 |
| 27 | 20,581 | 25,971 | 30,213 | 30,822 | 34,922 | 34,803 | 34,067 | 32,876 | 31,466 | 29,941 | 27,193 | 31,663 |
| 28 | 20,720 | 26,152 | 30,533 | 31,099 | 34,828 | 34,848 | 34,037 | 32,843 | 31,425 | 29,892 | 27,236 | 31,485 |
| 29 | 20,799 | 26,303 | — | 31,527 | 34,725 | 34,833 | 34,023 | 32,795 | 31,308 | 29,783 | 27,262 | 31,289 |
| 30 | 20,923 | 26,440 | — | 32,027 | 34,626 | 34,961 | 33,998 | 32,733 | 31,248 | 29,747 | 29,039 | 31,118 |
| 31 | 21,014 | 26,473 | — | 32,241 | — | 34,927 | — | 32,657 | 31,211 | — | 29,950 | — |
| Change[1] | +1,005 | +5,384 | +3,942 | +1,840 | +2,187 | +409 | –909 | –1,186 | –1,389 | –1,343 | +235 | +891 |
| Equivalent change[2] (Mgal/d) | +32.4 | +174 | +141 | +59.4 | +72.9 | +13.2 | –30.3 | –38.3 | –44.8 | –44.8 | +7.6 | +29.7 |
| Equivalent change[3] ($ft^3/s$) | +50.1 | +269 | +218 | +91.9 | +113 | +20.4 | –46.9 | –59.3 | –69.3 | –69.3 | +11.8 | +45.9 |

[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 +11,109 million gallons; minimum and maximum storage for December through May are 18,689 and 35,438 million gallons, respectively. Minimum and maximum storage for June through November are 26,821 and 35,394 million gallons, respectively.

[2]The net equivalent for the year is +30.4 million gallons per day.

[3]The net equivalent for the year is +47.0 cubic feet per second.

**Table 6.** Diversions to New York City water supply system for report year ending November 30, 2017.

[Delaware River Master daily operations record. Diversions in million gallons per day for each 24-hour period beginning 0800 local time. For December 1–May 31, the average is computed beginning June 1, 2015, to the given date. For June 1–November 30, the average is computed beginning June 1, 2016, to the given date. The diversion calculation is computed as authorized within the Decree. —, not applicable]

| Date | East Delaware Tunnel | West Delaware Tunnel | Neversink Tunnel | Average from June 1 |
|---|---|---|---|---|
| 12/1/2016 | 0 | 0 | 263 | 607 |
| 12/2/2016 | 106 | 0 | 263 | 606 |
| 12/3/2016 | 161 | 0 | 263 | 605 |
| 12/4/2016 | 159 | 0 | 263 | 604 |
| 12/5/2016 | 158 | 0 | 262 | 603 |
| 12/6/2016 | 158 | 0 | 262 | 602 |
| 12/7/2016 | 158 | 0 | 262 | 601 |
| 12/8/2016 | 335 | 0 | 262 | 601 |
| 12/9/2016 | 232 | 180 | 261 | 601 |
| 12/10/2016 | 158 | 265 | 261 | 602 |
| 12/11/2016 | 158 | 265 | 261 | 602 |
| 12/12/2016 | 158 | 348 | 25 | 602 |
| 12/13/2016 | 158 | 359 | 0 | 601 |
| 12/14/2016 | 158 | 359 | 0 | 601 |
| 12/15/2016 | 158 | 359 | 0 | 600 |
| 12/16/2016 | 158 | 359 | 0 | 600 |
| 12/17/2016 | 159 | 359 | 0 | 600 |
| 12/18/2016 | 158 | 360 | 0 | 599 |
| 12/19/2016 | 16 | 361 | 0 | 598 |
| 12/20/2016 | 0 | 362 | 0 | 597 |
| 12/21/2016 | 200 | 85 | 0 | 595 |
| 12/22/2016 | 301 | 0 | 0 | 594 |
| 12/23/2016 | 301 | 172 | 0 | 593 |
| 12/24/2016 | 301 | 200 | 0 | 593 |
| 12/25/2016 | 301 | 200 | 0 | 592 |
| 12/26/2016 | 288 | 84 | 0 | 591 |
| 12/27/2016 | 163 | 334 | 0 | 591 |
| 12/28/2016 | 164 | 365 | 0 | 591 |
| 12/29/2016 | 165 | 366 | 0 | 590 |
| 12/30/2016 | 186 | 288 | 0 | 590 |
| 12/31/2016 | 199 | 280 | 0 | 589 |
| **Total** | **5,475** | **6,310** | **2,908** | — |

| Date | East Delaware Tunnel | West Delaware Tunnel | Neversink Tunnel | Average from June 1 |
|---|---|---|---|---|
| 1/1/2017 | 199 | 280 | 0 | 589 |
| 1/2/2017 | 199 | 280 | 0 | 588 |
| 1/3/2017 | 171 | 280 | 0 | 588 |
| 1/4/2017 | 202 | 281 | 0 | 587 |
| 1/5/2017 | 202 | 281 | 0 | 587 |
| 1/6/2017 | 202 | 281 | 0 | 586 |
| 1/7/2017 | 202 | 281 | 0 | 586 |
| 1/8/2017 | 202 | 281 | 0 | 585 |
| 1/9/2017 | 109 | 4 | 0 | 583 |
| 1/10/2017 | 88 | 0 | 2 | 581 |
| 1/11/2017 | 167 | 238 | 59 | 580 |
| 1/12/2017 | 167 | 319 | 0 | 580 |
| 1/13/2017 | 183 | 320 | 0 | 580 |
| 1/14/2017 | 199 | 273 | 0 | 579 |
| 1/15/2017 | 199 | 280 | 0 | 579 |
| 1/16/2017 | 199 | 280 | 77 | 579 |
| 1/17/2017 | 15 | 231 | 21 | 577 |
| 1/18/2017 | 0 | 276 | 0 | 576 |
| 1/19/2017 | 0 | 276 | 0 | 575 |
| 1/20/2017 | 0 | 22 | 0 | 572 |
| 1/21/2017 | 0 | 0 | 0 | 570 |
| 1/22/2017 | 0 | 0 | 0 | 567 |
| 1/23/2017 | 0 | 192 | 0 | 566 |
| 1/24/2017 | 0 | 202 | 0 | 564 |
| 1/25/2017 | 0 | 202 | 0 | 563 |
| 1/26/2017 | 0 | 202 | 0 | 561 |
| 1/27/2017 | 0 | 1 | 0 | 559 |
| 1/28/2017 | 0 | 0 | 0 | 557 |
| 1/29/2017 | 0 | 0 | 0 | 554 |
| 1/30/2017 | 0 | 0 | 76 | 552 |
| 1/31/2017 | 0 | 0 | 0 | 550 |
| **Total** | **2,905** | **5,563** | **235** | — |

**Table 6.** Diversions to New York City water supply system for report year ending November 30, 2017.—Continued

[Delaware River Master daily operations record. Diversions in million gallons per day for each 24-hour period beginning 0800 local time. For December 1–May 31, the average is computed beginning June 1, 2015, to the given date. For June 1–November 30, the average is computed beginning June 1, 2016, to the given date. The diversion calculation is computed as authorized within the Decree. —, not applicable]

| Date | East Delaware Tunnel | West Delaware Tunnel | Neversink Tunnel | Average from June 1 |
|---|---|---|---|---|
| 2/1/2017 | 0 | 0 | 0 | 548 |
| 2/2/2017 | 3 | 0 | 73 | 546 |
| 2/3/2017 | 3 | 0 | 3 | 544 |
| 2/4/2017 | 3 | 0 | 0 | 542 |
| 2/5/2017 | 0 | 0 | 0 | 540 |
| 2/6/2017 | 76 | 0 | 2 | 538 |
| 2/7/2017 | 0 | 0 | 74 | 536 |
| 2/8/2017 | 0 | 0 | 0 | 534 |
| 2/9/2017 | 79 | 0 | 0 | 532 |
| 2/10/2017 | 112 | 0 | 77 | 531 |
| 2/11/2017 | 0 | 0 | 0 | 529 |
| 2/12/2017 | 0 | 0 | 0 | 526 |
| 2/13/2017 | 120 | 0 | 77 | 525 |
| 2/14/2017 | 75 | 0 | 77 | 524 |
| 2/15/2017 | 79 | 0 | 0 | 522 |
| 2/16/2017 | 78 | 0 | 77 | 521 |
| 2/17/2017 | 75 | 0 | 78 | 519 |
| 2/18/2017 | 0 | 0 | 0 | 517 |
| 2/19/2017 | 0 | 0 | 0 | 515 |
| 2/20/2017 | 0 | 0 | 0 | 513 |
| 2/21/2017 | 0 | 0 | 0 | 511 |
| 2/22/2017 | 211 | 0 | 1 | 510 |
| 2/23/2017 | 250 | 228 | 199 | 511 |
| 2/24/2017 | 42 | 57 | 0 | 509 |
| 2/25/2017 | 0 | 0 | 0 | 508 |
| 2/26/2017 | 0 | 0 | 0 | 506 |
| 2/27/2017 | 0 | 0 | 0 | 504 |
| 2/28/2017 | 152 | 0 | 416 | 504 |
| **Total** | **1,358** | **285** | **1,154** | — |

| Date | East Delaware Tunnel | West Delaware Tunnel | Neversink Tunnel | Average from June 1 |
|---|---|---|---|---|
| 3/1/2017 | 175 | 0 | 450 | 504 |
| 3/2/2017 | 401 | 0 | 27 | 504 |
| 3/3/2017 | 347 | 0 | 189 | 504 |
| 3/4/2017 | 420 | 0 | 299 | 505 |
| 3/5/2017 | 420 | 0 | 299 | 506 |
| 3/6/2017 | 275 | 308 | 112 | 507 |
| 3/7/2017 | 257 | 474 | 0 | 507 |
| 3/8/2017 | 249 | 474 | 0 | 508 |
| 3/9/2017 | 249 | 474 | 0 | 509 |
| 3/10/2017 | 0 | 474 | 223 | 510 |
| 3/11/2017 | 0 | 454 | 242 | 510 |
| 3/12/2017 | 0 | 474 | 248 | 511 |
| 3/13/2017 | 140 | 473 | 119 | 512 |
| 3/14/2017 | 210 | 474 | 0 | 512 |
| 3/15/2017 | 210 | 179 | 0 | 512 |
| 3/16/2017 | 210 | 141 | 2 | 511 |
| 3/17/2017 | 211 | 0 | 264 | 511 |
| 3/18/2017 | 209 | 191 | 0 | 511 |
| 3/19/2017 | 211 | 192 | 0 | 510 |
| 3/20/2017 | 0 | 421 | 0 | 510 |
| 3/21/2017 | 0 | 474 | 0 | 510 |
| 3/22/2017 | 0 | 474 | 0 | 510 |
| 3/23/2017 | 0 | 473 | 0 | 510 |
| 3/24/2017 | 149 | 473 | 0 | 510 |
| 3/25/2017 | 214 | 472 | 0 | 511 |
| 3/26/2017 | 214 | 472 | 0 | 511 |
| 3/27/2017 | 214 | 472 | 0 | 512 |
| 3/28/2017 | 200 | 473 | 0 | 512 |
| 3/29/2017 | 201 | 474 | 0 | 513 |
| 3/30/2017 | 201 | 64 | 163 | 513 |
| 3/31/2017 | 202 | 0 | 203 | 512 |
| **Total** | **5,789** | **9,524** | **2,840** | — |

**Table 6.** Diversions to New York City water supply system for report year ending November 30, 2017.—Continued

[Delaware River Master daily operations record. Diversions in million gallons per day for each 24-hour period beginning 0800 local time. For December 1–May 31, the average is computed beginning June 1, 2015, to the given date. For June 1–November 30, the average is computed beginning June 1, 2016, to the given date. The diversion calculation is computed as authorized within the Decree. —, not applicable]

| Date | East Delaware Tunnel | West Delaware Tunnel | Neversink Tunnel | Average from June 1 |
|---|---|---|---|---|
| 4/1/2017 | 203 | 0 | 0 | 511 |
| 4/2/2017 | 203 | 0 | 0 | 510 |
| 4/3/2017 | 204 | 0 | 0 | 509 |
| 4/4/2017 | 34 | 0 | 0 | 508 |
| 4/5/2017 | 0 | 0 | 0 | 506 |
| 4/6/2017 | 0 | 0 | 0 | 505 |
| 4/7/2017 | 0 | 0 | 0 | 503 |
| 4/8/2017 | 0 | 0 | 0 | 501 |
| 4/9/2017 | 2 | 0 | 0 | 500 |
| 4/10/2017 | 204 | 0 | 0 | 499 |
| 4/11/2017 | 206 | 0 | 0 | 498 |
| 4/12/2017 | 450 | 0 | 0 | 498 |
| 4/13/2017 | 298 | 0 | 136 | 497 |
| 4/14/2017 | 450 | 0 | 203 | 498 |
| 4/15/2017 | 450 | 0 | 203 | 498 |
| 4/16/2017 | 450 | 0 | 203 | 499 |
| 4/17/2017 | 450 | 0 | 138 | 499 |
| 4/18/2017 | 450 | 0 | 203 | 500 |
| 4/19/2017 | 450 | 0 | 203 | 500 |
| 4/20/2017 | 450 | 0 | 203 | 501 |
| 4/21/2017 | 450 | 0 | 59 | 501 |
| 4/22/2017 | 450 | 0 | 0 | 500 |
| 4/23/2017 | 450 | 0 | 186 | 501 |
| 4/24/2017 | 450 | 0 | 0 | 501 |
| 4/25/2017 | 431 | 0 | 0 | 501 |
| 4/26/2017 | 450 | 0 | 189 | 501 |
| 4/27/2017 | 450 | 0 | 203 | 501 |
| 4/28/2017 | 450 | 0 | 204 | 502 |
| 4/29/2017 | 449 | 0 | 203 | 502 |
| 4/30/2017 | 450 | 0 | 203 | 503 |
| **Total** | **9,434** | **0** | **2,739** | — |

| Date | East Delaware Tunnel | West Delaware Tunnel | Neversink Tunnel | Average from June 1 |
|---|---|---|---|---|
| 5/1/2017 | 450 | 0 | 0 | 503 |
| 5/2/2017 | 450 | 0 | 0 | 502 |
| 5/3/2017 | 450 | 0 | 0 | 502 |
| 5/4/2017 | 383 | 0 | 0 | 502 |
| 5/5/2017 | 58 | 0 | 259 | 501 |
| 5/6/2017 | 222 | 0 | 236 | 501 |
| 5/7/2017 | 409 | 0 | 205 | 502 |
| 5/8/2017 | 451 | 0 | 226 | 502 |
| 5/9/2017 | 451 | 0 | 120 | 502 |
| 5/10/2017 | 451 | 0 | 0 | 502 |
| 5/11/2017 | 451 | 0 | 0 | 502 |
| 5/12/2017 | 286 | 0 | 0 | 501 |
| 5/13/2017 | 253 | 0 | 0 | 501 |
| 5/14/2017 | 434 | 0 | 0 | 500 |
| 5/15/2017 | 417 | 0 | 163 | 501 |
| 5/16/2017 | 450 | 0 | 194 | 501 |
| 5/17/2017 | 450 | 0 | 195 | 502 |
| 5/18/2017 | 448 | 0 | 107 | 502 |
| 5/19/2017 | 400 | 183 | 17 | 502 |
| 5/20/2017 | 400 | 200 | 0 | 502 |
| 5/21/2017 | 400 | 200 | 120 | 503 |
| 5/22/2017 | 385 | 95 | 0 | 503 |
| 5/23/2017 | 375 | 129 | 0 | 503 |
| 5/24/2017 | 252 | 299 | 0 | 503 |
| 5/25/2017 | 252 | 299 | 151 | 503 |
| 5/26/2017 | 295 | 299 | 179 | 504 |
| 5/27/2017 | 323 | 207 | 0 | 504 |
| 5/28/2017 | 387 | 200 | 69 | 505 |
| 5/29/2017 | 215 | 200 | 0 | 504 |
| 5/30/2017 | 205 | 46 | 142 | 504 |
| 5/31/2017 | 411 | 0 | 88 | 504 |
| **Total** | **11,264** | **2,357** | **2,471** | — |

**Table 6.** Diversions to New York City water supply system for report year ending November 30, 2017.—Continued

[Delaware River Master daily operations record. Diversions in million gallons per day for each 24-hour period beginning 0800 local time. For December 1–May 31, the average is computed beginning June 1, 2015, to the given date. For June 1–November 30, the average is computed beginning June 1, 2016, to the given date. The diversion calculation is computed as authorized within the Decree. —, not applicable]

| Date | East Delaware Tunnel | West Delaware Tunnel | Neversink Tunnel | Average from June 1 |
|---|---|---|---|---|
| 6/1/2017 | 449 | 0 | 0 | 449 |
| 6/2/2017 | 449 | 0 | 0 | 449 |
| 6/3/2017 | 450 | 0 | 69 | 472 |
| 6/4/2017 | 450 | 0 | 0 | 467 |
| 6/5/2017 | 87 | 0 | 0 | 391 |
| 6/6/2017 | 137 | 0 | 0 | 349 |
| 6/7/2017 | 411 | 0 | 155 | 380 |
| 6/8/2017 | 450 | 0 | 204 | 414 |
| 6/9/2017 | 446 | 0 | 204 | 440 |
| 6/10/2017 | 446 | 0 | 34 | 444 |
| 6/11/2017 | 357 | 251 | 0 | 459 |
| 6/12/2017 | 241 | 221 | 58 | 464 |
| 6/13/2017 | 325 | 198 | 89 | 475 |
| 6/14/2017 | 308 | 199 | 100 | 485 |
| 6/15/2017 | 350 | 299 | 0 | 496 |
| 6/16/2017 | 231 | 133 | 107 | 494 |
| 6/17/2017 | 250 | 201 | 0 | 492 |
| 6/18/2017 | 250 | 201 | 0 | 489 |
| 6/19/2017 | 250 | 0 | 0 | 477 |
| 6/20/2017 | 420 | 0 | 189 | 483 |
| 6/21/2017 | 448 | 0 | 203 | 491 |
| 6/22/2017 | 444 | 0 | 203 | 499 |
| 6/23/2017 | 322 | 0 | 261 | 502 |
| 6/24/2017 | 380 | 0 | 203 | 506 |
| 6/25/2017 | 399 | 223 | 42 | 512 |
| 6/26/2017 | 401 | 299 | 0 | 519 |
| 6/27/2017 | 450 | 299 | 0 | 528 |
| 6/28/2017 | 450 | 275 | 0 | 535 |
| 6/29/2017 | 450 | 299 | 0 | 542 |
| 6/30/2017 | 449 | 203 | 190 | 552 |
| **Total** | **10,950** | **3,301** | **2,311** | — |

| Date | East Delaware Tunnel | West Delaware Tunnel | Neversink Tunnel | Average from June 1 |
|---|---|---|---|---|
| 7/1/2017 | 338 | 298 | 0 | 555 |
| 7/2/2017 | 201 | 298 | 0 | 553 |
| 7/3/2017 | 273 | 299 | 0 | 554 |
| 7/4/2017 | 201 | 299 | 0 | 552 |
| 7/5/2017 | 333 | 299 | 0 | 554 |
| 7/6/2017 | 350 | 299 | 0 | 557 |
| 7/7/2017 | 317 | 299 | 0 | 559 |
| 7/8/2017 | 300 | 299 | 0 | 560 |
| 7/9/2017 | 301 | 298 | 0 | 561 |
| 7/10/2017 | 400 | 274 | 77 | 565 |
| 7/11/2017 | 400 | 274 | 79 | 570 |
| 7/12/2017 | 400 | 274 | 78 | 574 |
| 7/13/2017 | 448 | 274 | 77 | 580 |
| 7/14/2017 | 178 | 274 | 0 | 577 |
| 7/15/2017 | 300 | 275 | 0 | 577 |
| 7/16/2017 | 301 | 274 | 0 | 577 |
| 7/17/2017 | 400 | 274 | 0 | 579 |
| 7/18/2017 | 400 | 274 | 77 | 582 |
| 7/19/2017 | 400 | 226 | 115 | 585 |
| 7/20/2017 | 400 | 225 | 153 | 589 |
| 7/21/2017 | 384 | 225 | 113 | 592 |
| 7/22/2017 | 374 | 225 | 0 | 592 |
| 7/23/2017 | 375 | 227 | 0 | 592 |
| 7/24/2017 | 439 | 225 | 0 | 594 |
| 7/25/2017 | 449 | 226 | 0 | 595 |
| 7/26/2017 | 449 | 226 | 0 | 596 |
| 7/27/2017 | 449 | 226 | 0 | 598 |
| 7/28/2017 | 448 | 226 | 0 | 599 |
| 7/29/2017 | 449 | 225 | 0 | 600 |
| 7/30/2017 | 449 | 225 | 0 | 602 |
| 7/31/2017 | 449 | 225 | 0 | 603 |
| **Total** | **11,355** | **8,087** | **769** | — |

**Table 6.** Diversions to New York City water supply system for report year ending November 30, 2017.—Continued

[Delaware River Master daily operations record. Diversions in million gallons per day for each 24-hour period beginning 0800 local time. For December 1–May 31, the average is computed beginning June 1, 2015, to the given date. For June 1–November 30, the average is computed beginning June 1, 2016, to the given date. The diversion calculation is computed as authorized within the Decree. —, not applicable]

| Date | East Delaware Tunnel | West Delaware Tunnel | Neversink Tunnel | Average from June 1 |
|---|---|---|---|---|
| 8/1/2017 | 449 | 225 | 79 | 605 |
| 8/2/2017 | 449 | 225 | 97 | 608 |
| 8/3/2017 | 450 | 225 | 80 | 610 |
| 8/4/2017 | 450 | 225 | 78 | 612 |
| 8/5/2017 | 451 | 225 | 0 | 613 |
| 8/6/2017 | 451 | 225 | 0 | 614 |
| 8/7/2017 | 449 | 224 | 0 | 615 |
| 8/8/2017 | 451 | 225 | 0 | 616 |
| 8/9/2017 | 451 | 224 | 0 | 617 |
| 8/10/2017 | 450 | 224 | 74 | 619 |
| 8/11/2017 | 451 | 199 | 0 | 619 |
| 8/12/2017 | 451 | 199 | 0 | 620 |
| 8/13/2017 | 451 | 199 | 0 | 620 |
| 8/14/2017 | 451 | 199 | 78 | 621 |
| 8/15/2017 | 451 | 199 | 78 | 623 |
| 8/16/2017 | 451 | 67 | 134 | 623 |
| 8/17/2017 | 451 | 0 | 78 | 622 |
| 8/18/2017 | 450 | 0 | 134 | 622 |
| 8/19/2017 | 450 | 0 | 0 | 619 |
| 8/20/2017 | 451 | 0 | 0 | 617 |
| 8/21/2017 | 450 | 223 | 172 | 620 |
| 8/22/2017 | 450 | 224 | 191 | 623 |
| 8/23/2017 | 420 | 224 | 191 | 626 |
| 8/24/2017 | 450 | 224 | 78 | 627 |
| 8/25/2017 | 450 | 224 | 0 | 628 |
| 8/26/2017 | 450 | 224 | 0 | 628 |
| 8/27/2017 | 450 | 224 | 0 | 629 |
| 8/28/2017 | 450 | 224 | 78 | 630 |
| 8/29/2017 | 450 | 225 | 0 | 631 |
| 8/30/2017 | 450 | 224 | 0 | 631 |
| 8/31/2017 | 450 | 224 | 78 | 632 |
| **Total** | **13,929** | **5,773** | **1,698** | — |

| Date | East Delaware Tunnel | West Delaware Tunnel | Neversink Tunnel | Average from June 1 |
|---|---|---|---|---|
| 9/1/2017 | 450 | 299 | 0 | 634 |
| 9/2/2017 | 377 | 300 | 0 | 634 |
| 9/3/2017 | 377 | 300 | 0 | 634 |
| 9/4/2017 | 377 | 299 | 0 | 635 |
| 9/5/2017 | 376 | 296 | 78 | 636 |
| 9/6/2017 | 1 | 299 | 0 | 633 |
| 9/7/2017 | 0 | 299 | 0 | 629 |
| 9/8/2017 | 273 | 299 | 0 | 629 |
| 9/9/2017 | 325 | 299 | 0 | 629 |
| 9/10/2017 | 325 | 298 | 0 | 629 |
| 9/11/2017 | 328 | 296 | 29 | 629 |
| 9/12/2017 | 326 | 299 | 0 | 629 |
| 9/13/2017 | 326 | 299 | 0 | 629 |
| 9/14/2017 | 327 | 299 | 96 | 630 |
| 9/15/2017 | 400 | 299 | 99 | 631 |
| 9/16/2017 | 400 | 299 | 0 | 632 |
| 9/17/2017 | 400 | 299 | 0 | 632 |
| 9/18/2017 | 400 | 202 | 115 | 633 |
| 9/19/2017 | 400 | 202 | 0 | 633 |
| 9/20/2017 | 400 | 201 | 116 | 634 |
| 9/21/2017 | 400 | 201 | 97 | 634 |
| 9/22/2017 | 448 | 201 | 96 | 635 |
| 9/23/2017 | 450 | 201 | 0 | 635 |
| 9/24/2017 | 449 | 200 | 0 | 636 |
| 9/25/2017 | 449 | 194 | 153 | 637 |
| 9/26/2017 | 449 | 200 | 115 | 638 |
| 9/27/2017 | 449 | 200 | 0 | 638 |
| 9/28/2017 | 451 | 200 | 79 | 639 |
| 9/29/2017 | 306 | 202 | 0 | 638 |
| 9/30/2017 | 450 | 299 | 0 | 639 |
| **Total** | **10,889** | **7,781** | **1,073** | — |

**Table 6.** Diversions to New York City water supply system for report year ending November 30, 2017.—Continued

[Delaware River Master daily operations record. Diversions in million gallons per day for each 24-hour period beginning 0800 local time. For December 1–May 31, the average is computed beginning June 1, 2015, to the given date. For June 1–November 30, the average is computed beginning June 1, 2016, to the given date. The diversion calculation is computed as authorized within the Decree. —, not applicable]

| Date | East Delaware Tunnel | West Delaware Tunnel | Neversink Tunnel | Average from June 1 |
|---|---|---|---|---|
| 10/1/2017 | 450 | 298 | 0 | 640 |
| 10/2/2017 | 450 | 299 | 0 | 640 |
| 10/3/2017 | 450 | 298 | 0 | 641 |
| 10/4/2017 | 450 | 298 | 0 | 642 |
| 10/5/2017 | 450 | 301 | 117 | 644 |
| 10/6/2017 | 450 | 300 | 0 | 645 |
| 10/7/2017 | 450 | 300 | 0 | 646 |
| 10/8/2017 | 450 | 299 | 0 | 646 |
| 10/9/2017 | 0 | 0 | 0 | 641 |
| 10/10/2017 | 0 | 0 | 0 | 637 |
| 10/11/2017 | 0 | 0 | 0 | 632 |
| 10/12/2017 | 0 | 123 | 3 | 628 |
| 10/13/2017 | 0 | 299 | 195 | 627 |
| 10/14/2017 | 87 | 299 | 202 | 627 |
| 10/15/2017 | 0 | 299 | 202 | 626 |
| 10/16/2017 | 0 | 300 | 299 | 626 |
| 10/17/2017 | 1 | 300 | 303 | 625 |
| 10/18/2017 | 0 | 299 | 303 | 625 |
| 10/19/2017 | 0 | 299 | 303 | 625 |
| 10/20/2017 | 0 | 298 | 303 | 625 |
| 10/21/2017 | 0 | 298 | 302 | 625 |
| 10/22/2017 | 0 | 298 | 302 | 625 |
| 10/23/2017 | 290 | 291 | 279 | 626 |
| 10/24/2017 | 400 | 291 | 50 | 627 |
| 10/25/2017 | 401 | 299 | 0 | 628 |
| 10/26/2017 | 401 | 299 | 0 | 628 |
| 10/27/2017 | 401 | 299 | 0 | 628 |
| 10/28/2017 | 401 | 299 | 0 | 629 |
| 10/29/2017 | 401 | 299 | 0 | 629 |
| 10/30/2017 | 401 | 26 | 0 | 628 |
| 10/31/2017 | 401 | 0 | 2 | 627 |
| **Total** | **7,185** | **7,608** | **3,165** | — |

| Date | East Delaware Tunnel | West Delaware Tunnel | Neversink Tunnel | Average from June 1 |
|---|---|---|---|---|
| 11/1/2017 | 401 | 0 | 253 | 627 |
| 11/2/2017 | 401 | 0 | 255 | 627 |
| 11/3/2017 | 401 | 0 | 85 | 626 |
| 11/4/2017 | 418 | 0 | 0 | 625 |
| 11/5/2017 | 401 | 0 | 0 | 623 |
| 11/6/2017 | 401 | 0 | 0 | 622 |
| 11/7/2017 | 401 | 1 | 0 | 621 |
| 11/8/2017 | 401 | 0 | 0 | 619 |
| 11/9/2017 | 401 | 0 | 2 | 618 |
| 11/10/2017 | 401 | 0 | 226 | 618 |
| 11/11/2017 | 401 | 0 | 0 | 617 |
| 11/12/2017 | 401 | 0 | 0 | 615 |
| 11/13/2017 | 441 | 0 | 226 | 616 |
| 11/14/2017 | 451 | 300 | 0 | 616 |
| 11/15/2017 | 376 | 300 | 0 | 617 |
| 11/16/2017 | 451 | 301 | 153 | 618 |
| 11/17/2017 | 302 | 301 | 0 | 618 |
| 11/18/2017 | 302 | 301 | 0 | 618 |
| 11/19/2017 | 302 | 300 | 0 | 618 |
| 11/20/2017 | 1 | 0 | 0 | 615 |
| 11/21/2017 | 217 | 174 | 0 | 613 |
| 11/22/2017 | 302 | 300 | 114 | 614 |
| 11/23/2017 | 302 | 300 | 0 | 614 |
| 11/24/2017 | 302 | 300 | 0 | 614 |
| 11/25/2017 | 302 | 300 | 0 | 614 |
| 11/26/2017 | 289 | 268 | 0 | 613 |
| 11/27/2017 | 0 | 171 | 228 | 612 |
| 11/28/2017 | 0 | 286 | 228 | 612 |
| 11/29/2017 | 3 | 0 | 226 | 610 |
| 11/30/2017 | 302 | 298 | 0 | 610 |
| **Total** | **9,474** | **4,201** | **1,996** | — |

**Table 7.** Consumption of water by New York City, 1950–2017.

[Data provided 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, 1950–2017.—Continued

[Data provided 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 | 1,237.0 | 451.5 |
| 2008 | 1,082.9 | 114.8 | 1,197.7 | 438.4 |
| 2009 | 1,007.2 | 109.4 | 1,116.6 | 407.6 |
| 2010 | 1,039.0 | 119.0 | 1,158.0 | 422.7 |
| 2011 | 1,021.0 | 116.0 | 1,137.0 | 415.0 |
| 2012 | 1,009.1 | 110.2 | 1,119.3 | 409.7 |
| 2013 | 1,006.1 | 110.1 | 1,116.2 | 407.4 |
| 2014 | 996.0 | 109.6 | 1,105.6 | 403.5 |
| 2015 | 1,009.8 | 114.1 | 1,123.9 | 410.2 |
| 2016 | 1,001.6 | 113.5 | 1,115.1 | 408.1 |
| 2017 | 990.2 | 109.3 | 1,099.5 | 401.3 |

**Table 8.** Diversions by New Jersey, daily mean discharge, Delaware and Raritan Canal at Port Mercer, New Jersey (U.S. Geological Survey site number 01460440), for year ending November 30, 2017.

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

| Day | Dec. 2016 | Jan. 2017 | Feb. 2017 | Mar. 2017 | Apr. 2017 | May 2017 | June 2017 | July 2017 | Aug. 2017 | Sept. 2017 | Oct. 2017 | Nov. 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 95 | 69 | 89 | 92 | 56 | 83 | 83 | 87 | 86 | 95 | 100 | 98 |
| 2 | 92 | 68 | 88 | 90 | 83 | 84 | 84 | 82 | 87 | 96 | 101 | 102 |
| 3 | 66 | 70 | 90 | 90 | 85 | 86 | 84 | 83 | 88 | 94 | 101 | 101 |
| 4 | 64 | 66 | 89 | 90 | 69 | 85 | 84 | 85 | 87 | 94 | 101 | 101 |
| 5 | 64 | 67 | 90 | 90 | 79 | 76 | 86 | 85 | 91 | 94 | 103 | 104 |
| 6 | 63 | 70 | 89 | 90 | 69 | 79 | 88 | 89 | 89 | 95 | 103 | 103 |
| 7 | 59 | 70 | 90 | 92 | 62 | 83 | 87 | 91 | 91 | 94 | 106 | 100 |
| 8 | 70 | 75 | 90 | 92 | 80 | 85 | 85 | 89 | 87 | 94 | 107 | 104 |
| 9 | 78 | 75 | 88 | 92 | 83 | 85 | 83 | 89 | 89 | 95 | 103 | 104 |
| 10 | 75 | 70 | 90 | 92 | 82 | 85 | 83 | 89 | 90 | 94 | 101 | 103 |
| 11 | 71 | 71 | 90 | 91 | 83 | 85 | 82 | 87 | 90 | 96 | 103 | 103 |
| 12 | 76 | 65 | 91 | 91 | 85 | 85 | 81 | 83 | 90 | 96 | 103 | 104 |
| 13 | 73 | 69 | 89 | 83 | 85 | 61 | 81 | 87 | 90 | 97 | 102 | 103 |
| 14 | 75 | 70 | 89 | 90 | 85 | 64 | 80 | 81 | 90 | 96 | 102 | 106 |
| 15 | 76 | 70 | 89 | 91 | 86 | 78 | 79 | 81 | 90 | 96 | 103 | 104 |
| 16 | 81 | 70 | 89 | 91 | 85 | 79 | 82 | 84 | 91 | 96 | 103 | 104 |
| 17 | 85e | 69 | 90 | 83 | 85 | 81 | 85 | 85 | 91 | 96 | 101 | 104 |
| 18 | 70 | 65 | 89 | 81 | 85 | 85 | 86e | 83 | 93 | 95 | 101 | 105 |
| 19 | 70 | 67 | 88 | 79 | 86 | 85 | 86e | 83 | 91 | 94 | 102 | 106 |
| 20 | 70 | 77 | 89 | 76 | 87 | 87 | 80 | 86 | 91 | 94 | 105 | 105 |
| 21 | 69 | 87 | 88 | 74 | 87 | 87 | 84 | 86 | 91 | 94 | 107 | 104 |
| 22 | 73 | 90 | 87 | 76 | 87 | 87 | 86 | 87 | 93 | 96 | 106 | 105 |
| 23 | 69 | 81 | 88 | 81 | 87 | 83 | 89 | 87 | 92 | 96 | 106 | 105 |
| 24 | 68 | 59 | 90 | 78 | 87 | 85 | 54 | 90 | 92 | 96 | 105 | 104 |
| 25 | 68 | 81 | 91 | 83 | 87 | 84 | 82 | 87 | 90 | 96 | 105 | 105 |
| 26 | 69 | 88 | 90 | 83 | 79 | 70 | 83 | 86 | 92 | 100 | 105 | 105 |
| 27 | 68 | 87 | 90 | 81 | 81 | 82 | 85 | 87 | 94 | 101 | 105 | 105 |
| 28 | 66 | 87 | 90 | 65 | 84 | 83 | 86 | 86 | 94 | 101 | 103 | 103 |
| 29 | 70 | 89 | — | 65 | 78 | 85 | 87 | 87 | 95 | 101 | 96 | 103 |
| 30 | 70 | 88 | — | 76 | 82 | 83 | 87 | 85 | 94 | 100 | 80 | 102 |
| 31 | 70 | 89 | — | 48 | — | 83 | — | 85 | 94 | — | 96 | — |
| **Total[1]** | **2,235** | **2,316** | **2,501** | **2,577** | **2,439** | **2,532** | **2,491** | **2,665** | **2,815** | **2,884** | **3,164** | **3,107** |
| Mean[2] | 72.1 | 74.7 | 89.3 | 83.1 | 81.3 | 81.7 | 83.0 | 86.0 | 90.8 | 96.1 | 102.1 | 103.6 |

[1]The year's total is 31,726 million gallons.

[2]The combined mean is 86.9 million gallons per day.

**Table 9.** New York City reservoir release design data for report year ending November 30, 2017.

[Delaware River Master daily operations record. The Montague design rate was 1,650 cubic feet per second (ft³/s) from December 1, 2016, through January 18, 2017, when a drought watch was ended. The Montague flow objective was 1,750 ft³/s from January 19, 2017, until June 15, 2017, when the flow objective was increased to 1,858 ft³/sec to account for excess release flows. The Montage flow objective returned to 1,750 ft³/s on October 23, 2017, when the 2017 Flexible Flow Management Program became effective. The Montague design rate was 1,750 (ft³/s) for the remainder of the year. Column (col.) 1 was provided by electric utility Brookfield Renewable U.S.; col. 2 was provided by electric utility Eagle Creek Renewable Energy, LLC; col. 3 computed using baseflow recession curve of uncontrolled runoff at the Montague site; 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 the 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. ft³/s, cols. 10, 12, 13, and 14 are accumulated from the previous water year starting June 1, 2016, with these values being reset on June 1, 2017; –x, a miscalculation of cumulative adjusted directed release occurred—values are reported as originally calculated]

| 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 12/1/2016 to 8/6/2017 | | | | | | | | | | | | | | | |
| 8/4/2017 | 140 | 53 | 1,440 | 317 | 8/7/2017 | 1,950 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8/5/2017 | 222 | 106 | 1,600 | 575 | 8/8/2017 | 2,503 | 0 | 0 | 0 | 0 | 0 | 235 | 235 | –235 | 24 |
| 8/6/2017 | 140 | 106 | 1,685 | 494 | 8/9/2017 | 2,425 | 0 | 0 | 0 | 0 | 0 | 144 | 379 | –379 | 38 |
| 8/7/2017 | 280 | 53 | 1,739 | 82 | 8/10/2017 | 2,154 | 0 | 0 | 0 | 0 | 0 | 33 | 412 | –412 | 41 |
| 8/8/2017 | 280 | 0 | 1,550 | 0 | 8/11/2017 | 1,830 | 28 | 0 | 0 | 0 | 0 | 130 | 542 | –542 | 50 |
| 8/9/2017 | 484 | 0 | 1,405 | 5 | 8/12/2017 | 1,894 | 0 | 24 | 0 | 0 | 0 | 0 | 542 | –542 | 50 |
| 8/10/2017 | 140 | 0 | 1,450 | 27 | 8/13/2017 | 1,617 | 241 | 38 | 279 | 279 | †241 | 0 | 542 | –301 | 30 |
| 8/11/2017 | 140 | 0 | 1,360 | 125 | 8/14/2017 | 1,625 | 233 | 41 | 274 | 274 | †474 | 0 | 542 | –68 | 7 |
| 8/12/2017 | 226 | 0 | 1,450 | 18 | 8/15/2017 | 1,694 | 164 | 50 | 214 | 214 | †638 | 0 | 542 | 96 | –10 |
| 8/13/2017 | 226 | 0 | 1,808 | 5 | 8/16/2017 | 2,039 | 0 | 50 | 0 | 0 | 638 | 18 | 560 | 78 | –8 |
| 8/14/2017 | 468 | 0 | 1,951 | 2 | 8/17/2017 | 2,421 | 0 | 30 | 0 | 0 | 638 | 0 | 560 | 78 | –8 |
| 8/15/2017 | 392 | 0 | 1,780 | 23 | 8/18/2017 | 2,195 | 0 | 7 | 0 | 0 | 638 | 0 | 560 | 78 | –8 |
| 8/16/2017 | 430 | 0 | 1,550 | 45 | 8/19/2017 | 2,025 | 0 | –10 | 0 | 0 | 638 | 0 | 560 | 78 | –8 |
| 8/17/2017 | 140 | 177 | 1,390 | 58 | 8/20/2017 | 1,765 | 93 | –8 | 0 | 0 | 638 | 0 | 560 | 78 | –8 |
| 8/18/2017 | 140 | 0 | 1,370 | 130 | 8/21/2017 | 1,640 | 218 | –8 | 210 | 210 | 848 | 0 | 560 | 288 | –29 |
| 8/19/2017 | 602 | 0 | 1,308 | 0 | 8/22/2017 | 1,910 | 0 | –8 | 0 | 0 | 848 | 0 | 560 | 288 | –29 |
| 8/20/2017 | 602 | 0 | 1,700 | 33 | 8/23/2017 | 2,335 | 0 | –8 | 0 | 0 | 848 | 0 | 560 | 288 | –29 |
| 8/21/2017 | 640 | 0 | 1,790 | 105 | 8/24/2017 | 2,535 | 0 | –8 | 0 | 0 | 848 | 0 | 560 | 288 | –29 |
| 8/22/2017 | 441 | 0 | 1,830 | 103 | 8/25/2017 | 2,374 | 0 | –29 | 0 | 0 | 848 | 0 | 560 | 288 | –29 |
| 8/23/2017 | 527 | 0 | 1,685 | 0 | 8/26/2017 | 2,212 | 0 | –29 | 0 | 0 | 848 | 0 | 560 | 288 | –29 |
| 8/24/2017 | 140 | 0 | 1,700 | 0 | 8/27/2017 | 1,840 | 18 | –29 | 0 | 0 | 848 | 214 | 774 | 74 | –7 |
| 8/25/2017 | 151 | 0 | 1,750 | 0 | 8/28/2017 | 1,901 | 0 | –29 | 0 | 0 | 848 | 364 | 1,138 | –290 | 29 |

**Table 9.** New York City reservoir release design data for report year ending November 30, 2017.—Continued

[Delaware River Master daily operations record. The Montague design rate was 1,650 cubic feet per second ($ft^3/s$) from December 1, 2016, through January 18, 2017, when a drought watch was ended. The Montague flow objective was 1,750 $ft^3/s$ from January 19, 2017, until June 15, 2017, when the flow objective was increased to 1,858 $ft^3/sec$ to account for excess release flows. The Montage flow objective returned to 1,750 $ft^3/s$ on October 23, 2017, when the 2017 Flexible Flow Management Program became effective. The Montague design rate was 1,750 ($ft^3/s$) for the remainder of the year. Column (col.) 1 was provided by electric utility Brookfield Renewable U.S.; col. 2 was provided by electric utility Eagle Creek Renewable Energy, LLC; col. 3 computed using baseflow recession curve of uncontrolled runoff at the Montague site; 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 the 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 $ft^3/s$. $ft^3/s$, cols. 10, 12, 13, and 14 are accumulated from the previous water year starting June 1, 2016, with these values being reset on June 1, 2017; –x, a miscalculation of cumulative adjusted directed release occurred—values are reported as originally calculated]

| 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 |
| 8/26/2017 | 650 | 0 | 1,680 | 0 | 8/29/2017 | 2,330 | 0 | –29 | 0 | 0 | 848 | 41 | 1,179 | –331 | 33 |
| 8/27/2017 | 699 | 0 | 1,420 | 4 | 8/30/2017 | 2,123 | 0 | –29 | 0 | 0 | 848 | 213 | 1,392 | –544 | 50 |
| 8/28/2017 | 575 | 0 | 1,320 | 0 | 8/31/2017 | 1,895 | 0 | –7 | 0 | 0 | 848 | 194 | 1,586 | –738 | 50 |
| 8/29/2017 | 575 | 0 | 1,200 | 3 | 9/1/2017 | 1,778 | 0 | 29 | 0 | 0 | 848 | 190 | 1,776 | –928 | 50 |
| 8/30/2017 | 172 | 0 | 1,120 | 4 | 9/2/2017 | 1,296 | 562 | 33 | 595 | 595 | 1,443 | 827 | 2,603 | –1,160 | 50 |
| 8/31/2017 | 140 | 0 | 1,105 | 22 | 9/3/2017 | 1,267 | 591 | 50 | 641 | 641 | 2,084 | 789 | 3,392 | –1,308 | 50 |
| 9/1/2017 | 140 | 0 | 1,085 | 120 | 9/4/2017 | 1,345 | 513 | 50 | 563 | 563 | 2,647 | 489 | 3,881 | –1,234 | 50 |
| 9/2/2017 | 317 | 0 | 954 | 315 | 9/5/2017 | 1,586 | 272 | 50 | 322 | 322 | 2,969 | 125 | 4,006 | –1,037 | 50 |
| 9/3/2017 | 650 | 71 | 933 | 246 | 9/6/2017 | 1,900 | 0 | 50 | 0 | 0 | 2,969 | 0 | 4,006 | –1,037 | 50 |
| 9/4/2017 | 650 | 0 | 1,025 | 558 | 9/7/2017 | 2,233 | 0 | 50 | 0 | 0 | 2,969 | 0 | 4,006 | –1,037 | 50 |
| 9/5/2017 | 398 | 0 | 1,035 | 419 | 9/8/2017 | 1,852 | 0 | 50 | 0 | 0 | 2,969 | 0 | 4,006 | –1,037 | 50 |
| 9/6/2017 | 398 | 0 | 1,100 | 69 | 9/9/2017 | 1,567 | 291 | 50 | 341 | 341 | 3,310 | 0 | 4,006 | –696 | 50 |
| 9/7/2017 | 1,200 | 0 | 1,160 | 11 | 9/10/2017 | 2,371 | 0 | 50 | 0 | 0 | 3,310 | 0 | 4,006 | –696 | 50 |
| 9/8/2017 | 1,200 | 0 | 1,705 | 5 | 9/11/2017 | 2,910 | 0 | 50 | 0 | 0 | 3,310 | 0 | 4,006 | –696 | 50 |
| 9/9/2017 | 688 | 0 | 1,830 | 0 | 9/12/2017 | 2,518 | 0 | 50 | 0 | 0 | 3,310 | 0 | 4,006 | –696 | 50 |
| 9/10/2017 | 0 | 0 | 1,680 | 0 | 9/13/2017 | 1,680 | 178 | 50 | 228 | 228 | 3,538 | 111 | 4,117 | –579 | 50 |
| 9/11/2017 | 564 | 0 | 1,430 | 0 | 9/14/2017 | 1,994 | 0 | 50 | 0 | 0 | 3,538 | 122 | 4,239 | –701 | 50 |
| 9/12/2017 | 602 | 0 | 1,305 | 33 | 9/15/2017 | 1,940 | 0 | 50 | 0 | 0 | 3,538 | 150 | 4,389 | –851 | 50 |
| 9/13/2017 | 591 | 0 | 1,150 | 0 | 9/16/2017 | 1,741 | 117 | 50 | 167 | 167 | 3,705 | 0 | 4,389 | –684 | 50 |
| 9/14/2017 | 0 | 177 | 1,065 | 131 | 9/17/2017 | 1,373 | 485 | 50 | 535 | 549 | 4,254 | 317 | 4,706 | –452 | 45 |
| 9/15/2017 | 0 | 0 | 1,090 | 0 | 9/18/2017 | 1,090 | 768 | 50 | 818 | 823 | 5,077 | 331 | 5,037 | 40 | –4 |
| 9/16/2017 | 543 | 0 | 1,000 | 0 | 9/19/2017 | 1,543 | 315 | 50 | 365 | 365 | 5,442 | 323 | 5,360 | 82 | –8 |
| 9/17/2017 | 405 | 0 | 1,100 | 3 | 9/20/2017 | 1,508 | 350 | 50 | 400 | 426 | 5,868 | 544 | 5,904 | –36 | 4 |

**Table 9.** New York City reservoir release design data for report year ending November 30, 2017.—Continued

[Delaware River Master daily operations record. The Montague design rate was 1,650 cubic feet per second ($ft^3/s$) from December 1, 2016, through January 18, 2017, when a drought watch was ended. The Montague flow objective was 1,750 $ft^3/s$ from January 19, 2017, until June 15, 2017, when the flow objective was increased to 1,858 $ft^3/sec$ to account for excess release flows. The Montage flow objective returned to 1,750 $ft^3/s$ on October 23, 2017, when the 2017 Flexible Flow Management Program became effective. The Montague design rate was 1,750 ($ft^3/s$) for the remainder of the year. Column (col.) 1 was provided by electric utility Brookfield Renewable U.S.; col. 2 was provided by electric utility Eagle Creek Renewable Energy, LLC; col. 3 computed using baseflow recession curve of uncontrolled runoff at the Montague site; 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 the 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 $ft^3/s$. $ft^3/s$, cols. 10, 12, 13, and 14 are accumulated from the previous water year starting June 1, 2016, with these values being reset on June 1, 2017; –x, a miscalculation of cumulative adjusted directed release occurred—values are reported as originally calculated]

| 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 |
| 9/18/2017 | 269 | 0 | 1,050 | 13 | 9/21/2017 | 1,332 | 526 | 45 | 571 | 568 | 6,436 | 726 | 6,630 | –194 | 19 |
| 9/19/2017 | 269 | 0 | 1,037 | 0 | 9/22/2017 | 1,306 | 552 | –4 | 548 | 548 | 6,984 | 786 | 7,416 | –432 | 43 |
| 9/20/2017 | 129 | 0 | 933 | 0 | 9/23/2017 | 1,062 | 796 | –8 | 788 | 781 | 7,765 | 879 | 8,295 | –530 | 50 |
| 9/21/2017 | 129 | 0 | 733 | 0 | 9/24/2017 | 862 | 996 | 4 | 1,000 | 993 | 8,758 | 731 | 9,026 | –268 | 27 |
| 9/22/2017 | 129 | 0 | 600 | 0 | 9/25/2017 | 729 | 1,129 | 19 | 1,148 | 1,143 | 9,901 | 631 | 9,657 | 244 | –24 |
| 9/23/2017 | 323 | 0 | 600 | 0 | 9/26/2017 | 923 | 935 | 43 | 978 | 1,173 | 11,074 | 721 | 10,378 | 696 | –50 |
| 9/24/2017 | 274 | 0 | 465 | 0 | 9/27/2017 | 739 | 1,119 | 50 | 1,169 | 1,307 | 12,381 | 855 | 11,233 | 1,148 | –50 |
| 9/25/2017 | 226 | 0 | 490 | 0 | 9/28/2017 | 716 | 1,142 | 27 | 1,169 | 1,191 | 13,572 | 849 | 12,082 | 1,490 | –50 |
| 9/26/2017 | 0 | 0 | 430 | 12 | 9/29/2017 | 442 | 1,416 | –24 | 1,392 | 1,392 | 14,964 | 1,320 | 13,402 | 1,562 | –50 |
| 9/27/2017 | 0 | 71 | 430 | 15 | 9/30/2017 | 516 | 1,342 | –50 | 1,292 | 1,274 | 16,238 | 1,272 | 14,674 | 1,564 | –50 |
| 9/28/2017 | 0 | 0 | 400 | 12 | 10/1/2017 | 412 | 1,446 | –50 | 1,396 | 1,386 | 17,624 | 1,314 | 15,988 | 1,636 | –50 |
| 9/29/2017 | 0 | 0 | 410 | 6 | 10/2/2017 | 416 | 1,442 | –50 | 1,392 | 1,387 | 19,011 | 1,285 | 17,273 | 1,738 | –50 |
| 9/30/2017 | 0 | 0 | 350 | 0 | 10/3/2017 | 350 | 1,508 | –50 | 1,458 | 1,453 | 20,464 | 1,251 | 18,524 | 1,940 | –50 |
| 10/1/2017 | 0 | 0 | 350 | 0 | 10/4/2017 | 350 | 1,508 | –50 | 1,458 | 1,452 | 21,916 | 1,090 | 19,614 | 2,302 | –50 |
| 10/2/2017 | 0 | 0 | 350 | 0 | 10/5/2017 | 350 | 1,508 | –50 | 1,458 | 1,453 | 23,369 | 1,261 | 20,875 | 2,494 | –50 |
| 10/3/2017 | 0 | 0 | 500 | 0 | 10/6/2017 | 500 | 1,358 | –50 | 1,308 | 1,306 | 24,675 | 1,264 | 22,139 | 2,536 | –50 |
| 10/4/2017 | 0 | 0 | 500 | 45 | 10/7/2017 | 545 | 1,313 | –50 | 1,263 | 1,260 | 25,935 | 1,198 | 23,337 | 2,598 | –50 |
| 10/5/2017 | 0 | 0 | 500 | 31 | 10/8/2017 | 531 | 1,327 | –50 | 1,277 | 1,272 | 27,207 | 1,210 | 24,547 | 2,660 | –50 |
| 10/6/2017 | 0 | 0 | 500 | 40 | 10/9/2017 | 540 | 1,318 | –50 | 1,268 | 1,261 | 28,468 | 879 | 25,426 | 3,042 | –50 |
| 10/7/2017 | 0 | 0 | 500 | 2,245 | 10/10/2017 | 2,745 | 0 | –50 | 0 | 0 | 28,468 | 369 | 25,795 | 2,673 | –50 |
| 10/8/2017 | 0 | 0 | 500 | 700 | 10/11/2017 | 1,200 | 658 | –50 | 608 | 605 | 29,073 | 353 | 26,148 | 2,925 | –50 |
| 10/9/2017 | 0 | 0 | 600 | 200 | 10/12/2017 | 800 | 1,058 | –50 | 1,008 | 1,005 | 30,078 | 663 | 26,811 | 3,267 | –50 |
| 10/10/2017 | 0 | 0 | 700 | 100 | 10/13/2017 | 800 | 1,058 | –50 | 1,008 | 1,010 | 31,088 | 898 | 27,709 | 3,379 | –50 |

**Table 9.** New York City reservoir release design data for report year ending November 30, 2017.—Continued

[Delaware River Master daily operations record. The Montague design rate was 1,650 cubic feet per second ($ft^3/s$) from December 1, 2016, through January 18, 2017, when a drought watch was ended. The Montague flow objective was 1,750 $ft^3/s$ from January 19, 2017, until June 15, 2017, when the flow objective was increased to 1,858 $ft^3/sec$ to account for excess release flows. The Montage flow objective returned to 1,750 $ft^3/s$ on October 23, 2017, when the 2017 Flexible Flow Management Program became effective. The Montague design rate was 1,750 ($ft^3/s$) for the remainder of the year. Column (col.) 1 was provided by electric utility Brookfield Renewable U.S.; col. 2 was provided by electric utility Eagle Creek Renewable Energy, LLC; col. 3 computed using baseflow recession curve of uncontrolled runoff at the Montague site; 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 the 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 $ft^3/s$. $ft^3/s$, cols. 10, 12, 13, and 14 are accumulated from the previous water year starting June 1, 2016, with these values being reset on June 1, 2017; –x, a miscalculation of cumulative adjusted directed release occurred—values are reported as originally calculated]

| 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 |
| 10/11/2017 | 0 | 0 | 1,100 | 58 | 10/14/2017 | 1,158 | 700 | –50 | 650 | 638 | 31,726 | 886 | 28,595 | 3,131 | –50 |
| 10/12/2017 | 0 | 177 | 1,200 | 0 | 10/15/2017 | 1,377 | 481 | –50 | 431 | 434 | 32,160 | 762 | 29,357 | 2,803 | –50 |
| 10/13/2017 | 0 | 0 | 900 | 0 | 10/16/2017 | 900 | 958 | –50 | 908 | 924 | 33,084 | 1,072 | 30,429 | 2,655 | –50 |
| 10/14/2017 | 0 | 0 | 800 | 0 | 10/17/2017 | 800 | 1,058 | –50 | 1,008 | 1,009 | 34,093 | 1,007 | 31,436 | 2,657 | –50 |
| 10/15/2017 | 0 | 0 | 700 | 0 | 10/18/2017 | 700 | 1,158 | –50 | 1,108 | 1,103 | 35,196 | 1,051 | 32,487 | 2,709 | –50 |
| 10/16/2017 | 0 | 0 | 700 | 0 | 10/19/2017 | 700 | 1,158 | –50 | 1,108 | 1,102 | 36,298 | 1,070 | 33,557 | 2,741 | –50 |
| 10/17/2017 | 0 | 0 | 650 | 0 | 10/20/2017 | 650 | 1,208 | –50 | 1,158 | 1,155 | 37,453 | 1,133 | 34,690 | 2,763 | –50 |
| 10/18/2017 | 0 | 0 | 650 | 0 | 10/21/2017 | 650 | 1,208 | –50 | 1,158 | 1,156 | 38,609 | 1,164 | 35,854 | 2,755 | –50 |
| 10/19/2017 | 0 | 0 | 650 | 0 | 10/22/2017 | 650 | 1,208 | –50 | 1,158 | 1,157 | 39,766 | 1,165 | 37,019 | 2,747 | –50 |
| 10/20/2017 | 0 | 0 | 650 | 0 | 10/23/2017 | 650 | 1,208 | –50 | 1,158 | 1,156 | 40,922 | 1,194 | 38,213 | 2,709 | –50 |
| 10/21/2017 | 0 | 0 | 640 | 8 | 10/24/2017 | 648 | 1,210 | –50 | 1,160 | 1,045 | 41,967 | 925 | 39,138 | 2,829 | –50 |
| 10/22/2017 | 0 | 0 | 630 | 2,995 | 10/25/2017 | 3,625 | 0 | –50 | 0 | 0 | †42,542 | 315 | 39,453 | 3,089 | –50 |
| 10/23/2017 | 0 | 0 | 630 | 300 | 10/26/2017 | 930 | 820 | –50 | 770 | 713 | 43,255 | 233 | 39,686 | 3,569 | –50 |
| 10/24/2017 | 0 | 0 | 600 | 300 | 10/27/2017 | 900 | 850 | –50 | 800 | 796 | 44,051 | 206 | 39,892 | 4,159 | –50 |
| 10/25/2017 | 0 | 71 | 650 | 0 | 10/28/2017 | 721 | 1,029 | –50 | 979 | 972 | 45,023 | 542 | 40,434 | 4,589 | –50 |
| 10/26/2017 | 0 | 0 | 650 | 1,100 | 10/29/2017 | 1,750 | 0 | –50 | 0 | 0 | †45,592 | 389 | 40,823 | 4,769 | –50 |
| 10/27/2017 | 0 | 0 | 1,000 | 3,000 | 10/30/2017 | 4,000 | 0 | –50 | 0 | 0 | 45,592 | 0 | 40,823 | 4,769 | –50 |
| 10/28/2017 | 0 | 0 | 1,000 | 8,500 | 10/31/2017 | 9,500 | 0 | –50 | 0 | 0 | 45,592 | 0 | 40,823 | 4,769 | –50 |
| The estimated Montague discharge was greater than the Montague design rate from 11/1/2017 to 11/30/2017 | | | | | | | | | | | | | | | |

†A miscalculation of cumulative adjusted directed release occurred—values are reported as originally calculated.

**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, 2017.

[Delaware River Master daily operations record. All provided measurements are given in the mean discharge in cubic feet per second ($ft^3/s$) for 24 hours, except col. 14, which is in cubic feet per second accumulated daily. Column (col.) 1 = 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, 1 day later; col. 4 = 24 hours beginning 1500, 1 day later; col. 5 = 24 hours beginning 0000 of date shown; col. 6 = 24 hours beginning 1600 of date shown; col. 7 = col. 2 + col. 3 + col. 4 in response to direction (col. 1); col. 8 = col. 2 + col. 3 + col. 4 – col. 7; col. 9 = col. 5 + col. 6; col. 10 = col. 11 – col. 7 – col. 8 – col. 9; col. 11 = 24 hours of calendar day shown; col. 12 = Interim Excess Release Quantity (IERQ) Bank releases. From 6/1/2017 to 10/23/2017 thermal releases were allowed per Delaware River Basin Commission Docket no. D–77–20 CP (Revised). Table footnotes in col. 12 indicate thermal release or Rapid Flow Change Mitigation Bank—refer to table footnotes. Starting on 10/23/2017, releases were made from 2017 Flexible Flow Management Program IERQ Banks; col. 13: if col. 7 > 0, col. 13 = col. 11 – col 8 –1,750 $ft^3/s$ but not greater than col. 7; if col 7 = 0, col. 13 = 1,858 $ft^3/s$ – (col. 11 – col. 8), positive values only and not greater than 108 $ft^3/s$; col. 14 = cumulative summation of col. 13 values. Excess release credits were only applicable from June 1 to October 23, 2017. —, not applicable]

| Controlled releases from New York City reservoirs | | | | | Controlled releases from power reservoirs | | | Segregation of flow, Delaware River at Montague, New Jersey | | | | | | Excess release credits | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | Daily | Cumulative |
| | | | | | | | | | 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 | Col. 13 | Col. 14 |
| 11/28/2016 | 0 | 45 | 54 | 29 | 11/30/2016 | 0 | 0 | 12/1/2016 | 0 | 128 | 0 | 5,952 | 6,080 | 0 | — | — |
| 11/29/2016 | 0 | 45 | 54 | 29 | 12/1/2016 | 0 | 0 | 12/2/2016 | 0 | 128 | 0 | 8,872 | 9,000 | 0 | — | — |
| 11/30/2016 | 0 | 45 | 56 | 29 | 12/2/2016 | 0 | 0 | 12/3/2016 | 0 | 130 | 0 | 6,070 | 6,200 | 0 | — | — |
| 12/1/2016 | 0 | 45 | 56 | 29 | 12/3/2016 | 0 | 0 | 12/4/2016 | 0 | 130 | 0 | 4,560 | 4,690 | 0 | — | — |
| 12/2/2016 | 0 | 46 | 56 | 29 | 12/4/2016 | 0 | 0 | 12/5/2016 | 0 | 131 | 0 | 3,709 | 3,840 | 0 | — | — |
| 12/3/2016 | 0 | 46 | 56 | 29 | 12/5/2016 | 0 | 0 | 12/6/2016 | 0 | 131 | 0 | 3,249 | 3,380 | 0 | — | — |
| 12/4/2016 | 0 | 45 | 57 | 29 | 12/6/2016 | 0 | 0 | 12/7/2016 | 0 | 131 | 0 | 3,079 | 3,210 | 0 | — | — |
| 12/5/2016 | 0 | 46 | 57 | 29 | 12/7/2016 | 0 | 0 | 12/8/2016 | 0 | 132 | 0 | 3,088 | 3,220 | 0 | — | — |
| 12/6/2016 | 0 | 45 | 56 | 29 | 12/8/2016 | 0 | 0 | 12/9/2016 | 0 | 130 | 0 | 3,030 | 3,160 | 0 | — | — |
| 12/7/2016 | 0 | 45 | 56 | 29 | 12/9/2016 | 0 | 0 | 12/10/2016 | 0 | 130 | 0 | 2,640 | 2,770 | 0 | — | — |
| 12/8/2016 | 0 | 45 | 50 | 29 | 12/10/2016 | 0 | 0 | 12/11/2016 | 0 | 124 | 0 | 2,286 | 2,410 | 0 | — | — |
| 12/9/2016 | 0 | 45 | 53 | 29 | 12/11/2016 | 0 | 0 | 12/12/2016 | 0 | 127 | 0 | 2,133 | 2,260 | 0 | — | — |
| 12/10/2016 | 0 | 45 | 59 | 29 | 12/12/2016 | 0 | 0 | 12/13/2016 | 0 | 133 | 0 | 2,057 | 2,190 | 0 | — | — |
| 12/11/2016 | 0 | 45 | 56 | 29 | 12/13/2016 | 0 | 0 | 12/14/2016 | 0 | 130 | 0 | 2,150 | 2,280 | 0 | — | — |
| 12/12/2016 | 0 | 45 | 56 | 29 | 12/14/2016 | 0 | 18 | 12/15/2016 | 0 | 130 | 18 | 2,002 | 2,150 | 0 | — | — |
| 12/13/2016 | 0 | 45 | 56 | 29 | 12/15/2016 | 0 | 124 | 12/16/2016 | 0 | 130 | 124 | 2,246 | 2,500 | 0 | — | — |
| 12/14/2016 | 0 | 45 | 56 | 29 | 12/16/2016 | 0 | 106 | 12/17/2016 | 0 | 130 | 106 | 1,524 | 1,760 | 0 | — | — |
| 12/15/2016 | 0 | 45 | 56 | 29 | 12/17/2016 | 0 | 0 | 12/18/2016 | 0 | 130 | 0 | 1,670 | 1,800 | 0 | — | — |
| 12/16/2016 | 0 | 45 | 56 | 29 | 12/18/2016 | 0 | 0 | 12/19/2016 | 0 | 130 | 0 | 7,810 | 7,940 | 0 | — | — |
| 12/17/2016 | 0 | 45 | 56 | 29 | 12/19/2016 | 0 | 0 | 12/20/2016 | 0 | 130 | 0 | 7,720 | 7,850 | 0 | — | — |
| 12/18/2016 | 0 | 45 | 56 | 29 | 12/20/2016 | 0 | 0 | 12/21/2016 | 0 | 130 | 0 | 5,320 | 5,450 | 0 | — | — |
| 12/19/2016 | 0 | 45 | 57 | 29 | 12/21/2016 | 0 | 0 | 12/22/2016 | 0 | 131 | 0 | 4,509 | 4,640 | 0 | — | — |
| 12/20/2016 | 0 | 45 | 57 | 29 | 12/22/2016 | 0 | 0 | 12/23/2016 | 0 | 131 | 0 | 4,259 | 4,390 | 0 | — | — |
| 12/21/2016 | 0 | 45 | 57 | 29 | 12/23/2016 | 0 | 0 | 12/24/2016 | 0 | 131 | 0 | 3,589 | 3,720 | 0 | — | — |
| 12/22/2016 | 0 | 45 | 57 | 29 | 12/24/2016 | 0 | 0 | 12/25/2016 | 0 | 131 | 0 | 3,309 | 3,440 | 0 | — | — |
| 12/23/2016 | 0 | 45 | 57 | 29 | 12/25/2016 | 0 | 0 | 12/26/2016 | 0 | 131 | 0 | 3,349 | 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, 2017.—Continued

[Delaware River Master daily operations record. All provided measurements are given in the mean discharge in cubic feet per second ($ft^3/s$) for 24 hours, except col. 14, which is in cubic feet per second accumulated daily. Column (col.) 1 = 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, 1 day later; col. 4 = 24 hours beginning 1500, 1 day later; col. 5 = 24 hours beginning 0000 of date shown; col. 6 = 24 hours beginning 1600 of date shown; col. 7 = col. 2 + col. 3 + col. 4 in response to direction (col. 1); col. 8 = col. 2 + col. 3 + col. 4 – col. 7; col. 9 = col. 5 + col. 6; col. 10 = col. 11 – col. 7 – col. 8 – col. 9; col. 11 = 24 hours of calendar day shown; col. 12 = Interim Excess Release Quantity (IERQ) Bank releases. From 6/1/2017 to 10/23/2017 thermal releases were allowed per Delaware River Basin Commission Docket no. D–77–20 CP (Revised). Table footnotes in col. 12 indicate thermal release or Rapid Flow Change Mitigation Bank—refer to table footnotes. Starting on 10/23/2017, releases were made from 2017 Flexible Flow Management Program IERQ Banks; col. 13: if col. 7 > 0, col. 13 = col. 11 – col 8 –1,750 $ft^3/s$ but not greater than col. 7; if col 7 = 0, col. 13 = 1,858 $ft^3/s$ – (col. 11 – col. 8), positive values only and not greater than 108 $ft^3/s$; col. 14 = cumulative summation of col. 13 values. Excess release credits were only applicable from June 1 to October 23, 2017. —, not applicable]

| Controlled releases from New York City reservoirs | | | | | Controlled releases from power reservoirs | | | Segregation of flow, Delaware River at Montague, New Jersey | | | | | IERQ Bank releases | Excess release credits | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Directed | | | | | | | | Controlled releases | | | | | | | |
| Date | Amount | Pepacton | Cannonsville | Neversink | Date | Lake Wallenpaupack | Rio Reservoir | Date | New York City reservoirs | | Powerplants | Computed uncontrolled | Total | | Daily | Cumulative |
| | | | | | | | | | 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 | Col. 13 | Col. 14 |
| 12/24/2016 | 0 | 45 | 57 | 29 | 12/26/2016 | 0 | 0 | 12/27/2016 | 0 | 131 | 0 | 3,259 | 3,390 | 0 | — | — |
| 12/25/2016 | 0 | 45 | 57 | 29 | 12/27/2016 | 0 | 0 | 12/28/2016 | 0 | 131 | 0 | 3,719 | 3,850 | 0 | — | — |
| 12/26/2016 | 0 | 45 | 57 | 29 | 12/28/2016 | 0 | 0 | 12/29/2016 | 0 | 131 | 0 | 4,079 | 4,210 | 0 | — | — |
| 12/27/2016 | 0 | 45 | 57 | 29 | 12/29/2016 | 0 | 0 | 12/30/2016 | 0 | 131 | 0 | 3,619 | 3,750 | 0 | — | — |
| 12/28/2016 | 0 | 45 | 57 | 29 | 12/30/2016 | 0 | 0 | 12/31/2016 | 0 | 131 | 0 | 3,299 | 3,430 | 0 | — | — |
| 12/29/2016 | 0 | 45 | 57 | 29 | 12/31/2016 | 0 | 0 | 1/1/2017 | 0 | 131 | 0 | 3,019 | 3,150 | 0 | — | — |
| 12/30/2016 | 0 | 45 | 56 | 29 | 1/1/2017 | 0 | 0 | 1/2/2017 | 0 | 130 | 0 | 2,780 | 2,910 | 0 | — | — |
| 12/31/2016 | 0 | 45 | 56 | 29 | 1/2/2017 | 0 | 0 | 1/3/2017 | 0 | 130 | 0 | 2,660 | 2,790 | 0 | — | — |
| 1/1/2017 | 0 | 45 | 56 | 29 | 1/3/2017 | 0 | 0 | 1/4/2017 | 0 | 130 | 0 | 3,910 | 4,040 | 0 | — | — |
| 1/2/2017 | 0 | 45 | 57 | 29 | 1/4/2017 | 0 | 0 | 1/5/2017 | 0 | 131 | 0 | 6,889 | 7,020 | 0 | — | — |
| 1/3/2017 | 0 | 45 | 57 | 29 | 1/5/2017 | 0 | 0 | 1/6/2017 | 0 | 131 | 0 | 5,739 | 5,870 | 0 | — | — |
| 1/4/2017 | 0 | 45 | 57 | 29 | 1/6/2017 | 18 | 0 | 1/7/2017 | 0 | 131 | 18 | 4,401 | 4,550 | 0 | — | — |
| 1/5/2017 | 0 | 46 | 57 | 29 | 1/7/2017 | 0 | 71 | 1/8/2017 | 0 | 132 | 71 | 3,957 | 4,160 | 0 | — | — |
| 1/6/2017 | 0 | 46 | 57 | 29 | 1/8/2017 | 0 | 195 | 1/9/2017 | 0 | 132 | 195 | 3,493 | 3,820 | 0 | — | — |
| 1/7/2017 | 0 | 46 | 57 | 29 | 1/9/2017 | 17 | 160 | 1/10/2017 | 0 | 132 | 177 | 3,231 | 3,540 | 0 | — | — |
| 1/8/2017 | 0 | 45 | 56 | 29 | 1/10/2017 | 0 | 71 | 1/11/2017 | 0 | 130 | 71 | 3,159 | 3,360 | 0 | — | — |
| 1/9/2017 | 0 | 46 | 54 | 29 | 1/11/2017 | 0 | 0 | 1/12/2017 | 0 | 129 | 0 | 3,901 | 4,030 | 0 | — | — |
| 1/10/2017 | 0 | 45 | 54 | 29 | 1/12/2017 | 0 | 160 | 1/13/2017 | 0 | 128 | 160 | 7,052 | 7,340 | 0 | — | — |
| 1/11/2017 | 0 | 46 | 56 | 29 | 1/13/2017 | 0 | 89 | 1/14/2017 | 0 | 131 | 89 | 10,680 | 10,900 | 0 | — | — |
| 1/12/2017 | 0 | 46 | 59 | 29 | 1/14/2017 | 0 | 0 | 1/15/2017 | 0 | 134 | 0 | 7,756 | 7,890 | 0 | — | — |
| 1/13/2017 | 0 | 46 | 59 | 29 | 1/15/2017 | 0 | 0 | 1/16/2017 | 0 | 134 | 0 | 6,036 | 6,170 | 0 | — | — |
| 1/14/2017 | 0 | 46 | 56 | 29 | 1/16/2017 | 0 | 89 | 1/17/2017 | 0 | 131 | 89 | 4,950 | 5,170 | 0 | — | — |
| 1/15/2017 | 0 | 45 | 56 | 29 | 1/17/2017 | 23 | 53 | 1/18/2017 | 0 | 130 | 76 | 5,294 | 5,500 | 0 | — | — |
| 1/16/2017 | 0 | 45 | 56 | 29 | 1/18/2017 | 0 | 53 | 1/19/2017 | 0 | 130 | 53 | 6,067 | 6,250 | 0 | — | — |
| 1/17/2017 | 0 | 45 | 56 | 29 | 1/19/2017 | 0 | 177 | 1/20/2017 | 0 | 130 | 177 | 5,783 | 6,090 | 0 | — | — |
| 1/18/2017 | 0 | 45 | 56 | 29 | 1/20/2017 | 0 | 124 | 1/21/2017 | 0 | 130 | 124 | 5,226 | 5,480 | 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, 2017.—Continued

[Delaware River Master daily operations record. All provided measurements are given in the mean discharge in cubic feet per second ($ft^3/s$) for 24 hours, except col. 14, which is in cubic feet per second accumulated daily. Column (col.) 1 = 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, 1 day later; col. 4 = 24 hours beginning 1500, 1 day later; col. 5 = 24 hours beginning 0000 of date shown; col. 6 = 24 hours beginning 1600 of date shown; col. 7 = col. 2 + col. 3 + col. 4 in response to direction (col. 1); col. 8 = col. 2 + col. 3 + col. 4 – col. 7; col. 9 = col. 5 + col. 6; col. 10 = col. 11 – col. 7 – col. 8 – col. 9; col. 11 = 24 hours of calendar day shown; col. 12 = Interim Excess Release Quantity (IERQ) Bank releases. From 6/1/2017 to 10/23/2017 thermal releases were allowed per Delaware River Basin Commission Docket no. D–77–20 CP (Revised). Table footnotes in col. 12 indicate thermal release or Rapid Flow Change Mitigation Bank—refer to table footnotes. Starting on 10/23/2017, releases were made from 2017 Flexible Flow Management Program IERQ Banks; col. 13: if col. 7 > 0, col. 13 = col. 11 – col 8 –1,750 $ft^3/s$ but not greater than col. 7; if col 7 = 0, col. 13 = 1,858 $ft^3/s$ – (col. 11 – col. 8), positive values only and not greater than 108 $ft^3/s$; col. 14 = cumulative summation of col. 13 values. Excess release credits were only applicable from June 1 to October 23, 2017. —, not applicable]

| Controlled releases from New York City reservoirs | | | | | Controlled releases from power reservoirs | | | Segregation of flow, Delaware River at Montague, New Jersey | | | | | | Excess release credits | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | Daily | Cumulative |
| | | | | | | | | | 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 | Col. 13 | Col. 14 |
| 1/19/2017 | 0 | 45 | 56 | 29 | 1/21/2017 | 0 | 124 | 1/22/2017 | 0 | 130 | 124 | 5,066 | 5,320 | 0 | — | — |
| 1/20/2017 | 0 | 45 | 57 | 29 | 1/22/2017 | 0 | 0 | 1/23/2017 | 0 | 131 | 0 | 5,519 | 5,650 | 0 | — | — |
| 1/21/2017 | 0 | 46 | 57 | 29 | 1/23/2017 | 0 | 248 | 1/24/2017 | 0 | 132 | 248 | 8,960 | 9,340 | 0 | — | — |
| 1/22/2017 | 0 | 45 | 56 | 29 | 1/24/2017 | 0 | 390 | 1/25/2017 | 0 | 130 | 390 | 11,980 | 12,500 | 0 | — | — |
| 1/23/2017 | 0 | 45 | 54 | 29 | 1/25/2017 | 0 | 426 | 1/26/2017 | 0 | 128 | 426 | 9,116 | 9,670 | 0 | — | — |
| 1/24/2017 | 0 | 45 | 56 | 29 | 1/26/2017 | 0 | 461 | 1/27/2017 | 0 | 130 | 461 | 8,659 | 9,250 | 0 | — | — |
| 1/25/2017 | 0 | 45 | 56 | 29 | 1/27/2017 | 0 | 443 | 1/28/2017 | 0 | 130 | 443 | 7,477 | 8,050 | 0 | — | — |
| 1/26/2017 | 0 | 45 | 54 | 29 | 1/28/2017 | 0 | 408 | 1/29/2017 | 0 | 128 | 408 | 6,244 | 6,780 | 0 | — | — |
| 1/27/2017 | 0 | 45 | 54 | 29 | 1/29/2017 | 0 | 496 | 1/30/2017 | 0 | 128 | 496 | 5,526 | 6,150 | 0 | — | — |
| 1/28/2017 | 0 | 45 | 56 | 29 | 1/30/2017 | 365 | 496 | 1/31/2017 | 0 | 130 | 861 | 4,639 | 5,630 | 0 | — | — |
| 1/29/2017 | 0 | 46 | 56 | 29 | 1/31/2017 | 130 | 514 | 2/1/2017 | 0 | 131 | 644 | 3,945 | 4,720 | 0 | — | — |
| 1/30/2017 | 0 | 46 | 56 | 29 | 2/1/2017 | 41 | 514 | 2/2/2017 | 0 | 131 | 555 | 3,794 | 4,480 | 0 | — | — |
| 1/31/2017 | 0 | 45 | 56 | 29 | 2/2/2017 | 352 | 160 | 2/3/2017 | 0 | 130 | 512 | 3,868 | 4,510 | 0 | — | — |
| 2/1/2017 | 0 | 45 | 54 | 29 | 2/3/2017 | 585 | 160 | 2/4/2017 | 0 | 128 | 745 | 3,047 | 3,920 | 0 | — | — |
| 2/2/2017 | 0 | 45 | 54 | 31 | 2/4/2017 | 383 | 195 | 2/5/2017 | 0 | 130 | 578 | 2,882 | 3,590 | 0 | — | — |
| 2/3/2017 | 0 | 46 | 59 | 36 | 2/5/2017 | 342 | 195 | 2/6/2017 | 0 | 141 | 537 | 2,772 | 3,450 | 0 | — | — |
| 2/4/2017 | 0 | 50 | 60 | 36 | 2/6/2017 | 535 | 213 | 2/7/2017 | 0 | 146 | 748 | 2,766 | 3,660 | 0 | — | — |
| 2/5/2017 | 0 | 50 | 60 | 36 | 2/7/2017 | 235 | 195 | 2/8/2017 | 0 | 146 | 430 | 2,804 | 3,380 | 0 | — | — |
| 2/6/2017 | 0 | 50 | 60 | 36 | 2/8/2017 | 142 | 284 | 2/9/2017 | 0 | 146 | 426 | 3,578 | 4,150 | 0 | — | — |
| 2/7/2017 | 0 | 50 | 60 | 36 | 2/9/2017 | 98 | 426 | 2/10/2017 | 0 | 146 | 524 | 3,740 | 4,410 | 0 | — | — |
| 2/8/2017 | 0 | 50 | 62 | 36 | 2/10/2017 | 547 | 142 | 2/11/2017 | 0 | 148 | 689 | 3,453 | 4,290 | 0 | — | — |
| 2/9/2017 | 0 | 50 | 62 | 36 | 2/11/2017 | 158 | 53 | 2/12/2017 | 0 | 148 | 211 | 3,551 | 3,910 | 0 | — | — |
| 2/10/2017 | 0 | 50 | 62 | 36 | 2/12/2017 | 0 | 71 | 2/13/2017 | 0 | 148 | 71 | 3,181 | 3,400 | 0 | — | — |
| 2/11/2017 | 0 | 50 | 62 | 36 | 2/13/2017 | 274 | 496 | 2/14/2017 | 0 | 148 | 770 | 3,062 | 3,980 | 0 | — | — |
| 2/12/2017 | 0 | 50 | 67 | 36 | 2/14/2017 | 574 | 248 | 2/15/2017 | 0 | 153 | 822 | 3,215 | 4,190 | 0 | — | — |
| 2/13/2017 | 0 | 50 | 77 | 36 | 2/15/2017 | 594 | 142 | 2/16/2017 | 0 | 163 | 736 | 3,151 | 4,050 | 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, 2017.—Continued

[Delaware River Master daily operations record. All provided measurements are given in the mean discharge in cubic feet per second ($ft^3/s$) for 24 hours, except col. 14, which is in cubic feet per second accumulated daily. Column (col.) 1 = 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, 1 day later; col. 4 = 24 hours beginning 1500, 1 day later; col. 5 = 24 hours beginning 0000 of date shown; col. 6 = 24 hours beginning 1600 of date shown; col. 7 = col. 2 + col. 3 + col. 4 in response to direction (col. 1); col. 8 = col. 2 + col. 3 + col. 4 – col. 7; col. 9 = col. 5 + col. 6; col. 10 = col. 11 – col. 7 – col. 8 – col. 9; col. 11 = 24 hours of calendar day shown; col. 12 = Interim Excess Release Quantity (IERQ) Bank releases. From 6/1/2017 to 10/23/2017 thermal releases were allowed per Delaware River Basin Commission Docket no. D–77–20 CP (Revised). Table footnotes in col. 12 indicate thermal release or Rapid Flow Change Mitigation Bank—refer to table footnotes. Starting on 10/23/2017, releases were made from 2017 Flexible Flow Management Program IERQ Banks; col. 13: if col. 7 > 0, col. 13 = col. 11 – col 8 –1,750 $ft^3/s$ but not greater than col. 7; if col 7 = 0, col. 13 = 1,858 $ft^3/s$ – (col. 11 – col. 8), positive values only and not greater than 108 $ft^3/s$; col. 14 = cumulative summation of col. 13 values. Excess release credits were only applicable from June 1 to October 23, 2017. —, not applicable]

| Controlled releases from New York City reservoirs | | | | | Controlled releases from power reservoirs | | | Segregation of flow, Delaware River at Montague, New Jersey | | | | | IERQ Bank releases | Excess release credits | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Directed | | | | | | | | Controlled releases | | | | | | | |
| Date | Amount | Pepacton | Cannonsville | Neversink | Date | Lake Wallenpaupack | Rio Reservoir | Date | New York City reservoirs | | Powerplants | Computed uncontrolled | Total | | Daily | Cumulative |
| | | | | | | | | | 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 | Col. 13 | Col. 14 |
| 2/14/2017 | 0 | 50 | 80 | 43 | 2/16/2017 | 543 | 124 | 2/17/2017 | 0 | 173 | 667 | 2,720 | 3,560 | 0 | — | — |
| 2/15/2017 | 0 | 59 | 90 | 45 | 2/17/2017 | 521 | 18 | 2/18/2017 | 0 | 194 | 539 | 2,677 | 3,410 | 0 | — | — |
| 2/16/2017 | 0 | 62 | 91 | 45 | 2/18/2017 | 608 | 18 | 2/19/2017 | 0 | 198 | 626 | 2,796 | 3,620 | 0 | — | — |
| 2/17/2017 | 0 | 62 | 91 | 45 | 2/19/2017 | 724 | 35 | 2/20/2017 | 0 | 198 | 759 | 4,003 | 4,960 | 0 | — | — |
| 2/18/2017 | 0 | 62 | 90 | 45 | 2/20/2017 | 835 | 53 | 2/21/2017 | 0 | 197 | 888 | 4,885 | 5,970 | 0 | — | — |
| 2/19/2017 | 0 | 60 | 88 | 45 | 2/21/2017 | 1,055 | 53 | 2/22/2017 | 0 | 193 | 1,108 | 4,359 | 5,660 | 0 | — | — |
| 2/20/2017 | 0 | 60 | 90 | 45 | 2/22/2017 | 929 | 0 | 2/23/2017 | 0 | 195 | 929 | 5,006 | 6,130 | 0 | — | — |
| 2/21/2017 | 0 | 60 | 91 | 45 | 2/23/2017 | 763 | 124 | 2/24/2017 | 0 | 196 | 887 | 7,897 | 8,980 | 0 | — | — |
| 2/22/2017 | 0 | 60 | 91 | 45 | 2/24/2017 | 751 | 213 | 2/25/2017 | 0 | 196 | 964 | 11,740 | 12,900 | 0 | — | — |
| 2/23/2017 | 0 | 60 | 91 | 45 | 2/25/2017 | 1,186 | 301 | 2/26/2017 | 0 | 196 | 1,487 | 28,517 | 30,200 | 0 | — | — |
| 2/24/2017 | 0 | 60 | 91 | 45 | 2/26/2017 | 1,599 | 532 | 2/27/2017 | 0 | 196 | 2,131 | 20,173 | 22,500 | 0 | — | — |
| 2/25/2017 | 0 | 60 | 93 | 45 | 2/27/2017 | 1,246 | 567 | 2/28/2017 | 0 | 198 | 1,813 | 11,989 | 14,000 | 0 | — | — |
| 2/26/2017 | 0 | 60 | 91 | 45 | 2/28/2017 | 742 | 567 | 3/1/2017 | 0 | 196 | 1,309 | 9,495 | 11,000 | 0 | — | — |
| 2/27/2017 | 0 | 63 | 133 | 73 | 3/1/2017 | 787 | 567 | 3/2/2017 | 0 | 269 | 1,354 | 8,197 | 9,820 | 0 | — | — |
| 2/28/2017 | 0 | 139 | 226 | 74 | 3/2/2017 | 722 | 567 | 3/3/2017 | 0 | 439 | 1,289 | 6,782 | 8,510 | 0 | — | — |
| 3/1/2017 | 0 | 150 | 226 | 74 | 3/3/2017 | 660 | 567 | 3/4/2017 | 0 | 450 | 1,227 | 5,643 | 7,320 | 0 | — | — |
| 3/2/2017 | 0 | 150 | 226 | 74 | 3/4/2017 | 505 | 567 | 3/5/2017 | 0 | 450 | 1,072 | 4,518 | 6,040 | 0 | — | — |
| 3/3/2017 | 0 | 150 | 227 | 74 | 3/5/2017 | 602 | 496 | 3/6/2017 | 0 | 451 | 1,098 | 4,111 | 5,660 | 0 | — | — |
| 3/4/2017 | 0 | 150 | 227 | 74 | 3/6/2017 | 739 | 390 | 3/7/2017 | 0 | 451 | 1,129 | 3,960 | 5,540 | 0 | — | — |
| 3/5/2017 | 0 | 150 | 226 | 74 | 3/7/2017 | 502 | 372 | 3/8/2017 | 0 | 450 | 874 | 4,626 | 5,950 | 0 | — | — |
| 3/6/2017 | 0 | 150 | 226 | 74 | 3/8/2017 | 489 | 372 | 3/9/2017 | 0 | 450 | 861 | 5,099 | 6,410 | 0 | — | — |
| 3/7/2017 | 0 | 150 | 226 | 74 | 3/9/2017 | 519 | 372 | 3/10/2017 | 0 | 450 | 891 | 4,699 | 6,040 | 0 | — | — |
| 3/8/2017 | 0 | 150 | 224 | 74 | 3/10/2017 | 815 | 479 | 3/11/2017 | 0 | 448 | 1,294 | 4,398 | 6,140 | 0 | — | — |
| 3/9/2017 | 0 | 150 | 224 | 74 | 3/11/2017 | 1,224 | 479 | 3/12/2017 | 0 | 448 | 1,703 | 3,439 | 5,590 | 0 | — | — |
| 3/10/2017 | 0 | 150 | 224 | 71 | 3/12/2017 | 975 | 603 | 3/13/2017 | 0 | 445 | 1,578 | 3,057 | 5,080 | 0 | — | — |
| 3/11/2017 | 0 | 144 | 215 | 74 | 3/13/2017 | 1,215 | 851 | 3/14/2017 | 0 | 433 | 2,066 | 2,771 | 5,270 | 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, 2017.—Continued

[Delaware River Master daily operations record. All provided measurements are given in the mean discharge in cubic feet per second ($ft^3/s$) for 24 hours, except col. 14, which is in cubic feet per second accumulated daily. Column (col.) 1 = 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, 1 day later; col. 4 = 24 hours beginning 1500, 1 day later; col. 5 = 24 hours beginning 0000 of date shown; col. 6 = 24 hours beginning 1600 of date shown; col. 7 = col. 2 + col. 3 + col. 4 in response to direction (col. 1); col. 8 = col. 2 + col. 3 + col. 4 – col. 7; col. 9 = col. 5 + col. 6; col. 10 = col. 11 – col. 7 – col. 8 – col. 9; col. 11 = 24 hours of calendar day shown; col. 12 = Interim Excess Release Quantity (IERQ) Bank releases. From 6/1/2017 to 10/23/2017 thermal releases were allowed per Delaware River Basin Commission Docket no. D–77–20 CP (Revised). Table footnotes in col. 12 indicate thermal release or Rapid Flow Change Mitigation Bank—refer to table footnotes. Starting on 10/23/2017, releases were made from 2017 Flexible Flow Management Program IERQ Banks; col. 13: if col. 7 > 0, col. 13 = col. 11 – col 8 –1,750 $ft^3/s$ but not greater than col. 7; if col 7 = 0, col. 13 = 1,858 $ft^3/s$ – (col. 11 – col. 8), positive values only and not greater than 108 $ft^3/s$; col. 14 = cumulative summation of col. 13 values. Excess release credits were only applicable from June 1 to October 23, 2017. —, not applicable]

| Controlled releases from New York City reservoirs | | | | | Controlled releases from power reservoirs | | | Segregation of flow, Delaware River at Montague, New Jersey | | | | | | Excess release credits | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | Daily | Cumulative |
| | | | | | | | | | 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 | Col. 13 | Col. 14 |
| 3/12/2017 | 0 | 152 | 224 | 74 | 3/14/2017 | 1,121 | 851 | 3/15/2017 | 0 | 450 | 1,972 | 3,068 | 5,490 | 0 | — | — |
| 3/13/2017 | 0 | 150 | 224 | 74 | 3/15/2017 | 1,531 | 851 | 3/16/2017 | 0 | 448 | 2,382 | 3,090 | 5,920 | 0 | — | — |
| 3/14/2017 | 0 | 150 | 224 | 74 | 3/16/2017 | 1,535 | 851 | 3/17/2017 | 0 | 448 | 2,386 | 4,016 | 6,850 | 0 | — | — |
| 3/15/2017 | 0 | 150 | 224 | 74 | 3/17/2017 | 1,534 | 496 | 3/18/2017 | 0 | 448 | 2,030 | 3,832 | 6,310 | 0 | — | — |
| 3/16/2017 | 0 | 150 | 224 | 74 | 3/18/2017 | 1,535 | 71 | 3/19/2017 | 0 | 448 | 1,606 | 3,226 | 5,280 | 0 | — | — |
| 3/17/2017 | 0 | 150 | 224 | 74 | 3/19/2017 | 367 | 106 | 3/20/2017 | 0 | 448 | 473 | 3,259 | 4,180 | 0 | — | — |
| 3/18/2017 | 0 | 150 | 223 | 74 | 3/20/2017 | 29 | 160 | 3/21/2017 | 0 | 447 | 189 | 3,644 | 4,280 | 0 | — | — |
| 3/19/2017 | 0 | 150 | 224 | 74 | 3/21/2017 | 0 | 230 | 3/22/2017 | 0 | 448 | 230 | 4,222 | 4,900 | 0 | — | — |
| 3/20/2017 | 0 | 150 | 492 | 74 | 3/22/2017 | 0 | 355 | 3/23/2017 | 0 | 716 | 355 | 4,689 | 5,760 | 0 | — | — |
| 3/21/2017 | 0 | 150 | 1,264 | 74 | 3/23/2017 | 0 | 142 | 3/24/2017 | 0 | 1,488 | 142 | 3,970 | 5,600 | 0 | — | — |
| 3/22/2017 | 0 | 150 | 1,494 | 74 | 3/24/2017 | 0 | 0 | 3/25/2017 | 0 | 1,718 | 0 | 4,172 | 5,890 | 0 | — | — |
| 3/23/2017 | 0 | 150 | 1,493 | 74 | 3/25/2017 | 3 | 0 | 3/26/2017 | 0 | 1,717 | 3 | 5,480 | 7,200 | 0 | — | — |
| 3/24/2017 | 0 | 150 | 1,502 | 74 | 3/26/2017 | 0 | 35 | 3/27/2017 | 0 | 1,726 | 35 | 7,129 | 8,890 | 0 | — | — |
| 3/25/2017 | 0 | 150 | 1,508 | 74 | 3/27/2017 | 360 | 0 | 3/28/2017 | 0 | 1,732 | 360 | 12,808 | 14,900 | 0 | — | — |
| 3/26/2017 | 0 | 150 | 1,494 | 74 | 3/28/2017 | 1,532 | 106 | 3/29/2017 | 0 | 1,718 | 1,638 | 19,244 | 22,600 | 0 | — | — |
| 3/27/2017 | 0 | 150 | 1,494 | 74 | 3/29/2017 | 1,439 | 408 | 3/30/2017 | 0 | 1,718 | 1,847 | 22,435 | 26,000 | 0 | — | — |
| 3/28/2017 | 0 | 373 | 1,501 | 74 | 3/30/2017 | 640 | 851 | 3/31/2017 | 0 | 1,948 | 1,491 | 19,761 | 23,200 | 0 | — | — |
| 3/29/2017 | 0 | 690 | 1,511 | 74 | 3/31/2017 | 1,139 | 851 | 4/1/2017 | 0 | 2,275 | 1,990 | 27,235 | 31,500 | 0 | — | — |
| 3/30/2017 | 0 | 696 | 1,513 | 74 | 4/1/2017 | 1,635 | 851 | 4/2/2017 | 0 | 2,283 | 2,486 | 20,731 | 25,500 | 0 | — | — |
| 3/31/2017 | 0 | 696 | 1,507 | 74 | 4/2/2017 | 1,643 | 851 | 4/3/2017 | 0 | 2,277 | 2,494 | 16,029 | 20,800 | 0 | — | — |
| 4/1/2017 | 0 | 696 | 1,513 | 161 | 4/3/2017 | 1,564 | 851 | 4/4/2017 | 0 | 2,370 | 2,415 | 16,215 | 21,000 | 0 | — | — |
| 4/2/2017 | 0 | 695 | 1,511 | 190 | 4/4/2017 | 1,530 | 851 | 4/5/2017 | 0 | 2,396 | 2,381 | 21,023 | 25,800 | 0 | — | — |
| 4/3/2017 | 0 | 696 | 1,515 | 192 | 4/5/2017 | 1,093 | 851 | 4/6/2017 | 0 | 2,403 | 1,944 | 18,353 | 22,700 | 0 | — | — |
| 4/4/2017 | 0 | 696 | 1,507 | 192 | 4/6/2017 | 1,630 | 851 | 4/7/2017 | 0 | 2,395 | 2,481 | 35,324 | 40,200 | 0 | — | — |
| 4/5/2017 | 0 | 696 | 1,496 | 192 | 4/7/2017 | 470 | 851 | 4/8/2017 | 0 | 2,384 | 1,321 | 30,295 | 34,000 | 0 | — | — |
| 4/6/2017 | 0 | 696 | 518 | 192 | 4/8/2017 | 659 | 851 | 4/9/2017 | 0 | 1,406 | 1,510 | 22,884 | 25,800 | 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, 2017.—Continued

[Delaware River Master daily operations record. All provided measurements are given in the mean discharge in cubic feet per second ($ft^3/s$) for 24 hours, except col. 14, which is in cubic feet per second accumulated daily. Column (col.) 1 = 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, 1 day later; col. 4 = 24 hours beginning 1500, 1 day later; col. 5 = 24 hours beginning 0000 of date shown; col. 6 = 24 hours beginning 1600 of date shown; col. 7 = col. 2 + col. 3 + col. 4 in response to direction (col. 1); col. 8 = col. 2 + col. 3 + col. 4 – col. 7; col. 9 = col. 5 + col. 6; col. 10 = col. 11 – col. 7 – col. 8 – col. 9; col. 11 = 24 hours of calendar day shown; col. 12 = Interim Excess Release Quantity (IERQ) Bank releases. From 6/1/2017 to 10/23/2017 thermal releases were allowed per Delaware River Basin Commission Docket no. D–77–20 CP (Revised). Table footnotes in col. 12 indicate thermal release or Rapid Flow Change Mitigation Bank—refer to table footnotes. Starting on 10/23/2017, releases were made from 2017 Flexible Flow Management Program IERQ Banks; col. 13: if col. 7 > 0, col. 13 = col. 11 – col 8 –1,750 $ft^3/s$ but not greater than col. 7; if col 7 = 0, col. 13 = 1,858 $ft^3/s$ – (col. 11 – col. 8), positive values only and not greater than 108 $ft^3/s$; col. 14 = cumulative summation of col. 13 values. Excess release credits were only applicable from June 1 to October 23, 2017. —, not applicable]

| Controlled releases from New York City reservoirs | | | | | Controlled releases from power reservoirs | | | Segregation of flow, Delaware River at Montague, New Jersey | | | | | | Excess release credits | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | Daily | Cumulative |
| | | | | | | | | | 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 | Col. 13 | Col. 14 |
| 4/7/2017 | 0 | 138 | 40 | 192 | 4/9/2017 | 479 | 851 | 4/10/2017 | 0 | 370 | 1,330 | 19,200 | 20,900 | 0 | — | — |
| 4/8/2017 | 0 | 36 | 40 | 196 | 4/10/2017 | 650 | 851 | 4/11/2017 | 0 | 272 | 1,501 | 16,027 | 17,800 | 0 | — | — |
| 4/9/2017 | 0 | 36 | 286 | 189 | 4/11/2017 | 837 | 851 | 4/12/2017 | 0 | 511 | 1,688 | 13,701 | 15,900 | 0 | — | — |
| 4/10/2017 | 0 | 364 | 1,394 | 192 | 4/12/2017 | 854 | 851 | 4/13/2017 | 0 | 1,950 | 1,705 | 10,445 | 14,100 | 0 | — | — |
| 4/11/2017 | 0 | 696 | 1,491 | 192 | 4/13/2017 | 1,082 | 674 | 4/14/2017 | 0 | 2,379 | 1,756 | 7,365 | 11,500 | 0 | — | — |
| 4/12/2017 | 0 | 699 | 1,488 | 190 | 4/14/2017 | 141 | 532 | 4/15/2017 | 0 | 2,377 | 673 | 6,140 | 9,190 | 0 | — | — |
| 4/13/2017 | 0 | 699 | 1,493 | 189 | 4/15/2017 | 0 | 284 | 4/16/2017 | 0 | 2,381 | 284 | 5,375 | 8,040 | 0 | — | — |
| 4/14/2017 | 0 | 699 | 1,497 | 189 | 4/16/2017 | 0 | 284 | 4/17/2017 | 0 | 2,385 | 284 | 5,001 | 7,670 | 0 | — | — |
| 4/15/2017 | 0 | 620 | 1,494 | 170 | 4/17/2017 | 315 | 390 | 4/18/2017 | 0 | 2,284 | 705 | 3,871 | 6,860 | 0 | — | — |
| 4/16/2017 | 0 | 532 | 704 | 110 | 4/18/2017 | 489 | 355 | 4/19/2017 | 0 | 1,346 | 844 | 4,660 | 6,850 | 0 | — | — |
| 4/17/2017 | 0 | 500 | 1,241 | 110 | 4/19/2017 | 502 | 372 | 4/20/2017 | 0 | 1,851 | 874 | 4,395 | 7,120 | 0 | — | — |
| 4/18/2017 | 0 | 500 | 1,239 | 110 | 4/20/2017 | 593 | 372 | 4/21/2017 | 0 | 1,849 | 965 | 7,286 | 10,100 | 0 | — | — |
| 4/19/2017 | 0 | 493 | 1,239 | 110 | 4/21/2017 | 0 | 496 | 4/22/2017 | 0 | 1,842 | 496 | 13,362 | 15,700 | 0 | — | — |
| 4/20/2017 | 0 | 399 | 1,375 | 110 | 4/22/2017 | 0 | 461 | 4/23/2017 | 0 | 1,884 | 461 | 10,155 | 12,500 | 0 | — | — |
| 4/21/2017 | 0 | 399 | 1,499 | 110 | 4/23/2017 | 0 | 443 | 4/24/2017 | 0 | 2,008 | 443 | 8,449 | 10,900 | 0 | — | — |
| 4/22/2017 | 0 | 399 | 1,499 | 110 | 4/24/2017 | 862 | 408 | 4/25/2017 | 0 | 2,008 | 1,270 | 7,122 | 10,400 | 0 | — | — |
| 4/23/2017 | 0 | 399 | 1,499 | 110 | 4/25/2017 | 1,015 | 426 | 4/26/2017 | 0 | 2,008 | 1,441 | 6,391 | 9,840 | 0 | — | — |
| 4/24/2017 | 0 | 399 | 1,497 | 110 | 4/26/2017 | 724 | 408 | 4/27/2017 | 0 | 2,006 | 1,132 | 6,112 | 9,250 | 0 | — | — |
| 4/25/2017 | 0 | 545 | 1,497 | 110 | 4/27/2017 | 728 | 301 | 4/28/2017 | 0 | 2,152 | 1,029 | 5,429 | 8,610 | 0 | — | — |
| 4/26/2017 | 0 | 699 | 1,496 | 110 | 4/28/2017 | 0 | 301 | 4/29/2017 | 0 | 2,305 | 301 | 4,584 | 7,190 | 0 | — | — |
| 4/27/2017 | 0 | 495 | 1,496 | 105 | 4/29/2017 | 0 | 301 | 4/30/2017 | 0 | 2,096 | 301 | 3,833 | 6,230 | 0 | — | — |
| 4/28/2017 | 0 | 331 | 1,454 | 74 | 4/30/2017 | 0 | 284 | 5/1/2017 | 0 | 1,859 | 284 | 3,497 | 5,640 | 0 | — | — |
| 4/29/2017 | 0 | 300 | 948 | 73 | 5/1/2017 | 355 | 408 | 5/2/2017 | 0 | 1,321 | 763 | 7,246 | 9,330 | 0 | — | — |
| 4/30/2017 | 0 | 195 | 299 | 70 | 5/2/2017 | 268 | 532 | 5/3/2017 | 0 | 564 | 800 | 17,236 | 18,600 | 0 | — | — |
| 5/1/2017 | 0 | 82 | 300 | 99 | 5/3/2017 | 265 | 567 | 5/4/2017 | 0 | 481 | 832 | 13,787 | 15,100 | 0 | — | — |
| 5/2/2017 | 0 | 36 | 473 | 101 | 5/4/2017 | 350 | 727 | 5/5/2017 | 0 | 610 | 1,077 | 11,113 | 12,800 | 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, 2017.—Continued

[Delaware River Master daily operations record. All provided measurements are given in the mean discharge in cubic feet per second ($ft^3/s$) for 24 hours, except col. 14, which is in cubic feet per second accumulated daily. Column (col.) 1 = 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, 1 day later; col. 4 = 24 hours beginning 1500, 1 day later; col. 5 = 24 hours beginning 0000 of date shown; col. 6 = 24 hours beginning 1600 of date shown; col. 7 = col. 2 + col. 3 + col. 4 in response to direction (col. 1); col. 8 = col. 2 + col. 3 + col. 4 – col. 7; col. 9 = col. 5 + col. 6; col. 10 = col. 11 – col. 7 – col. 8 – col. 9; col. 11 = 24 hours of calendar day shown; col. 12 = Interim Excess Release Quantity (IERQ) Bank releases. From 6/1/2017 to 10/23/2017 thermal releases were allowed per Delaware River Basin Commission Docket no. D–77–20 CP (Revised). Table footnotes in col. 12 indicate thermal release or Rapid Flow Change Mitigation Bank—refer to table footnotes. Starting on 10/23/2017, releases were made from 2017 Flexible Flow Management Program IERQ Banks; col. 13: if col. 7 > 0, col. 13 = col. 11 – col 8 –1,750 $ft^3/s$ but not greater than col. 7; if col 7 = 0, col. 13 = 1,858 $ft^3/s$ – (col. 11 – col. 8), positive values only and not greater than 108 $ft^3/s$; col. 14 = cumulative summation of col. 13 values. Excess release credits were only applicable from June 1 to October 23, 2017. —, not applicable]

| Controlled releases from New York City reservoirs | | | | | Controlled releases from power reservoirs | | | Segregation of flow, Delaware River at Montague, New Jersey | | | | | | Excess release credits | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | Daily | Cumulative |
| | | | | | | | | | 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 | Col. 13 | Col. 14 |
| 5/3/2017 | 0 | 51 | 473 | 101 | 5/5/2017 | 210 | 603 | 5/6/2017 | 0 | 625 | 813 | 12,762 | 14,200 | 0 | — | — |
| 5/4/2017 | 0 | 150 | 473 | 99 | 5/6/2017 | 0 | 443 | 5/7/2017 | 0 | 722 | 443 | 13,535 | 14,700 | 0 | — | — |
| 5/5/2017 | 0 | 150 | 473 | 101 | 5/7/2017 | 0 | 284 | 5/8/2017 | 0 | 724 | 284 | 12,492 | 13,500 | 0 | — | — |
| 5/6/2017 | 0 | 150 | 475 | 101 | 5/8/2017 | 269 | 142 | 5/9/2017 | 0 | 726 | 411 | 10,463 | 11,600 | 0 | — | — |
| 5/7/2017 | 0 | 150 | 473 | 101 | 5/9/2017 | 281 | 89 | 5/10/2017 | 0 | 724 | 370 | 8,906 | 10,000 | 0 | — | — |
| 5/8/2017 | 0 | 150 | 473 | 101 | 5/10/2017 | 288 | 89 | 5/11/2017 | 0 | 724 | 377 | 7,779 | 8,880 | 0 | — | — |
| 5/9/2017 | 0 | 150 | 473 | 101 | 5/11/2017 | 637 | 124 | 5/12/2017 | 0 | 724 | 761 | 6,515 | 8,000 | 0 | — | — |
| 5/10/2017 | 0 | 150 | 473 | 101 | 5/12/2017 | 427 | 195 | 5/13/2017 | 0 | 724 | 622 | 5,624 | 6,970 | 0 | — | — |
| 5/11/2017 | 0 | 150 | 473 | 101 | 5/13/2017 | 0 | 89 | 5/14/2017 | 0 | 724 | 89 | 8,617 | 9,430 | 0 | — | — |
| 5/12/2017 | 0 | 150 | 473 | 101 | 5/14/2017 | 0 | 284 | 5/15/2017 | 0 | 724 | 284 | 9,192 | 10,200 | 0 | — | — |
| 5/13/2017 | 0 | 150 | 473 | 101 | 5/15/2017 | 327 | 160 | 5/16/2017 | 0 | 724 | 487 | 7,639 | 8,850 | 0 | — | — |
| 5/14/2017 | 0 | 150 | 473 | 101 | 5/16/2017 | 228 | 195 | 5/17/2017 | 0 | 724 | 423 | 6,803 | 7,950 | 0 | — | — |
| 5/15/2017 | 0 | 150 | 473 | 101 | 5/17/2017 | 204 | 372 | 5/18/2017 | 0 | 724 | 576 | 5,990 | 7,290 | 0 | — | — |
| 5/16/2017 | 0 | 201 | 600 | 101 | 5/18/2017 | 383 | 337 | 5/19/2017 | 0 | 902 | 720 | 5,118 | 6,740 | 0 | — | — |
| 5/17/2017 | 0 | 251 | 600 | 85 | 5/19/2017 | 324 | 106 | 5/20/2017 | 0 | 936 | 430 | 4,054 | 5,420 | 0 | — | — |
| 5/18/2017 | 0 | 183 | 283 | 85 | 5/20/2017 | 0 | 177 | 5/21/2017 | 0 | 551 | 177 | 4,072 | 4,800 | 0 | — | — |
| 5/19/2017 | 0 | 110 | 257 | 90 | 5/21/2017 | 0 | 35 | 5/22/2017 | 0 | 457 | 35 | 3,748 | 4,240 | 0 | — | — |
| 5/20/2017 | 0 | 113 | 288 | 101 | 5/22/2017 | 312 | 0 | 5/23/2017 | 0 | 502 | 312 | 3,446 | 4,260 | 0 | — | — |
| 5/21/2017 | 0 | 130 | 303 | 101 | 5/23/2017 | 393 | 35 | 5/24/2017 | 0 | 534 | 428 | 3,098 | 4,060 | 0 | — | — |
| 5/22/2017 | 0 | 128 | 303 | 101 | 5/24/2017 | 459 | 0 | 5/25/2017 | 0 | 532 | 459 | 2,989 | 3,980 | 0 | — | — |
| 5/23/2017 | 0 | 130 | 303 | 101 | 5/25/2017 | 428 | 0 | 5/26/2017 | 0 | 534 | 428 | 3,598 | 4,560 | 0 | — | — |
| 5/24/2017 | 0 | 130 | 302 | 101 | 5/26/2017 | 328 | 0 | 5/27/2017 | 0 | 533 | 328 | 3,399 | 4,260 | 0 | — | — |
| 5/25/2017 | 0 | 130 | 302 | 101 | 5/27/2017 | 0 | 177 | 5/28/2017 | 0 | 533 | 177 | 3,070 | 3,780 | 0 | — | — |
| 5/26/2017 | 0 | 130 | 302 | 101 | 5/28/2017 | 0 | 35 | 5/29/2017 | 0 | 533 | 35 | 3,062 | 3,630 | 0 | — | — |
| 5/27/2017 | 0 | 130 | 302 | 101 | 5/29/2017 | 0 | 0 | 5/30/2017 | 0 | 533 | 0 | 4,017 | 4,550 | 0 | — | — |
| 5/28/2017 | 0 | 130 | 302 | 101 | 5/30/2017 | 391 | 0 | 5/31/2017 | 0 | 533 | 391 | 3,956 | 4,880 | 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, 2017.—Continued

[Delaware River Master daily operations record. All provided measurements are given in the mean discharge in cubic feet per second ($ft^3/s$) for 24 hours, except col. 14, which is in cubic feet per second accumulated daily. Column (col.) 1 = 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, 1 day later; col. 4 = 24 hours beginning 1500, 1 day later; col. 5 = 24 hours beginning 0000 of date shown; col. 6 = 24 hours beginning 1600 of date shown; col. 7 = col. 2 + col. 3 + col. 4 in response to direction (col. 1); col. 8 = col. 2 + col. 3 + col. 4 – col. 7; col. 9 = col. 5 + col. 6; col. 10 = col. 11 – col. 7 – col. 8 – col. 9; col. 11 = 24 hours of calendar day shown; col. 12 = Interim Excess Release Quantity (IERQ) Bank releases. From 6/1/2017 to 10/23/2017 thermal releases were allowed per Delaware River Basin Commission Docket no. D–77–20 CP (Revised). Table footnotes in col. 12 indicate thermal release or Rapid Flow Change Mitigation Bank—refer to table footnotes. Starting on 10/23/2017, releases were made from 2017 Flexible Flow Management Program IERQ Banks; col. 13: if col. 7 > 0, col. 13 = col. 11 – col 8 –1,750 $ft^3/s$ but not greater than col. 7; if col 7 = 0, col. 13 = 1,858 $ft^3/s$ – (col. 11 – col. 8), positive values only and not greater than 108 $ft^3/s$; col. 14 = cumulative summation of col. 13 values. Excess release credits were only applicable from June 1 to October 23, 2017. —, not applicable]

| Controlled releases from New York City reservoirs | | | | | Controlled releases from power reservoirs | | | Segregation of flow, Delaware River at Montague, New Jersey | | | | | | Excess release credits | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | Daily | Cumulative |
| | | | | | | | | | 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 | Col. 13 | Col. 14 |
| 5/29/2017 | 0 | 130 | 302 | 101 | 5/31/2017 | 457 | 18 | 6/1/2017 | 0 | 533 | 475 | 4,342 | 5,350 | 0 | — | — |
| 5/30/2017 | 0 | 130 | 302 | 104 | 6/1/2017 | 511 | 106 | 6/2/2017 | 0 | 536 | 617 | 4,447 | 5,600 | 0 | — | — |
| 5/31/2017 | 0 | 135 | 317 | 110 | 6/2/2017 | 450 | 195 | 6/3/2017 | 0 | 562 | 645 | 3,173 | 4,380 | 0 | — | — |
| 6/1/2017 | 0 | 152 | 325 | 110 | 6/3/2017 | 0 | 53 | 6/4/2017 | 0 | 587 | 53 | 3,040 | 3,680 | 0 | — | — |
| 6/2/2017 | 0 | 150 | 325 | 110 | 6/4/2017 | 0 | 35 | 6/5/2017 | 0 | 585 | 35 | 3,260 | 3,880 | 0 | — | — |
| 6/3/2017 | 0 | 150 | 325 | 110 | 6/5/2017 | 523 | 301 | 6/6/2017 | 0 | 585 | 824 | 11,091 | 12,500 | 0 | — | — |
| 6/4/2017 | 0 | 150 | 325 | 110 | 6/6/2017 | 704 | 851 | 6/7/2017 | 0 | 585 | 1,555 | 19,760 | 21,900 | 0 | — | — |
| 6/5/2017 | 0 | 150 | 326 | 110 | 6/7/2017 | 321 | 567 | 6/8/2017 | 0 | 586 | 888 | 14,526 | 16,000 | 0 | — | — |
| 6/6/2017 | 0 | 152 | 326 | 110 | 6/8/2017 | 238 | 390 | 6/9/2017 | 0 | 588 | 628 | 10,684 | 11,900 | 0 | — | — |
| 6/7/2017 | 0 | 152 | 353 | 110 | 6/9/2017 | 14 | 266 | 6/10/2017 | 0 | 615 | 280 | 8,835 | 9,730 | 0 | — | — |
| 6/8/2017 | 0 | 243 | 979 | 110 | 6/10/2017 | 0 | 301 | 6/11/2017 | 0 | 1,332 | 301 | 6,557 | 8,190 | 0 | — | — |
| 6/9/2017 | 0 | 300 | 1,213 | 110 | 6/11/2017 | 0 | 355 | 6/12/2017 | 0 | 1,623 | 355 | 5,502 | 7,480 | 0 | — | — |
| 6/10/2017 | 0 | 497 | 1,502 | 110 | 6/12/2017 | 838 | 372 | 6/13/2017 | 0 | 2,109 | 1,210 | 3,621 | 6,940 | 0 | — | — |
| 6/11/2017 | 0 | 500 | 1,501 | 110 | 6/13/2017 | 853 | 213 | 6/14/2017 | 0 | 2,111 | 1,066 | 2,713 | 5,890 | 0 | — | — |
| 6/12/2017 | 0 | 464 | 1,303 | 105 | 6/14/2017 | 556 | 71 | 6/15/2017 | 0 | 1,872 | 627 | 1,981 | 4,480 | †20 | 0 | 0 |
| 6/13/2017 | 0 | 203 | 495 | 90 | 6/15/2017 | 267 | 71 | 6/16/2017 | 0 | 788 | 338 | 2,164 | 3,290 | 0 | 0 | 0 |
| 6/14/2017 | 0 | 125 | 274 | 90 | 6/16/2017 | 0 | 89 | 6/17/2017 | 0 | 489 | 89 | 2,382 | 2,960 | 0 | 0 | 0 |
| 6/15/2017 | 0 | 125 | 336 | 101 | 6/17/2017 | 70 | 195 | 6/18/2017 | 0 | 562 | 265 | 2,303 | 3,130 | 0 | 0 | 0 |
| 6/16/2017 | 0 | 139 | 433 | 101 | 6/18/2017 | 266 | 213 | 6/19/2017 | 0 | 673 | 479 | 2,588 | 3,740 | †59 | 0 | 0 |
| 6/17/2017 | 0 | 139 | 441 | 101 | 6/19/2017 | 513 | 319 | 6/20/2017 | 0 | 681 | 832 | 4,627 | 6,140 | †73 | 0 | 0 |
| 6/18/2017 | 0 | 139 | 402 | 101 | 6/20/2017 | 381 | 284 | 6/21/2017 | 0 | 642 | 665 | 4,723 | 6,030 | 0 | 0 | 0 |
| 6/19/2017 | 0 | 141 | 402 | 101 | 6/21/2017 | 212 | 35 | 6/22/2017 | 0 | 644 | 247 | 3,389 | 4,280 | 0 | 0 | 0 |
| 6/20/2017 | 0 | 139 | 402 | 101 | 6/22/2017 | 438 | 53 | 6/23/2017 | 0 | 642 | 491 | 2,717 | 3,850 | 0 | 0 | 0 |
| 6/21/2017 | 0 | 139 | 402 | 101 | 6/23/2017 | 449 | 53 | 6/24/2017 | 0 | 642 | 502 | 2,506 | 3,650 | 0 | 0 | 0 |
| 6/22/2017 | 0 | 138 | 394 | 101 | 6/24/2017 | 367 | 195 | 6/25/2017 | 0 | 633 | 562 | 2,525 | 3,720 | 0 | 0 | 0 |
| 6/23/2017 | 0 | 138 | 398 | 101 | 6/25/2017 | 457 | 0 | 6/26/2017 | 0 | 637 | 457 | 2,096 | 3,190 | 0 | 0 | 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, 2017.—Continued

[Delaware River Master daily operations record. All provided measurements are given in the mean discharge in cubic feet per second ($ft^3/s$) for 24 hours, except col. 14, which is in cubic feet per second accumulated daily. Column (col.) 1 = 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, 1 day later; col. 4 = 24 hours beginning 1500, 1 day later; col. 5 = 24 hours beginning 0000 of date shown; col. 6 = 24 hours beginning 1600 of date shown; col. 7 = col. 2 + col. 3 + col. 4 in response to direction (col. 1); col. 8 = col. 2 + col. 3 + col. 4 – col. 7; col. 9 = col. 5 + col. 6; col. 10 = col. 11 – col. 7 – col. 8 – col. 9; col. 11 = 24 hours of calendar day shown; col. 12 = Interim Excess Release Quantity (IERQ) Bank releases. From 6/1/2017 to 10/23/2017 thermal releases were allowed per Delaware River Basin Commission Docket no. D–77–20 CP (Revised). Table footnotes in col. 12 indicate thermal release or Rapid Flow Change Mitigation Bank—refer to table footnotes. Starting on 10/23/2017, releases were made from 2017 Flexible Flow Management Program IERQ Banks; col. 13: if col. 7 > 0, col. 13 = col. 11 – col 8 –1,750 $ft^3/s$ but not greater than col. 7; if col 7 = 0, col. 13 = 1,858 $ft^3/s$ – (col. 11 – col. 8), positive values only and not greater than 108 $ft^3/s$; col. 14 = cumulative summation of col. 13 values. Excess release credits were only applicable from June 1 to October 23, 2017. —, not applicable]

| Controlled releases from New York City reservoirs | | | | | Controlled releases from power reservoirs | | | Segregation of flow, Delaware River at Montague, New Jersey | | | | | | Excess release credits | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | Daily | Cumulative |
| | | | | | | | | | 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 | Col. 13 | Col. 14 |
| 6/24/2017 | 0 | 139 | 401 | 101 | 6/26/2017 | 201 | 0 | 6/27/2017 | 0 | 641 | 201 | 1,948 | 2,790 | 0 | 0 | 0 |
| 6/25/2017 | 0 | 139 | 401 | 101 | 6/27/2017 | 0 | 0 | 6/28/2017 | 0 | 641 | 0 | 1,839 | 2,480 | 0 | 19 | 19 |
| 6/26/2017 | 0 | 139 | 402 | 101 | 6/28/2017 | 180 | 0 | 6/29/2017 | 0 | 642 | 180 | 1,828 | 2,650 | 0 | 0 | 19 |
| 6/27/2017 | 0 | 139 | 489 | 101 | 6/29/2017 | 189 | 0 | 6/30/2017 | 0 | 729 | 189 | 1,732 | 2,650 | †122 | 0 | 19 |
| 6/28/2017 | 0 | 139 | 647 | 101 | 6/30/2017 | 486 | 0 | 7/1/2017 | 0 | 887 | 486 | 1,777 | 3,150 | †320 | 0 | 19 |
| 6/29/2017 | 0 | 139 | 699 | 101 | 7/1/2017 | 301 | 18 | 7/2/2017 | 0 | 939 | 319 | 1,762 | 3,020 | †374 | 0 | 19 |
| 6/30/2017 | 0 | 139 | 699 | 101 | 7/2/2017 | 453 | 53 | 7/3/2017 | 0 | 939 | 506 | 2,155 | 3,600 | †374 | 0 | 19 |
| 7/1/2017 | 0 | 139 | 613 | 101 | 7/3/2017 | 618 | 89 | 7/4/2017 | 0 | 853 | 707 | 1,620 | 3,180 | †278 | 0 | 19 |
| 7/2/2017 | 0 | 139 | 503 | 101 | 7/4/2017 | 629 | 18 | 7/5/2017 | 0 | 743 | 647 | 1,510 | 2,900 | †175 | 0 | 19 |
| 7/3/2017 | 0 | 139 | 596 | 101 | 7/5/2017 | 559 | 53 | 7/6/2017 | 0 | 836 | 612 | 1,362 | 2,810 | †271 | 0 | 19 |
| 7/4/2017 | 0 | 139 | 651 | 101 | 7/6/2017 | 424 | 35 | 7/7/2017 | 0 | 891 | 459 | 1,420 | 2,770 | †325 | 0 | 19 |
| 7/5/2017 | 0 | 139 | 603 | 101 | 7/7/2017 | 650 | 124 | 7/8/2017 | 0 | 843 | 774 | 1,443 | 3,060 | †275 | 0 | 19 |
| 7/6/2017 | 0 | 139 | 603 | 101 | 7/8/2017 | 497 | 0 | 7/9/2017 | 0 | 843 | 497 | 1,400 | 2,740 | †275 | 0 | 19 |
| 7/7/2017 | 0 | 139 | 603 | 101 | 7/9/2017 | 509 | 35 | 7/10/2017 | 0 | 843 | 544 | 1,343 | 2,730 | †275 | 0 | 19 |
| 7/8/2017 | 0 | 139 | 654 | 101 | 7/10/2017 | 386 | 142 | 7/11/2017 | 0 | 894 | 528 | 1,348 | 2,770 | †325 | 0 | 19 |
| 7/9/2017 | 0 | 139 | 625 | 101 | 7/11/2017 | 521 | 213 | 7/12/2017 | 0 | 865 | 734 | 1,111 | 2,710 | †291 | 13 | 32 |
| 7/10/2017 | 0 | 139 | 395 | 101 | 7/12/2017 | 312 | 177 | 7/13/2017 | 0 | 635 | 489 | 1,216 | 2,340 | 0 | 108 | 140 |
| 7/11/2017 | 0 | 139 | 394 | 101 | 7/13/2017 | 310 | 124 | 7/14/2017 | 0 | 634 | 434 | 1,272 | 2,340 | 0 | 108 | 248 |
| 7/12/2017 | 0 | 139 | 394 | 101 | 7/14/2017 | 388 | 53 | 7/15/2017 | 0 | 634 | 441 | 2,235 | 3,310 | 0 | 0 | 248 |
| 7/13/2017 | 0 | 139 | 401 | 101 | 7/15/2017 | 290 | 0 | 7/16/2017 | 0 | 641 | 290 | 3,209 | 4,140 | 0 | 0 | 248 |
| 7/14/2017 | 0 | 139 | 401 | 101 | 7/16/2017 | 391 | 106 | 7/17/2017 | 0 | 641 | 497 | 2,032 | 3,170 | 0 | 0 | 248 |
| 7/15/2017 | 0 | 139 | 401 | 101 | 7/17/2017 | 292 | 142 | 7/18/2017 | 0 | 641 | 434 | 1,725 | 2,800 | 0 | 0 | 248 |
| 7/16/2017 | 0 | 139 | 401 | 101 | 7/18/2017 | 356 | 284 | 7/19/2017 | 0 | 641 | 640 | 1,679 | 2,960 | 0 | 0 | 248 |
| 7/17/2017 | 0 | 141 | 473 | 101 | 7/19/2017 | 601 | 355 | 7/20/2017 | 0 | 715 | 956 | 1,579 | 3,250 | †237 | 0 | 248 |
| 7/18/2017 | 0 | 139 | 600 | 101 | 7/20/2017 | 630 | 355 | 7/21/2017 | 0 | 840 | 985 | 1,505 | 3,330 | †275 | 0 | 248 |
| 7/19/2017 | 0 | 139 | 600 | 101 | 7/21/2017 | 692 | 124 | 7/22/2017 | 0 | 840 | 816 | 1,334 | 2,990 | †275 | 0 | 248 |

**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, 2017.—Continued

[Delaware River Master daily operations record. All provided measurements are given in the mean discharge in cubic feet per second ($ft^3/s$) for 24 hours, except col. 14, which is in cubic feet per second accumulated daily. Column (col.) 1 = 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, 1 day later; col. 4 = 24 hours beginning 1500, 1 day later; col. 5 = 24 hours beginning 0000 of date shown; col. 6 = 24 hours beginning 1600 of date shown; col. 7 = col. 2 + col. 3 + col. 4 in response to direction (col. 1); col. 8 = col. 2 + col. 3 + col. 4 – col. 7; col. 9 = col. 5 + col. 6; col. 10 = col. 11 – col. 7 – col. 8 – col. 9; col. 11 = 24 hours of calendar day shown; col. 12 = Interim Excess Release Quantity (IERQ) Bank releases. From 6/1/2017 to 10/23/2017 thermal releases were allowed per Delaware River Basin Commission Docket no. D–77–20 CP (Revised). Table footnotes in col. 12 indicate thermal release or Rapid Flow Change Mitigation Bank—refer to table footnotes. Starting on 10/23/2017, releases were made from 2017 Flexible Flow Management Program IERQ Banks; col. 13: if col. 7 > 0, col. 13 = col. 11 – col 8 –1,750 $ft^3/s$ but not greater than col. 7; if col 7 = 0, col. 13 = 1,858 $ft^3/s$ – (col. 11 – col. 8), positive values only and not greater than 108 $ft^3/s$; col. 14 = cumulative summation of col. 13 values. Excess release credits were only applicable from June 1 to October 23, 2017. —, not applicable]

| Controlled releases from New York City reservoirs | | | | | Controlled releases from power reservoirs | | | Segregation of flow, Delaware River at Montague, New Jersey | | | | | | Excess release credits | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | Daily | Cumulative |
| | | | | | | | | | 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 | Col. 13 | Col. 14 |
| 7/20/2017 | 0 | 139 | 600 | 101 | 7/22/2017 | 602 | 177 | 7/23/2017 | 0 | 840 | 779 | 1,221 | 2,840 | †275 | 0 | 248 |
| 7/21/2017 | 0 | 139 | 537 | 101 | 7/23/2017 | 568 | 0 | 7/24/2017 | 0 | 777 | 568 | 1,695 | 3,040 | †53 | 0 | 248 |
| 7/22/2017 | 0 | 141 | 404 | 101 | 7/24/2017 | 75 | 0 | 7/25/2017 | 0 | 646 | 75 | 7,019 | 7,740 | 0 | 0 | 248 |
| 7/23/2017 | 0 | 139 | 378 | 101 | 7/25/2017 | 0 | 0 | 7/26/2017 | 0 | 618 | 0 | 7,092 | 7,710 | 0 | 0 | 248 |
| 7/24/2017 | 0 | 139 | 362 | 105 | 7/26/2017 | 672 | 0 | 7/27/2017 | 0 | 606 | 672 | 4,982 | 6,260 | 0 | 0 | 248 |
| 7/25/2017 | 0 | 139 | 503 | 127 | 7/27/2017 | 718 | 0 | 7/28/2017 | 0 | 769 | 718 | 3,613 | 5,100 | 0 | 0 | 248 |
| 7/26/2017 | 0 | 142 | 503 | 139 | 7/28/2017 | 708 | 0 | 7/29/2017 | 0 | 784 | 708 | 2,858 | 4,350 | 0 | 0 | 248 |
| 7/27/2017 | 0 | 150 | 503 | 139 | 7/29/2017 | 278 | 0 | 7/30/2017 | 0 | 792 | 278 | 2,460 | 3,530 | 0 | 0 | 248 |
| 7/28/2017 | 0 | 150 | 503 | 139 | 7/30/2017 | 376 | 53 | 7/31/2017 | 0 | 792 | 429 | 2,069 | 3,290 | 0 | 0 | 248 |
| 7/29/2017 | 0 | 150 | 503 | 139 | 7/31/2017 | 655 | 213 | 8/1/2017 | 0 | 792 | 868 | 1,720 | 3,380 | 0 | 0 | 248 |
| 7/30/2017 | 0 | 150 | 503 | 139 | 8/1/2017 | 656 | 248 | 8/2/2017 | 0 | 792 | 904 | 1,484 | 3,180 | 0 | 0 | 248 |
| 7/31/2017 | 0 | 150 | 501 | 139 | 8/2/2017 | 541 | 177 | 8/3/2017 | 0 | 790 | 718 | 1,662 | 3,170 | 0 | 0 | 248 |
| 8/1/2017 | 0 | 149 | 501 | 139 | 8/3/2017 | 425 | 177 | 8/4/2017 | 0 | 789 | 602 | 1,909 | 3,300 | 0 | 0 | 248 |
| 8/2/2017 | 0 | 150 | 500 | 139 | 8/4/2017 | 592 | 160 | 8/5/2017 | 0 | 789 | 752 | 1,979 | 3,520 | 0 | 0 | 248 |
| 8/3/2017 | 0 | 150 | 498 | 139 | 8/5/2017 | 339 | 0 | 8/6/2017 | 0 | 787 | 339 | 2,054 | 3,180 | 0 | 0 | 248 |
| 8/4/2017 | 0 | 150 | 498 | 139 | 8/6/2017 | 168 | 0 | 8/7/2017 | 0 | 787 | 168 | 1,745 | 2,700 | 0 | 0 | 248 |
| 8/5/2017 | 0 | 150 | 498 | 139 | 8/7/2017 | 18 | 0 | 8/8/2017 | 0 | 787 | 18 | 1,605 | 2,410 | 0 | 108 | 356 |
| 8/6/2017 | 0 | 150 | 497 | 139 | 8/8/2017 | 26 | 0 | 8/9/2017 | 0 | 786 | 26 | 1,688 | 2,500 | 0 | 108 | 464 |
| 8/7/2017 | 0 | 150 | 506 | 139 | 8/9/2017 | 296 | 0 | 8/10/2017 | 0 | 795 | 296 | 1,529 | 2,620 | 0 | 33 | 497 |
| 8/8/2017 | 0 | 150 | 503 | 139 | 8/10/2017 | 474 | 0 | 8/11/2017 | 0 | 792 | 474 | 1,254 | 2,520 | 0 | 108 | 605 |
| 8/9/2017 | 0 | 150 | 498 | 139 | 8/11/2017 | 455 | 0 | 8/12/2017 | 0 | 787 | 455 | 2,138 | 3,380 | 0 | 0 | 605 |
| 8/10/2017 | 279 | 150 | 498 | 139 | 8/12/2017 | 172 | 0 | 8/13/2017 | 279 | 508 | 172 | 2,741 | 3,700 | 0 | 279 | 884 |
| 8/11/2017 | 274 | 150 | 497 | 139 | 8/13/2017 | 170 | 0 | 8/14/2017 | 274 | 512 | 170 | 2,264 | 3,220 | 0 | 274 | 1,158 |
| 8/12/2017 | 214 | 150 | 497 | 141 | 8/14/2017 | 254 | 0 | 8/15/2017 | 214 | 574 | 254 | 1,808 | 2,850 | 0 | 214 | 1,372 |
| 8/13/2017 | 0 | 150 | 500 | 150 | 8/15/2017 | 249 | 0 | 8/16/2017 | 0 | 800 | 249 | 1,591 | 2,640 | 0 | 18 | 1,390 |
| 8/14/2017 | 0 | 150 | 493 | 150 | 8/16/2017 | 443 | 0 | 8/17/2017 | 0 | 793 | 443 | 1,624 | 2,860 | 0 | 0 | 1,390 |

**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, 2017.—Continued

[Delaware River Master daily operations record. All provided measurements are given in the mean discharge in cubic feet per second ($ft^3/s$) for 24 hours, except col. 14, which is in cubic feet per second accumulated daily. Column (col.) 1 = 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, 1 day later; col. 4 = 24 hours beginning 1500, 1 day later; col. 5 = 24 hours beginning 0000 of date shown; col. 6 = 24 hours beginning 1600 of date shown; col. 7 = col. 2 + col. 3 + col. 4 in response to direction (col. 1); col. 8 = col. 2 + col. 3 + col. 4 – col. 7; col. 9 = col. 5 + col. 6; col. 10 = col. 11 – col. 7 – col. 8 – col. 9; col. 11 = 24 hours of calendar day shown; col. 12 = Interim Excess Release Quantity (IERQ) Bank releases. From 6/1/2017 to 10/23/2017 thermal releases were allowed per Delaware River Basin Commission Docket no. D–77–20 CP (Revised). Table footnotes in col. 12 indicate thermal release or Rapid Flow Change Mitigation Bank—refer to table footnotes. Starting on 10/23/2017, releases were made from 2017 Flexible Flow Management Program IERQ Banks; col. 13: if col. 7 > 0, col. 13 = col. 11 – col 8 –1,750 $ft^3/s$ but not greater than col. 7; if col 7 = 0, col. 13 = 1,858 $ft^3/s$ – (col. 11 – col. 8), positive values only and not greater than 108 $ft^3/s$; col. 14 = cumulative summation of col. 13 values. Excess release credits were only applicable from June 1 to October 23, 2017. —, not applicable]

| Controlled releases from New York City reservoirs | | | | | Controlled releases from power reservoirs | | | Segregation of flow, Delaware River at Montague, New Jersey | | | | | | Excess release credits | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | Daily | Cumulative |
| | | | | | | | | | 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 | Col. 13 | Col. 14 |
| 8/15/2017 | 0 | 150 | 497 | 150 | 8/17/2017 | 474 | 0 | 8/18/2017 | 0 | 797 | 474 | 1,579 | 2,850 | 0 | 0 | 1,390 |
| 8/16/2017 | 0 | 150 | 500 | 150 | 8/18/2017 | 463 | 35 | 8/19/2017 | 0 | 800 | 498 | 2,082 | 3,380 | 0 | 0 | 1,390 |
| 8/17/2017 | 0 | 150 | 500 | 150 | 8/19/2017 | 552 | 177 | 8/20/2017 | 0 | 800 | 729 | 2,471 | 4,000 | 0 | 0 | 1,390 |
| 8/18/2017 | 210 | 150 | 501 | 150 | 8/20/2017 | 549 | 124 | 8/21/2017 | 210 | 591 | 673 | 2,356 | 3,830 | 0 | 210 | 1,600 |
| 8/19/2017 | 0 | 150 | 501 | 150 | 8/21/2017 | 599 | 142 | 8/22/2017 | 0 | 801 | 741 | 1,978 | 3,520 | 0 | 0 | 1,600 |
| 8/20/2017 | 0 | 149 | 501 | 150 | 8/22/2017 | 804 | 53 | 8/23/2017 | 0 | 800 | 857 | 2,173 | 3,830 | 0 | 0 | 1,600 |
| 8/21/2017 | 0 | 149 | 500 | 150 | 8/23/2017 | 707 | 0 | 8/24/2017 | 0 | 799 | 707 | 2,434 | 3,940 | 0 | 0 | 1,600 |
| 8/22/2017 | 0 | 149 | 500 | 150 | 8/24/2017 | 599 | 0 | 8/25/2017 | 0 | 799 | 599 | 1,992 | 3,390 | 0 | 0 | 1,600 |
| 8/23/2017 | 0 | 149 | 500 | 147 | 8/25/2017 | 444 | 0 | 8/26/2017 | 0 | 796 | 444 | 1,640 | 2,880 | 0 | 0 | 1,600 |
| 8/24/2017 | 0 | 149 | 498 | 139 | 8/26/2017 | 187 | 0 | 8/27/2017 | 0 | 786 | 187 | 1,457 | 2,430 | 0 | 108 | 1,708 |
| 8/25/2017 | 0 | 149 | 498 | 139 | 8/27/2017 | 174 | 0 | 8/28/2017 | 0 | 786 | 174 | 1,320 | 2,280 | 0 | 108 | 1,816 |
| 8/26/2017 | 0 | 149 | 495 | 139 | 8/28/2017 | 611 | 0 | 8/29/2017 | 0 | 783 | 611 | 1,206 | 2,600 | 0 | 41 | 1,857 |
| 8/27/2017 | 0 | 149 | 497 | 139 | 8/29/2017 | 463 | 0 | 8/30/2017 | 0 | 785 | 463 | 1,182 | 2,430 | 0 | 108 | 1,965 |
| 8/28/2017 | 0 | 150 | 497 | 139 | 8/30/2017 | 510 | 0 | 8/31/2017 | 0 | 786 | 510 | 1,154 | 2,450 | 0 | 108 | 2,073 |
| 8/29/2017 | 0 | 150 | 503 | 139 | 8/31/2017 | 680 | 0 | 9/1/2017 | 0 | 792 | 680 | 988 | 2,460 | 0 | 108 | 2,181 |
| 8/30/2017 | 595 | 149 | 492 | 128 | 9/1/2017 | 0 | 71 | 9/2/2017 | 595 | 174 | 71 | 960 | 1,800 | 0 | 50 | 2,231 |
| 8/31/2017 | 641 | 150 | 430 | 101 | 9/2/2017 | 0 | 0 | 9/3/2017 | 641 | 40 | 0 | 1,069 | 1,750 | 0 | 0 | 2,231 |
| 9/1/2017 | 563 | 149 | 401 | 101 | 9/3/2017 | 170 | 0 | 9/4/2017 | 563 | 88 | 170 | 1,199 | 2,020 | 0 | 182 | 2,413 |
| 9/2/2017 | 322 | 150 | 396 | 101 | 9/4/2017 | 329 | 0 | 9/5/2017 | 322 | 325 | 329 | 1,404 | 2,380 | 0 | 305 | 2,718 |
| 9/3/2017 | 0 | 150 | 401 | 101 | 9/5/2017 | 613 | 0 | 9/6/2017 | 0 | 652 | 613 | 1,415 | 2,680 | 0 | 0 | 2,718 |
| 9/4/2017 | 0 | 150 | 350 | 101 | 9/6/2017 | 443 | 0 | 9/7/2017 | 0 | 601 | 443 | 2,016 | 3,060 | 0 | 0 | 2,718 |
| 9/5/2017 | 0 | 150 | 323 | 101 | 9/7/2017 | 447 | 0 | 9/8/2017 | 0 | 574 | 447 | 2,319 | 3,340 | 0 | 0 | 2,718 |
| 9/6/2017 | 341 | 150 | 323 | 101 | 9/8/2017 | 548 | 0 | 9/9/2017 | 341 | 233 | 548 | 2,058 | 3,180 | 0 | 341 | 3,059 |
| 9/7/2017 | 0 | 150 | 323 | 101 | 9/9/2017 | 363 | 0 | 9/10/2017 | 0 | 574 | 363 | 1,653 | 2,590 | 0 | 0 | 3,059 |
| 9/8/2017 | 0 | 150 | 322 | 101 | 9/10/2017 | 361 | 35 | 9/11/2017 | 0 | 573 | 396 | 1,471 | 2,440 | 0 | 0 | 3,059 |
| 9/9/2017 | 0 | 150 | 322 | 101 | 9/11/2017 | 627 | 71 | 9/12/2017 | 0 | 573 | 698 | 1,289 | 2,560 | 0 | 0 | 3,059 |

**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, 2017.—Continued

[Delaware River Master daily operations record. All provided measurements are given in the mean discharge in cubic feet per second ($ft^3/s$) for 24 hours, except col. 14, which is in cubic feet per second accumulated daily. Column (col.) 1 = 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, 1 day later; col. 4 = 24 hours beginning 1500, 1 day later; col. 5 = 24 hours beginning 0000 of date shown; col. 6 = 24 hours beginning 1600 of date shown; col. 7 = col. 2 + col. 3 + col. 4 in response to direction (col. 1); col. 8 = col. 2 + col. 3 + col. 4 – col. 7; col. 9 = col. 5 + col. 6; col. 10 = col. 11 – col. 7 – col. 8 – col. 9; col. 11 = 24 hours of calendar day shown; col. 12 = Interim Excess Release Quantity (IERQ) Bank releases. From 6/1/2017 to 10/23/2017 thermal releases were allowed per Delaware River Basin Commission Docket no. D–77–20 CP (Revised). Table footnotes in col. 12 indicate thermal release or Rapid Flow Change Mitigation Bank—refer to table footnotes. Starting on 10/23/2017, releases were made from 2017 Flexible Flow Management Program IERQ Banks; col. 13: if col. 7 > 0, col. 13 = col. 11 – col 8 –1,750 $ft^3/s$ but not greater than col. 7; if col 7 = 0, col. 13 = 1,858 $ft^3/s$ – (col. 11 – col. 8), positive values only and not greater than 108 $ft^3/s$; col. 14 = cumulative summation of col. 13 values. Excess release credits were only applicable from June 1 to October 23, 2017. —, not applicable]

| Controlled releases from New York City reservoirs | | | | | Controlled releases from power reservoirs | | | Segregation of flow, Delaware River at Montague, New Jersey | | | | | | Excess release credits | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | Daily | Cumulative |
| | | | | | | | | | 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 | Col. 13 | Col. 14 |
| 9/10/2017 | 228 | 150 | 322 | 101 | 9/12/2017 | 461 | 89 | 9/13/2017 | 228 | 345 | 550 | 1,197 | 2,320 | 0 | 225 | 3,284 |
| 9/11/2017 | 0 | 150 | 303 | 101 | 9/13/2017 | 523 | 71 | 9/14/2017 | 0 | 554 | 594 | 1,142 | 2,290 | 0 | 108 | 3,392 |
| 9/12/2017 | 0 | 149 | 302 | 101 | 9/14/2017 | 553 | 0 | 9/15/2017 | 0 | 552 | 553 | 1,155 | 2,260 | 0 | 108 | 3,500 |
| 9/13/2017 | 167 | 150 | 305 | 101 | 9/15/2017 | 566 | 0 | 9/16/2017 | 167 | 389 | 566 | 1,308 | 2,430 | 0 | 167 | 3,667 |
| 9/14/2017 | 535 | 150 | 303 | 96 | 9/16/2017 | 139 | 177 | 9/17/2017 | 549 | 0 | 316 | 1,225 | 2,090 | 0 | 340 | 4,007 |
| 9/15/2017 | 818 | 142 | 596 | 85 | 9/17/2017 | 356 | 71 | 9/18/2017 | 823 | 0 | 427 | 1,100 | 2,350 | 0 | 600 | 4,607 |
| 9/16/2017 | 365 | 110 | 300 | 85 | 9/18/2017 | 439 | 35 | 9/19/2017 | 365 | 130 | 474 | 1,061 | 2,030 | 0 | 150 | 4,757 |
| 9/17/2017 | 400 | 110 | 231 | 85 | 9/19/2017 | 296 | 0 | 9/20/2017 | 426 | 0 | 296 | 1,018 | 1,740 | 0 | –10 | 4,747 |
| 9/18/2017 | 571 | 110 | 373 | 85 | 9/20/2017 | 256 | 0 | 9/21/2017 | 568 | 0 | 256 | 876 | 1,700 | 0 | –50 | 4,697 |
| 9/19/2017 | 548 | 110 | 353 | 85 | 9/21/2017 | 151 | 0 | 9/22/2017 | 548 | 0 | 151 | 921 | 1,620 | 0 | –130 | 4,567 |
| 9/20/2017 | 788 | 110 | 586 | 85 | 9/22/2017 | 155 | 0 | 9/23/2017 | 781 | 0 | 155 | 824 | 1,760 | 0 | 10 | 4,577 |
| 9/21/2017 | 1,000 | 110 | 798 | 85 | 9/23/2017 | 282 | 0 | 9/24/2017 | 993 | 0 | 282 | 845 | 2,120 | 0 | 370 | 4,947 |
| 9/22/2017 | 1,148 | 110 | 948 | 85 | 9/24/2017 | 557 | 0 | 9/25/2017 | 1,143 | 0 | 557 | 670 | 2,370 | 0 | 620 | 5,567 |
| 9/23/2017 | 978 | 110 | 978 | 85 | 9/25/2017 | 421 | 0 | 9/26/2017 | 1,173 | 0 | 421 | 716 | 2,310 | 0 | 560 | 6,127 |
| 9/24/2017 | 1,169 | 110 | 1,112 | 85 | 9/26/2017 | 369 | 0 | 9/27/2017 | 1,307 | 0 | 369 | 634 | 2,310 | 0 | 560 | 6,687 |
| 9/25/2017 | 1,169 | 108 | 998 | 85 | 9/27/2017 | 364 | 0 | 9/28/2017 | 1,191 | 0 | 364 | 645 | 2,200 | 0 | 450 | 7,137 |
| 9/26/2017 | 1,392 | 108 | 1,199 | 85 | 9/28/2017 | 0 | 0 | 9/29/2017 | 1,392 | 0 | 0 | 538 | 1,930 | 0 | 180 | 7,317 |
| 9/27/2017 | 1,292 | 108 | 1,081 | 85 | 9/29/2017 | 0 | 0 | 9/30/2017 | 1,274 | 0 | 0 | 586 | 1,860 | 0 | 110 | 7,427 |
| 9/28/2017 | 1,396 | 110 | 1,191 | 85 | 9/30/2017 | 0 | 0 | 10/1/2017 | 1,386 | 0 | 0 | 544 | 1,930 | 0 | 180 | 7,607 |
| 9/29/2017 | 1,392 | 110 | 1,197 | 80 | 10/1/2017 | 0 | 0 | 10/2/2017 | 1,387 | 0 | 0 | 573 | 1,960 | 0 | 210 | 7,817 |
| 9/30/2017 | 1,458 | 105 | 1,278 | 70 | 10/2/2017 | 0 | 0 | 10/3/2017 | 1,453 | 0 | 0 | 607 | 2,060 | 0 | 310 | 8,127 |
| 10/1/2017 | 1,458 | 84 | 1,298 | 70 | 10/3/2017 | 0 | 124 | 10/4/2017 | 1,452 | 0 | 124 | 644 | 2,220 | 0 | 470 | 8,597 |
| 10/2/2017 | 1,458 | 85 | 1,298 | 70 | 10/4/2017 | 0 | 18 | 10/5/2017 | 1,453 | 0 | 18 | 579 | 2,050 | 0 | 300 | 8,897 |
| 10/3/2017 | 1,308 | 85 | 1,151 | 70 | 10/5/2017 | 0 | 0 | 10/6/2017 | 1,306 | 0 | 0 | 594 | 1,900 | 0 | 150 | 9,047 |
| 10/4/2017 | 1,263 | 85 | 1,105 | 70 | 10/6/2017 | 0 | 71 | 10/7/2017 | 1,260 | 0 | 71 | 589 | 1,920 | 0 | 170 | 9,217 |
| 10/5/2017 | 1,277 | 85 | 1,117 | 70 | 10/7/2017 | 0 | 0 | 10/8/2017 | 1,272 | 0 | 0 | 648 | 1,920 | 0 | 170 | 9,387 |

**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, 2017.—Continued

[Delaware River Master daily operations record. All provided measurements are given in the mean discharge in cubic feet per second ($ft^3/s$) for 24 hours, except col. 14, which is in cubic feet per second accumulated daily. Column (col.) 1 = 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, 1 day later; col. 4 = 24 hours beginning 1500, 1 day later; col. 5 = 24 hours beginning 0000 of date shown; col. 6 = 24 hours beginning 1600 of date shown; col. 7 = col. 2 + col. 3 + col. 4 in response to direction (col. 1); col. 8 = col. 2 + col. 3 + col. 4 – col. 7; col. 9 = col. 5 + col. 6; col. 10 = col. 11 – col. 7 – col. 8 – col. 9; col. 11 = 24 hours of calendar day shown; col. 12 = Interim Excess Release Quantity (IERQ) Bank releases. From 6/1/2017 to 10/23/2017 thermal releases were allowed per Delaware River Basin Commission Docket no. D–77–20 CP (Revised). Table footnotes in col. 12 indicate thermal release or Rapid Flow Change Mitigation Bank—refer to table footnotes. Starting on 10/23/2017, releases were made from 2017 Flexible Flow Management Program IERQ Banks; col. 13: if col. 7 > 0, col. 13 = col. 11 – col 8 –1,750 $ft^3/s$ but not greater than col. 7; if col 7 = 0, col. 13 = 1,858 $ft^3/s$ – (col. 11 – col. 8), positive values only and not greater than 108 $ft^3/s$; col. 14 = cumulative summation of col. 13 values. Excess release credits were only applicable from June 1 to October 23, 2017. —, not applicable]

| Controlled releases from New York City reservoirs | | | | | Controlled releases from power reservoirs | | | Segregation of flow, Delaware River at Montague, New Jersey | | | | | | Excess release credits | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | Daily | Cumulative |
| | | | | | | | | | 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 | Col. 13 | Col. 14 |
| 10/6/2017 | 1,268 | 85 | 1,106 | 70 | 10/8/2017 | 0 | 71 | 10/9/2017 | 1,261 | 0 | 71 | 908 | 2,240 | 0 | 490 | 9,877 |
| 10/7/2017 | 0 | 59 | 316 | 36 | 10/9/2017 | 0 | 106 | 10/10/2017 | 0 | 411 | 106 | 1,383 | 1,900 | 0 | 108 | 9,985 |
| 10/8/2017 | 608 | 74 | 495 | 36 | 10/10/2017 | 0 | 71 | 10/11/2017 | 605 | 0 | 71 | 1,434 | 2,110 | 0 | 360 | 10,345 |
| 10/9/2017 | 1,008 | 80 | 869 | 56 | 10/11/2017 | 0 | 0 | 10/12/2017 | 1,005 | 0 | 0 | 1,195 | 2,200 | 0 | 450 | 10,795 |
| 10/10/2017 | 1,008 | 102 | 852 | 56 | 10/12/2017 | 0 | 0 | 10/13/2017 | 1,010 | 0 | 0 | 960 | 1,970 | 0 | 220 | 11,015 |
| 10/11/2017 | 650 | 101 | 492 | 45 | 10/13/2017 | 0 | 0 | 10/14/2017 | 638 | 0 | 0 | 972 | 1,610 | 0 | –140 | 10,875 |
| 10/12/2017 | 431 | 101 | 288 | 45 | 10/14/2017 | 0 | 177 | 10/15/2017 | 434 | 0 | 177 | 919 | 1,530 | 0 | –220 | 10,655 |
| 10/13/2017 | 908 | 68 | 811 | 45 | 10/15/2017 | 0 | 0 | 10/16/2017 | 924 | 0 | 0 | 786 | 1,710 | 0 | –40 | 10,615 |
| 10/14/2017 | 1,008 | 68 | 896 | 45 | 10/16/2017 | 0 | 0 | 10/17/2017 | 1,009 | 0 | 0 | 851 | 1,860 | 0 | 110 | 10,725 |
| 10/15/2017 | 1,108 | 68 | 990 | 45 | 10/17/2017 | 0 | 0 | 10/18/2017 | 1,103 | 0 | 0 | 807 | 1,910 | 0 | 160 | 10,885 |
| 10/16/2017 | 1,108 | 70 | 987 | 45 | 10/18/2017 | 0 | 0 | 10/19/2017 | 1,102 | 0 | 0 | 788 | 1,890 | 0 | 140 | 11,025 |
| 10/17/2017 | 1,158 | 70 | 1,040 | 45 | 10/19/2017 | 0 | 0 | 10/20/2017 | 1,155 | 0 | 0 | 725 | 1,880 | 0 | 130 | 11,155 |
| 10/18/2017 | 1,158 | 70 | 1,043 | 43 | 10/20/2017 | 0 | 0 | 10/21/2017 | 1,156 | 0 | 0 | 694 | 1,850 | 0 | 100 | 11,255 |
| 10/19/2017 | 1,158 | 70 | 1,044 | 43 | 10/21/2017 | 0 | 0 | 10/22/2017 | 1,157 | 0 | 0 | 693 | 1,850 | 0 | 100 | 11,355 |
| 10/20/2017 | 1,158 | 70 | 1,026 | 60 | 10/22/2017 | 0 | 0 | 10/23/2017 | 1,156 | 0 | 0 | 664 | 1,820 | 0 | 70 | 11,425 |
| 10/21/2017 | 1,160 | 80 | 905 | 60 | 10/23/2017 | 0 | 0 | 10/24/2017 | 1,045 | 0 | 0 | 825 | 1,870 | 0 | — | — |
| 10/22/2017 | 0 | 80 | 435 | 60 | 10/24/2017 | 0 | 11 | 10/25/2017 | 0 | 575 | 11 | 1,424 | 2,010 | ††285 | — | — |
| 10/23/2017 | 770 | 80 | 481 | 152 | 10/25/2017 | 0 | 0 | 10/26/2017 | 713 | 0 | 0 | 1,517 | 2,230 | 0 | — | — |
| 10/24/2017 | 800 | 80 | 656 | 60 | 10/26/2017 | 0 | 0 | 10/27/2017 | 796 | 0 | 0 | 1,544 | 2,340 | 0 | — | — |
| 10/25/2017 | 979 | 80 | 832 | 60 | 10/27/2017 | 0 | 71 | 10/28/2017 | 972 | 0 | 71 | 1,137 | 2,180 | 0 | — | — |
| 10/26/2017 | 0 | 80 | 429 | 60 | 10/28/2017 | 0 | 0 | 10/29/2017 | 0 | 569 | 0 | 1,361 | 1,930 | ††279 | — | — |
| 10/27/2017 | 0 | 80 | 220 | 60 | 10/29/2017 | 0 | 89 | 10/30/2017 | 0 | 360 | 89 | 10,151 | 10,600 | ††70 | — | — |
| 10/28/2017 | 0 | 80 | 152 | 60 | 10/30/2017 | 0 | 851 | 10/31/2017 | 0 | 292 | 851 | 17,457 | 18,600 | 0 | — | — |
| 10/29/2017 | 0 | 74 | 152 | 60 | 10/31/2017 | 0 | 851 | 11/1/2017 | 0 | 286 | 851 | 8,163 | 9,300 | 0 | — | — |
| 10/30/2017 | 0 | 67 | 152 | 60 | 11/1/2017 | 27 | 851 | 11/2/2017 | 0 | 279 | 878 | 5,433 | 6,590 | 0 | — | — |
| 10/31/2017 | 0 | 80 | 150 | 60 | 11/2/2017 | 0 | 851 | 11/3/2017 | 0 | 290 | 851 | 4,329 | 5,470 | 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, 2017.—Continued

[Delaware River Master daily operations record. All provided measurements are given in the mean discharge in cubic feet per second ($ft^3/s$) for 24 hours, except col. 14, which is in cubic feet per second accumulated daily. Column (col.) 1 = 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, 1 day later; col. 4 = 24 hours beginning 1500, 1 day later; col. 5 = 24 hours beginning 0000 of date shown; col. 6 = 24 hours beginning 1600 of date shown; col. 7 = col. 2 + col. 3 + col. 4 in response to direction (col. 1); col. 8 = col. 2 + col. 3 + col. 4 – col. 7; col. 9 = col. 5 + col. 6; col. 10 = col. 11 – col. 7 – col. 8 – col. 9; col. 11 = 24 hours of calendar day shown; col. 12 = Interim Excess Release Quantity (IERQ) Bank releases. From 6/1/2017 to 10/23/2017 thermal releases were allowed per Delaware River Basin Commission Docket no. D–77–20 CP (Revised). Table footnotes in col. 12 indicate thermal release or Rapid Flow Change Mitigation Bank—refer to table footnotes. Starting on 10/23/2017, releases were made from 2017 Flexible Flow Management Program IERQ Banks; col. 13: if col. 7 > 0, col. 13 = col. 11 – col 8 –1,750 $ft^3/s$ but not greater than col. 7; if col 7 = 0, col. 13 = 1,858 $ft^3/s$ – (col. 11 – col. 8), positive values only and not greater than 108 $ft^3/s$; col. 14 = cumulative summation of col. 13 values. Excess release credits were only applicable from June 1 to October 23, 2017. —, not applicable]

| Controlled releases from New York City reservoirs | | | | | Controlled releases from power reservoirs | | | Segregation of flow, Delaware River at Montague, New Jersey | | | | | | Excess release credits | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | Daily | Cumulative |
| | | | | | | | | | 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 | Col. 13 | Col. 14 |
| 11/1/2017 | 0 | 80 | 152 | 60 | 11/3/2017 | 0 | 603 | 11/4/2017 | 0 | 292 | 603 | 3,595 | 4,490 | 0 | — | — |
| 11/2/2017 | 0 | 80 | 152 | 60 | 11/4/2017 | 0 | 603 | 11/5/2017 | 0 | 292 | 603 | 3,045 | 3,940 | 0 | — | — |
| 11/3/2017 | 0 | 80 | 152 | 63 | 11/5/2017 | 0 | 160 | 11/6/2017 | 0 | 295 | 160 | 2,715 | 3,170 | 0 | — | — |
| 11/4/2017 | 0 | 84 | 158 | 60 | 11/6/2017 | 0 | 0 | 11/7/2017 | 0 | 302 | 0 | 2,598 | 2,900 | 0 | — | — |
| 11/5/2017 | 0 | 80 | 152 | 60 | 11/7/2017 | 0 | 0 | 11/8/2017 | 0 | 292 | 0 | 2,738 | 3,030 | 0 | — | — |
| 11/6/2017 | 0 | 80 | 153 | 60 | 11/8/2017 | 0 | 0 | 11/9/2017 | 0 | 293 | 0 | 2,587 | 2,880 | 0 | — | — |
| 11/7/2017 | 0 | 80 | 152 | 60 | 11/9/2017 | 0 | 0 | 11/10/2017 | 0 | 292 | 0 | 2,398 | 2,690 | 0 | — | — |
| 11/8/2017 | 0 | 80 | 150 | 60 | 11/10/2017 | 0 | 0 | 11/11/2017 | 0 | 290 | 0 | 2,310 | 2,600 | 0 | — | — |
| 11/9/2017 | 0 | 80 | 150 | 60 | 11/11/2017 | 0 | 0 | 11/12/2017 | 0 | 290 | 0 | 2,160 | 2,450 | 0 | — | — |
| 11/10/2017 | 0 | 80 | 152 | 60 | 11/12/2017 | 0 | 0 | 11/13/2017 | 0 | 292 | 0 | 1,998 | 2,290 | 0 | — | — |
| 11/11/2017 | 0 | 80 | 152 | 60 | 11/13/2017 | 0 | 53 | 11/14/2017 | 0 | 292 | 53 | 1,895 | 2,240 | 0 | — | — |
| 11/12/2017 | 0 | 80 | 152 | 60 | 11/14/2017 | 0 | 53 | 11/15/2017 | 0 | 292 | 53 | 1,835 | 2,180 | 0 | — | — |
| 11/13/2017 | 0 | 80 | 152 | 60 | 11/15/2017 | 0 | 18 | 11/16/2017 | 0 | 292 | 18 | 1,790 | 2,100 | 0 | — | — |
| 11/14/2017 | 0 | 80 | 152 | 60 | 11/16/2017 | 0 | 0 | 11/17/2017 | 0 | 292 | 0 | 1,778 | 2,070 | 0 | — | — |
| 11/15/2017 | 0 | 80 | 152 | 60 | 11/17/2017 | 0 | 0 | 11/18/2017 | 0 | 292 | 0 | 1,808 | 2,100 | 0 | — | — |
| 11/16/2017 | 0 | 80 | 152 | 60 | 11/18/2017 | 0 | 0 | 11/19/2017 | 0 | 292 | 0 | 1,888 | 2,180 | 0 | — | — |
| 11/17/2017 | 0 | 80 | 152 | 60 | 11/19/2017 | 0 | 0 | 11/20/2017 | 0 | 292 | 0 | 2,768 | 3,060 | 0 | — | — |
| 11/18/2017 | 0 | 80 | 153 | 60 | 11/20/2017 | 0 | 0 | 11/21/2017 | 0 | 293 | 0 | 3,167 | 3,460 | 0 | — | — |
| 11/19/2017 | 0 | 80 | 150 | 60 | 11/21/2017 | 0 | 0 | 11/22/2017 | 0 | 290 | 0 | 2,630 | 2,920 | 0 | — | — |
| 11/20/2017 | 0 | 80 | 149 | 60 | 11/22/2017 | 0 | 0 | 11/23/2017 | 0 | 289 | 0 | 2,381 | 2,670 | 0 | — | — |
| 11/21/2017 | 0 | 80 | 152 | 60 | 11/23/2017 | 0 | 0 | 11/24/2017 | 0 | 292 | 0 | 2,218 | 2,510 | 0 | — | — |
| 11/22/2017 | 0 | 80 | 152 | 60 | 11/24/2017 | 0 | 0 | 11/25/2017 | 0 | 292 | 0 | 2,098 | 2,390 | 0 | — | — |
| 11/23/2017 | 0 | 80 | 152 | 60 | 11/25/2017 | 0 | 0 | 11/26/2017 | 0 | 292 | 0 | 2,018 | 2,310 | 0 | — | — |
| 11/24/2017 | 0 | 80 | 152 | 60 | 11/26/2017 | 0 | 0 | 11/27/2017 | 0 | 292 | 0 | 1,948 | 2,240 | 0 | — | — |
| 11/25/2017 | 0 | 80 | 152 | 60 | 11/27/2017 | 0 | 89 | 11/28/2017 | 0 | 292 | 89 | 1,809 | 2,190 | 0 | — | — |
| 11/26/2017 | 0 | 80 | 152 | 60 | 11/28/2017 | 0 | 35 | 11/29/2017 | 0 | 292 | 35 | 1,723 | 2,050 | 0 | — | — |
| 11/27/2017 | 0 | 80 | 153 | 60 | 11/29/2017 | 0 | 18 | 11/30/2017 | 0 | 293 | 18 | 1,659 | 1,970 | 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, 2017.—Continued

[Delaware River Master daily operations record. All provided measurements are given in the mean discharge in cubic feet per second ($ft^3/s$) for 24 hours, except col. 14, which is in cubic feet per second accumulated daily. Column (col.) 1 = 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, 1 day later; col. 4 = 24 hours beginning 1500, 1 day later; col. 5 = 24 hours beginning 0000 of date shown; col. 6 = 24 hours beginning 1600 of date shown; col. 7 = col. 2 + col. 3 + col. 4 in response to direction (col. 1); col. 8 = col. 2 + col. 3 + col. 4 – col. 7; col. 9 = col. 5 + col. 6; col. 10 = col. 11 – col. 7 – col. 8 – col. 9; col. 11 = 24 hours of calendar day shown; col. 12 = Interim Excess Release Quantity (IERQ) Bank releases. From 6/1/2017 to 10/23/2017 thermal releases were allowed per Delaware River Basin Commission Docket no. D–77–20 CP (Revised). Table footnotes in col. 12 indicate thermal release or Rapid Flow Change Mitigation Bank—refer to table footnotes. Starting on 10/23/2017, releases were made from 2017 Flexible Flow Management Program IERQ Banks; col. 13: if col. 7 > 0, col. 13 = col. 11 – col 8 –1,750 $ft^3/s$ but not greater than col. 7; if col 7 = 0, col. 13 = 1,858 $ft^3/s$ – (col. 11 – col. 8), positive values only and not greater than 108 $ft^3/s$; col. 14 = cumulative summation of col. 13 values. Excess release credits were only applicable from June 1 to October 23, 2017. —, not applicable]

| Controlled releases from New York City reservoirs | | | | | Controlled releases from power reservoirs | | | Segregation of flow, Delaware River at Montague, New Jersey | | | | | | Excess release credits | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | Daily | Cumulative |
| | | | | | | | | | 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 | Col. 13 | Col. 14 |
| Monthly totals | | | | | | | | | | | | | | | | |
| Dec. 2016 | 0 | 1,398 | 1,738 | 899 | Dec. 2016 | 0 | 248 | Dec. 2016 | 0 | 4,035 | 248 | 118,157 | 122,440 | 0 | — | — |
| Jan. 2017 | 0 | 1,404 | 1,741 | 899 | Jan. 2017 | 423 | 4,734 | Jan. 2017 | 0 | 4,044 | 5,157 | 179,169 | 188,370 | 0 | — | — |
| Feb. 2017 | 0 | 1,488 | 2,044 | 1,081 | Feb. 2017 | 14,504 | 6,046 | Feb. 2017 | 0 | 4,613 | 21,796 | 159,571 | 185,980 | 0 | — | — |
| Mar. 2017 | 0 | 4,681 | 16,954 | 2,261 | Mar. 2017 | 22,122 | 12,762 | Mar. 2017 | 0 | 23,896 | 34,884 | 198,840 | 257,620 | 0 | — | — |
| Apr. 2017 | 0 | 16,003 | 38,095 | 4,355 | Apr. 2017 | 20,634 | 17,871 | Apr. 2017 | 0 | 58,453 | 38,505 | 376,992 | 473,950 | 0 | — | — |
| May 2017 | 0 | 4,691 | 14,072 | 2,998 | May 2017 | 7,127 | 6,489 | May 2017 | 0 | 21,761 | 13,616 | 216,823 | 252,200 | 0 | — | — |
| June 2017 | 0 | 5,576 | 15,796 | 3,123 | June 2017 | 9,455 | 5,601 | June 2017 | 0 | 24,495 | 15,056 | 142,899 | 182,450 | 274 | — | — |
| July 2017 | 0 | 4,338 | 16,249 | 3,275 | July 2017 | 14,292 | 2,730 | July 2017 | 0 | 23,862 | 17,022 | 69,046 | 109,930 | 4,673 | — | — |
| Aug. 2017 | 977 | 4,641 | 15,476 | 4,429 | Aug. 2017 | 13,069 | 1,506 | Aug. 2017 | 977 | 23,569 | 14,575 | 55,819 | 94,940 | 0 | — | — |
| Sept. 2017 | 15,030 | 4,003 | 15,674 | 2,882 | Sept. 2017 | 10,469 | 620 | Sept. 2017 | 15,390 | 7,169 | 11,089 | 34,302 | 67,950 | 0 | — | — |
| Oct. 2017 | 28,456 | 2,545 | 26,000 | 1,872 | Oct. 2017 | 0 | 1,660 | Oct. 2017 | 28,210 | 2,207 | 1,660 | 53,973 | 86,050 | 634 | — | — |
| Nov. 2017 | 0 | 2,385 | 4,558 | 1,803 | Nov. 2017 | 27 | 4,185 | Nov. 2017 | 0 | 8,746 | 4,212 | 79,482 | 92,440 | 0 | — | — |

†Thermal release.

††Rapid Flow Change Mitigation Bank.

**Table 11.** Daily mean discharge of the Delaware River at Montague, New Jersey (U.S. Geological Survey site number 01438500), for report year ending November 30, 2017.

[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 discharged is given in cubic feet per second accumulated daily ([$ft^3/s$]-d). —, not applicable]

| Day | Dec. 2016 | Jan. 2017 | Feb. 2017 | Mar. 2017 | Apr. 2017 | May 2017 | June 2017 | July 2017 | Aug. 2017 | Sept. 2017 | Oct. 2017 | Nov. 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 6,060 | 3,150 | 4,720 | 11,000 | 31,500 | 5,640 | 5,350 | 3,130 | 3,360 | 2,480 | 2,020 | 9,390 |
| 2 | 9,000 | 2,910 | 4,480 | 9,820 | 25,200 | 9,330 | 5,590 | 2,980 | 3,200 | 1,820 | 2,060 | 6,690 |
| 3 | 6,200 | 2,790 | 4,510 | 8,510 | 20,600 | 18,600 | 4,380 | 3,540 | 3,190 | 1,760 | 2,080 | 5,470 |
| 4 | 4,690 | 4,040 | 3,920 | 7,320 | 21,300 | 15,100 | 3,680 | 3,110 | 3,320 | 2,040 | 2,240 | 4,490 |
| 5 | 3,840 | 7,020 | 3,590 | 6,040 | 25,800 | 12,800 | 3,880 | 2,810 | 3,540 | 2,400 | 2,080 | 3,940 |
| 6 | 3,380 | 5,870 | 3,450 | 5,660 | 22,900 | 14,200 | 12,500 | 2,700 | 3,200 | 2,700 | 1,930 | 3,170 |
| 7 | 3,210 | 4,550 | 3,660 | 5,540 | 40,900 | 14,700 | 21,900 | 2,650 | 2,720 | 3,070 | 1,960 | 2,900 |
| 8 | 3,220 | 3,980 | 3,380 | 5,950 | 33,500 | 13,500 | 16,000 | 2,910 | 2,430 | 3,350 | 1,970 | 3,030 |
| 9 | 3,160 | 3,190 | 3,960 | 6,410 | 25,600 | 11,600 | 11,900 | 2,580 | 2,520 | 3,190 | 2,290 | 2,880 |
| 10 | 2,770 | 3,300 | 4,250 | 6,040 | 20,700 | 10,000 | 9,730 | 2,560 | 2,640 | 2,610 | 1,950 | 2,690 |
| 11 | 2,410 | 3,360 | 4,200 | 6,140 | 17,700 | 8,880 | 8,190 | 2,570 | 2,540 | 2,460 | 2,170 | 2,600 |
| 12 | 2,260 | 4,030 | 3,910 | 5,570 | 15,800 | 8,000 | 7,480 | 2,500 | 3,400 | 2,580 | 2,270 | 2,450 |
| 13 | 2,190 | 7,340 | 3,400 | 5,070 | 14,000 | 6,970 | 6,940 | 2,130 | 3,710 | 2,340 | 2,040 | 2,290 |
| 14 | 2,280 | 10,900 | 3,980 | 5,280 | 11,400 | 9,430 | 5,890 | 2,270 | 3,210 | 2,310 | 1,680 | 2,240 |
| 15 | 1,970 | 7,540 | 4,190 | 5,350 | 9,120 | 10,200 | 4,480 | 3,030 | 2,830 | 2,280 | 1,600 | 2,180 |
| 16 | 1,700 | 5,800 | 4,050 | 5,790 | 8,010 | 8,850 | 3,290 | 3,830 | 2,620 | 2,450 | 1,790 | 2,100 |
| 17 | 1,760 | 5,170 | 3,560 | 6,870 | 7,700 | 7,950 | 2,960 | 3,150 | 2,880 | 2,110 | 1,860 | 2,070 |
| 18 | 1,800 | 5,500 | 3,410 | 6,270 | 6,820 | 7,290 | 3,130 | 2,780 | 2,860 | 2,370 | 1,910 | 2,100 |
| 19 | 7,870 | 6,250 | 3,620 | 5,200 | 6,840 | 6,740 | 3,740 | 2,940 | 3,400 | 2,050 | 1,890 | 2,180 |
| 20 | 7,850 | 6,090 | 4,960 | 4,200 | 7,170 | 5,420 | 6,140 | 3,230 | 4,010 | 1,770 | 1,880 | 3,060 |
| 21 | 5,450 | 5,480 | 5,970 | 4,290 | 10,400 | 4,800 | 6,030 | 3,300 | 3,840 | 1,730 | 1,850 | 3,460 |
| 22 | 4,640 | 5,320 | 5,660 | 4,940 | 15,600 | 4,240 | 4,280 | 2,970 | 3,530 | 1,660 | 1,850 | 2,920 |
| 23 | 4,390 | 5,650 | 6,130 | 5,780 | 12,400 | 4,260 | 3,850 | 2,820 | 3,850 | 1,810 | 1,820 | 2,670 |
| 24 | 3,720 | 9,340 | 8,980 | 5,590 | 10,900 | 4,060 | 3,650 | 3,020 | 3,950 | 2,180 | 1,870 | 2,510 |
| 25 | 3,440 | 12,500 | 12,900 | 5,920 | 10,300 | 3,980 | 3,720 | 7,730 | 3,410 | 2,440 | 2,010 | 2,390 |
| 26 | 3,480 | 9,670 | 30,200 | 7,270 | 9,810 | 4,560 | 3,190 | 7,690 | 2,900 | 2,390 | 2,230 | 2,310 |
| 27 | 3,390 | 9,250 | 22,500 | 9,030 | 9,220 | 4,260 | 2,790 | 6,240 | 2,440 | 2,390 | 2,340 | 2,240 |
| 28 | 3,850 | 8,050 | 14,000 | 15,200 | 8,580 | 3,780 | 2,480 | 5,080 | 2,300 | 2,280 | 2,180 | 2,190 |
| 29 | 4,210 | 6,780 | — | 22,900 | 7,100 | 3,630 | 2,650 | 4,330 | 2,620 | 2,010 | 1,930 | 2,050 |
| 30 | 3,750 | 6,150 | — | 25,800 | 6,200 | 4,550 | 2,650 | 3,510 | 2,450 | 1,940 | 10,600 | 1,970 |
| 31 | 3,430 | 5,630 | — | 23,400 | — | 4,880 | — | 3,270 | 2,470 | — | 18,600 | — |
| **Total**[1] | **121,370** | **186,600** | **185,540** | **258,150** | **473,070** | **252,200** | **182,440** | **107,360** | **95,340** | **68,970** | **86,950** | **92,630** |
| Mean[2] | 3,915 | 6,019 | 6,626 | 8,327 | 15,769 | 8,135 | 6,081 | 3,463 | 3,075 | 2,299 | 2,805 | 3,088 |

[1]The year's total is 2,110,620 cubic feet per second accumulated daily.

[2]The combined mean is 5,800 cubic feet per second.

**Table 13.** Daily mean discharge of the East Branch Delaware River at Downsville, New York (U.S. Geological Survey site number 01417000), for report year ending November 30, 2017.

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

| Day | Dec. 2016 | Jan. 2017 | Feb. 2017 | Mar. 2017 | Apr. 2017 | May 2017 | June 2017 | July 2017 | Aug. 2017 | Sept. 2017 | Oct. 2017 | Nov. 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 50 | 46 | 47 | 147 | 703 | 103 | 261 | 132 | 143 | 154 | 98 | 89 |
| 2 | 50 | 46 | 47 | 147 | 703 | 2,700 | 179 | 132 | 143 | 154 | 89 | 89 |
| 3 | 50 | 47 | 47 | 147 | 703 | 3,120 | 147 | 132 | 143 | 154 | 90 | 89 |
| 4 | 49 | 46 | 52 | 147 | 703 | 2,190 | 143 | 132 | 144 | 154 | 92 | 89 |
| 5 | 49 | 46 | 55 | 147 | 703 | 1,830 | 175 | 132 | 144 | 154 | 95 | 88 |
| 6 | 49 | 47 | 55 | 147 | 703 | 1,860 | 1,330 | 132 | 146 | 154 | 95 | 88 |
| 7 | 49 | 47 | 55 | 147 | 1,840 | 1,430 | 1,700 | 132 | 147 | 154 | 86 | 88 |
| 8 | 49 | 47 | 55 | 147 | 3,070 | 1,080 | 1,310 | 134 | 147 | 154 | 70 | 87 |
| 9 | 49 | 46 | 55 | 147 | 2,740 | 820 | 1,030 | 136 | 147 | 154 | 90 | 87 |
| 10 | 49 | 47 | 55 | 147 | 2,190 | 617 | 817 | 134 | 147 | 154 | 100 | 87 |
| 11 | 49 | 47 | 55 | 147 | 1,870 | 468 | 623 | 133 | 147 | 154 | 110 | 87 |
| 12 | 49 | 48 | 55 | 147 | 1,420 | 373 | 523 | 134 | 147 | 154 | 110 | 87 |
| 13 | 49 | 74 | 55 | 146 | 1,090 | 485 | 324 | 135 | 147 | 154 | 93 | 87 |
| 14 | 49 | 47 | 55 | 146 | 852 | 732 | 128 | 136 | 147 | 154 | 79 | 87 |
| 15 | 48 | 47 | 58 | 144 | 682 | 657 | 122 | 136 | 147 | 154 | 79 | 87 |
| 16 | 48 | 47 | 66 | 144 | 519 | 582 | 129 | 136 | 147 | 128 | 78 | 86 |
| 17 | 48 | 47 | 66 | 145 | 480 | 543 | 136 | 136 | 147 | 117 | 77 | 86 |
| 18 | 48 | 47 | 66 | 145 | 469 | 422 | 134 | 136 | 149 | 117 | 79 | 87 |
| 19 | 47 | 47 | 65 | 145 | 469 | 275 | 137 | 136 | 151 | 117 | 80 | 85 |
| 20 | 47 | 47 | 64 | 145 | 410 | 254 | 158 | 136 | 151 | 117 | 80 | 87 |
| 21 | 48 | 47 | 64 | 145 | 372 | 210 | 135 | 136 | 151 | 117 | 87 | 89 |
| 22 | 48 | 47 | 64 | 145 | 371 | 157 | 132 | 136 | 152 | 117 | 92 | 89 |
| 23 | 48 | 47 | 64 | 147 | 374 | 131 | 132 | 136 | 151 | 117 | 92 | 89 |
| 24 | 48 | 47 | 65 | 147 | 407 | 128 | 132 | 138 | 151 | 116 | 92 | 89 |
| 25 | 48 | 47 | 66 | 147 | 469 | 166 | 132 | 136 | 151 | 116 | 92 | 89 |
| 26 | 48 | 47 | 66 | 147 | 663 | 130 | 132 | 136 | 151 | 116 | 92 | 86 |
| 27 | 48 | 47 | 65 | 147 | 602 | 141 | 132 | 141 | 151 | 116 | 92 | 84 |
| 28 | 47 | 48 | 91 | 270 | 359 | 133 | 132 | 143 | 153 | 116 | 91 | 84 |
| 29 | 46 | 48 | — | 703 | 285 | 129 | 132 | 143 | 154 | 116 | 92 | 84 |
| 30 | 46 | 48 | — | 703 | 262 | 195 | 133 | 143 | 154 | 116 | 72 | 85 |
| 31 | 46 | 48 | — | 703 | — | 313 | — | 143 | 154 | — | 88 | — |
| **Total**[1] | **1,496** | **1,484** | **1,673** | **6,328** | **2,483** | **22,374** | **10,830** | **4,213** | **4,604** | **4,069** | **2,752** | **2,615** |
| Mean[2] | 48 | 48 | 60 | 204 | 883 | 722 | 361 | 136 | 149 | 136 | 89 | 87 |

[1]The year's total is 88,921 cubic feet per second accumulated daily.

[2]The combined mean is 243 cubic feet per second.

**Table 14.** Daily mean discharge, West Branch Delaware River at Stilesvillle, New York (U.S. Geological Survey site number 01425000), for report year ending November 30, 2017.

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

| Day | Dec. 2016 | Jan. 2017 | Feb. 2017 | Mar. 2017 | Apr. 2017 | May 2017 | June 2017 | July 2017 | Aug. 2017 | Sept. 2017 | Oct. 2017 | Nov. 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 80 | 75 | 76 | 205 | 1,410 | 316 | 591 | 674 | 526 | 423 | 1,180 | 150 |
| 2 | 79 | 76 | 74 | 201 | 1,410 | 925 | 628 | 613 | 527 | 374 | 1,200 | 150 |
| 3 | 78 | 77 | 73 | 203 | 1,410 | 1,800 | 627 | 529 | 526 | 374 | 1,200 | 151 |
| 4 | 78 | 80 | 74 | 203 | 1,420 | 1,920 | 630 | 594 | 529 | 374 | 1,070 | 152 |
| 5 | 78 | 81 | 78 | 206 | 1,850 | 1,960 | 706 | 633 | 527 | 336 | 1,030 | 152 |
| 6 | 79 | 81 | 80 | 204 | 2,680 | 2,210 | 2,040 | 597 | 526 | 316 | 1,040 | 152 |
| 7 | 79 | 81 | 81 | 205 | 3,800 | 2,280 | 2,790 | 597 | 529 | 316 | 1,030 | 154 |
| 8 | 77 | 80 | 83 | 204 | 4,350 | 2,210 | 2,590 | 597 | 534 | 317 | 313 | 152 |
| 9 | 74 | 80 | 84 | 201 | 3,900 | 2,050 | 2,620 | 638 | 531 | 316 | 496 | 151 |
| 10 | 68 | 77 | 84 | 202 | 3,420 | 1,820 | 2,290 | 607 | 518 | 316 | 811 | 151 |
| 11 | 76 | 74 | 84 | 203 | 3,460 | 1,600 | 2,010 | 367 | 518 | 314 | 787 | 152 |
| 12 | 77 | 74 | 85 | 201 | 2,740 | 1,390 | 1,560 | 365 | 519 | 302 | 528 | 152 |
| 13 | 76 | 79 | 86 | 202 | 2,300 | 1,280 | 1,200 | 368 | 518 | 299 | 267 | 152 |
| 14 | 76 | 80 | 92 | 208 | 1,940 | 1,360 | 472 | 371 | 518 | 299 | 745 | 152 |
| 15 | 75 | 78 | 94 | 200 | 1,680 | 1,420 | 274 | 370 | 519 | 299 | 829 | 153 |
| 16 | 75 | 75 | 98 | 199 | 1,490 | 1,400 | 316 | 370 | 518 | 587 | 917 | 153 |
| 17 | 75 | 74 | 99 | 200 | 765 | 1,390 | 413 | 372 | 518 | 296 | 916 | 153 |
| 18 | 77 | 74 | 99 | 200 | 1,200 | 1,270 | 428 | 449 | 528 | 250 | 968 | 154 |
| 19 | 78 | 75 | 100 | 199 | 1,130 | 937 | 368 | 589 | 523 | 375 | 969 | 154 |
| 20 | 78 | 75 | 100 | 201 | 1,120 | 814 | 365 | 590 | 521 | 336 | 969 | 152 |
| 21 | 78 | 75 | 100 | 310 | 1,530 | 728 | 365 | 590 | 520 | 562 | 960 | 151 |
| 22 | 77 | 75 | 101 | 1,320 | 2,110 | 659 | 365 | 524 | 524 | 748 | 847 | 152 |
| 23 | 77 | 76 | 101 | 1,410 | 2,160 | 643 | 362 | 373 | 526 | 900 | 415 | 154 |
| 24 | 77 | 78 | 103 | 1,410 | 2,040 | 569 | 365 | 355 | 522 | 919 | 460 | 154 |
| 25 | 78 | 78 | 107 | 1,410 | 1,860 | 415 | 366 | 340 | 518 | 1,030 | 652 | 154 |
| 26 | 78 | 79 | 108 | 1,420 | 1,710 | 350 | 368 | 533 | 518 | 942 | 774 | 153 |
| 27 | 78 | 79 | 104 | 1,410 | 1,560 | 320 | 369 | 534 | 524 | 1,100 | 401 | 153 |
| 28 | 77 | 77 | 120 | 1,410 | 1,430 | 306 | 466 | 534 | 530 | 1,010 | 213 | 154 |
| 29 | 76 | 76 | — | 1,410 | 1,320 | 298 | 628 | 529 | 534 | 1,110 | 154 | 153 |
| 30 | 75 | 76 | — | 1,420 | 861 | 300 | 673 | 526 | 534 | 1,110 | 159 | 153 |
| 31 | 75 | 76 | — | 1,420 | — | 402 | — | 526 | 527 | — | 151 | — |
| **Total**[1] | **2,379** | **2,391** | **2,568** | **18,397** | **60,056** | **35,342** | **27,245** | **15,654** | **16,250** | **16,250** | **22,451** | **4,573** |
| Mean[2] | 77 | 77 | 92 | 593 | 2,002 | 1,140 | 908 | 505 | 524 | 542 | 724 | 152 |

[1]The year's total is 223,556 cubic feet per second accumulated daily.

[2]The combined mean is 611 cubic feet per second.

**Table 15.** Daily mean discharge, Neversink River at Town of Neversink, New York (U.S. Geological Survey site number 01436000), for report year ending November 30, 2017.

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

| Day | Dec. 2016 | Jan. 2017 | Feb. 2017 | Mar. 2017 | Apr. 2017 | May 2017 | June 2017 | July 2017 | Aug. 2017 | Sept. 2017 | Oct. 2017 | Nov. 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 31 | 30 | 29 | 76 | 77 | 72 | 120 | 96 | 135 | 103 | 65 | 54 |
| 2 | 30 | 31 | 29 | 74 | 94 | 94 | 138 | 96 | 135 | 93 | 61 | 54 |
| 3 | 30 | 31 | 29 | 74 | 187 | 120 | 132 | 97 | 135 | 92 | 61 | 54 |
| 4 | 30 | 30 | 34 | 73 | 187 | 102 | 106 | 97 | 135 | 92 | 61 | 55 |
| 5 | 31 | 32 | 37 | 74 | 187 | 145 | 164 | 97 | 134 | 92 | 62 | 55 |
| 6 | 31 | 30 | 36 | 75 | 566 | 102 | 1,460 | 98 | 134 | 94 | 61 | 55 |
| 7 | 30 | 30 | 36 | 75 | 1,970 | 122 | 757 | 99 | 134 | 92 | 61 | 55 |
| 8 | 30 | 30 | 37 | 75 | 1,080 | 123 | 259 | 99 | 133 | 93 | 48 | 55 |
| 9 | 29 | 30 | 36 | 74 | 650 | 99 | 142 | 100 | 133 | 93 | 30 | 55 |
| 10 | 30 | 30 | 36 | 75 | 496 | 99 | 110 | 100 | 134 | 93 | 37 | 52 |
| 11 | 30 | 31 | 36 | 73 | 452 | 111 | 141 | 100 | 134 | 93 | 48 | 53 |
| 12 | 30 | 31 | 36 | 73 | 424 | 180 | 154 | 99 | 134 | 93 | 45 | 53 |
| 13 | 30 | 30 | 34 | 75 | 349 | 252 | 129 | 99 | 133 | 93 | 39 | 55 |
| 14 | 30 | 30 | 36 | 75 | 187 | 408 | 93 | 100 | 139 | 93 | 39 | 55 |
| 15 | 29 | 30 | 39 | 75 | 180 | 304 | 86 | 99 | 143 | 93 | 39 | 55 |
| 16 | 30 | 30 | 44 | 74 | 189 | 121 | 92 | 100 | 142 | 82 | 38 | 55 |
| 17 | 30 | 30 | 44 | 75 | 143 | 102 | 96 | 100 | 141 | 78 | 38 | 54 |
| 18 | 30 | 29 | 46 | 75 | 114 | 92 | 97 | 100 | 142 | 78 | 38 | 55 |
| 19 | 30 | 29 | 46 | 75 | 114 | 85 | 104 | 100 | 142 | 78 | 38 | 54 |
| 20 | 30 | 29 | 45 | 75 | 116 | 82 | 166 | 100 | 142 | 77 | 38 | 54 |
| 21 | 30 | 29 | 46 | 75 | 117 | 92 | 100 | 99 | 143 | 77 | 44 | 55 |
| 22 | 30 | 29 | 46 | 72 | 115 | 96 | 97 | 99 | 143 | 77 | 53 | 54 |
| 23 | 30 | 30 | 46 | 74 | 115 | 96 | 98 | 99 | 142 | 77 | 53 | 55 |
| 24 | 30 | 30 | 47 | 75 | 115 | 96 | 97 | 100 | 142 | 77 | 89 | 55 |
| 25 | 30 | 29 | 47 | 75 | 116 | 97 | 97 | 99 | 133 | 77 | 109 | 55 |
| 26 | 30 | 29 | 451 | 75 | 118 | 110 | 97 | 113 | 129 | 77 | 53 | 55 |
| 27 | 30 | 29 | 46 | 77 | 117 | 97 | 96 | 132 | 129 | 77 | 53 | 55 |
| 28 | 30 | 29 | 56 | 77 | 117 | 96 | 96 | 136 | 130 | 76 | 53 | 55 |
| 29 | 30 | 29 | — | 76 | 96 | 97 | 97 | 136 | 129 | 77 | 55 | 55 |
| 30 | 30 | 29 | — | 77 | 75 | 109 | 97 | 136 | 129 | 77 | 55 | 56 |
| 31 | 30 | 29 | — | 77 | — | 102 | — | 135 | 130 | — | 54 | — |
| **Total**[1] | **931** | **924** | **1,530** | **2,320** | **8,863** | **3,903** | **5,518** | **3,260** | **4,213** | **2,564** | **1,618** | **1,637** |
| Mean[2] | 30 | 30 | 40 | 75 | 295 | 126 | 184 | 105 | 136 | 85 | 52 | 55 |

[1]The year total is 37,281 cubic feet per second accumulated daily.

[2]The combined mean is 102 cubic feet per second.

**Table 16.** Daily mean discharge, Delaware River at Trenton, New Jersey (U.S. Geological Survey site number 01463500), for report year ending November 30, 2017.

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

| Day | Dec. 2016 | Jan. 2017 | Feb. 2017 | Mar. 2017 | Apr. 2017 | May 2017 | June 2017 | July 2017 | Aug. 2017 | Sep. 2017 | Oct. 2017 | Nov. 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 7,590 | 6,290 | 10,300 | 18,500 | 54,500 | 10,800 | 10,400 | 5,150 | 6,640 | 4,590 | 3,230 | 23,600 |
| 2 | 10,700 | 5,880 | 9,130 | 17,000 | 50,600 | 10,000 | 10,000 | 6,790 | 6,310 | 4,550 | 3,180 | 14,700 |
| 3 | 13,600 | 5,870 | 8,540 | 15,400 | 40,900 | 13,200 | 9,810 | 6,270 | 6,990 | 5,120 | 3,240 | 11,400 |
| 4 | 10,400 | 7,310 | 8,230 | 13,900 | 38,200 | 21,900 | 8,990 | 5,710 | 7,660 | 5,500 | 3,210 | 9,800 |
| 5 | 8,290 | 8,160 | 7,390 | 11,900 | 42,100 | 19,900 | 8,010 | 5,770 | 8,110 | 4,910 | 3,220 | 8,450 |
| 6 | 7,110 | 11,100 | 6,800 | 10,500 | 44,300 | 19,200 | 8,780 | 5,190 | 9,450 | 5,480 | 3,380 | 7,480 |
| 7 | 6,980 | 10,400 | 6,650 | 9,830 | 57,400 | 20,300 | 20,500 | 5,890 | 8,170 | 7,830 | 3,290 | 6,820 |
| 8 | 6,790 | 7,630 | 7,160 | 10,100 | 65,400 | 20,300 | 27,900 | 14,300 | 8,630 | 8,540 | 3,630 | 6,230 |
| 9 | 6,320 | 5,580 | 7,370 | 10,300 | 50,300 | 18,700 | 21,300 | 9,570 | 6,940 | 7,750 | 5,410 | 6,040 |
| 10 | 6,110 | 5,000 | 7,670 | 10,600 | 39,400 | 16,600 | 16,800 | 7,570 | 6,070 | 6,900 | 5,350 | 5,740 |
| 11 | 5,750 | 5,680 | 7,890 | 10,500 | 33,000 | 14,500 | 14,400 | 6,380 | 5,690 | 6,110 | 5,440 | 5,310 |
| 12 | 5,530 | 6,550 | 8,130 | 9,980 | 28,500 | 13,100 | 12,400 | 5,790 | 7,150 | 5,400 | 4,960 | 5,100 |
| 13 | 5,560 | 7,390 | 8,420 | 9,420 | 25,200 | 15,500 | 11,200 | 5,870 | 10,700 | 5,150 | 4,920 | 5,010 |
| 14 | 5,140 | 10,400 | 8,070 | 9,100 | 22,200 | 19,300 | 10,400 | 6,010 | 9,420 | 5,010 | 4,460 | 4,890 |
| 15 | 4,850 | 14,800 | 7,940 | 9,050 | 18,900 | 18,800 | 9,400 | 7,970 | 8,250 | 4,770 | 3,880 | 4,580 |
| 16 | 4,830 | 11,400 | 8,390 | 9,060 | 16,100 | 18,300 | 8,050 | 8,540 | 7,530 | 4,600 | 3,360 | 4,360 |
| 17 | 3,230 | 9,830 | 8,240 | 10,100 | 14,600 | 16,100 | 6,980 | 8,080 | 6,660 | 4,570 | 3,180 | 4,310 |
| 18 | 3,750 | 9,810 | 7,500 | 11,700 | 13,800 | 14,000 | 6,360 | 7,660 | 6,490 | 4,470 | 3,380 | 4,150 |
| 19 | 4,040 | 9,660 | 6,970 | 10,900 | 12,500 | 13,000 | 6,020 | 6,600 | 9,900 | 4,250 | 3,480 | 4,460 |
| 20 | 5,740 | 10,400 | 7,190 | 10,700 | 11,900 | 11,900 | 7,410 | 6,370 | 8,630 | 4,440 | 3,490 | 4,900 |
| 21 | 9,770 | 10,700 | 8,550 | 11,000 | 12,600 | 10,700 | 11,000 | 6,510 | 8,060 | 3,990 | 3,360 | 5,000 |
| 22 | 7,920 | 10,400 | 10,100 | 13,400 | 17,000 | 9,180 | 10,600 | 7,050 | 7,460 | 3,590 | 3,280 | 5,910 |
| 23 | 7,340 | 10,200 | 9,720 | 13,300 | 21,200 | 8,690 | 8,130 | 8,030 | 9,230 | 3,410 | 3,170 | 5,690 |
| 24 | 7,090 | 17,400 | 9,740 | 13,000 | 17,800 | 8,380 | 11,800 | 8,670 | 7,880 | 3,270 | 3,210 | 5,200 |
| 25 | 6,800 | 19,200 | 12,300 | 12,600 | 16,100 | 8,730 | 10,800 | 15,800 | 7,280 | 3,340 | 3,990 | 4,890 |
| 26 | 6,180 | 20,500 | 18,600 | 12,800 | 16,000 | 11,800 | 8,410 | 16,800 | 6,690 | 3,720 | 3,980 | 4,710 |
| 27 | 5,930 | 16,900 | 36,700 | 15,200 | 15,500 | 10,100 | 7,290 | 14,800 | 6,290 | 3,870 | 3,790 | 4,600 |
| 28 | 5,880 | 15,700 | 26,300 | 20,000 | 14,200 | 9,440 | 6,050 | 12,300 | 5,540 | 3,800 | 4,000 | 4,450 |
| 29 | 5,990 | 14,100 | — | 31,400 | 14,400 | 8,330 | 5,340 | 10,400 | 5,040 | 3,670 | 4,790 | 4,470 |
| 30 | 7,310 | 12,500 | — | 38,400 | 12,400 | 9,740 | 4,940 | 8,990 | 4,820 | 3,490 | 11,300 | 4,370 |
| 31 | 6,870 | 11,200 | — | 44,100 | — | 10,300 | — | 7,400 | 4,760 | — | 19,300 | — |
| **Total[1]** | **209,390** | **327,940** | **289,990** | **453,740** | **37,000** | **430,790** | **319,470** | **258,230** | **228,440** | **146,090** | **141,860** | **196,620** |
| Mean[2] | 6,755 | 10,579 | 10,357 | 14,637 | 27,900 | 13,896 | 10,649 | 8,330 | 7,369 | 4,870 | 4,576 | 6,554 |

[1]The year's total is 3,839,560 cubic feet per second accumulated daily.

[2]The combined mean is 10,539 cubic feet per second.

**Table 17.** Daily maximum and minimum specific conductance, Delaware River at Reedy Island Jetty, Delaware (site number 01482800), for report year ending November 30, 2017.

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

| Day | Dec. 2016 | | Jan. 2017 | | Feb. 2017 | | Mar. 2017 | | Apr. 2017 | | May 2017 | | June 2017 | | July 2017 | | Aug. 2017 | | Sept. 2017 | | Oct. 2017 | | Nov. 2017 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 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 | 23,000 | 15,500 | 15,900 | 7,550 | 13,400 | 5,610 | 11,600 | 4,700 | 11,000 | 2,480 | 5,420 | 1,570 | 6,810 | 3,320 | 7,370 | 2,040 | 13,500 | 4,570 | 16,600 | 16,600 | 23,000 | 11,800 | 14,900 | 8,400 |
| 2 | 21,600 | 14,100 | 17,500 | 8,180 | 12,300 | 5,500 | 9,510 | 2,480 | 9,370 | 1,440 | 5,470 | 1,530 | 7,570 | 3,190 | 8,020 | 1,960 | 14,000 | 4,410 | 17,000 | 17,000 | 22,100 | 12,200 | 13,900 | 7,810 |
| 3 | 18,600 | 11,900 | 19,100 | 9,570 | 12,400 | 5,410 | 7,370 | 2,210 | 6,740 | 1,240 | 4,960 | 1,420 | 8,620 | 2,990 | 8,980 | 1,900 | 15,200 | 4,730 | 17,400 | 17,400 | 22,500 | 13,200 | 14,100 | 7,380 |
| 4 | 22,300 | 12,400 | 18,000 | 9,800 | 10,900 | 4,980 | 8,060 | 1,960 | 5,580 | 1,080 | 5,940 | 1,540 | 9,600 | 2,960 | 10,500 | 2,010 | 16,300 | 5,080 | 16,800 | 16,800 | 20,300 | 12,900 | 15,100 | 7,360 |
| 5 | 22,700 | 13,200 | 14,500 | 8,820 | 14,000 | 4,870 | 10,500 | 1,910 | 5,840 | 1,140 | 6,690 | 1,640 | 9,980 | 3,010 | 11,700 | 2,330 | 13,700 | 5,520 | 16,700 | 16,700 | 20,200 | 12,700 | 15,700 | 7,750 |
| 6 | 22,100 | 12,500 | 16,200 | 7,890 | 13,800 | 4,240 | 12,900 | 2,620 | 5,200 | 1,260 | 4,970 | 1,610 | 11,700 | 3,220 | 10,700 | 3,000 | 14,600 | 4,840 | 14,600 | 14,600 | 19,100 | 12,300 | 14,600 | 7,540 |
| 7 | 23,400 | 14,400 | 16,300 | 7,870 | 14,000 | 4,890 | 13,700 | 4,530 | 1,980 | 730 | 3,470 | 1,140 | 11,400 | 3,710 | 11,500 | 3,290 | 14,700 | 5,090 | 14,500 | 14,500 | 20,100 | 12,800 | 14,100 | 7,160 |
| 8 | 21,900 | 13,300 | 18,200 | 7,980 | 13,400 | 5,610 | 11,300 | 4,120 | 1,540 | 934 | 5,120 | 984 | 11,200 | 3,430 | 11,500 | 3,600 | 13,000 | 4,700 | 13,400 | 13,400 | 19,500 | 12,600 | 16,100 | 7,850 |
| 9 | 18,900 | 12,700 | 19,600 | 8,030 | 14,500 | 4,760 | 10,300 | 3,180 | 1,290 | 739 | 5,600 | 935 | 9,860 | 3,050 | 11,200 | 3,410 | 13,600 | 4,610 | 12,600 | 12,600 | 18,900 | 12,000 | 16,500 | 7,970 |
| 10 | 20,600 | 12,200 | 19,200 | 9,410 | 14,100 | 5,090 | 11,700 | 3,120 | 996 | 574 | 5,810 | 946 | 9,150 | 2,700 | 12,600 | 3,510 | 14,000 | 4,940 | 14,600 | 14,600 | 17,800 | 11,500 | 13,200 | 7,970 |
| 11 | 21,900 | 12,000 | 17,900 | 9,040 | 13,900 | 5,350 | 10,600 | 2,840 | 953 | 581 | 6,960 | 968 | 7,990 | 2,500 | 13,000 | 3,740 | 13,900 | 5,120 | 14,000 | 14,000 | 18,200 | 11,500 | 15,200 | 7,320 |
| 12 | 22,300 | 12,600 | 17,600 | 8,740 | 16,100 | 5,810 | 11,000 | 3,000 | 904 | 642 | 5,990 | 1,060 | 8,290 | 2,350 | 12,400 | 3,740 | 12,700 | 5,330 | 15,000 | 15,000 | 20,600 | 12,100 | 15,600 | 7,400 |
| 13 | 21,100 | 12,400 | 15,100 | 7,580 | 14,300 | 5,190 | 10,900 | 2,920 | 776 | 590 | 6,280 | 1,130 | 8,220 | 2,310 | 12,400 | 3,910 | 12,700 | 5,370 | 15,800 | 15,800 | 19,800 | 12,800 | 15,400 | 7,670 |
| 14 | 21,700 | 12,600 | 16,300 | 7,500 | 15,100 | 5,460 | 13,200 | 3,080 | 804 | 513 | 5,800 | 1,110 | 8,860 | 2,410 | 12,600 | 3,980 | 12,000 | 5,150 | 15,500 | 15,500 | 18,900 | 12,400 | 16,900 | 7,920 |
| 15 | 19,600 | 11,500 | 15,100 | 7,430 | 16,800 | 6,010 | 11,200 | 3,470 | 1,100 | 518 | 5,100 | 848 | 9,900 | 2,820 | 13,100 | 4,500 | 13,000 | 5,170 | 14,800 | 14,800 | 18,000 | 12,000 | 18,000 | 9,070 |
| 16 | 18,300 | 9,900 | 14,400 | 7,260 | 12,600 | 5,290 | 9,820 | 2,630 | 846 | 466 | 7,380 | 993 | 9,960 | 3,090 | 12,900 | 4,460 | 13,200 | 5,260 | 15,100 | 15,100 | 17,100 | 11,700 | 18,300 | 9,360 |
| 17 | 20,400 | 9,920 | 14,000 | 7,150 | 14,100 | 5,180 | 13,000 | 3,010 | 1,440 | 490 | 8,300 | 1,300 | 10,100 | 3,340 | 13,100 | 4,730 | 12,800 | 4,690 | 15,000 | 15,000 | 18,000 | 11,600 | 14,800 | 8,980 |
| 18 | 17,900 | 9,770 | 14,400 | 7,100 | 14,400 | 4,430 | 14,300 | 3,890 | 4,420 | 491 | 7,880 | 1,640 | 8,650 | 3,420 | 13,200 | 4,870 | 12,000 | 4,730 | 15,800 | 15,800 | 17,800 | 12,000 | 17,300 | 9,150 |
| 19 | 18,000 | 9,770 | 16,000 | 7,080 | 16,000 | 5,620 | 17,200 | 6,840 | 4,730 | 970 | 8,710 | 1,830 | 7,190 | 3,120 | 13,800 | 4,940 | 11,900 | 4,370 | 16,300 | 16,300 | 17,200 | 11,700 | 13,900 | 6,760 |
| 20 | 19,400 | 9,760 | 15,300 | 6,940 | 16,400 | 6,720 | 17,600 | 8,080 | 4,590 | 687 | 10,100 | 2,080 | 8,340 | 2,600 | 13,800 | 4,810 | 11,600 | 4,140 | 16,700 | 16,700 | 16,800 | 11,000 | 12,200 | 6,150 |
| 21 | 19,400 | 10,700 | 16,000 | 7,120 | 18,300 | 7,520 | 18,900 | 7,960 | 5,770 | 973 | 10,200 | 2,810 | 8,520 | 2,410 | 14,300 | 4,730 | 11,600 | 4,090 | 16,100 | 16,100 | 16,600 | 10,800 | 13,800 | 5,670 |
| 22 | 19,300 | 10,900 | 16,500 | 7,100 | 18,700 | 8,600 | 18,900 | 8,080 | 6,860 | 1,090 | 9,470 | 3,300 | 8,770 | 2,310 | 15,200 | 4,970 | 11,100 | 4,050 | 16,200 | 16,200 | 16,800 | 11,000 | 14,000 | 5,190 |
| 23 | 19,600 | 9,410 | 20,000 | 9,370 | 17,900 | 8,450 | 18,600 | 9,110 | 7,390 | 1,140 | 11,000 | 3,320 | 8,560 | 2,470 | 15,300 | 5,390 | 10,200 | 3,740 | 16,100 | 16,100 | 17,300 | 11,100 | 15,600 | 5,610 |
| 24 | 20,600 | 10,000 | 22,600 | 11,800 | 18,000 | 8,580 | 18,000 | 8,870 | 6,440 | 1,220 | 11,900 | 3,610 | 8,710 | 2,280 | 15,300 | 5,640 | 9,500 | 3,600 | 15,100 | 15,100 | 18,100 | 12,100 | 15,300 | 6,350 |
| 25 | 19,300 | 9,490 | 18,700 | 8,580 | 17,500 | 8,200 | 17,700 | 7,060 | 8,190 | 1,340 | 11,800 | 4,120 | 7,430 | 1,980 | 14,700 | 4,780 | 9,090 | 3,540 | 16,400 | 16,400 | 17,900 | 11,800 | 15,900 | 6,680 |
| 26 | 20,200 | 10,200 | 18,600 | 9,750 | 16,400 | 7,190 | 18,700 | 8,340 | 8,190 | 1,220 | 10,900 | 3,680 | 7,830 | 1,930 | 12,900 | 4,330 | 9,080 | 3,570 | 15,400 | 15,400 | 18,000 | 11,800 | 14,800 | 7,000 |
| 27 | 20,500 | 11,000 | 14,800 | 7,520 | 13,200 | 5,350 | 18,400 | 7,720 | 7,810 | 1,500 | 9,180 | 3,420 | 7,720 | 2,000 | 10,800 | 4,040 | 10,300 | 3,740 | 16,600 | 16,600 | 18,000 | 11,500 | 15,900 | 6,900 |
| 28 | 19,000 | 9,710 | 13,200 | 5,800 | 11,500 | 4,780 | 16,800 | 7,890 | 5,940 | 1,540 | 9,340 | 3,490 | 7,820 | 2,080 | 9,500 | 3,950 | 11,500 | 3,920 | 18,300 | 18,300 | 19,000 | 11,400 | 16,400 | 6,070 |
| 29 | 20,400 | 10,600 | 13,800 | 5,400 | — | — | 16,300 | 6,960 | 5,660 | 1,480 | 9,980 | 3,490 | 8,340 | 2,240 | 11,300 | 3,730 | 11,700 | 4,330 | 20,200 | 20,200 | 19,300 | 11,900 | 17,800 | 8,110 |
| 30 | 17,800 | 10,300 | 14,500 | 5,480 | — | — | 15,000 | 6,130 | 4,910 | 1,480 | 9,520 | 3,650 | 6,770 | 2,210 | 14,600 | 4,290 | 14,600 | 5,940 | 20,000 | 20,000 | 15,400 | 10,400 | 17,800 | 8,470 |
| 31 | 17,900 | 8,910 | 15,100 | 5,660 | — | — | 13,400 | 4,960 | — | — | 7,870 | 3,410 | — | — | 13,700 | 4,860 | 14,000 | 5,480 | — | — | 14,000 | 8,500 | — | — |
| Mean | 20,313 | 11,408 | 16,594 | 7,887 | 14,786 | 5,882 | 13,757 | 4,957 | 4,575 | 1,018 | 7,649 | 2,083 | 8,795 | 2,715 | 12,322 | 3,917 | 12,615 | 4,639 | 15,953 | 7,771 | 18,590 | 11,777 | 15,437 | 7,434 |
| Maximum | 23,400 | 15,500 | 22,600 | 11,800 | 18,700 | 8,600 | 18,900 | 9,110 | 11,000 | 2,480 | 11,900 | 4,120 | 11,700 | 3,710 | 15,300 | 5,640 | 16,300 | 5,940 | 20,200 | 10,700 | 23,000 | 13,200 | 18,300 | 9,360 |
| Minimum | 17,800 | 8,910 | 13,200 | 5,400 | 4,240 | 4,240 | 7,370 | 1,910 | 776 | 466 | 3,470 | 848 | 6,770 | 1,930 | 7,370 | 1,900 | 9,080 | 3,540 | 12,600 | 5,220 | 14,000 | 8,500 | 12,200 | 5,190 |

**Table 18.** Daily maximum and minimum chloride concentrations, Delaware River at Chester, Pennsylvania (site number 01477050), for report year ending November 30, 2017.

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

| Day | Dec. 2016 | | Jan. 2017 | | Feb. 2017 | | Mar. 2017 | | Apr. 2017 | | May 2017 | | June 2017 | | July 2017 | | Aug. 2017 | | Sept. 2017 | | Oct. 2017 | | Nov. 2017 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 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 | 651 | 602 | 99 | 90 | 81 | 72 | 81 | 72 | 63 | 51 | 45 | 45 | 45 | 45 | 52 | 45 | 45 | 45 | 52 | 45 | 103 | 84 | 103 | 167 |
| 2 | 651 | 310 | 109 | 99 | 72 | 72 | 72 | 72 | 58 | 51 | 45 | 45 | 45 | 45 | 52 | 45 | 45 | 45 | 52 | 45 | 103 | 84 | 94 | 76 |
| 3 | 480 | 310 | 109 | 99 | 72 | 56 | 72 | 66 | * | * | 45 | 45 | 45 | 39 | 45 | 45 | 52 | 45 | 52 | 45 | 124 | 76 | 76 | 67 |
| 4 | 414 | 288 | 109 | 99 | 81 | 56 | 73 | 58 | * | * | 45 | 45 | 45 | 45 | 52 | 45 | 45 | 45 | 45 | 45 | 103 | 84 | 67 | 52 |
| 5 | 414 | 230 | 109 | 99 | 90 | 72 | 72 | 58 | * | * | 45 | 45 | 45 | 45 | 52 | 45 | 52 | 45 | 52 | 45 | 94 | 76 | 67 | 52 |
| 6 | 385 | 333 | 109 | 99 | 81 | 72 | 66 | 58 | * | * | 45 | 45 | 45 | 39 | 52 | 45 | 52 | 45 | 52 | 45 | 124 | 84 | 67 | 52 |
| 7 | 358 | 288 | 109 | 99 | 72 | 64 | 73 | 51 | * | * | 45 | 45 | 53 | 45 | 54 | 45 | 52 | 45 | 67 | 52 | 124 | 84 | 59 | 52 |
| 8 | 358 | 230 | 109 | 90 | 72 | 56 | 66 | 66 | * | * | 45 | 45 | 45 | 45 | 45 | 39 | 45 | 45 | 59 | 45 | 203 | 84 | 84 | 45 |
| 9 | 230 | 169 | 109 | 81 | 72 | 56 | 73 | 58 | 33 | 33 | 53 | 39 | 45 | 45 | 45 | 45 | 52 | 52 | 52 | 45 | 272 | 114 | 76 | 52 |
| 10 | 213 | 143 | 99 | 90 | 81 | 81 | 58 | 51 | 33 | 33 | 45 | 39 | 45 | 45 | 52 | 45 | 52 | 45 | 52 | 52 | 203 | 45 | 76 | 52 |
| 11 | 169 | 143 | 90 | 81 | 81 | 72 | 73 | 45 | 33 | 33 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 52 | 52 | 188 | 103 | 67 | 59 |
| 12 | 155 | 131 | 99 | 90 | 81 | 81 | 51 | 45 | 44 | 33 | 45 | 45 | 45 | 39 | 53 | 45 | 45 | 45 | 59 | 45 | 219 | 161 | 67 | 52 |
| 13 | 169 | 131 | 109 | 90 | 81 | 81 | 51 | 51 | 44 | 33 | 45 | 45 | 48 | 45 | 53 | 45 | 45 | 45 | 59 | 52 | 293 | 148 | 57 | 49 |
| 14 | 169 | 131 | 90 | 90 | 81 | 72 | 51 | 49 | 44 | 38 | 60 | 45 | 48 | 45 | 45 | 45 | 45 | 45 | 59 | 52 | 254 | 136 | 57 | 49 |
| 15 | 143 | 123 | 90 | 90 | 72 | 72 | 58 | 51 | 44 | 33 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 59 | 52 | 203 | 114 | 72 | 49 |
| 16 | 143 | 123 | 90 | 90 | 81 | 64 | 66 | 51 | 44 | 33 | 45 | 45 | 53 | 53 | 45 | 45 | 45 | 39 | 59 | 52 | 203 | 114 | 67 | 49 |
| 17 | 143 | 123 | 90 | 90 | 81 | 72 | 51 | 51 | 39 | 33 | 45 | 39 | 53 | 53 | 53 | 45 | 52 | 45 | 59 | 52 | 174 | 52 | 57 | 49 |
| 18 | 169 | 120 | 90 | 90 | 82 | 72 | 58 | 51 | 39 | 33 | 45 | 39 | 53 | 53 | 53 | 45 | 45 | 45 | 59 | 52 | 161 | 136 | 57 | 49 |
| 19 | 155 | 14 | 90 | 90 | 81 | 72 | 73 | 51 | 33 | 33 | 53 | 45 | 53 | 53 | 60 | 45 | 45 | 45 | 52 | 45 | 161 | 136 | 57 | 49 |
| 20 | 169 | 120 | 90 | 90 | 81 | 72 | 82 | 66 | 39 | 33 | 45 | 45 | 53 | 53 | 53 | 45 | 45 | 45 | 67 | 45 | 161 | 32 | 49 | 49 |
| 21 | 143 | 99 | 90 | 90 | 72 | 72 | 73 | 66 | 44 | 39 | 45 | 45 | 53 | 53 | 45 | 45 | 59 | 45 | 75 | 67 | 180 | 140 | 64 | 49 |
| 22 | 143 | 119 | 90 | 90 | 72 | 72 | 73 | 66 | 51 | 44 | 45 | 45 | 45 | 45 | 53 | 45 | 45 | 45 | 84 | 67 | 196 | 152 | 64 | 49 |
| 23 | 123 | 109 | 90 | 90 | 81 | 72 | 73 | 66 | 51 | 39 | 45 | 45 | 45 | 45 | 53 | 45 | 45 | 45 | 76 | 67 | 212 | 166 | 64 | 49 |
| 24 | 119 | 109 | 90 | 90 | 90 | 72 | 82 | 73 | 39 | 39 | 45 | 45 | 53 | 45 | 45 | 45 | 45 | 45 | 84 | 59 | 361 | 166 | 57 | 51 |
| 25 | 119 | 109 | 90 | 90 | 81 | 72 | 82 | 73 | 51 | 33 | 45 | 45 | 53 | 39 | 53 | 45 | 52 | 45 | 84 | 67 | 361 | 180 | 73 | 51 |
| 26 | 130 | 109 | 90 | 81 | 72 | 64 | 82 | 73 | 45 | 39 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 84 | 67 | 311 | 166 | 76 | 38 |
| 27 | 130 | 81 | 90 | 90 | 72 | 72 | 82 | 73 | 45 | 39 | 45 | 45 | 52 | 45 | 45 | 45 | 52 | 45 | 84 | 76 | 267 | 152 | 58 | 38 |
| 28 | 109 | 99 | 90 | 72 | 73 | 72 | 90 | 82 | 45 | 45 | 45 | 39 | 59 | 45 | 45 | 45 | 52 | 45 | 94 | 76 | 248 | 140 | 73 | 51 |
| 29 | 109 | 99 | 72 | 72 | — | — | * | * | 51 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 52 | 45 | 94 | 84 | 389 | 212 | 65 | 51 |
| 30 | 109 | 99 | 90 | 72 | — | — | 90 | 73 | 45 | 39 | 45 | 45 | 45 | 45 | 45 | 45 | 59 | 52 | 94 | 84 | 152 | 128 | 73 | 51 |
| 31 | 109 | 99 | 81 | 72 | — | — | 73 | 66 | — | — | 45 | 45 | — | — | 52 | 52 | 52 | 52 | — | — | 124 | 84 | — | — |
| Mean | 228 | 228 | 96 | 89 | 78 | 70 | 71 | 61 | 44 | 36 | 46 | 44 | 48 | 46 | 49 | 45 | 49 | 45 | 66 | 56 | 202 | 117 | 68 | 52 |
| Maximum | 651 | 651 | 109 | 199 | 90 | 81 | 90 | 82 | 51 | 45 | 60 | 45 | 59 | 53 | 60 | 52 | 59 | 52 | 94 | 84 | 389 | 212 | 103 | 76 |
| Minimum | 109 | 14 | 72 | 72 | 72 | 56 | 51 | 45 | 33 | 33 | 45 | 39 | 45 | 39 | 45 | 39 | 45 | 39 | 45 | 45 | 94 | 32 | 49 | 38 |

**Table 19.** Daily mean dissolved-oxygen concentration, Delaware River at Benjamin Franklin Bridge at Philadelphia, Pennsylvania (site number 01467200), April 1 to November 30, 2017.

[Station was renamed "Delaware River at Penn's Landing, Philadelphia, PA," in January 2020. Data from U.S. Geological Survey, 2020d. Concentrations are in milligrams per liter. —, not applicable]

| Day | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. |
|---|---|---|---|---|---|---|---|---|
| 1 | 11.8 | 8.9 | 6.4 | 6.8 | 6.0 | 5.9 | 6.0 | 8.0 |
| 2 | 11.9 | 8.8 | 6.6 | 6.4 | 6.0 | 6.0 | 6.0 | 8.1 |
| 3 | 11.8 | 8.8 | 6.7 | 6.3 | 6.0 | 5.8 | 6.0 | 8.0 |
| 4 | 11.8 | 8.8 | 6.8 | 6.2 | 6.4 | 5.9 | 6.0 | 8.0 |
| 5 | 11.7 | 8.5 | 6.7 | 6.0 | 6.6 | 6.1 | 6.1 | 7.9 |
| 6 | 11.4 | 8.2 | 6.6 | 5.8 | 6.7 | 5.9 | 6.0 | 7.9 |
| 7 | 10.9 | 8.4 | 6.7 | 5.4 | 6.5 | 5.7 | 5.9 | 8.1 |
| 8 | 11.0 | 8.6 | 7.0 | 5.4 | 6.2 | 5.8 | 5.9 | 8.3 |
| 9 | 11.2 | 8.6 | 7.3 | 5.6 | 6.2 | 6.0 | 5.8 | 8.2 |
| 10 | 11.2 | 8.6 | 7.7 | 5.7 | 6.2 | 6.2 | 5.6 | 8.5 |
| 11 | 11.3 | 8.7 | 8.0 | 5.7 | 6.1 | 6.2 | 5.6 | 8.8 |
| 12 | 11.2 | 8.8 | 8.1 | 5.6 | 5.9 | 6.1 | 5.9 | 8.8 |
| 13 | 11.0 | 8.9 | 8.2 | 5.6 | 5.8 | 5.9 | 6.0 | 8.7 |
| 14 | 10.7 | 9.1 | 8.3 | 5.4 | 5.9 | 5.8 | 6.1 | 8.7 |
| 15 | 10.4 | 9.4 | 8.4 | 5.0 | 5.7 | 5.8 | 6.1 | 8.7 |
| 16 | 10.1 | 9.3 | 8.4 | 5.0 | 5.6 | 5.8 | 6.2 | 8.6 |
| 17 | 9.9 | 9.1 | 8.2 | 5.1 | 5.5 | 5.7 | 6.3 | 9.0 |
| 18 | 9.8 | 8.8 | 7.9 | 5.2 | 5.4 | 5.6 | 6.3 | 9.0 |
| 19 | 9.8 | 8.6 | 7.8 | 5.4 | 5.1 | 5.7 | 6.4 | 9.2 |
| 20 | 9.7 | 8.4 | 7.5 | 5.5 | 5.2 | 5.7 | 6.5 | 9.6 |
| 21 | 9.6 | 8.3 | 7.5 | 5.6 | 5.2 | 5.7 | 6.5 | 9.7 |
| 22 | 9.3 | 8.0 | 7.5 | 5.7 | 5.2 | 5.6 | 6.4 | 9.7 |
| 23 | 9.1 | 7.6 | 7.3 | 5.4 | 5.3 | 5.6 | 6.5 | 9.8 |
| 24 | 9.0 | 7.3 | 7.1 | 5.3 | 5.2 | 5.6 | 6.6 | 9.8 |
| 25 | 9.0 | 7.1 | 7.0 | 5.3 | 5.2 | 5.4 | 6.6 | 9.8 |
| 26 | 8.9 | 6.8 | 6.9 | 5.3 | 5.3 | 5.4 | 6.6 | 9.9 |
| 27 | 8.9 | 6.8 | 6.8 | 5.4 | 5.4 | 5.4 | 6.8 | 10.1 |
| 28 | 9.0 | 6.7 | 6.8 | 5.4 | 5.6 | 5.4 | 6.9 | 10.1 |
| 29 | 8.9 | 6.6 | 6.8 | 5.4 | 5.7 | 5.6 | 6.8 | 10.0 |
| 30 | 9.0 | 6.4 | 7.0 | 5.6 | 5.6 | 5.8 | 7.2 | 10.0 |
| 31 | — | 6.3 | — | 5.8 | 5.7 | — | 7.8 | — |
| Mean | 10.3 | 8.2 | 7.3 | 5.6 | 5.8 | 5.8 | 6.3 | 9.0 |
| Maximum | 11.9 | 9.4 | 8.4 | 6.8 | 6.7 | 6.2 | 7.8 | 10.1 |
| Minimum | 8.9 | 6.3 | 6.4 | 5.0 | 5.1 | 5.4 | 5.6 | 7.9 |

**Table 20.** Daily mean dissolved-oxygen concentration, Delaware at Chester, Pennsylvania (site number 01477050), April 1 to November 30, 2017.

| Day | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. |
|---|---|---|---|---|---|---|---|---|
| 1 | 11.2 | 8.5 | 6.5 | 6.6 | 7.2 | 6.2 | 6.7 | 7.6 |
| 2 | 11.2 | 8.6 | 6.6 | 6.4 | 7.0 | 6.2 | 6.8 | 7.4 |
| 3 | 11.2 | 8.6 | 6.8 | 6.2 | 7.0 | 6.3 | 6.8 | 7.1 |
| 4 | 11.1 | 8.8 | 7.3 | 6.2 | 7.3 | 6.3 | 6.8 | 7.1 |
| 5 | 10.9 | 8.8 | 7.3 | 6.2 | 7.3 | 6.5 | 6.7 | 7.1 |
| 6 | 10.8 | 8.5 | 7.4 | 6.1 | 7.1 | 6.1 | 6.4 | 7.2 |
| 7 | 10.6 | 8.4 | 7.6 | 5.9 | 6.6 | 6.0 | 6.3 | 7.2 |
| 8 | 10.6 | 8.2 | 7.4 | 5.8 | 6.4 | 6.1 | 6.4 | 7.4 |
| 9 | 10.6 | 8.1 | 7.5 | 5.9 | 6.4 | 6.2 | 6.2 | 7.4 |
| 10 | 10.5 | 7.9 | 7.9 | 6.1 | 6.2 | 6.3 | 5.8 | 7.6 |
| 11 | 10.5 | 7.9 | 8.3 | 6.3 | 6.1 | 6.4 | 5.7 | 7.9 |
| 12 | 10.4 | 7.9 | 8.8 | 6.2 | 5.9 | 6.3 | 6.3 | 7.9 |
| 13 | 10.3 | 8.2 | 9.3 | 6.1 | 5.7 | 6.1 | 6.6 | 7.8 |
| 14 | 10.2 | 8.2 | 9.5 | 5.8 | 5.6 | 6.1 | 6.4 | 7.8 |
| 15 | 10.1 | 8.4 | 9.8 | 5.5 | 5.2 | 6.1 | 6.3 | 7.9 |
| 16 | 10.0 | 8.5 | 9.7 | 5.5 | 5.0 | 5.9 | 6.2 | 8.0 |
| 17 | 9.9 | 8.6 | 9.1 | 5.6 | 5.2 | 6.0 | 6.4 | 8.3 |
| 18 | 9.7 | 8.7 | 8.6 | 5.7 | 5.1 | 5.9 | 6.6 | 8.3 |
| 19 | 9.7 | 8.9 | 8.1 | 5.9 | 5.2 | 5.9 | 6.7 | 8.8 |
| 20 | 9.5 | 8.9 | 7.7 | 6.2 | 5.3 | 6.0 | 6.8 | 9.0 |
| 21 | 9.3 | 9.3 | 7.6 | 6.4 | 5.4 | 5.9 | 6.7 | 9.3 |
| 22 | 9.1 | 9.0 | 7.5 | 6.6 | 5.7 | 5.8 | 6.7 | 9.2 |
| 23 | 9.0 | 8.6 | 7.1 | 6.6 | 6.0 | 5.8 | 6.8 | 9.2 |
| 24 | 9.0 | 8.7 | 6.8 | 6.5 | 5.8 | 5.7 | 7.4 | 9.1 |
| 25 | 9.1 | 8.6 | 6.6 | 6.2 | 5.8 | 5.7 | 7.2 | 9.0 |
| 26 | 8.9 | 8.4 | 6.6 | 6.2 | 5.9 | 5.8 | 7.1 | 9.0 |
| 27 | 8.7 | 8.2 | 6.5 | 6.2 | 6.1 | 5.8 | 7.2 | 9.0 |
| 28 | 8.5 | 8.2 | 6.4 | 6.0 | 6.4 | 5.9 | 7.4 | 9.0 |
| 29 | 8.4 | 7.6 | 6.5 | 6.1 | 6.4 | 6.2 | 7.6 | 9.0 |
| 30 | 8.4 | 7.1 | 6.7 | 6.6 | 6.4 | 6.4 | 7.7 | 8.9 |
| 31 | — | 6.6 | — | 7.0 | 6.3 | — | 7.7 | — |
| Mean | 9.9 | 8.4 | 7.6 | 6.2 | 6.1 | 6.1 | 6.7 | 8.2 |
| Maximum | 11.2 | 9.3 | 9.8 | 7.0 | 7.3 | 6.5 | 7.7 | 9.3 |
| Minimum | 8.4 | 6.6 | 6.4 | 5.5 | 5.0 | 5.7 | 5.7 | 7.1 |

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# 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 Montague, New Jersey (U.S. Geological Survey streamgaging site 01438500). The balancing adjustment calls for more water to be released when previous directed releases (a 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. Based on provisional data, the balancing adjustment is computed as 10 percent of the difference between the cumulative adjusted directed release and the cumulative directed release required for exact forecasting. The balancing adjustment is applied to the following day's release design. The maximum daily balancing adjustment is intentionally limited to preclude unacceptably large variations in the 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 designed to maintain specified minimum flows in stream channels immediately below the reservoirs (tailwaters). The following conservation release rate zones are defined in the October 21, 2017, Flexible Flow Management Plan:

- Spill Mitigation (L1) Discharge Mitigation Releases are releases designed to help mitigate the effects of spilling immediately below the Delaware River Basin reservoirs. New York City shall make such controlled releases from the Delaware River Basin reservoirs in accordance with figures 1 and 2 and tables 4a-g in the 2017 Flexible Flow Management Program (FFMP2017). Zones or volumes may change depending on the specific requirements of the FFMP in effect at the time and may change during a report year if a new FFMP becomes effective. Three zones of reservoir-specific storage (L1–a, L1–b, and L1–c) are defined relative to two rule curves for each reservoir.

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

- Watch (L3) Conservation releases from table 3 of FFMP2017 when New York City combined reservoir storage is in the drought watch (L3) storage zone.

- Warning (L4) Conservation releases from table 3 of FFMP2017 when New York City combined reservoir storage is in the drought warning (L4) storage zone.

- Drought (L5) Conservation releases from table 3 of FFMP2017 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.

**diversions** The out-of-basin transfer of water by New York City from the 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 Canal.

**excess quantity** As defined by the Decree, the excess quantity of water is "equal to 83 percent of the amount by which the estimated consumption by New York City during the year is less than New York City's estimate of continuous safe yield (1,665 million gallons per day [Mgal/d] stipulated by the 1954 Decree) from all its sources of supply obtainable without pumping, except that the excess quantity shall not exceed 70 billion gallons and the seasonal period of release of the excess quantity begins on June 15 and concludes on the following March 15."

**daily excess release credits** Daily credits and deficits during the seasonal period (from June 15 to the following March 15) are computed as the arithmetic difference between the daily mean discharge of the Delaware River at Montague, New Jersey, and 1,750 cubic feet per second ($ft^3/s$). The daily credit cannot exceed the 24-hour period releases from Pepacton, Cannonsville, and Neversink Reservoirs route to Montague and made in accordance with direction, except as follows: during the seasonal period, credits are also applied for part of all of the other releases from these reservoirs that contribute to the daily mean discharge at Montague between 1,750 ($ft^3/s$) and the applicable excess release rate.

**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 a 1954 Decree of the Supreme Court of the United States (available at https://webapps.usgs.gov/odrm/about/decree) and unanimously agreed to by the Decree Parties (Delaware, New Jersey, New York, New York City, and Pennsylvania).

**Interim Excess Release Quantity** An Interim Excess Release Quantity (IERQ) was defined in the 2017 Flexible Flow Management Program (app. 2).

Effective from December 1, 2016, to May 31, 2017, 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 [Mgal/d])—and New York City's current estimate of continuous safe yield of the New York City water supply system of 1,290 Mgal/d, obtainable without pumping. The IERQ was available for release of 15,468 cubic feet per second accumulated daily ([$ft^3/s$]-d). 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 Delaware River Basin reservoirs. The IERQ balance of 6.09 billion gallons (9,423 [$ft^3/s$]-d) is reserved and can be used for additional releases to meet the Trenton Equivalent Flow Objective or to establish an Extraordinary Needs Bank.

Effective October 23, 2017, in FFMP2017, an IERQ of 10.0 billion gallons (15,468 [$ft^3/s$]-d) shall be provided (determined as in the original FFMP) and based upon 83 percent of the difference between 1,257 Mgal/d (the highest year's consumption of the New York City water supply system between 2002 and 2006, inclusive) and 1,290 Mgal/d (New York City's estimate of continuous safe yield of the New York City water supply system at that time, obtainable without pumping). The IERQ shall reset to 10.0 billion gallons (15,468 [$ft^3/s$]-d) on June 1st of each year of the Agreement or upon return to normal conditions after drought.

For each year beginning June 1st of the current program, the IERQ shall be used as defined below:

Trenton Equivalent Flow Objective: 6.09 billion gallons (9,423 cubic feet per second accumulated daily [($ft^3$/s)-d]) of the IERQ, upon request by the "Lower Basin States" or the Delaware River Basin Commission (DRBC), New York City shall release from the IERQ water in sufficient quantities to maintain a flow at Trenton of 3,000 cubic feet per second ($ft^3$/s) during basin-wide normal conditions for the period commencing on June 1 and continuing through May 31. NYC shall make releases from the IERQ as provided above until the aggregate quantity of the IERQ is exhausted.

Thermal Mitigation: 1.62 billion gallons (2,500 [$ft^3$/s]-d) of the IERQ is banked and available during basinwide normal conditions to support mitigation of thermal events that could adversely impact the cold-water fishery below the New York City Delaware reservoirs. Use of the water for any single event is informed by the current and forecasted basin conditions and the thermal mitigation guidance as developed by the Decree Parties. Releases for thermal mitigation shall be made at the direction of the New York State Department of Environmental Conservation (NYSDEC) and administered by the Office of the Delaware River Master (ODRM) and the New York City Department of Environmental Protection (NYCDEP) with notification made to all Decree Parties.

Rapid Flow Change Mitigation: 0.65 billion gallons (1,000 [$ft^3$/s]-d) of the IERQ is to be banked and is available during basinwide normal conditions to mitigate potentially ecologically harmful conditions caused by rapid reductions in the New York City Delaware reservoir directed releases because of the requirements of the Montague flow objective in Section 2.a. Use of the water for any single event is informed by the current basin conditions and the guidance for its use as developed by the Decree Parties. Releases to mitigate rapid flow changes shall be made at the direction of the ODRM and NYCDEP, with notification to all Decree Parties.

New Jersey Diversion Amelioration: 1.65 billion gallons (2,545 [$ft^3$/s]-d) of the IERQ is banked and reserved for use during drought conditions (basinwide or lower basin) to supply New Jersey's increased diversion when the New Jersey Diversion Offset Bank as described below in Section 4.d., has been exhausted. Once the New York City reservoirs enter into drought watch, the combined storage of the City Delaware Reservoirs shall be computed as the actual storage volume minus the NJ Diversion Amelioration Bank and NJ Diversion Offset Bank volumes for purposes of determining storage zones.

**Interim Excess Release Quantity Extraordinary (IERQ) Needs Bank** In addition to the hydrologic criteria described in section 2.5.6.A. of the Water Code (18 CFR part 410) and subject to other provisional uses of the Interim Excess Release Quantity (IERQ) as provided herein, the Decree Parties, 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 reallocate all or a portion of the IERQ uses identified in section 3.c 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 reallocated shall be deducted from the agreed upon IERQ source as defined above. 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 sites are used on a year-round basis in the 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 level is also referred to as minimum full-operating level.

**Montague flow objective** In section 2a of the October 21, 2017 Flexible Flow Management Program (FFMP2017; app. 2), "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 the Code of Federal Regulations (18 CFR part 410).

**rate of flow** Mean discharge for a specified 24-hour period, in cubic feet per second ($ft^3/s$) 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. The Montague flow objective is a benchmark used to control upstream releases and withdrawals of water from the Delaware River Basin.

**reservoir-controlled releases** Controlled releases from reservoirs passed through outlet valves in the dams or through turbines in powerplants. These releases do not include spillway overflow at the reservoirs.

**salt front** The salt front is defined as the 250 parts-per-million isochlor, or line of equal chloride concentration, in the Delaware River estuary—1 part per million is 1 part of solute (in this case, chloride) per 1 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 12 and a 25-hour day on November 5.

**Trenton flow objective** In section 2b of the October 21, 2017, Flexible Flow Management Program (FFMP2017; app. 2), "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 the Code of Federal Regulations (18 CFR part 410).

**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 the Rio Reservoir, but including spillway overflow at these dams.

# Appendix 1. Four-Party Letter for Interim Operations

A letter, signed by four of the five Decree Parties of the Amended Decree of the U.S. Supreme Court (*New Jersey* v. *New York*, 347 U.S. 995 (1954)), notified the Office of the Delaware River Master of the intent to continue higher conservation releases consistent with recent operational plans rather than those established by reverting to DRBC Docket No. D–77–20 CP (Revised), which went into effect June 1, 2017. A copy of the letter is provided here as appendix 1.

May 31, 2017

Robert R. Mason, Jr.
Delaware River Master
12201 Sunrise Valley Dr.
415 National Center
Reston, VA 20192

Steve J. Tambini, P.E.
Executive Director
Delaware River Basin Commission
P.O. Box 7360
West Trenton, NJ 08628

Dear Mr. Mason & Mr. Tambini:

As you are aware, the current Flexible Flow Management Plan (FFMP) expires, by its terms on May 31, 2017. Pursuant to Paragraph 21 of the FFMP upon expiration, diversion and release requirements will revert to what is provided for in DRBC Docket D-77-20 (Revised). D-77-20 (Revised) emanates from the Good Faith Agreement and was developed with the unanimous consent of the 1954 Decree Parties as is provided for in Article 3.3(a) of the Delaware River Compact.

We had hoped to avoid this reversion. The City of New York responded to the document submitted by the State of New Jersey in February with a robust alternative proposal for a new FFMP that included a data-driven path toward a long-term solution. Notwithstanding these proposals, to date, there has been no agreement among the Decree Parties with respect to a modified FFMP. As an alternative, the states of New York, Pennsylvania, Delaware and the City of New York have suggested the extension of the current FFMP for another year. This would allow the Decree Parties the time necessary to work through significant differences that apparently exist between what New Jersey and the City of New York have proposed. New Jersey, however, has refused to agree to the proposed extension and instead has indicated that all parties should plan for a reversion to D-77-20 (Revised).

It is indeed unfortunate that New Jersey has taken this position. Nonetheless, that is where the situation currently stands and all Parties need to plan accordingly. This letter, therefore, informs you of the current situation and also that, notwithstanding the New Jersey position, the City of New York will make releases beyond the minimums set forth in D-77-20 (Revised) and New York State regulations in order to address important flow related issues during the current impasse. Those flows are attached hereto as Exhibit A.

It is important to note that releases above what is provided in D-77-20 (Revised) are not precedent for any continued or additional actions by the City of New York and that these flows will be provided at the sole discretion of the City of New York. We expect DRBC and the River Master to strictly enforce the maximum diversions authorized under the DRBC Water Code and

hold New Jersey to the limitations imposed therein. The City will make these releases subject to its obligation to operate its water supply system in a prudent and responsible manner, and is prepared to continue these releases for a period of time in order to allow for meaningful discussion of a longer-term agreement, so long as the Decree Parties engage in good faith negotiations.

The executing parties acknowledge that signature or acquiescence to this letter and Exhibit hereto does not waive any claims, rights, or defenses that any executing party may have against other participating parties arising out of the releases and management of water resources subject of this letter.

New York City, the State of New York, the Commonwealth of Pennsylvania, and the State of Delaware will work with you to ensure that operations on the Delaware River are undertaken in an orderly fashion and, notwithstanding the current position of New Jersey, will continue to attempt to resolve differences among the Decree Parties. In the meantime, do not hesitate to contact us if you have any questions or need additional information.

Sincerely,

Mark Klotz
Director
New York State Department of
Environmental Conservation
625 Broadway, 4th FL
Albany, NY 12233

Kelly Heffner
Special Deputy Secretary
Pennsylvania Department of
Environmental Protection
400 Market St.
Harrisburg, PA 21701

Paul V. Rush, P.E.
Deputy Commissioner
New York City Department of
Environmental Protection
P.O. Box 358
Grahamsville, NY 12740

David Wunsch, Ph.D.
State Geologist & Director,
Delaware Geological Survey
257 Academy St.
Newark, DE 19716

# Appendix 2. Agreement For a Flexible Flow Management Program

An agreement affecting the Amended Decree of the U.S. Supreme Court in *New Jersey* v. *New York*, 347 U.S. 995 (1954), for managing diversions and releases under the Decree, was consented to by all of the Decree Parties: the State of Delaware, the State of New Jersey, the State of New York, the Commonwealth of Pennsylvania, and the City of New York. The agreement is a 10-year, two-part successor to the Flexible Flow Management Program that ended on May 31, 2016. A copy of the agreement and the associated operations plan, both of which went into effect beginning October 23, 2017, are included as appendix 2 here; the original page numbers were removed to avoid confusion. The agreement and operations plan, respectively, are available through the U.S. Geological Survey website (https://webapps.usgs.gov/odrm/documents/ffmp/FFMP2017.pdf; https://webapps.usgs.gov/odrm/documents/ffmp/FFMP2017_Appendix_A.pdf).

FFMP2017

**AGREEMENT FOR A FLEXIBLE FLOW MANAGEMENT PROGRAM**

This Agreement to establish a Flexible Flow Management Program (FFMP2017 or this Agreement), is consented to by and among the State of Delaware (DE), the State of New Jersey (NJ), the State of New York (NY), the Commonwealth of Pennsylvania (PA), and the City of New York (NYC or City), (hereafter Decree Parties) who are Parties to the Amended Decree (Decree) of the U.S. Supreme Court in New Jersey v. New York, 347 U.S. 995 (1954).

**RECITALS**

1. In 1954, the United States Supreme Court entered a Decree in New Jersey v New York, 347 U.S. 995 (1954) (Decree). That Decree established certain rights and obligations for New York City and New Jersey concerning diversions of water out of the Delaware River Basin. Delaware, New Jersey, New York, Pennsylvania and New York City (hereinafter collectively referred to as the Decree Parties) were all Parties to the Supreme Court action and are bound by the terms of the Decree.
2. In 1961, Delaware, New Jersey, New York, Pennsylvania and the United States (hereinafter referred to collectively as the Compact Parties) entered into the Delaware River Basin Compact (Compact). The Compact established the Delaware River Basin Commission (DRBC or Commission), made up of the Compact Parties. The Compact provided the Commission with various authorities regarding water and associated management within the Delaware River Basin, subject to certain restrictions related to the Decree.
3. Article 3.4 of the Compact provides that the Compact Parties waived and relinquished for the duration of the Compact any right, privilege or power they may have to apply for any modification of the terms of the Decree which would increase or decrease the diversions

authorized or increase or decrease the releases required under the Decree except as may otherwise be provided in Article 3.3 of the Compact.

4. Article 3.3 of the Compact provides that the diversions, compensating releases, rights, conditions, obligations, and provisions for the administration of the Decree shall not be impaired, diminished or otherwise adversely affected without the unanimous consent of the Decree Parties, except during a Commission-declared state of emergency and after the Commission consults with the River Master.
5. In November 1982, the Decree Parties negotiated the Good Faith Agreement (GFA). The GFA included recommendations to the Commission for modified diversions and releases related to the operation of Cannonsville, Pepacton, and Neversink Reservoirs (New York City Reservoirs) and diversions by New Jersey. The recommended modifications, among other things, addressed drought-related diversion and release issues emanating from record drought in the 1960s as well as conservation-related releases. The GFA also included the unanimous consent of the Decree Parties to these proposed modifications.
6. The GFA recommendations for reductions during periods of drought in diversions by New York City and New Jersey and in flow objectives were incorporated into the Commission's Water Code through DRBC Resolution 83-13, also with the unanimous consent of the Decree Parties.
7. The GFA recommendations for augmented conservation releases from the New York City Reservoirs were adopted by the Commission as Docket D-77-20 CP (Revised) and were made a part of the Commission's Comprehensive Plan. With the unanimous consent of the Decree Parties, the provisions of D-77-20 CP (Revised) were modified several times on a temporary and experimental basis by means of Commission-issued dockets, through 2007.
8. In 2007, the Decree Parties, through unanimous consent, stipulated to the first of a series of flexible flow management programs that were implemented in lieu of D-77-20 CP (Revised) and

revisions. The flexible flow management program and its subsequent revisions modified the diversions by New Jersey under drought conditions and created a tailwater habitat protection program and a discharge mitigation program.

9. Upon termination of each applicable flexible flow management program and absent an agreement to proceed in another way, diversions and releases from New York City reservoirs and diversions by New Jersey would be in accordance with the provisions of D-77-20 CP (Revised) and the Water Code.
10. The most recent Flexible Flow Management Program terminated on May 31, 2017.
11. The Decree Parties have sought and obtained public comments in the formulation of this and prior agreements for the implementation of flexible flow management programs on the Delaware River. The Decree Parties will continue to seek public input as they implement the 2017 Flexible Flow Management Program (FFMP2017) and negotiate successor agreements.
12. The Decree Parties have met and conferred and have agreed to a program for the management of diversions, releases, and related operational procedures on the Delaware River that, for the term of this Agreement, will supersede and replace existing diversion, release and related operational procedures for the Delaware River. The Decree Parties during the term of this Agreement shall work to modify the program and to negotiate a long-term agreement to replace this agreement.

**AGREEMENT AND UNANIMOUS CONSENT**

Accordingly, the Decree Parties, consistent with the provisions of the Compact, HEREBY UNANIMOUSLY AGREE AND CONSENT to the following:

FFMP2017

## I. THE FLEXIBLE FLOW MANAGEMENT PROGRAM

The Flexible Flow Management Program (FFMP2017) is set forth in full in this Agreement, which includes Appendix A, attached hereto and fully incorporated herein by reference. Appendix A may be modified by the unanimous consent of the Decree Parties.

## II. EFFECTIVE DATE

This Agreement shall become effective upon unanimous signed consent by all of the Decree Parties (Effective Date).

## III. TERM OF AGREEMENT

1. This Agreement is for a term starting on the Effective Date and is a predicate to a longer-term flexible flow management program. This Agreement may remain in effect until May 31, 2028 unless renewed, modified or terminated earlier pursuant to either Section III.4. or Section VII.
2. This Agreement provides for an interim review by the Decree Parties prior to May 31, 2023.
3. Based on the progress in negotiations made by May 31, 2023 and on the results of studies described in Section IV, the Decree Parties shall decide by unanimous consent to either: (a.) continue this Agreement until May 31, 2028, (b.) modify this Agreement, or (c.) continue this Agreement for a shorter term to allow for negotiations of an alternative course of action.
4. In the event that the Decree Parties do not reach unanimous consent on how to proceed, this Agreement shall terminate on May 31, 2023, except for those provisions related to the New Jersey diversion outlined in Section VIII.

## IV. MATTERS TO BE EVALUATED IN THE MODIFICATION OF THE FLEXIBLE FLOW MANAGEMENT PROGRAM

1. During the term of this Agreement, if modifications to the FFMP2017 are agreed to by the unanimous consent of the Decree Parties, including any modifications that are identified as a

result of the studies referenced in Section IV.3, the FFMP2017 shall be modified and implemented accordingly. Negotiation necessary to reach unanimous consent regarding modifications to Appendix A or the Agreement may be based on the criteria set forth in Section IV.3. Modifications shall be recorded by and managed through the Office of the River Master at the request of the Decree Parties. After any modification is signed by all the Decree Parties, it will be made available to the public.

2. The Decree Parties have identified in Sections IV.3 through IV.5 a list of matters to be evaluated throughout the term of this Agreement. In reviewing proposed modifications to the FFMP2017 the Decree Parties shall consider, but are not limited to, in no order of priority, the following:

   (a.) Decree Party equity

   (b.) Net benefits and costs to environmental and economic resources

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

   (d.) Habitat types—with naturally-occurring habitats receiving consideration over human-made habitats

   (e.) Scientific basis for modification

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

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

   (h.) Potential impacts to water quality, existing or draft National and State Pollution Discharge Elimination System permits and the assimilative capacity of the Delaware River

   (i.) Ease and practicability of operation

   (j.) Consistency with adaptive management principles

   (k.) Applicability and implementation of water conservation practices

   (l.) Impacts to salinity, including those associated with sea level rise.

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3. Through May 31, 2023, the Decree Parties shall support and conduct the required studies and evaluations outlined in this Agreement in accordance with mutually agreeable scope, work schedules and timelines. The scope and work schedules will include progress monitoring and defined milestones. The Decree Parties will endeavor to commence the studies described below within six months of the execution of this Agreement, including completing scopes and schedules of work and identifying roles and responsibilities of the Decree Parties, the River Master's Office and other external parties as appropriate.
    a. The primary objectives of the studies will be to evaluate the impacts and conditions resulting from the following:
        i. The detachment of releases from the New York City Delaware Reservoirs from the position of the salt front during drought emergency and replacing the benefit that New York City releases have with respect to the salt front with an alternative methodology or methodologies that will provide comparable protection for existing resources within the Basin.
        ii. The increase in the New Jersey Diversion during drought conditions (basinwide and/or lower basin).
        iii. The increase in available storage for the lower Basin from either the optimization of existing storage or the development of new storage in the Basin in accordance with the mutually adopted GFA and water planning efforts conducted by the Decree Parties.
    b. The studies identified in subdivision (a) above will evaluate the impacts to: the salt front, aquatic and fishery resources in the Basin, and projections of future sea level rise to salinity. The studies will also evaluate whether the changes identified in subdivisions IV.3.a.i through iii above will provide for comparable protection for existing resources

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and uses within the Basin to avoid significant adverse impacts to the Basin. If studies by the Decree Parties or external entities on behalf of a Decree Party support that detachment provides comparable protection for existing resources and uses within the Basin and does not cause significant adverse impacts, then detachment will be implemented between June 1, 2023 and May 31, 2028, based on a schedule to be unanimously determined by the Decree Parties.

4. The Decree Parties shall study, evaluate, and consider the River Master's balancing adjustment procedure.
5. During the second five years of this Agreement, from June 1, 2023 through May 31, 2028, the Decree Parties shall identify and stipulate by unanimous consent the method of calculating the Excess Release Quantity.
6. The studies described in Sections IV.3 and IV.4 shall consider the following, as relevant, in no particular order of priority:
    (a.) Coordination with DRBC plans and programs
    (b.) Climate change and sea level rise
    (c.) Thermal mitigation for habitat and ecological protection
    (d.) Rapid flow change mitigation
    (e.) Alternate uses of the F.E. Walter Reservoir
    (f.) Montague and Trenton flow objectives
    (g.) Drought management
    (h.) Flood mitigation
    (i.) Optimization of use of other sources of augmentation flows
    (j.) Endangered species
    (k.) Cold and warm-water and migratory fishery resources
    (l.) Estuary and bay ecological health

(m.) Other relevant conditions

## V. CONSENT PURSUANT TO ARTICLE 3.3 OF THE COMPACT; RESOLUTION OF CONFLICTS

This Agreement is a stipulation among the Decree Parties and constitutes the unanimous consent for DRBC to take certain actions authorized by Article 3.3 of the Compact. The Decree Parties shall implement this Agreement in advance and independent of any action by DRBC to amend Docket D-77-20 CP (Revised) and the Water Code to be consistent with this Agreement. In the case of a conflict among the provisions of this Agreement on the one hand, and DRBC Docket D 77-20 CP (Revised) or the Delaware River Basin Water Code, 18 CFR Part 410, Sections 2.5.3 through 2.5.6 (drought operations) on the other, the provisions of FFMP2017 will, nonetheless, be implemented during the term of this Agreement, until and unless the conflicts are resolved.

## VI. RESERVATIONS

1. Nothing contained herein is nor should it be deemed to constitute a waiver or modification of, or limitation on, the Decree Parties' rights under the Decree or with respect to any other legal right, obligation, or duty. This Agreement shall not be cited as precedent of any intention to waive, modify, or limit such rights.
2. The Decree Parties have authorized certain actions, as part of FFMP2017 including, but not limited to discharge mitigation releases, to assist in mitigating the impacts of flooding immediately below the New York City 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.

FFMP2017

**VII. TERMINATION AND REVERSION**

1. Any Decree Party may terminate this Agreement by providing written notice to the other Decree Parties of its intent to terminate this Agreement. This written notice shall be provided not less than 30 days prior to such termination date. The Decree Parties agree to enter into good faith negotiations to determine a course of action in the event of such termination.
2. Upon any failure by the Decree Parties to continue this Agreement, including operations described in Appendix A, as described in Section III.4 or Section VII.1, and without a subsequent executed agreement, operations shall revert to those provided in DRBC Docket D-77-20 CP (Revised) and Sections 2.5.3 through 2.5.6 of the DRBC Water Code.

**VIII. SAVINGS PROVISION FOR NEW JERSEY DIVERSIONS AND DIVERSION BANK**

1. Upon termination of this Agreement prior to May 31, 2028, pursuant to Section III.4 or Section VII.1, by any Decree Party other than New Jersey:
    a. The River Master shall set aside, maintain, and make available a total of 1.034 billion gallons of the Excess Release Quantity as the "New Jersey Surviving Diversions Bank" for purpose of offsetting New Jersey's diversions under Subdivision VIII.1.b during drought conditions.
    b. New Jersey's right to diversions in accordance with Section 4, Table 1 of Appendix A shall be allowed to take place until May 31, 2023 if such termination occurs prior to June 1, 2023 or until May 31, 2028 if such termination occurs after May 31, 2023.
2. The New Jersey Surviving Diversions Bank shall be accounted for and used as follows:
    a. Once the New York City Reservoirs enter into drought watch, the combined storage of the New York City Delaware Reservoirs, for the purposes of determining drought

operations, shall be computed as the actual storage volume minus the New Jersey Surviving Diversions Bank volumes for purposes of determining storage zones.

b. If the accumulated incremental increased diversions by New Jersey,[1] at any time, exceed the available water in the New Jersey Surviving Diversions Bank, the Lower Basin Reservoirs in Pennsylvania will provide the additional water to offset New Jersey's diversions.

c. Releases from the New Jersey Surviving Diversions Bank shall be at the direction of DRBC with prior notification to New Jersey, 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.

d. Releases from the New Jersey Surviving Diversions Bank or from the Lower Basin Reservoirs in Pennsylvania to offset New Jersey's incremental increases in out-of-basin diversions, measured at Port Mercer, NJ 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 diversion on any day when DRBC determines that no water is required to meet the current Trenton flow objective.

e. The River Master will maintain the ongoing accounting for releases made from this bank. At no time during the year commencing June 1st shall releases from the New Jersey Surviving Diversions Bank exceed the balance of the bank. The bank will reset under normal conditions on June 1st. If under basin wide drought conditions on May

[1] The accumulated incremental increased diversions by New Jersey shall be the differences in New Jersey's diversion, computed on the basis of Table 1 of the Good Faith Agreement, and the corresponding rates in Section 4, Table 1 of FFMP2017.

FFMP2017

31st the balance of the New Jersey Surviving Diversions Bank shall remain available for use until normal conditions resume based on Figure 1 of Section 2.5.3. of the Water Code. Upon return to normal conditions, the New Jersey Surviving Diversions Bank will reset.

3. This Section VIII shall survive this Agreement until it expires on May 31, 2028.

FFMP2017

# Agreement and Consent of the Parties to the 1954 U.S. Supreme Court Decree Effective October 21, 2017

STATE OF DELAWARE

The State of Delaware hereby approves this Agreement of the Parties to the U.S. Supreme Court Decree of 1954 for a Flexible Flow Management Program and consents to the submission of this Agreement to the Delaware River Basin Commission for adoption, exactly as drafted, or exactly as otherwise unanimously consented to by the Decree Parties, as appropriate through rules, dockets and/ or resolutions, provided, however, that the State of Delaware retains the right to terminate this Agreement or otherwise withdraw consent, consistent with the provisions of Paragraphs III.4, VII and VIII herein, in which case operations shall revert to those provided in DRBC Docket D-77-20 CP (Revised) and sections 2.5.2 through 2.5.6 of the DRBC Water Code, adopted by Resolutions 88-13 and 88-22 (revised) except as otherwise provided in the agreement and provided further that this approval and consent is subject to the further agreement of the Parties as provided for in Section 3.3(a) of the Delaware River Basin Compact.

//Signed by David R. Wunsch//

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FFMP2017

# Agreement of the Parties to the 1954 U.S. Supreme Court Decree Effective October 21, 2017

STATE OF NEW JERSEY

The State of New Jersey hereby approves this Agreement of the Parties to the U.S. Supreme Court Decree of 1954 for a Flexible Flow Management Program and consents to the submission of this Agreement to the Delaware River Basin Commission for adoption, exactly as drafted, or exactly as otherwise unanimously consented to by the Decree Parties, as appropriate through rules, dockets and/or resolutions, provided, however, that the State of New Jersey retains the right to terminate this Agreement or otherwise withdraw consent, consistent with the provisions of Paragraphs III.4, VII and VIII herein, in which case operations shall revert to those provided in DRBC Docket D-77-20 CP (Revised) and sections 2.5.2 through 2.5.6 of the DRBC Water Code, adopted by Resolutions 88-13 and 88-22 (revised) except as otherwise provided in the agreement and provided further that this approval and consent is subject to the further agreement of the Parties as provided for in Section 3.3(a) of the Delaware River Basin Compact.

//Signed by Michelle Putnam//

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FFMP2017

# Agreement of the Parties to the 1954 U.S. Supreme Court Decree Effective October 21, 2017

CITY OF NEW YORK

The City of New York hereby approves this Agreement of the Parties to the U.S. Supreme Court Decree of 1954 for a Flexible Flow Management Program and consents to the submission of this Agreement to the Delaware River Basin Commission for adoption, exactly as drafted, or exactly as otherwise unanimously consented to by the Decree Parties, as appropriate through rules, dockets and/ or resolutions, provided, however, that the City of New York retains the right to terminate this Agreement or otherwise withdraw consent, consistent with the provisions of Paragraphs III.4, VII and VIII herein, in which case operations shall revert to those provided in DRBC Docket D-77-20 CP (Revised) and sections 2.5.2 through 2.5.6 of the DRBC Water Code, adopted by Resolutions 88-13 and 88-22 (revised) except as otherwise provided in the agreement and provided further that this approval and consent is subject to the further agreement of the Parties as provided for in Section 3.3(a) of the Delaware River Basin Compact.

//Signed by Paul Rush//

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FFMP2017

# Agreement of the Parties to the 1954 U.S. Supreme Court Decree Effective October 21, 2017

STATE OF NEW YORK

The State of New York hereby approves this Agreement of the Parties to the U.S. Supreme Court Decree of 1954 for a Flexible Flow Management Program and consents to the submission of this Agreement to the Delaware River Basin Commission for adoption, exactly as drafted, or exactly as otherwise unanimously consented to by the Decree Parties, as appropriate through rules, dockets and/ or resolutions, provided, however, that the State of New York retains the right to terminate this Agreement or otherwise withdraw consent, consistent with the provisions of Paragraphs III.4, VII and VIII herein, in which case operations shall revert to those provided in DRBC Docket D-77-20 CP (Revised) and sections 2.5.2 through 2.5.6 of the DRBC Water Code, adopted by Resolutions 88-13 and 88-22 (revised) except as otherwise provided in the agreement and provided further that this approval and consent is subject to the further agreement of the Parties as provided for in Section 3.3(a) of the Delaware River Basin Compact.

//Signed by Mark Klotz//

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FFMP2017

# Agreement of the Parties to the 1954 U.S. Supreme Court Decree Effective October 21, 2017

COMMONWEALTH OF PENNSYLVANIA

The Commonwealth of Pennsylvania hereby approves this Agreement of the Parties to the U.S. Supreme Court Decree of 1954 for a Flexible Flow Management Program and consents to the submission of this Agreement to the Delaware River Basin Commission for adoption, exactly as drafted, or exactly as otherwise unanimously consented to by the Decree Parties, as appropriate through rules, dockets and/or resolutions, provided, however, that the Commonwealth of Pennsylvania retains the right to terminate this Agreement or otherwise withdraw consent, consistent with the provisions of Paragraphs III.4, VII and VIII herein, in which case operations shall revert to those provided in DRBC Docket D-77-20 CP (Revised) and sections 2.5.2 through 2.5.6 of the DRBC Water Code, adopted by Resolutions 88-13 and 88-22 (revised) except as otherwise provided in the agreement and provided further that this approval and consent is subject to the further agreement of the Parties as provided for in Section 3.3(a) of the Delaware River Basin Compact.

//Signed by Lisa Daniels//

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APPENDIX A

FLEXIBLE FLOW MANAGEMENT PROGRAM

This Flexible Flow Management Program (FFMP or FFMP2017) is the program referred to in the Agreement for a Flexible Flow Management Program and consented to by the Parties (the State of Delaware, the State of New Jersey, the State of New York, the Commonwealth of Pennsylvania, and the City of New York; hereafter Decree Parties or Parties) to the Amended Decree of the Supreme Court in New Jersey v. New York, 347 U.S. 995 (1954), (hereafter Decree). References herein to "Agreement" are to that document and modifications, if any, to this FFMP shall be pursuant to the provisions of the Agreement. Accordingly, the FFMP shall be implemented as follows:

1. 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 any twelve-month period, commencing June 1st, shall the aggregate total quantity of water diverted by the City, divided by the number of days elapsed since the preceding May 31st, 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, and to the limitations provided herein in Section 4. For the term of the 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 4, 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. 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. Pursuant to Section V.2. of the Decree, 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

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watershed without compensating releases shall not exceed an average of 100 mgd during any calendar year.

2. FLOW OBJECTIVES

a. Montague Flow Objective

Except with respect to limitations provided herein in Section 3, 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 United States 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 4 of this FFMP 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 5 shall seek to maximize the frequency of the minimum basic rate of 1,750 cfs flows at the USGS gaging station at Montague, N.J. without adversely impacting basin water supplies and other objectives of the FFMP.

b. Trenton Equivalent Flow Objective

Section 2.5.3 of the Water Code establishes a set of equivalent flow objectives at Trenton, N.J. to control salinity intrusion in the Delaware Estuary. One means to manage salinity 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 an amount of water, determined by the Delaware River Basin Commission (DRBC), 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 4 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.

3. 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 5 below.

FFMP2017 OPERATIONS PLAN

b. Excess Release Quantity

Section III.B.1.(c) of the Decree defines an excess amount of water, known herein as the Excess Release Quantity (ERQ). For the period of the current program, the Decree Parties agree to use the Excess Release Quantity in support of an Interim Excess Release Quantity (IERQ) as defined in Paragraph c. below.

c. Interim Excess Release Quantity

An IERQ of 10.0 billion gallons (15,468 cfs-days) shall be provided (determined as in the original FFMP) and 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 1,290 mgd (NYC's estimate of continuous safe yield of the NYC water supply system at that time, obtainable without pumping). The IERQ shall reset to 10.0 BG (15,468 cfs-days) on June 1st of each year of the Agreement or upon return to normal conditions after drought.

For each year beginning June 1st of the current program, the IERQ shall be used as defined below:

i. Trenton Equivalent Flow Objective: 6.09 billion gallons (9,423 cfs-days) of the IERQ, upon request by the Lower Basin States or the DRBC, NYC shall release from the IERQ water in sufficient quantities to maintain a flow at Trenton of 3,000 cfs during basin wide normal conditions for the period commencing on June 1 and continuing through May 31. NYC shall make releases from the IERQ as provided above until the aggregate quantity of the IERQ is exhausted.

ii. Thermal Mitigation: 1.62 billion gallons (2,500 cfs-days) of the IERQ will be banked and is available during basinwide normal conditions to support mitigation of thermal events which may adversely impact the cold-water fishery below the NYC Delaware Reservoirs. Use of the water for any single event will be informed by the current and forecasted basin conditions and the thermal mitigation guidance as developed by the Decree Parties. Releases for Thermal Mitigation shall be made at the direction of the New York State Department of Environmental Conservation ("NYSDEC") and administered by the River Master and the New York City Department of Environmental Protection ("NYCDEP") with notification made to all Decree Parties.

iii. Rapid Flow Change Mitigation: 0.65 billion gallons (1,000 cfs-days) of the IERQ will be banked and is available during basinwide normal conditions to mitigate potentially ecologically harmful conditions caused by rapid reductions in the NYC Delaware Reservoir directed releases because of the requirements of the Montague Flow Objective in Section 2.a. Use of the water for any single event will be informed by the current basin conditions and the guidance for its use as developed by the Decree Parties. Releases to mitigate rapid flow changes shall be made at the direction of the River Master and NYCDEP, with notification to all Decree Parties.

iv. NJ Diversion Amelioration: 1.65 billion gallons (2,545 cfs-days) of the IERQ will be banked and reserved for use during drought conditions (basinwide and/or lower basin), to supply NJ's increased diversion when the NJ Diversion Offset Bank, as described below in Section 4.d., has been exhausted. Once the NYC Reservoirs enter into drought watch, the combined storage of the City Delaware Reservoirs shall be computed as the actual storage volume minus the NJ Diversion Amelioration Bank and NJ Diversion Offset Bank volumes for purposes of determining storage zones.

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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 reallocate all or a portion of the IERQ uses identified in section 3.c 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 reallocated shall be deducted from the agreed upon IERQ source as defined above. Any unused Extraordinary Needs Bank water shall be returned to IERQ.

4. DROUGHT MANAGEMENT

Figure 1 defines five 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 one additional curve that subdivides the Normal storage zone into two zones (L1 – discharge mitigation and L2- normal). The three drought management zones are described below. The two normal conditions storage zones are described in Section 5.

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 in DRBC Resolution No. 83-13, 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.

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, when said diversion shall not exceed a daily running average of 90 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.

c. Drought Emergency (L5)

The operation level named "Drought" in the rule curves included in DRBC Resolution No. 83-13 and Docket D-77-20 CP (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.

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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, when said diversion shall not exceed a daily running average of 80 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 NJ Diversion Offset Bank, not to exceed 1.49 billion gallons (2,300 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 FFMP, during drought conditions (basinwide and/or lower basin). The 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 20 mgd during Drought Warning; and up to 15 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 FFMP, establish the additional increments for New Jersey's diversion as incorporated herein.

This Diversion Offset Bank shall be created by use of Forecast Available Water from June 1 to August 31 as described in Section 5 of this Appendix and reserved for New Jersey to offset the increased diversion during drought periods (basinwide and/or lower basin). Water shall be accumulated in the Diversion Offset Bank (up to 25 cfs per day) and shall be excluded from the Forecast Available Water calculation. Once the NYC Reservoirs enter into drought watch, the combined storage of the City Delaware Reservoirs shall be computed as the actual storage volume minus the NJ Amelioration Bank and NJ Diversion Offset Bank volumes for purposes of determining storage zones.

If the accumulated incremental increased diversions by New Jersey, at any time, exceed the available water in the Diversion Offset Bank, the IERQ water dedicated to the NJ diversion amelioration will be used in the same manner. If the accumulated incremental increased diversions by New Jersey exceed both the combined NJ Diversion Offset Bank and the IERQ water dedicated to NJ diversion amelioration, the Lower Basin Reservoirs in Pennsylvania will provide the additional water to offset New Jersey's increased diversions.

Releases from the NJ Diversion Offset Bank and the IERQ dedicated to the NJ diversion amelioration shall be at the direction of DRBC with prior notification to New Jersey, 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 NJ Diversion Offset Bank, the IERQ dedicated to the NJ diversion amelioration, or the Lower Basin Reservoirs in Pennsylvania to offset New Jersey's incremental increases in out-of-basin diversions, measured at Port Mercer, NJ 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 to meet the current Trenton flow objective.

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The River Master will maintain the ongoing accounting for releases made from this bank and the Diversion Amelioration Bank. At no time during the year commencing June 1st shall releases from the NJ Diversion Offset Bank exceed the balance of the bank. The bank will reset under normal conditions on June 1st and begin accumulating water as defined in this section. If under basin wide drought conditions on May 31st the balance of the NJ Diversion Offset Bank shall remain available for use until normal conditions resume. Upon return to normal conditions, the NJ Diversion Offset Bank will reset and begin accumulating water as described in this and Section 5.

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

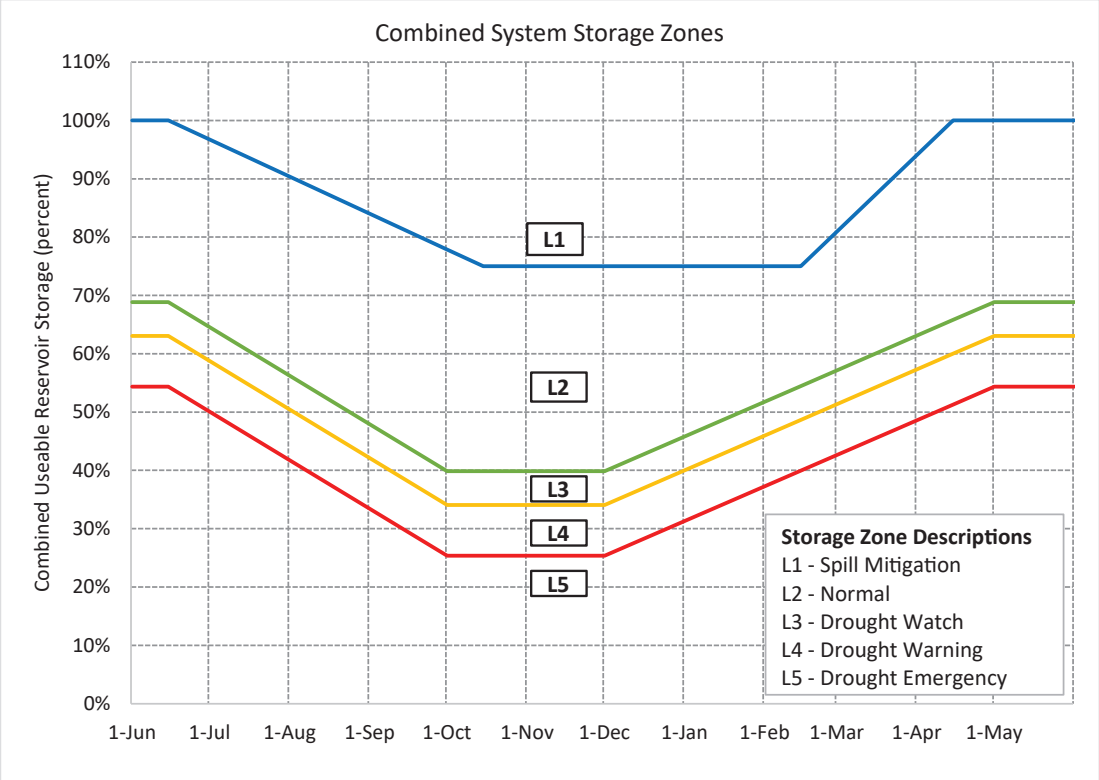

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**Table 1**
**Interstate Operation Formula for Diversions and Flow Objectives**

| *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 | 90 | 1,550 | 2,700 |
| Drought Emergency (L5) | 520 | 80 | 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**

| 7-day average location of Salt Front*, River Mile** | Flow objective, cubic feet per second at: Montague, NJ | | | Trenton, NJ*** | | |
|---|---|---|---|---|---|---|
| | 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 an amount to account for water withdrawn above Trenton and returned below the gage is greater than the Trenton Flow Objective listed above.

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**Table 3**
**Schedule of Releases (cfs) during Drought Operations**

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

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

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

5. 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.

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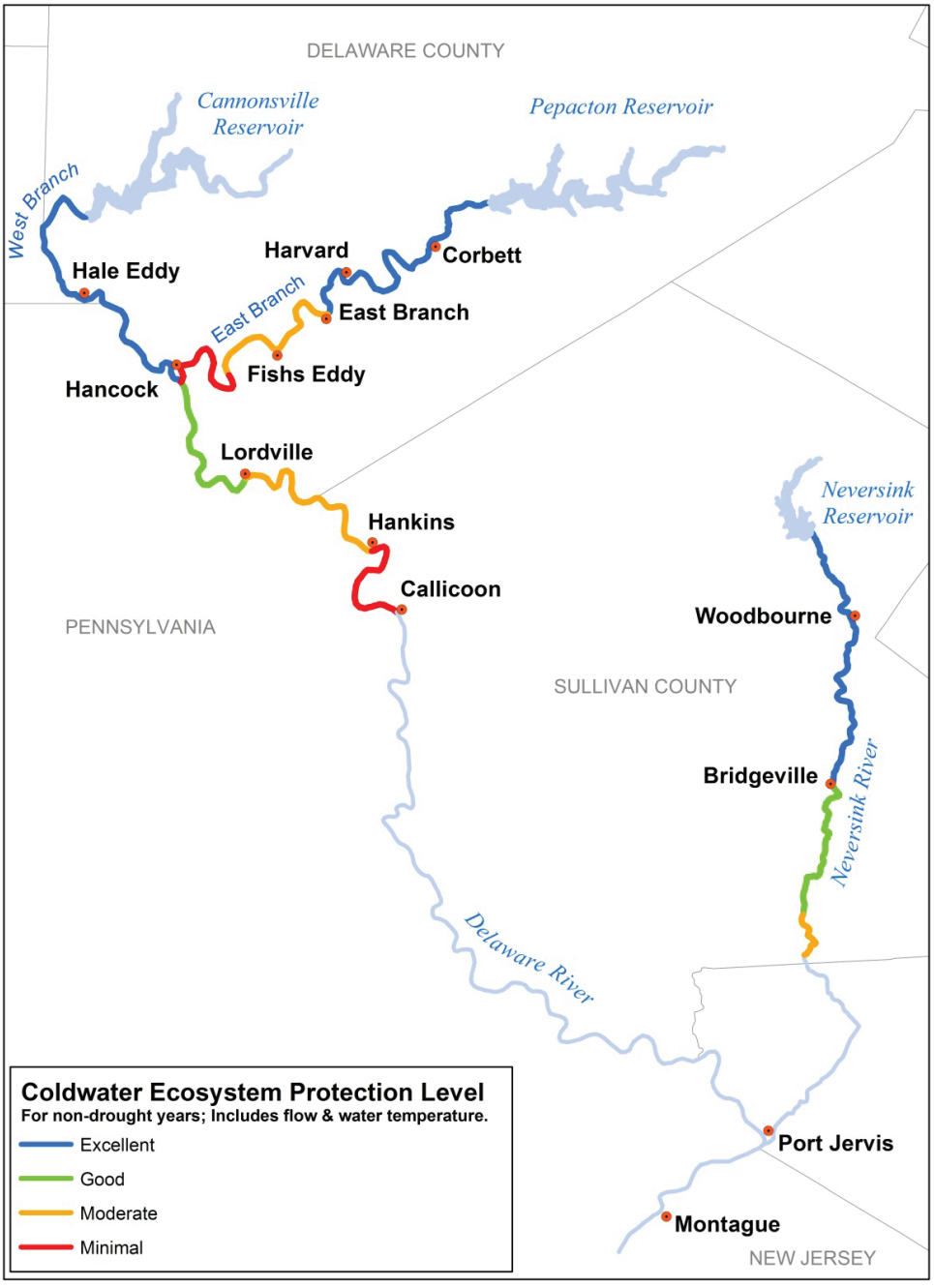
**Plate 1**

**Extent and Protection Level of the Cold-Water Ecosystem**



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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) as guidance, 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 CP Revised (Rev. 1), which can be maintained under Normal conditions, independent of inflow or the City's demand.

The City is using OST, a state-of-the-art forecast-driven analysis and decision support tool that provides the City with probabilistic predictions of future system status. 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 also provides 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 allows 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 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. During periods when Table 4g is in effect, a 25 cfs credit towards the New Jersey Diversion offset Bank shall be included with the total NYC Reservoir releases. During periods when Table 4f is in effect, a 10 cfs credit towards the New Jersey Diversion offset Bank shall be included with the total NYC Reservoir releases. 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.

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 OST Summary Data, described above 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.

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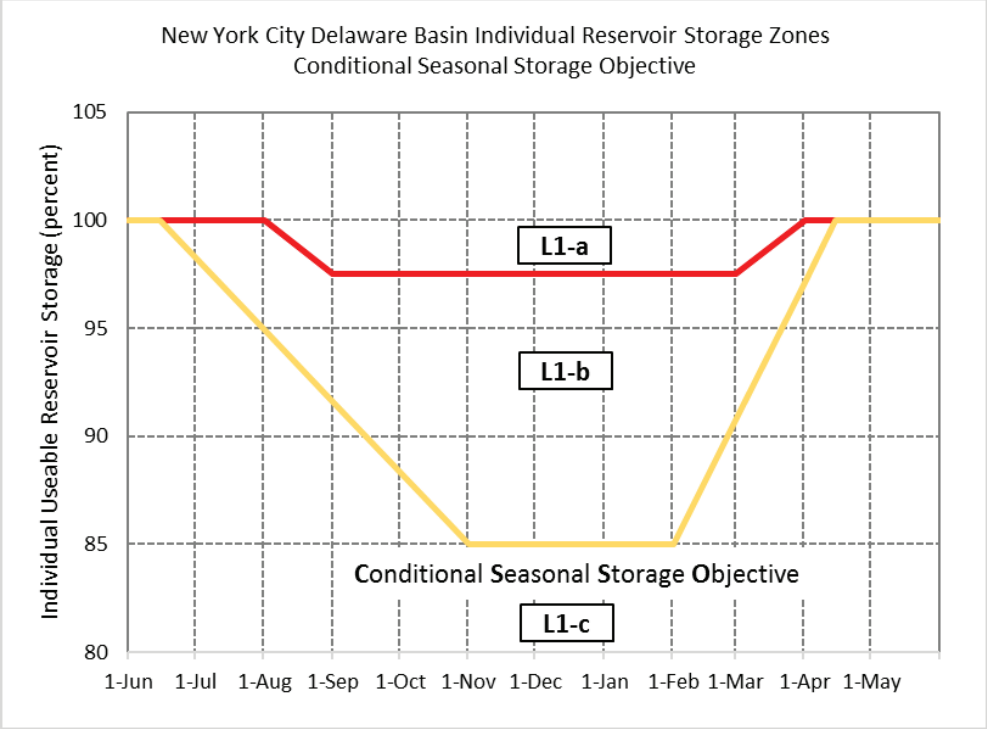
**Figure 2**
**New York City Delaware System Usable Individual Storage**
**(Cannonsville, Pepacton, and Neversink Reservoirs)**



FFMP2017 OPERATIONS PLAN

**Table 4a**

**Schedule of Releases (cfs) during Normal Conditions**
**Base Releases with no Forecast based Available Water (FAW)**

| | Summer | | | Fall | | | Winter | | Spring | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Cannonsville** | Jun 1 - | Jun 16 - | Jul 1 - | Sep 1 - | Sep 16 - | Oct 1 - | Dec 1 - | Apr 1 - | May 1 - | May 21 - |
| **Storage Zone** | 15-Jun | 30-Jun | 31-Aug | 15-Sep | 30-Sep | 30-Nov | 31-Mar | 30-Apr | 20-May | 31-May |
| L1-a | * | 1500 | 1500 | 1500 | 1500 | 1500 | 1500 | 1500 | * | * |
| L1-b | 600 | 600 | 600 | 600 | 600 | 600 | 600 | 600 | 600 | 600 |
| L1-c | 215 | 215 | 215 | 200 | 105 | 85 | 85 | 85 | 185 | 185 |
| L2 | 190 | 190 | 190 | 180 | 85 | 60 | 60 | 60 | 160 | 160 |

| | Summer | | | Fall | | | Winter | | Spring | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Pepacton** | Jun 1 - | Jun 16 - | Jul 1 - | Sep 1 - | Sep 16 - | Oct 1 - | Dec 1 - | Apr 1 - | May 1 - | May 21 - |
| **Storage Zone** | 15-Jun | 30-Jun | 31-Aug | 15-Sep | 30-Sep | 30-Nov | 31-Mar | 30-Apr | 20-May | 31-May |
| L1-a | * | 700 | 700 | 700 | 700 | 700 | 700 | 700 | * | * |
| L1-b | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 |
| L1-c | 120 | 120 | 120 | 110 | 80 | 70 | 70 | 70 | 100 | 100 |
| L2 | 100 | 100 | 100 | 90 | 60 | 50 | 50 | 50 | 80 | 80 |

| | Summer | | | Fall | | | Winter | | Spring | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Neversink** | Jun 1 - | Jun 16 - | Jul 1 - | Sep 1 - | Sep 16 - | Oct 1 - | Dec 1 - | Apr 1 - | May 1 - | May 21 - |
| **Storage Zone** | 15-Jun | 30-Jun | 31-Aug | 15-Sep | 30-Sep | 30-Nov | 31-Mar | 30-Apr | 20-May | 31-May |
| L1-a | * | 190 | 190 | 190 | 190 | 190 | 190 | 190 | * | * |
| L1-b | 150 | 150 | 150 | 150 | 110 | 110 | 110 | 110 | 110 | 110 |
| L1-c | 90 | 90 | 90 | 85 | 65 | 50 | 50 | 50 | 75 | 75 |
| L2 | 75 | 75 | 75 | 70 | 50 | 35 | 35 | 35 | 60 | 60 |

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

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**Table 4b**

**Schedule of Releases (cfs) during Normal Conditions**

| | Summer | | | Fall | | | Winter | | Spring | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Cannonsville** | Jun 1 - | Jun 16 - | Jul 1 - | Sep 1 - | Sep 16 - | Oct 1 - | Dec 1 - | Apr 1 - | May 1 - | May 21 - |
| **Storage Zone** | 15-Jun | 30-Jun | 31-Aug | 15-Sep | 30-Sep | 30-Nov | 31-Mar | 30-Apr | 20-May | 31-May |
| L1-a | * | 1500 | 1500 | 1500 | 1500 | 1500 | 1500 | 1500 | * | * |
| L1-b | 600 | 600 | 600 | 600 | 600 | 600 | 600 | 600 | 600 | 600 |
| L1-c | 300 | 300 | 300 | 250 | 200 | 110 | 110 | 165 | 245 | 265 |
| L2 | 245 | 245 | 245 | 225 | 140 | 75 | 75 | 110 | 200 | 210 |

| | Summer | | | Fall | | | Winter | | Spring | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Pepacton** | Jun 1 - | Jun 16 - | Jul 1 - | Sep 1 - | Sep 16 - | Oct 1 - | Dec 1 - | Apr 1 - | May 1 - | May 21 - |
| **Storage Zone** | 15-Jun | 30-Jun | 31-Aug | 15-Sep | 30-Sep | 30-Nov | 31-Mar | 30-Apr | 20-May | 31-May |
| L1-a | * | 700 | 700 | 700 | 700 | 700 | 700 | 700 | * | * |
| L1-b | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 |
| L1-c | 135 | 135 | 135 | 125 | 95 | 80 | 80 | 80 | 95 | 110 |
| L2 | 110 | 110 | 110 | 100 | 70 | 55 | 55 | 55 | 90 | 90 |

| | Summer | | | Fall | | | Winter | | Spring | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Neversink** | Jun 1 - | Jun 16 - | Jul 1 - | Sep 1 - | Sep 16 - | Oct 1 - | Dec 1 - | Apr 1 - | May 1 - | May 21 - |
| **Storage Zone** | 15-Jun | 30-Jun | 31-Aug | 15-Sep | 30-Sep | 30-Nov | 31-Mar | 30-Apr | 20-May | 31-May |
| L1-a | * | 190 | 190 | 190 | 190 | 190 | 190 | 190 | * | * |
| L1-b | 150 | 150 | 150 | 150 | 110 | 110 | 110 | 110 | 110 | 110 |
| L1-c | 100 | 100 | 100 | 85 | 75 | 55 | 55 | 55 | 85 | 85 |
| L2 | 80 | 80 | 80 | 75 | 55 | 40 | 40 | 40 | 65 | 65 |

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

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**Table 4c**

**Schedule of Releases (cfs) during Normal Conditions**

| | Summer | | | Fall | | | Winter | | Spring | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Cannonsville** | Jun 1 - | Jun 16 - | Jul 1 - | Sep 1 - | Sep 16 - | Oct 1 - | Dec 1 - | Apr 1 - | May 1 - | May 21 - |
| **Storage Zone** | 15-Jun | 30-Jun | 31-Aug | 15-Sep | 30-Sep | 30-Nov | 31-Mar | 30-Apr | 20-May | 31-May |
| L1-a | * | 1500 | 1500 | 1500 | 1500 | 1500 | 1500 | 1500 | * | * |
| L1-b | 600 | 600 | 600 | 600 | 600 | 600 | 600 | 600 | 600 | 600 |
| L1-c | 350 | 350 | 350 | 300 | 225 | 110 | 110 | 175 | 275 | 275 |
| L2 | 300 | 300 | 300 | 270 | 190 | 90 | 90 | 155 | 240 | 255 |

| | Summer | | | Fall | | | Winter | | Spring | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Pepacton** | Jun 1 - | Jun 16 - | Jul 1 - | Sep 1 - | Sep 16 - | Oct 1 - | Dec 1 - | Apr 1 - | May 1 - | May 21 - |
| **Storage Zone** | 15-Jun | 30-Jun | 31-Aug | 15-Sep | 30-Sep | 30-Nov | 31-Mar | 30-Apr | 20-May | 31-May |
| L1-a | * | 700 | 700 | 700 | 700 | 700 | 700 | 700 | * | * |
| L1-b | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 |
| L1-c | 140 | 140 | 140 | 125 | 105 | 80 | 80 | 80 | 100 | 120 |
| L2 | 115 | 115 | 115 | 105 | 80 | 60 | 60 | 60 | 95 | 100 |

| | Summer | | | Fall | | | Winter | | Spring | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Neversink** | Jun 1 - | Jun 16 - | Jul 1 - | Sep 1 - | Sep 16 - | Oct 1 - | Dec 1 - | Apr 1 - | May 1 - | May 21 - |
| **Storage Zone** | 15-Jun | 30-Jun | 31-Aug | 15-Sep | 30-Sep | 30-Nov | 31-Mar | 30-Apr | 20-May | 31-May |
| L1-a | * | 190 | 190 | 190 | 190 | 190 | 190 | 190 | * | * |
| L1-b | 150 | 150 | 150 | 150 | 110 | 110 | 110 | 110 | 110 | 110 |
| L1-c | 105 | 105 | 105 | 95 | 75 | 60 | 60 | 60 | 85 | 90 |
| L2 | 90 | 90 | 90 | 80 | 65 | 45 | 45 | 45 | 70 | 75 |

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

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**Table 4d**

**Schedule of Releases (cfs) during Normal Conditions**

| | Summer | | | Fall | | | Winter | | Spring | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Cannonsville** | Jun 1 - | Jun 16 - | Jul 1 - | Sep 1 - | Sep 16 - | Oct 1 - | Dec 1 - | Apr 1 - | May 1 - | May 21 - |
| **Storage Zone** | 15-Jun | 30-Jun | 31-Aug | 15-Sep | 30-Sep | 30-Nov | 31-Mar | 30-Apr | 20-May | 31-May |
| L1-a | * | 1500 | 1500 | 1500 | 1500 | 1500 | 1500 | 1500 | * | * |
| L1-b | 600 | 600 | 600 | 600 | 600 | 600 | 600 | 600 | 600 | 600 |
| L1-c | 400 | 400 | 400 | 325 | 275 | 140 | 140 | 245 | 305 | 345 |
| L2 | 360 | 360 | 360 | 315 | 245 | 105 | 105 | 205 | 280 | 305 |

| | Summer | | | Fall | | | Winter | | Spring | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Pepacton** | Jun 1 - | Jun 16 - | Jul 1 - | Sep 1 - | Sep 16 - | Oct 1 - | Dec 1 - | Apr 1 - | May 1 - | May 21 - |
| **Storage Zone** | 15-Jun | 30-Jun | 31-Aug | 15-Sep | 30-Sep | 30-Nov | 31-Mar | 30-Apr | 20-May | 31-May |
| L1-a | * | 700 | 700 | 700 | 700 | 700 | 700 | 700 | * | * |
| L1-b | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 |
| L1-c | 150 | 150 | 150 | 125 | 115 | 85 | 85 | 85 | 120 | 130 |
| L2 | 125 | 125 | 125 | 115 | 95 | 65 | 65 | 65 | 105 | 110 |

| | Summer | | | Fall | | | Winter | | Spring | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Neversink** | Jun 1 - | Jun 16 - | Jul 1 - | Sep 1 - | Sep 16 - | Oct 1 - | Dec 1 - | Apr 1 - | May 1 - | May 21 - |
| **Storage Zone** | 15-Jun | 30-Jun | 31-Aug | 15-Sep | 30-Sep | 30-Nov | 31-Mar | 30-Apr | 20-May | 31-May |
| L1-a | * | 190 | 190 | 190 | 190 | 190 | 190 | 190 | * | * |
| L1-b | 150 | 150 | 150 | 150 | 110 | 110 | 110 | 110 | 110 | 110 |
| L1-c | 110 | 110 | 110 | 95 | 85 | 60 | 60 | 60 | 90 | 95 |
| L2 | 95 | 95 | 95 | 85 | 70 | 50 | 50 | 50 | 75 | 80 |

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

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**Table 4e**

**Schedule of Releases (cfs) during Normal Conditions**

| | Summer | | | Fall | | | Winter | | Spring | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Cannonsville** | Jun 1 - | Jun 16 - | Jul 1 - | Sep 1 - | Sep 16 - | Oct 1 - | Dec 1 - | Apr 1 - | May 1 - | May 21 - |
| **Storage Zone** | 15-Jun | 30-Jun | 31-Aug | 15-Sep | 30-Sep | 30-Nov | 31-Mar | 30-Apr | 20-May | 31-May |
| L1-a | * | 1500 | 1500 | 1500 | 1500 | 1500 | 1500 | 1500 | * | * |
| L1-b | 600 | 600 | 600 | 600 | 600 | 600 | 600 | 600 | 600 | 600 |
| L1-c | 450 | 450 | 450 | 375 | 335 | 150 | 150 | 285 | 350 | 385 |
| L2 | 415 | 415 | 415 | 360 | 295 | 120 | 120 | 255 | 320 | 355 |

| | Summer | | | Fall | | | Winter | | Spring | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Pepacton** | Jun 1 - | Jun 16 - | Jul 1 - | Sep 1 - | Sep 16 - | Oct 1 - | Dec 1 - | Apr 1 - | May 1 - | May 21 - |
| **Storage Zone** | 15-Jun | 30-Jun | 31-Aug | 15-Sep | 30-Sep | 30-Nov | 31-Mar | 30-Apr | 20-May | 31-May |
| L1-a | * | 700 | 700 | 700 | 700 | 700 | 700 | 700 | * | * |
| L1-b | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 |
| L1-c | 155 | 155 | 155 | 140 | 125 | 90 | 90 | 90 | 120 | 140 |
| L2 | 135 | 135 | 135 | 125 | 105 | 70 | 70 | 70 | 110 | 120 |

| | Summer | | | Fall | | | Winter | | Spring | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Neversink** | Jun 1 - | Jun 16 - | Jul 1 - | Sep 1 - | Sep 16 - | Oct 1 - | Dec 1 - | Apr 1 - | May 1 - | May 21 - |
| **Storage Zone** | 15-Jun | 30-Jun | 31-Aug | 15-Sep | 30-Sep | 30-Nov | 31-Mar | 30-Apr | 20-May | 31-May |
| L1-a | * | 190 | 190 | 190 | 190 | 190 | 190 | 190 | * | * |
| L1-b | 150 | 150 | 150 | 150 | 110 | 110 | 110 | 110 | 110 | 110 |
| L1-c | 115 | 115 | 115 | 105 | 90 | 65 | 65 | 65 | 95 | 100 |
| L2 | 100 | 100 | 100 | 90 | 75 | 50 | 50 | 50 | 80 | 85 |

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

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**Table 4f**

**Schedule of Releases (cfs) during Normal Conditions**

| | Summer | | | Fall | | | Winter | | Spring | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Cannonsville** | Jun 1 - | Jun 16 - | Jul 1 - | Sep 1 - | Sep 16 - | Oct 1 - | Dec 1 - | Apr 1 - | May 1 - | May 21 - |
| **Storage Zone** | 15-Jun | 30-Jun | 31-Aug | 15-Sep | 30-Sep | 30-Nov | 31-Mar | 30-Apr | 20-May | 31-May |
| L1-a | * | 1500 | 1500 | 1500 | 1500 | 1500 | 1500 | 1500 | * | * |
| L1-b | 600 | 600 | 600 | 600 | 600 | 600 | 600 | 600 | 600 | 600 |
| L1-c | 500 | 500 | 500 | 425 | 400 | 175 | 160 | 325 | 375 | 425 |
| L2 | 460 | 460 | 460 | 405 | 350 | 135 | 135 | 300 | 360 | 400 |

| | Summer | | | Fall | | | Winter | | Spring | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Pepacton** | Jun 1 - | Jun 16 - | Jul 1 - | Sep 1 - | Sep 16 - | Oct 1 - | Dec 1 - | Apr 1 - | May 1 - | May 21 - |
| **Storage Zone** | 15-Jun | 30-Jun | 31-Aug | 15-Sep | 30-Sep | 30-Nov | 31-Mar | 30-Apr | 20-May | 31-May |
| L1-a | * | 700 | 700 | 700 | 700 | 700 | 700 | 700 | * | * |
| L1-b | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 |
| L1-c | 160 | 160 | 160 | 145 | 135 | 95 | 95 | 95 | 130 | 150 |
| L2 | 140 | 140 | 140 | 130 | 115 | 75 | 75 | 75 | 120 | 130 |

| | Summer | | | Fall | | | Winter | | Spring | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Neversink** | Jun 1 - | Jun 16 - | Jul 1 - | Sep 1 - | Sep 16 - | Oct 1 - | Dec 1 - | Apr 1 - | May 1 - | May 21 - |
| **Storage Zone** | 15-Jun | 30-Jun | 31-Aug | 15-Sep | 30-Sep | 30-Nov | 31-Mar | 30-Apr | 20-May | 31-May |
| L1-a | * | 190 | 190 | 190 | 190 | 190 | 190 | 190 | * | * |
| L1-b | 150 | 150 | 150 | 150 | 110 | 110 | 110 | 110 | 110 | 110 |
| L1-c | 120 | 120 | 120 | 105 | 95 | 65 | 65 | 65 | 100 | 105 |
| L2 | 110 | 110 | 110 | 95 | 85 | 55 | 55 | 55 | 85 | 95 |

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

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**Table 4g**

**Schedule of Releases (cfs) during Normal Conditions**

| | Summer | | | Fall | | | Winter | | Spring | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Cannonsville Storage Zone** | Jun 1 - 15-Jun | Jun 16 - 30-Jun | Jul 1 - 31-Aug | Sep 1 - 15-Sep | Sep 16 - 30-Sep | Oct 1 - 30-Nov | Dec 1 - 31-Mar | Apr 1 - 30-Apr | May 1 - 20-May | May 21 - 31-May |
| L1-a | * | 1500 | 1500 | 1500 | 1500 | 1500 | 1500 | 1500 | * | * |
| L1-b | 600 | 600 | 600 | 600 | 600 | 600 | 600 | 600 | 600 | 600 |
| L1-c | 550 | 550 | 550 | 475 | 425 | 175 | 175 | 375 | 425 | 475 |
| L2 | 500 | 500 | 500 | 450 | 400 | 150 | 150 | 350 | 400 | 450 |

| | Summer | | | Fall | | | Winter | | Spring | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Pepacton Storage Zone** | Jun 1 - 15-Jun | Jun 16 - 30-Jun | Jul 1 - 31-Aug | Sep 1 - 15-Sep | Sep 16 - 30-Sep | Oct 1 - 30-Nov | Dec 1 - 31-Mar | Apr 1 - 30-Apr | May 1 - 20-May | May 21 - 31-May |
| L1-a | * | 700 | 700 | 700 | 700 | 700 | 700 | 700 | * | * |
| L1-b | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 |
| L1-c | 170 | 170 | 170 | 160 | 145 | 100 | 100 | 100 | 145 | 160 |
| L2 | 150 | 150 | 150 | 140 | 125 | 80 | 80 | 80 | 125 | 140 |

| | Summer | | | Fall | | | Winter | | Spring | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Neversink Storage Zone** | Jun 1 - 15-Jun | Jun 16 - 30-Jun | Jul 1 - 31-Aug | Sep 1 - 15-Sep | Sep 16 - 30-Sep | Oct 1 - 30-Nov | Dec 1 - 31-Mar | Apr 1 - 30-Apr | May 1 - 20-May | May 21 - 31-May |
| L1-a | * | 190 | 190 | 190 | 190 | 190 | 190 | 190 | * | * |
| L1-b | 150 | 150 | 150 | 150 | 110 | 110 | 110 | 110 | 110 | 120 |
| L1-c | 125 | 125 | 125 | 115 | 100 | 75 | 75 | 75 | 100 | 115 |
| L2 | 115 | 115 | 115 | 100 | 90 | 60 | 60 | 60 | 90 | 100 |

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

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6. DISCHARGE MITIGATION PROGRAM

To enhance flood mitigation provided by the City Delaware Basin Reservoirs, a Conditional Seasonal Storage Objective (CSSO) rule curve in Figure 2 will be established. 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 CSSO (boundary between the L1-b and L1-c storage zones in Figure 2) must be limited and ramped. NYC shall endeavor, to the maximum extent possible without impacting water supply reliability, to maintain reservoir levels at the CSSO, thus creating a high probability of maintaining fifteen (15) percent void spaces each year between November 1 through the following February 1to help mitigate flooding events. In determining the releases needed to maintain the CSSO, 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, including inflow from the snow water equivalent (snowmelt) as forecast by the National Weather Service's (NWS) Hydrological Ensemble Forecasting System (HEFS), and the current usable reservoir storage. Based on any projected seven (7) day storage surplus, the City will calculate new release volumes, above the FAW table releases in effect, to progress toward the CSSO and allocate those volumes 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. 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. HEFS will explicitly model the amount and timing of snowmelt in reservoir inflow forecasts. By incorporating the most recent City snowpack survey data, as well as the City's automated snowpack sensor network data and the NWS's meteorological forecasts into a runoff model, HEFS will determine an up to date prediction of reservoir inflows from rainfall and snowmelt.

ii. For the period April 16 through June 15, discharge mitigation releases shall be made in accordance with standard practices for water supply reliability, toward achieving the CSSO, at rates up to but not exceeding L1-a release rates as provided in Figure 2 and Tables 4a through 4g.

iii. NYCDEP and the 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 feet. Accordingly, Zone L1 discharge mitigation releases will not be made from Cannonsville Reservoir when the river stage for the West Branch Delaware River at Hale Eddy is above 9 feet, or is forecasted to be above 9 feet within 48 hours of 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 feet. 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 feet or is forecast to be above 11 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.

vi. The current NWS flood stage for the Neversink River at Bridgeville is 13 feet. Accordingly, Zone L1 discharge mitigation releases will not be made from Neversink Reservoir when the river stage for the Neversink River at Bridgeville is above 12 feet, or is forecast to be above 12 feet within 48 hours of 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 L5 in Table 3.

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 shall be undertaken pursuant to Section V of the Agreement.

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**Table 5**
**Maximum Combined Discharge Rates**

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

7. 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.

8. TEMPERATURE MONITORING AND REPORTING

During the term of the current Agreement, NYSDEC shall monitor water temperatures within the stream reaches defined and categorized in Section 5. Monitoring will be conducted at a sufficient number of locations (to be determined by NYSDEC) to adequately characterize temperatures. At the end of the current Agreement, NYSDEC shall provide a compilation of the monitoring data with a brief statement of the findings to the Decree Parties.

9. TEMPORARY SUSPENSION OR MODIFICATION OF FFMP

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

New York City shall provide reasonable advance notification to the Decree Parties, River Master and DRBC of any planned extended tunnel shutdowns from New York City's Delaware System reservoirs and/or changes in releases due to emergencies, maintenance and repair operations, upgrades to existing facilities or the construction and integration of new infrastructure. New York City shall establish the scope of work and the schedule for the work and shall inform the Decree Parties and DRBC of such plans as early as practicable. For work involving a temporary suspension or modification due to new infrastructure or an upgrade to an existing facility, New York City shall provide the Decree Parties and DRBC with the releases modification strategy and project design materials at the sixty (60) percent design point to allow for review, comment and discussion. The Decree Parties shall make their best effort to reach unanimous approval for a modified release schedule as may be required for purposes of performing the work. In the absence of unanimous approval, New York City, acting in cooperation with the New York State

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Department of Environmental Conservation (NYSDEC), will make releases to the best of its ability for the duration of the 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 the NYSDEC, provided, however, that releases shall be sufficient to meet the Montague flow objective in effect at the time.

**For more information about this report, contact:**
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