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Report of the River Master of the Delaware River for the Period December 1, 2015–November 30, 2016

Open-File Report 2024–1012

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

Calendar for Report Year 2016

December 2015

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November 2016

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Report of the River Master of the Delaware River for the Period December 1, 2015–November 30, 2016

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

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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

May 22, 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 am transmitting the 63rd Annual Report of the River Master of the Delaware River for December 1, 2015, to November 30, 2016. In this report, this period is referred to as the River Master "report year."

During the report year, monthly precipitation in the upper Delaware River Basin ranged from 41 percent of the long-term average in March 2016 to 164 percent of the long-term average in February 2016. Precipitation from December to May, when reservoirs typically refill, was 17.55 inches. Precipitation was below normal in January, March, April, May, June, September, October, and November and above normal in the other 4 months.

When the report year began on December 1, 2015, combined useable storage in the New York City reservoirs in the upper Delaware River Basin was 193.475 billion gallons or 71.4 percent of combined storage capacity. The combined storage in the Pepacton, Cannonsville, and Neversink Reservoirs increased from December 1, 2015, to late May 2016. Reservoir storage decreased from late May through November 30, 2016. The combined usable storage was 107.901 billion gallons at the end of the report year on November 30, 2016. The Delaware River Basin Commission (DRBC) issued a basinwide drought watch on November 23, 2016. The drought watch continued through the end of the 2016 report year. During the report year, operations in the basin were conducted as stipulated by the Decree and the 2016 Flexible Flow Management Program (FFMP). During the report year, the following agency staff members served on the Delaware River Master Advisory Committee (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

The River Master and staff participated in water-supply related meetings of the DRBC. In addition to managing reservoir releases and streamflow in the upper Delaware River Basin, an issue of particular interest to the River Master was the impending expiration of the 2015 FFMP on June 1, 2016.

River Master operations were executed through the U.S. Geological Survey (USGS) Office of the Delaware River Master (ODRM) located at Milford, Pennsylvania. Marie Owens, Deputy Delaware River Master, continued in charge of the office, assisted by hydrologist Vincent DiFrenna.

The ODRM continued the weekly distribution of a summary hydrologic report during the report year. The 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, the daily segregation of the flow of the Delaware River at the USGS streamgaging site at Montague, New Jersey, 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 and monthly 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 186.719 billion gallons from the Delaware River Basin

and released 115.024 billion gallons from the Pepacton, Cannonsville, and Neversink Reservoirs to the Delaware River. A total of 2.531 billion gallons was spilled from the Pepacton, Cannonsville, and Neversink Reservoirs. The River Master directed releases from these reservoirs to the Delaware River that totaled 60.902 billion gallons. The second section of this report describes water quality at various monitoring sites on the Delaware River estuary. The section includes basic data on the chemical properties and physical characteristics of the water and presents summary statistics.

Throughout the report year, diversions to New York City's water supply system and releases designed to maintain the flow of the Delaware River at 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 limit stipulated by the Decree. Diversions by the State of New Jersey were also within stipulated limits. New York City and the State of New Jersey complied fully with the terms of the Decree and, during drought watch conditions, with the terms of DRBC Resolution 2016–07.

The River Master and staff are grateful for the continued cooperation and support of the Decree Parties. Also, the contributions of the Talen Energy Corporation, Brookfield Renewable U.S., and Eagle Creek Renewable Energy, LLC, in informing the ODRM of plans for power generation and providing data on the 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 were 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 the Talen Energy Corporation (purchased by Brookfield Renewable U.S. on April 1, 2016). Data for Rio Reservoir were provided by Eagle Creek Renewable Energy, LLC. Contributions from these agencies are greatly appreciated. The National Weather Service offices in Binghamton, New York, and State College, Pennsylvania, provided quantitative precipitation forecasts and some precipitation data. Marie Owens and Amy McHugh of the USGS assisted and contributed to this report by collecting, organizing, and reviewing data. Amy Shallcross of the Delaware River Basin Commission provided information about 2016 activities, including the basin-wide drought watch and Interim Excess Release Quantity use.

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)	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 follows:

$$°F = (1.8 \times °C) + 32.$$

Datums

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

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

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

Supplemental Information

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

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

Abbreviations

Del.	Delaware
DRBC	Delaware River Basin Commission
FFMP	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
N.J.	New Jersey
NJDOB	New Jersey Diversion Offset Bank
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
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, 2015–November 30, 2016

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

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 reservoirs owned by New York City to be made under the supervision and direction of the River Master. The Decree stipulates that the River Master provide reports to the Court not less frequently than annually. This report is the 63rd annual report of the River Master of the Delaware River. The report covers the 2016 River Master report year, which is the period from December 1, 2015, to November 30, 2016.

During the report year, precipitation in the upper Delaware River Basin was 38.6 inches or 87 percent of the long-term average. Combined storage remained high (above 80 percent of combined capacity) for much of the year and did not decline below 80 percent of combined capacity until August 2016. The lowest combined storage was 106.406 billion gallons or 39 percent of combined capacity on November 28, 2016. Delaware River Basin Commission Resolution 2016–07 necessitated a basinwide drought watch on November 23, 2016. The drought watch continued through the remainder of the 2016 report year. Delaware River Master operations during the year were conducted as stipulated by the Decree and the Flexible Flow Management Program. New York City and New Jersey fully complied with the terms of the Decree and, during drought watch conditions, with the Delaware River Basin Commission Resolution 2016–07 terms. Diversions from the Delaware River Basin by New York City and New Jersey fully complied with the Decree. The reservoir releases were made as directed by the River Master at rates designed to meet the flow objective for the Delaware River at Montague, New Jersey, on 126 days during the report year. Interim Excess Release Quantity and conservation releases, designed to relieve thermal stress and protect the fishery and aquatic habitat in the tailwaters of the reservoirs, were also made during the report year.

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

Introduction

An amended Decree of the Supreme Court of the United States, entered June 7, 1954 (*New Jersey* v. *New York*, 347 U.S. 995; available at https://webapps.usgs.gov/odrm/about/decree), which superseded a 1931 Decree, authorizes diversion of water from the Delaware River Basin and provides for releases of water from three New York City reservoirs—Pepacton, Cannonsville, and Neversink—to the upper Delaware River. The Decree stipulates that these diversions and releases 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, 2015, to November 30, 2016, and is referred to as the 2016 River Master "report year." This report also presents information on the quality of water in the Delaware River estuary during the report year.

Since 2007, the Decree Parties (Delaware, New Jersey, New York, New York City, and Pennsylvania) have unanimously approved a series of Flexible Flow Management Program (FFMP) agreements (available at https://webapps.usgs.gov/odrm/ffmp/flexible-flow-management-program) to manage the shared waters of the Delaware River Basin. The June 1, 2016, FFMP (appendix 1; also available at https://webapps.usgs.gov/odrm/documents/ffmp/2016_FFMP_Agreement_Signed.pdf) is an extension of the June 1, 2011, agreement and incorporates the changes from the previous

[1]U.S. Geological Survey.

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

four extensions of the 2011 agreement (2012–15) with no additional program modifications other than the dates. The 2016 FFMP is effective from June 1, 2016, to May 31, 2017. Additional agreements were made in April 2016 (appendix 2; also available at https://webapps.usgs.gov/odrm/documents/ffmp/Temp.Releases.April.28-May.1.2016.One_Bug_Event.pdf) to facilitate a temporary release program to maintain steady streamflow during the "One Bug" fishing event of May 1 and 2, 2016. Additional releases were mandated from the Cannonsville Reservoir for July 23–25, 2016, to meet the water-temperature requirements of the FFMP (appendix 3; also available at https://webapps.usgs.gov/odrm/documents/ffmp/TemporaryThermalRelease-IERQ20160722.pdf). On November 23, 2016, the Parties to the Decree and the Delaware River Basin Commission (DRBC) agreed to preserve and protect water supplies in the Delaware River Basin during a drought watch under DRBC Resolution 2016–07 (DRBC, 2016a).

Some hydrologic data presented in this report are streamflow and water quality records for U.S. Geological Survey (USGS) streamgages. The USGS collected and computed these records in cooperation with the States of New York and New Jersey, the Commonwealth of Pennsylvania, and the City of New York. The locations of major streams and reservoirs, and selected USGS streamgages in the Delaware River Basin, are shown in figure 1.

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. The operational record has two parts: (1) segregating the streamflow components of the current daily mean discharge at the USGS streamgage at Montague, New Jersey (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 helps determine whether the ODRM directs the New York City reservoirs to release water to maintain, at a minimum, the Montague flow objective at the USGS streamgage at Montague, N.J., which is defined in table 1 of appendix 1.

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 the generation of hydroelectric power, 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 the Rio Reservoir on the Mongaup River to produce hydroelectric power.

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

Traveltimes were computed from 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 streamgage. During winter, ice formation and lower streamflow gradually increase the resistance to water flow, resulting in increased traveltimes. Because ice-affected traveltimes increased gradually over several days and releases were not directed to meet the Montague flow objective during periods of ice, no adjustments were made to compensate for increased traveltimes during these periods of the report year. The following list gives the average times for effective water travel from the various sources of controlled supply to the streamgage at Montague, N.J. (USGS site number 01438500). These traveltimes, in hours, were used for flow routing during the 2016 report year: Pepacton Reservoir, 60; Cannonsville Reservoir, 48; Neversink Reservoir, 33; Lake Wallenpaupack, 16; and Rio Reservoir, 8.

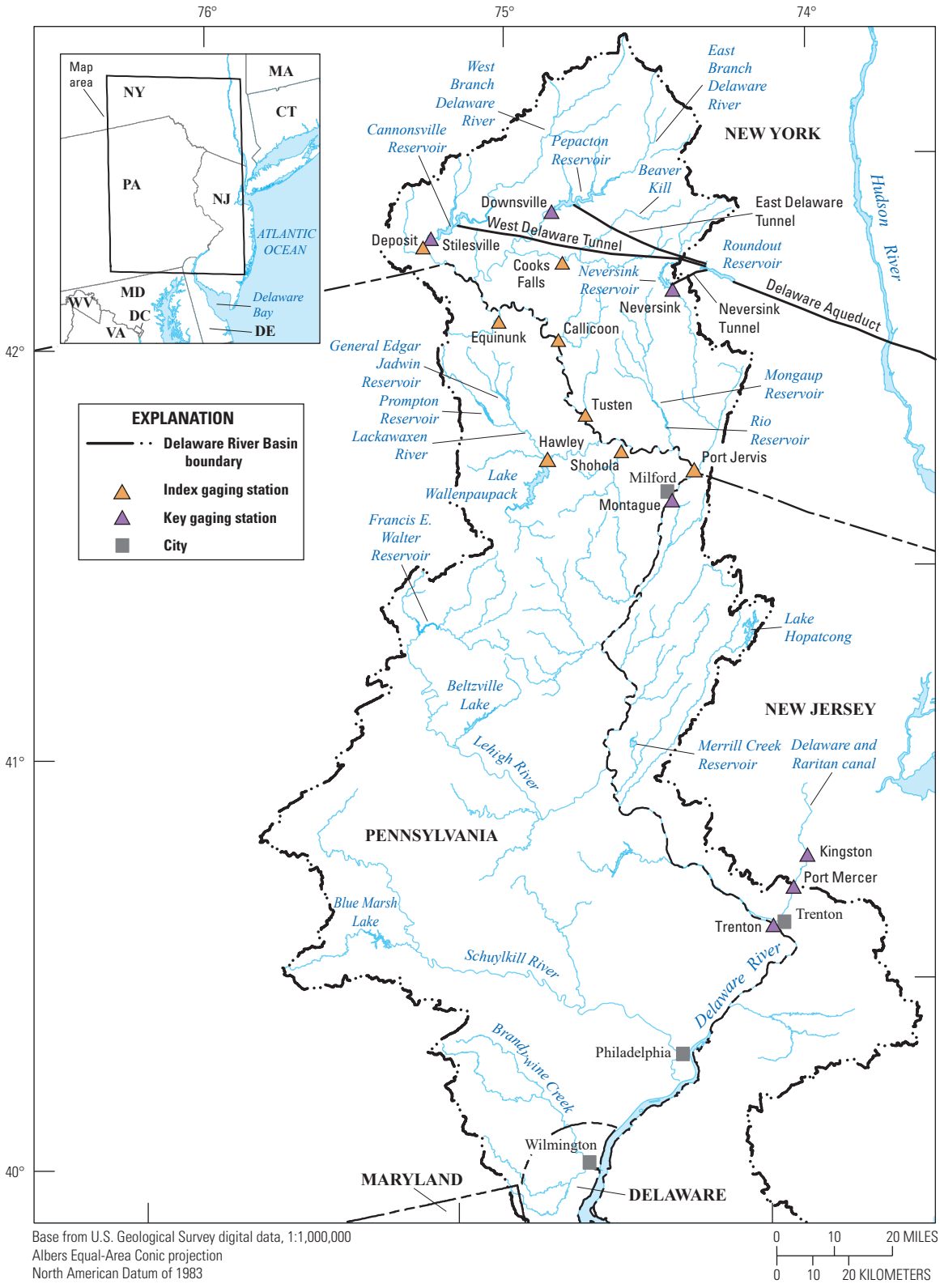

Figure 1. Map showing the Delaware River Basin upstream from Wilmington, Delaware. The Delaware River Basin boundary is shown along with key and index gaging stations; refer to the "Glossary" section for definitions.

The Talen Energy Corporation hydroelectric powerplant on Lake Wallenpaupack was purchased by Brookfield Renewable U.S. on April 1, 2016. Starting on August 1, 2016, Brookfield Renewable U.S. provided forecasted and actual controlled releases for the 24-hour period beginning at midnight on the previous day instead of 0800 hours. The traveltime used for Lake Wallenpaupack controlled releases, therefore, changed from 16 to 24 hours for the remainder of the 2016 report year based on the available data.

Forecasting Streamflow—Delaware River at Montague, New Jersey

The computed releases from New York City's reservoirs necessary to meet the Montague flow objective were 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—Talen Energy Corporation and Brookfield Renewable U.S.—controlled Lake Wallenpaupack, and Eagle Creek Renewable Energy, LLC, controlled Rio Reservoir. Those utilities provided forecasts of power generation and releases to the ODRM. Because the hydroelectric plants were primarily used for meeting rapidly varying peak-power demands, the forecasts were subject to various modifying factors, including the vagaries of weather on the demand for electricity. In addition, because the power companies are members of regional transmission organizations, demand for power outside the local service area can unexpectedly affect generation schedules. Consequently, at times, the actual use of water for power generation differs 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 powerplant 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 is made up by using releases from New York City's reservoirs, as directed by the ODRM.

Based on the previous day's provisional data, a balancing adjustment is applied to the following day's release design. 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 cubic foot per second (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 appreciable changes after a release was directed, the release required from New York City's reservoirs was recomputed on the basis of the updated forecasts. Commonly, this procedure results in a reduced release requirement for New York City reservoirs that day. Only final values for releases from New York City reservoirs are presented in this report.

Hydrologic Conditions

Precipitation

The sum of average monthly precipitation in the Delaware River Basin upstream from Montague, N.J., totaled 38.60 inches (in.) during the 2016 report year and was 87 percent of the long-term (75-year) average (table 1, in back of report). Monthly precipitation ranged from 41 percent of the long-term average in March 2016 to 164 percent of the long-term average in February 2016 (table 1). Precipitation data for the 2016 report year were computed from records from 10 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 in 2015–16, total precipitation was 17.55 in., which is about 86 percent of the 75-year long-term average. During the June–November period, total precipitation was 21.05 in., which is 88 percent of the 75-year long-term average.

Reservoir Storage

Table 2 summarizes the "point of maximum depletion" and other pertinent levels and the 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, 2015, combined useable storage in the three reservoirs was 193.475 billion gallons or 71.4 percent of combined capacity. From December to May, the inflow to the New York City reservoirs typically exceeds the outflow, consequently increasing storage. Combined storage increased during the first half of the report year, and the reservoirs were at about 98 percent of usable capacity on May 31, 2016. Combined storage remained high (above 80 percent of combined capacity) until August 2016. The lowest combined storage was 106.406 billion gallons or 39 percent on November 28, 2016.

The three reservoirs spilled a total of 2.531 billion gallons when reservoirs reached maximum capacity during the year. The Pepacton Reservoir did not spill. The Cannonsville Reservoir spilled from May 10 to 22, 2016. The Neversink Reservoir spilled from May 9 to 15, 2016. The combined storage reached a maximum for the report year on May 15, 2016, at 271.890 billion gallons. The reservoirs' storage steadily decreased from this point, and the combined storage was 107.901 billion gallons, or 39.8 percent of combined capacity, on November 30, 2016.

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

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

Level	Pepacton Reservoir		Cannonsville Reservoir		Neversink Reservoir	
	Elevation (ft)	Volume (Mgal)	Elevation (ft)	Volume (Mgal)	Elevation (ft)	Volume (Mgal)
Full pool or spillway crest	1,280	—	1,150	—	1,440	—
Point of maximum depletion	1,152	[1]140,190	1,040	[1]95,706	1,319	[1]34,941
Sill of diversion tunnel	1,143	[2]3,511	[3]1,035	[2]1,020	1,314	[2]525
Sill of river outlet tunnel	1,126.50	[4]4,200	1,020.5	[4]1,564	1,314	NA
Dead storage	—	1,800	—	328	—	1,680

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

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

[3]The elevation of the mouth of the inlet channel of diversion works.

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

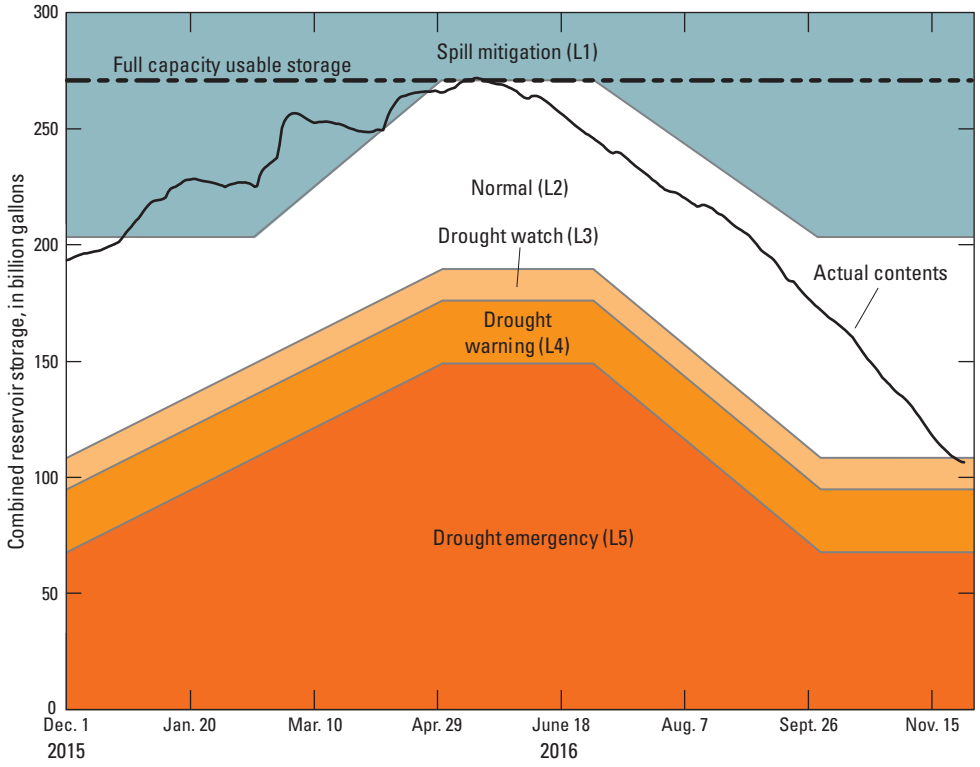

Figure 2. Graph showing rule curves and actual contents for New York City reservoirs in the Delaware River Basin from December 1, 2015, to November 30, 2016. Full capacity usable storage line and the five conservation release rate zones (L1–5) are shown. The conservation release rate zones are defined in the "conservation release" definition in the "Glossary" section.

Operations

Operations for December 1, 2015–November 30, 2016, were conducted as described by the FFMP (revised, effective June 1, 2015, and continued for a second year, effective June 1, 2016). The allowable diversion to New York City was 800 million gallons per day (Mgal/d) throughout the year. The Montague flow objective was 1,750 ft^3/s, except from November 23, 2016, to the end of the report year. The DRBC issued a basin-wide drought watch on November 23, 2016, for the portion of the watershed downstream from Montague, N.J. (DRBC, 2016b). The Trenton, N.J., 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. An offset bank was established by the Decree Parties to be used when there was a difference between the amount of water diverted from the basin by New Jersey and the lower values in the diversion ranges defined in table 1 of DRBC Resolution 2016–07 (DRBC, 2016a). The allowable diversion to New Jersey was 100 Mgal/d.

Conservation releases from the New York City reservoirs were made at the rates shown in tables 4a–g of the June 1, 2015, FFMP (appendix 1 in Russell and others, 2024) and the June 1, 2016, FFMP (appendix 1). In December 2015, table 4e was used. For 2016, tables 4f and 4g were used in January through February, tables 4a and 4b were used in March, table 4a was used in April, table 4d was used in early May, table 4c was used in mid-May, tables 4f and 4g were used for June through September, table 4d was used in October, table 4c was used in early November, and table 4a was used in late November (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.

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 the City's calibrated instruments, which are connected to Venturi meters installed in the tunnel conduits. The measured flows were transmitted electronically on a 15-second interval to New York City computers, and 5-minute interval release and diversion quantities for the preceding 5-minute period

were computed using the instantaneous rate-of-flow data from each instrument. These 5-minute quantities were then summed to compute the 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 beginning June 1, 2015, computed as stipulated by the Decree, is also shown in table 6. A total of 186.719 billion gallons of water was diverted to the New York City water supply system during the report year with an average of 510 Mgal/d, which is below the maximum diversion rate. The maximum daily diversion from a single reservoir was 549 million gallons (Mgal) on November 15–18, 2016, from the Pepacton Reservoir. The maximum daily combined diversion from all three reservoirs was 994 Mgal on October 20, 2016. Diversions by New York City did not exceed the limits stipulated by the Decree and the FFMP. Data on water consumption by New York City for each calendar year since 1950, from all sources of supply, are presented in table 7 (in back of report).

The East Delaware Tunnel is used to divert water from 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 in operation, some water leaked through the wicket gates and was not recorded by the totalizer. A current-meter measurement made in 1989 showed that the (assumed constant) rate of leakage is about 12.4 ft^3/s (8.0 Mgal/d). Because the powerplant was not in operation for the equivalent of 100 days during the 2016 report year, the estimated quantity of unmeasured leakage (diverted but not recorded) was about 0.8 billion gallons.

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

The Neversink Tunnel is used to divert water from the Neversink Reservoir to the Rondout Reservoir. A hydroelectric powerplant uses water diverted through the Neversink Tunnel. When the powerplant is not operating and the main valve on the diversion tunnel is open, leakage develops that is not recorded by the Venturi meters. One current-meter measurement made in 1999 showed a leakage rate of 16.2 ft^3/s (10.5 Mgal/d). The leakage is included in the recorded flow when the powerplant is operating. No leakage occurs when the main valve on the tunnel is closed. During the 2016 report year, the powerplant operated part of the day on most days and was not operated for the equivalent of 213 days. About 2.2 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 FFMP, New Jersey diversions shall not exceed 100 Mgal/d as a monthly average, and the daily mean diversion shall not exceed 120 Mgal/d.

As described in the "Drought Management" section (5d) of the 2016 FFMP and section 3e of DRBC Resolution 2016–07 (DRBC, 2016a), a New Jersey Diversion Offset Bank (NJDOB) was established to offset increased diversions by New Jersey during drought conditions. During a drought watch, diversions greater than 85 Mgal/d (up to 100 Mgal/d) are compensated with releases from the New York City reservoirs and debited from the NJDOB when water is required to meet the Trenton flow objective.

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 diversion was 99.8 Mgal/d during December 2015 (table 8, in back of report) (USGS, 2019e). The maximum daily mean diversion was 107 Mgal/d on January 1 and 12, 2016 (table 8). Diversions by New Jersey did not exceed the limits stipulated by the FFMP.

The basin was in a drought watch from November 23, 2016, through the end of the report year (DRBC, 2016a). The total accumulated NJDOB available for use was 2,300 cubic feet per second accumulated daily ($[ft^3/s]$-d). Releases were made from the New York City reservoirs and debited from the NJDOB to compensate for the increased diversions greater than 85 Mgal/day up to 100 Mgal/day in conjunction with DRBC releases from lower Delaware River Basin reservoirs to maintain the Trenton flow objective. A total of 89 (ft^3/s)-d from the NJDOB was used from November 23 to 26, 2016.

Montague Flow Objective

The components of forecasted flow at the Montague site during low flow (forecasted releases from powerplant reservoirs, estimated uncontrolled runoff including conservation releases from the 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 flow objective at the Montague site, 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 the segregation of the various components contributing to the flow of the Delaware River at the Montague site.

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 less than the flow objective on 122 days of the 2016 report year, from June 14 to November 30, 2016 (table 9) (USGS, 2019d). The ODRM directed releases on 122 days from June 14 to November 30, 2016, to maintain flow at the Montague site at or above the Montague flow objective (table 11, in back of report). The observed daily mean discharge at the Montague site was less than the flow objective (1,750 ft^3/s from December 1, 2015, to November 22, 2016, and 1,650 ft^3/s from November 23 to 30) on 24 days: June 24–25, September 2–6, and 19; October 7, 12, 16, and 18–24, and November 3–5 and 24–26, 2016 (table 11). However, 16 of the observed flows were within 10 percent of the flow objective. On October 23, 2016, the observed flow was 1,340 ft^3/s, about 77 percent of the flow objective (table 11).

The components of the total flow observed at the Montague site from June 17 to November 30, 2016, 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 described above, the uncontrolled runoff was computed as the residual of observed flow minus releases and was subject to errors in observations, transit times, and the routings of the various flow components. The conservation release from Rio Reservoir is included in the uncontrolled-runoff component. The effect of these uncertainties is incorporated into the computation of uncontrolled runoff.

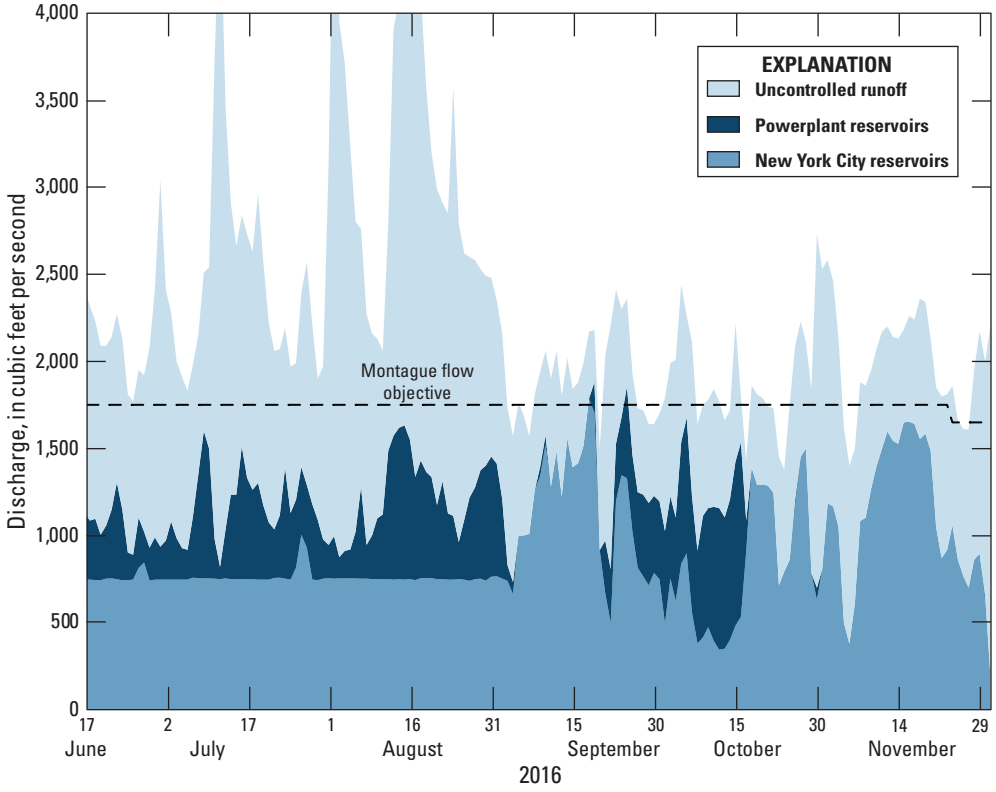

Figure 3. Graph showing flow components, Delaware River at Montague, New Jersey (U.S. Geological Survey site number 01438500), from June 17 to November 30, 2016.

Excess Release Quantity and Interim Excess Release Quantity

Per sections 4b and 4c of the 2016 FFMP (appendix 1 of this report), the Decree Parties agreed to use the Excess Release Quantity, as defined in the Decree, in support of an Interim Excess Release Quantity (IERQ). As specified in the 2016 FFMP, an IERQ equivalent to 10.0 billion gallons (15,468 [ft^3/s]-d) must be provided, with 3.91 billion gallons (6,045 [ft^3/s]-d) of the IERQ being incorporated in the releases tables to enhance base releases from the New York City Delaware River Basin Reservoirs. The remaining IERQ balance of 6.09 billion gallons (9,423 [ft^3/s]-d) is reserved and may be used for additional releases to meet the Trenton equivalent flow objective or to establish an Extraordinary Needs Bank. Upon request by the Lower Basin States or the DRBC, New York City must release water from the IERQ in sufficient quantities to maintain a flow at Trenton, N.J., of 3,000 ft^3/s during basinwide normal conditions from June 15, 2016, and through March 15, 2017 (known as the "seasonal period"). The maximum amount of water required to be released from the remaining IERQ in any seasonal period is 70 billion gallons. Under the 2016 FFMP, New York City must make these releases from the IERQ until May 31, 2017, or until the aggregate quantity of the IERQ is exhausted, whichever occurs first.

As described in section 4d of the 2016 FFMP, the Decree Parties, the DRBC, or the ODRM may at any time review extraordinary water needs to support such research, aquatic life, or other water-use activity as may be approved by the DRBC. Upon unanimous agreement, the Decree Parties may bank all or a portion of the IERQ remaining in an IERQ Extraordinary Needs Bank that can be used to provide for such extraordinary water needs. Banked quantities are deducted from the IERQ, and any unused Extraordinary Needs Bank water is returned to the IERQ.

None of the 2015 FFMP IERQ water was released to maintain a target flow of 3,000 ft^3/s at Trenton, N.J., from December 1, 2015, through May 31, 2016. The temporary release program to support the "One Bug" fishing event (appendix 2) used 1,203 (ft^3/s)-d of the 2015 FFMP IERQ for April 27–May 1, 2016 (table 10). The 6.09 billion gallons (9,423 [ft^3/s]-d) of the 2016 FFMP IERQ was used as follows:

(1) 499 (ft^3/s)-d for water temperature control on July 23–25, 2016. (table 10; appendix 3),

(2) 8,924 (ft^3/s)-d of the IERQ water was released to maintain a target flow of 3,000 ft^3/s at Trenton, N.J., intermittently from September 4 through November 16, 2016 (table 10).

Tailwaters Habitat Protection and Discharge Mitigation Program

The FFMP established a Tailwaters Habitat Protection and Discharge Mitigation Program, which consists of (1) conservation releases designed 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 water spilling from the full Delaware River Basin reservoirs. Controlled releases were made from the New York City Delaware River Basin reservoirs. From December 1, 2015, to November 30, 2016, 108.098 billion gallons was released from the New York City reservoirs in accordance with the Tailwaters Habitat Protection and Discharge Mitigation Program.

Comparison of River Master Operations Data With Other Records

The ODRM operations are conducted daily and, by necessity, use preliminary streamflow data. This section compares the records used in the ODRM operations to final data published for selected USGS streamgages. Data on releases were reported in million gallons per day (Mgal/d) and converted to cubic feet per second (ft^3/s) for use in the comparisons.

Analysis of Forecasts

Forecasts of streamflow at the Montague site, based on anticipated contributions from the components described previously but excluding releases from New York City reservoirs, differed from the observed flow on most days. Occasionally, component variations were partially compensating and observed flows compared favorably with 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 103 days from June 17 through November 30, 2016 (table 9), as indicated by directed releases being made. Table 12 computes forecasted and actual flow from hydroelectric powerplant releases and uncontrolled runoff for June 17–July 11, July 22–August 16, and August 30–November 30, 2016.

Table 12. Cumulative forecasted and actual release volumes from Lake Wallenpaupack and Rio Reservoir and uncontrolled runoff for June 17–July 11, July 22–August 16, and August 30–November 30, 2016.

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

Releases and runoff	Forecasted volume ([ft^3/s]-d)	Actual volume ([ft^3/s]-d)
Lake Wallenpaupack	27,019	31,420
Rio Reservoir	2,683	5,320
Runoff from uncontrolled area	130,668	149,263

For the June 17–July 11, July 22–August 16, and August 30–November 30, 2016, periods shown in table 12, actual releases from Lake Wallenpaupack and Rio Reservoir averaged 16 and 98 percent more than the forecasted releases, respectively. Powerplant forecasted volumes are calculated from columns 1 and 2 in table 9; powerplant actual releases are calculated from columns 5 and 6 in table 10. Observed runoff (column 10 in table 10) from the uncontrolled area was about 14 percent more than forecasted runoff (columns 3 + 4 in table 9).

Forecasted and actual releases from Lake Wallenpaupack and Rio Reservoir can differ on any given day. The differences between actual daily releases and forecasted daily releases for June 17–July 11, July 22–August 16, and August 30–November 30, 2016, are as follows: daily releases at Lake Wallenpaupack varied from 310 ft^3/s less than forecasted releases to 512 ft^3/s greater than forecasted releases, and daily releases at Rio Reservoir varied from 125 ft^3/s less than forecasted releases to 284 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 7.9 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 errors in the forecasts. 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. 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 the Pepacton Reservoir and a small amount of seepage and any runoff that enters the channel between the dam and the site. The drainage area is 371 mi^2 at the dam and 372 mi^2 at the site. The streamgage records are rated "good," which means that about 95 percent of the measured daily mean discharges are within 10 percent of the actual discharge.

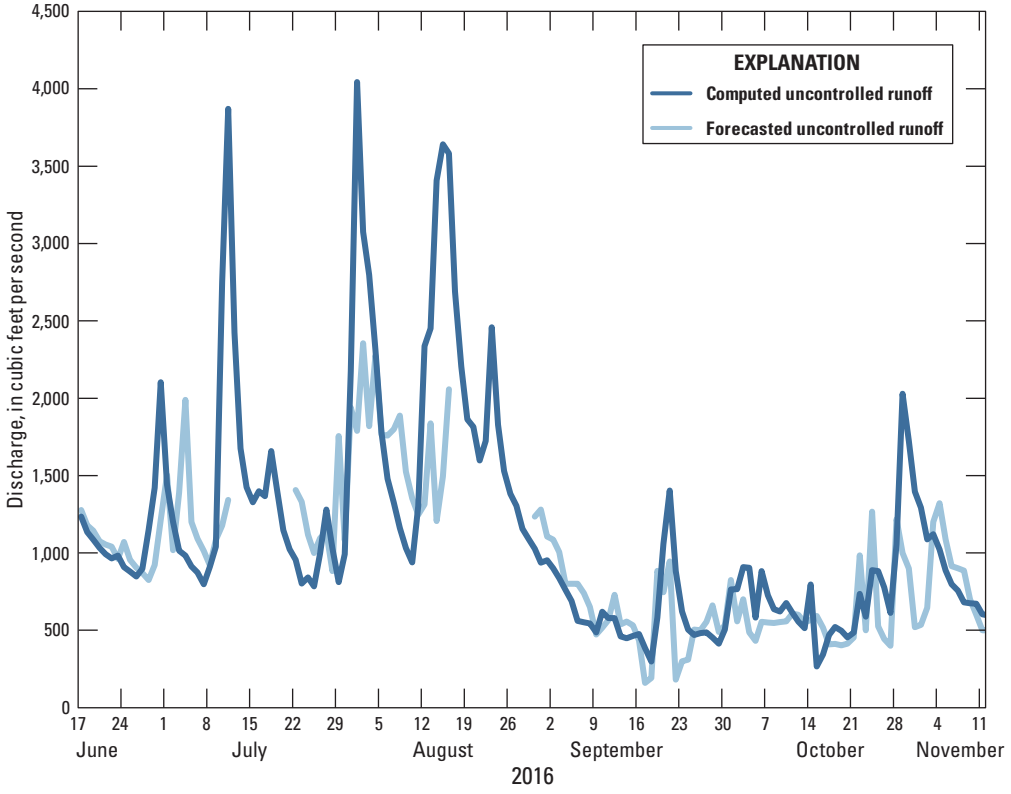

Figure 4. Hydrographs of computed and forecasted uncontrolled runoff components, Delaware River at Montague, New Jersey (U.S. Geological Survey site number 01460440), from June 17 to November 11, 2016. Discharge is shown in cubic feet per second.

Figure 5*A* shows the measured flow from the Pepacton Reservoir, including spillway, conservation, and directed releases, reported by New York City, compared with the 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, 2015, to November 30, 2016. The average difference is 5.2 percent, and 95 percent of the daily differences between the streamgage readings and New York City records are within 10.8 percent. Larger differences rarely occur and can be due to rainfall. The instruments connected to the Venturi meters were recalibrated periodically by New York City to improve the accuracy of the recorded flow data.

The USGS streamgage on the West Branch Delaware River at Stilesville, N.Y. (site number 01425000; fig. 1), is 1.4 mi downstream from Cannonsville Dam. Discharge measured at this site includes releases from the Cannonsville Reservoir and runoff from the 2 mi^2 of drainage area between the dam and the site. The drainage area is 454 mi^2 at the dam and 456 mi^2 at the site. 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 site and seepage near the base of the dam.

Figure 5*B* shows the 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, 2015, to November 30, 2016. The mean difference is 6.1 percent, and 95 percent of the daily differences between the streamgage readings and New York City records are within 21.6 percent. The largest differences between the measured flows 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. Discharge measured at this site includes releases from the Neversink Reservoir and, during storms, a small amount of runoff that originates between the dam and the site. The drainage area is 92.5 mi^2 at the dam and 92.6 mi^2 at the site. The streamgage records are rated "good," which means 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, 2015, to November 30, 2016. The mean difference between the released flow and measured flow is 5.5 percent, and 95 percent of the daily differences between the streamgage readings and New York City records are within 10.9 percent.

Delaware River at Montague, New Jersey

The ODRM's operations record for the Delaware River at Montague, N.J. (table 10), site showed 0.74 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, 2015, to November 30, 2016, operations by the ODRM were conducted as stipulated by the Decree, the FFMP, and DRBC Resolution 2016–07. Diversions from the Delaware River Basin to the New York City water supply system did not exceed those authorized by the Decree, the FFMP, and DRBC Resolution 2016–07. New York City released water from its reservoirs at rates directed by the ODRM to meet the applicable Montague flow objective. During the report year, New York City complied fully with all the directives and requests of the ODRM. Diversions from the Delaware River Basin by New Jersey were within the limits stipulated by the Decree, the FFMP, and DRBC Resolution 2016–07. New Jersey complied fully with all the directives and requests of the ODRM. The IERQ was used in accordance with the FFMP and agreements completed throughout the report year.

Quality of Water in the Delaware River Estuary

This section describes water-quality monitoring programs for the Delaware River estuary during the 2016 report year. Selected data are presented, and water-quality conditions are summarized.

Water-Quality Monitoring Programs

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

As part of a long-term program, in cooperation with the DRBC, the USGS operates continuous water-quality monitors at four locations in the Delaware River estuary between the streamgages at Trenton, N.J., and Reedy Island Jetty, Delaware (Del.) (fig. 6).

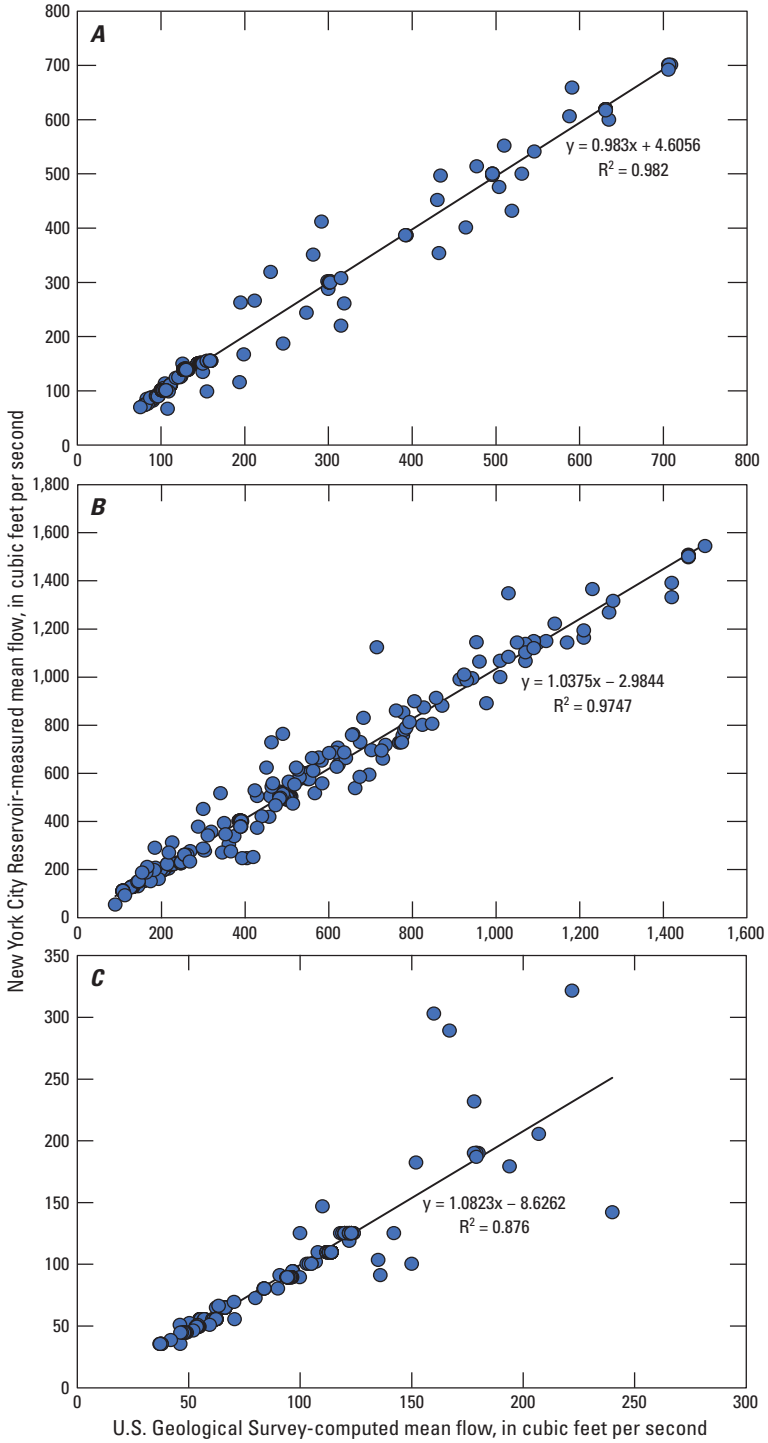

Figure 5. Graphs showing New York City-measured mean flow compared with computed mean flow records of U.S. Geological Survey (USGS) streamgaging sites downstream from their respective reservoirs: (*A*) East Branch Delaware River at Downsville, New York (N.Y.) (site number 01417000), downstream from Pepacton 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]), December 1, 2015, through November 30, 2016.

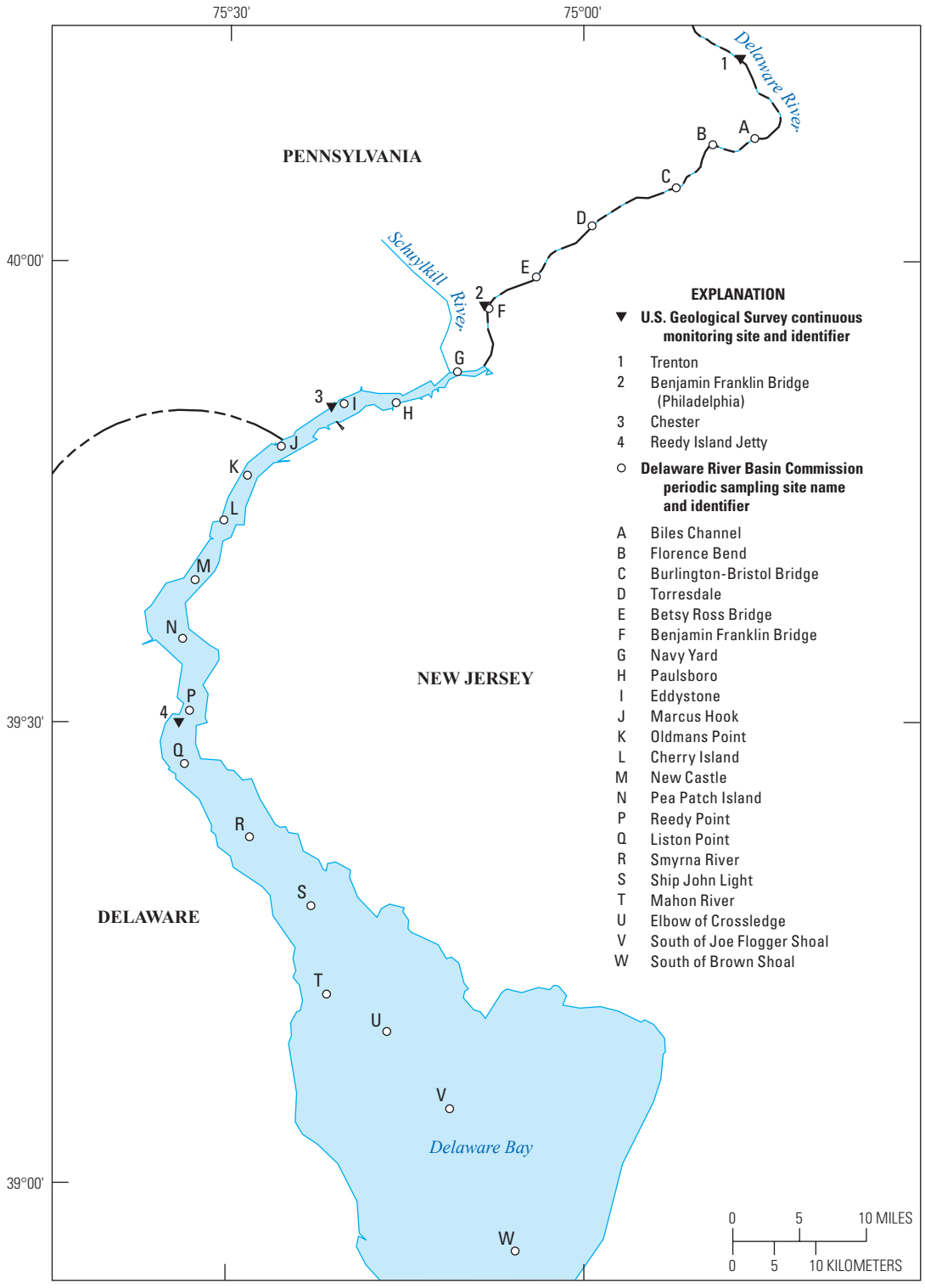

Figure 6. Map showing location of Delaware River Basin Commission (DRBC) water-quality monitoring sites on the Delaware River estuary. Modified from DRBC (2022). U.S. Geological Survey streamgaging sites (1–4) and DRBC sampling sites (A–N, P–W) are listed.

Continuous water temperature, specific conductance, dissolved oxygen, and pH data were collected at four sites: the Delaware River at Trenton, N.J. (USGS site number 01463500); the Delaware River at Benjamin Franklin Bridge at Philadelphia, Pennsylvania (Pa.) (USGS site number 01467200); the Delaware River at Chester, Pa. (USGS site number 01477050); and the Delaware River at Reedy Island Jetty, Del. (USGS site number 01482800). Continuous turbidity data were also collected at the Trenton and Reedy Island Jetty streamgages. 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 database (NWIS) and are available at https://waterdata.usgs.gov/nwis. Selected monitoring data from the 2016 report year are included in this report section.

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

Delaware River Estuary Boat Run Monitoring Program

Each year, the DBRC contracts with the Delaware Department of Natural Resources and Environmental Control to collect water samples at 22 sites on the Delaware River estuary (fig. 6, sites A–N, P–W) (DRBC, 2022). Samples are collected once a month from April to October. The goals of this program are to provide accurate, precise, and defensible estimates of the surface-water quality of the Delaware River estuary and allow for an assessment of compliance with water-quality criteria. Sample analysis includes routine and bacterial parameters, nutrients, heavy metals, chlorophyll-*a*, dissolved silica, and volatile organics. Water-quality data for these DBRC sampling sites are not presented in this report but are accessible from the DRBC Delaware Estuary Water Quality (Boat Run) Explorer (https://www.nj.gov/drbc/programs/quality/boat-run_explorer-app.html).

Water Quality During the 2016 Report Year

Streamflow

Streamflow significantly affects water quality in the Delaware River estuary. Large 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 average streamflow measured at the USGS streamgage at the Delaware River at Trenton, N.J. (site number 01463500), was highest during February 2016 (20,443 ft^3/s) and lowest during September 2016 (3,015 ft^3/s; table 16, in back of report). Long-term monthly mean streamflow was computed for October 1912–November 2015 (USGS, 2019f). Monthly mean streamflows were less than the long-term mean monthly streamflows for December 2015–February 2016 and less than the long-term mean monthly streamflows for March–November 2016. The greatest percentage of flow deficiency was in July 2016, when the monthly mean streamflow was 24 percent of the long-term mean monthly flow. The highest daily mean streamflow during the report year was 66,300 ft^3/s on February 26, 2016, and the lowest was 2,510 ft^3/s on September 8, 2016 (table 16).

Water Temperature

Water temperature significantly influences water quality, as it affects water's various physical, chemical, and biological properties (USGS, 2020c). Generally, increases in water temperature have detrimental effects on water quality by decreasing the dissolved oxygen saturation levels and increasing the biological activity of aquatic organisms. Although the primary factors that affect water temperature in the Delaware River estuary are climatic, various kinds of water use, especially powerplant cooling, can also have substantial effects.

Water temperature data for the monitoring site at the Benjamin Franklin Bridge, Philadelphia, Pa. (USGS site number 01467200), were collected almost continuously from April to November 2016. The procedures used to create figure 7 of this report were started for the 2011 report (DiFrenna and others, 2020) and are described here. The available long-term average daily temperature data were retrieved from the USGS NWIS database for April–November; the average value was computed for each month. Long-term average water temperatures were computed using data from 1964 to 2015 (fig. 7). The monthly average temperature was greater than the long-term average monthly temperature in April and from June through November 2016 (fig. 7). Monthly mean temperatures were less than the respective long-term mean monthly temperature only in May 2016 (fig. 7). The maximum daily mean water temperature of 28.9 degrees Celsius was recorded on August 20 and 21, 2016 (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 streamgage at Reedy Island Jetty, Del. (USGS site number 01482800). Chloride concentrations at Chester, Pa., were measured by Kimberly-Clark Chester Operations. Those data were provided by the DRBC and are not derived from specific conductance data.

At the Reedy Island Jetty site, the greatest daily maximum specific conductance was 26,100 microsiemens per centimeter at 25 degrees Celsius (µS/cm at 25 °C) on November 28, 2016 (table 17, in back of report) (USGS, 2020h). Daily maximum specific conductance during the report year exceeded 3,780 µS/cm at 25 °C on approximately 99 percent of the 364 days with measured specific conductance values in report year 2016. The lowest daily minimum specific conductance was 430 µS/cm at 25 °C on March 3, 2016. Daily minimum specific conductance exceeded 3,780 µS/cm at 25 °C on 76 percent of the 364 days with measured specific conductance values in report year 2016.

The data measured by Kimberly-Clark Chester Operations at Chester, Pa., indicates the greatest daily maximum chloride concentration was 651 mg/L on 41 days between October 19 and November 30, 2016 (table 18, in back of report). During the report year, daily maximum concentrations exceeded 50 mg/L on about 95 percent of the 365 days on which measurements were taken. The lowest daily minimum chloride concentration was 33 mg/L on December 3, 2015. Daily minimum concentrations exceeded 50 mg/L on about 50 percent of the reported days, including from December 1, 2015, to November 30, 2016 (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. (USGS site number 01467200), and the Delaware River at Chester, Pa. (USGS site number 01477050)—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 the water

For these sites, the daily mean and minimum daily mean dissolved-oxygen concentrations for July–September during the 1965–2016 report years are shown in figure 8. Although dissolved-oxygen concentrations increased over this 52-year period, mean concentrations can vary from year to year. Due to changes in technology and other factors, the process used to calculate mean dissolved-oxygen concentrations and the associated data values has changed slightly over time. The procedures used to create figure 8 of this report were started for the 2009–10 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 the daily values were computed over these 3 months for each report year.

Dissolved oxygen concentrations in the Delaware River estuary are usually highest 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 4.0 mg/L on July 30 and August 2, 2016 (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 May 31, 2016, and from October 6 through November 30, 2016. At the Chester site, the lowest recorded daily mean dissolved-oxygen concentration was 4.9 mg/L on August 1 and 2, 2016 (table 20, in back of report) (USGS, 2020f).

Histograms of quarter-hourly dissolved-oxygen concentrations during the critical summer period (July 1–30, 2016) at the Benjamin Franklin Bridge and Chester sites are presented in figure 9. During the 2016 critical summer period, quarter-hourly concentrations were 4 mg/L or less on 14 days (14.6 percent of

measured days) at the Benjamin Franklin Bridge monitoring site and on no days (0 percent) at the Chester monitoring site (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 acidic, whereas solutions with a pH greater than 7 are basic or alkaline. The pH of uncontaminated surface water usually ranges from 6.5 to 8.5. Significant 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, 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 (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, 6.9–7.6; Chester, 6.9–7.6; and Reedy Island Jetty, 7.3–8.1 (USGS, 2020d, f, h). Generally, the pH of water in the Delaware River estuary is lowest near the Trenton site and increases (the water becomes more alkaline) in the downstream direction. The pH of water in the Delaware River estuary between the Benjamin Franklin Bridge and Reedy Island Jetty was not a limiting factor for aquatic health or other beneficial water-uses during the report year.

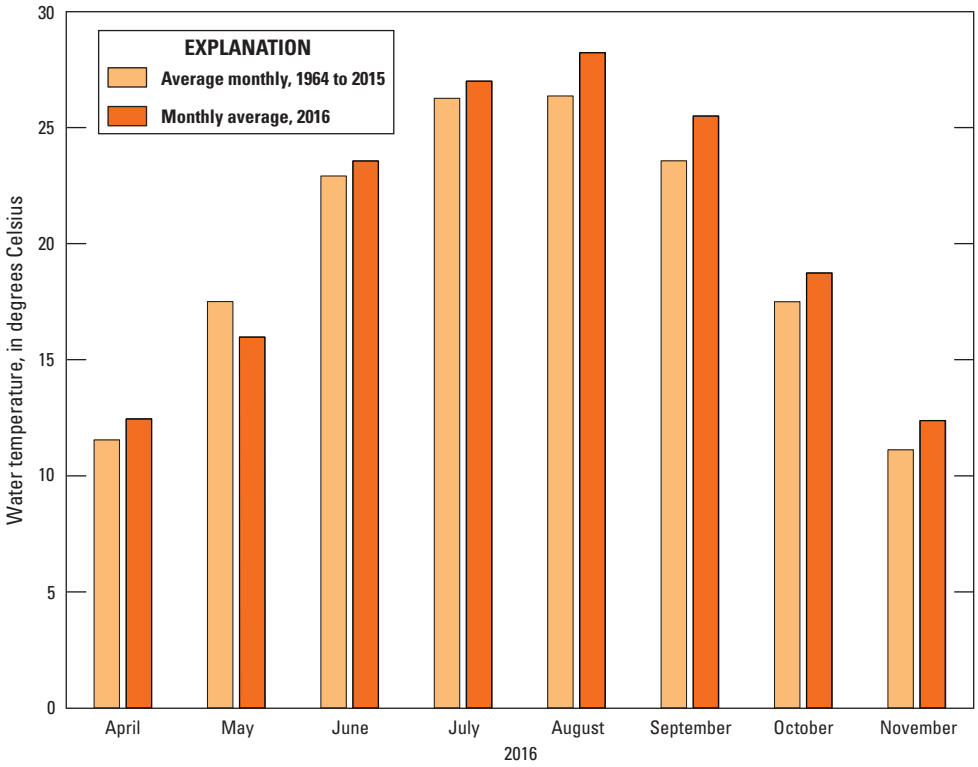

Figure 7. Bar chart showing monthly average water temperatures in 2016 and long-term average monthly water temperatures from 1964 to 2016, for April through November, in the Delaware River estuary at Benjamin Franklin Bridge at Philadelphia, Pennsylvania (USGS site number 01467200) (data from USGS [2020d]). Water temperatures are given in degrees Celsius.

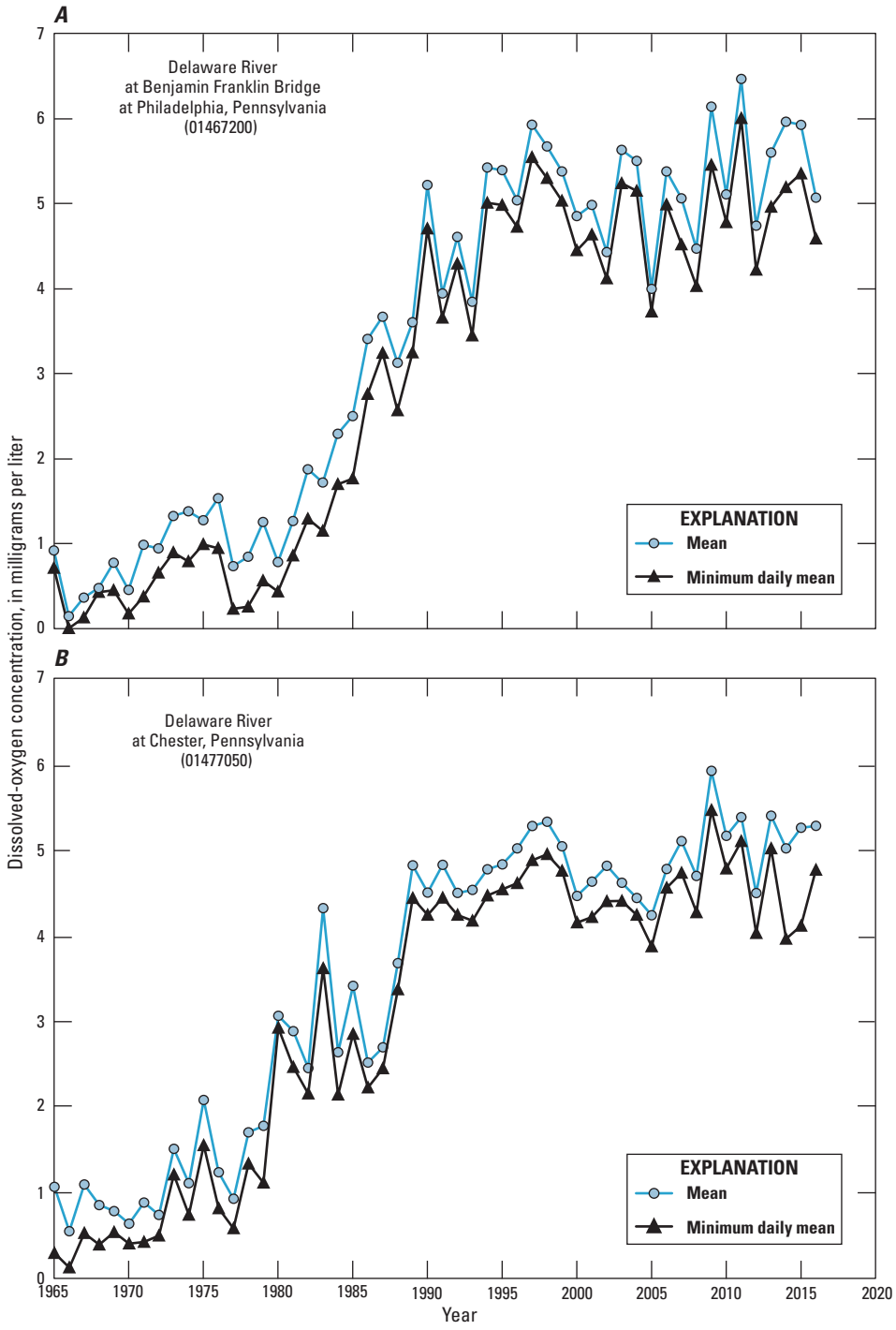

Figure 8. Graphs showing the daily mean and minimum daily mean dissolved-oxygen concentrations, in milligrams per liter, averaged from July to September, annually, at two sites on the Delaware River estuary, 1965–2016, at (*A*) Delaware River at Benjamin Franklin Bridge at Philadelphia, Pennsylvania (Pa.) (U.S. Geological Survey [USGS] site number 01457200; data from USGS [2020d]); and (*B*) Delaware River at Chester, Pa. (USGS site number 01477050; data from USGS [2020f]).

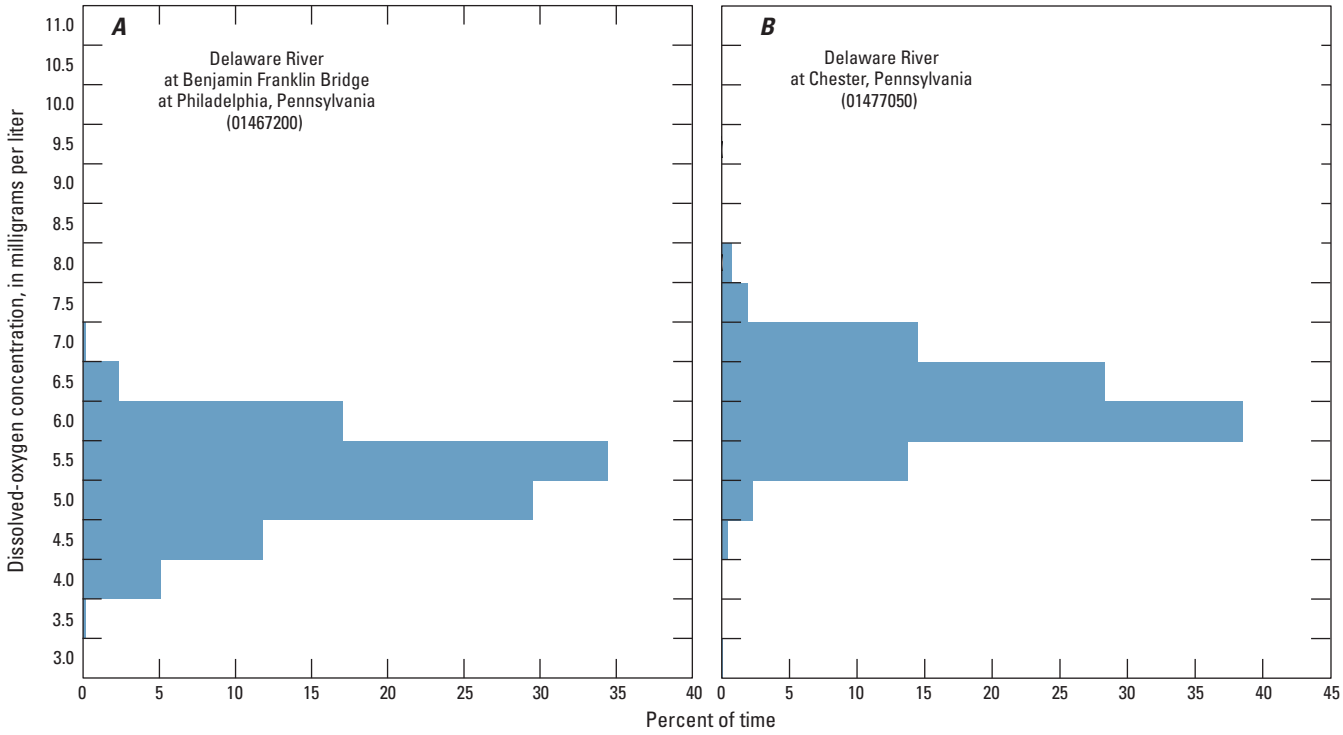

Figure 9. Graphs showing percent distribution of quarter-hourly dissolved-oxygen concentrations, in milligrams per liter, at two sites on the Delaware River estuary, from July to September 2016 for (*A*) Delaware River at Benjamin Franklin Bridge at Philadelphia, Pennsylvania (Pa.) (U.S. Geological Survey [USGS] site number 01467200; data from USGS [2020e]); and (*B*) Delaware River at Chester, Pa. (USGS site number 01477050; data from USGS [2020g]).

Tables 1, 3–11, and 13–20

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

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

Month	December 1940–November 2015 monthly average precipitation (in.)	December 2015–November 2016			
		Precipitation (in.)	Percent of average	Excess or deficit precipitation compared with long-term average (in.)	
				Month	Cumulative
December	3.49	3.92	112	0.43	0.43
January	3.01	1.73	57	–1.28	–0.85
February	2.63	4.31	164	1.68	0.83
March	3.37	1.39	41	–1.98	–1.15
April	3.75	2.65	71	–1.10	–2.25
May	4.17	3.55	85	–0.62	–2.87
June	4.27	3.21	75	–1.06	–3.93
July	4.21	6.27	149	2.06	–1.87
August	4.05	4.26	105	0.21	–1.66
September	4.09	1.99	49	–2.10	–3.76
October	3.73	3.24	87	–0.49	–4.25
November	3.69	2.08	56	–1.61	–5.86
Total	**44.46**	**38.60**	**87**	—	—

Table 3. Storage in Pepacton Reservoir, New York, for report year ending November 30, 2016.

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

Day	Dec. 2015	Jan. 2016	Feb. 2016	Mar. 2016	Apr. 2016	May 2016	June 2016	July 2016	Aug. 2016	Sept. 2016	Oct. 2016	Nov. 2016
1	97,450	107,863	113,832	128.937	128,532	138,572	137,930	129,412	121,351	112,365	101,117	85,087
2	97,328	108,427	113,733	129,253	128,585	138,885	137,693	128,954	121,231	112,316	100,761	84,594
3	97,587	108,959	113,338	129,430	128,690	139,142	137,437	128,514	121,060	111,889	100,450	84,103
4	97,816	109,461	113,535	129,412	128,884	139,289	137,310	128,022	120,735	111,415	100,109	83,667
5	98,076	109,754	113,650	129,306	129,007	139,308	137,419	127,565	120,327	110,941	99,769	83,165
6	98,291	109,981	113,848	129,148	128,866	139,345	137,875	127,093	119,902	110,436	99,428	82,538
7	98,475	110,192	114,097	129,042	128,901	139,693	137,730	126,621	119,580	109,932	99,106	81,940
8	98,690	110,485	114,379	128,972	130,138	139,969	137,730	126,307	119,155	109,883	98,690	81,168
9	98,598	110,794	114,429	128,813	131,167	140,043	137,492	126,236	118,681	109,819	98,229	80,533
10	98,813	111,154	114,412	128,690	132,076	140,079	137,127	126,603	118,192	109,689	97,755	79,960
11	98,998	111,824	114,512	128,725	132,826	140,061	136,799	126,673	117,989	109,624	97,298	79,155
12	99,151	112,266	114,545	128,813	133,599	140,024	136,508	126,638	117,669	109,559	96,780	78,342
13	99,290	112,415	114,595	128,849	134,372	139,895	136,109	126,167	117,736	109,154	96,234	77,521
14	99,413	112,712	114,446	128,919	135,004	140,061	135,765	125,747	118,039	108,669	95,750	76,702
15	99,753	113,189	114,279	128,937	135,493	140,024	135,294	125,366	117,888	108,250	95,176	75,944
16	100,078	113,584	114,462	128,849	135,946	139,914	134,877	124,932	117,635	107,734	94,635	75,347
17	100,280	114,113	116,160	128,884	136,381	139,785	134,588	124,551	117,366	107,220	94,126	74,701
18	100,652	114,379	116,964	128,866	136,799	139,601	134,318	124,135	117,048	106,788	93,527	74,124
19	100,993	114,495	117,602	128,813	137,218	139,472	134,012	123,773	116,713	106,452	92,873	73,576
20	101,320	114,628	118,175	128,901	137,310	139,326	133,707	123,756	116,294	106,084	92,264	73,081
21	101,680	114,828	118,681	128,866	137,181	139,234	133,401	123,722	115,893	105,637	91,806	72,574
22	102,023	114,895	119,172	128,849	137,346	139,087	133,114	123,687	115,625	105,129	91,423	72,072
23	102,570	114,828	119,580	128,673	137,638	138,976	132,773	123,635	115,243	104,653	90,863	71,545
24	103,105	114,678	119,987	128,497	137,893	139,013	132,469	123,583	114,812	104,177	90,219	71,172
25	103,767	114,545	122,464	128,514	138,113	139,197	132,022	123,514	114,313	103,688	89,462	70,765
26	104,431	114,462	125,245	128,549	138,296	139,142	131,523	123,549	113,865	103,183	88,662	70,371
27	105,002	114,379	126,777	128,532	138,480	139,068	131,043	123,170	113,453	102,822	88,157	70,053
28	105,621	114,329	127,776	128,567	138,811	138,976	130,759	122,670	112,975	102,367	87,681	69,776
29	106,212	114,246	128,479	128,585	138,664	138,811	130,351	122,327	112,563	101,914	87,023	69,625
30	106,580	114,130	—	128,549	138,425	138,572	129,890	121,899	112,481	101,523	86,294	69,763
31	107,204	114,031	—	128,532	—	138,425	—	121,660	112,398	—	85,611	—
Change[1]	+9,754	+6,168	+14,647	–405.0	+9,893	–147	–8,040	–7,752	–8,953	–10,842	–15,506	–15,324
Equivalent change[2] (Mgal/d)	+314.6	+199.0	+505.1	–13.1	+329.8	–4.7	–268.0	–250.1	–288.8	–361.4	–500.2	–510.8
Equivalent change[3] (ft^3/s)	+487	+308	+781	–20.3	+510	–7.3	–415	–387	–447	–559	–774	–790

[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 –27,793.0 million gallons. Minimum and maximum storage for December–May are 97,328 and 140,079 million gallons, respectively. Minimum and maximum storage for June–November are 69,625 and 137,930 million gallons, respectively.

[2]Net equivalent for the year is –75.9 million gallons per day.

[3]Net equivalent for the year is –117.5 cubic feet per second.

Table 4. Storage in Cannonsville Reservoir, New York, for report year ending November 30, 2016.

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

Day	Dec. 2015	Jan. 2016	Feb. 2016	Mar. 2016	Apr. 2016	May 2016	June 2016	July 2016	Aug. 2016	Sept. 2016	Oct. 2016	Nov. 2016
1	62,848	73,914	80,378	92,999	87,435	92,542	93,014	84,126	72,960	65,535	45,534	28,396
2	63,103	74,740	80,226	93,014	87,392	92,436	92,558	83,851	72,894	64,835	45,012	28,132
3	63,447	75,500	80,074	92,892	87,421	92,770	92,070	83,648	72,907	64,082	44,344	27,877
4	63,765	76,163	80,212	92,634	87,739	93,166	91,827	83,403	72,801	63,408	43,699	27,375
5	64,033	76,661	80,350	92,299	87,782	93,546	91,690	83,172	72,642	62,683	43,309	26,864
6	64,287	76,992	80,378	91,888	87,724	93,911	92,055	82,593	72,430	61,817	42,952	26,285
7	64,542	77,034	80,378	91,431	87,695	94,398	92,192	82,333	72,245	61,053	42,531	25,690
8	64,759	77,075	80,364	91,036	89,438	94,854	92,223	82,131	72,020	60,317	42,111	25,009
9	64,988	77,117	80,364	90,731	91,325	95,219	92,162	81,885	71,781	59,816	41,722	24,248
10	65,192	77,255	80,308	90,610	92,542	95,554	92,040	81,871	71,543	59,145	41,343	23,505
11	65,408	78,429	80,253	90,731	93,425	95,867	91,659	81,712	71,265	58,510	40,955	22,755
12	65,586	79,231	80,087	91,005	93,987	96,108	91,203	81,510	70,828	57,728	40,514	21,989
13	65,764	79,631	79,866	91,142	94,428	96,269	90,762	81,250	71,132	56,825	40,031	21,200
14	65,955	79,894	79,645	91,279	94,626	96,623	90,321	81,018	71,291	55,872	39,558	20,449
15	66,019	80,226	79,341	91,370	94,733	96,816	89,849	80,792	71,371	54,813	38,570	19,900
16	66,286	80,543	79,465	91,462	94,733	96,848	89,378	80,530	71,278	53,646	37,609	19,408
17	66,630	80,932	81,365	91,416	94,672	96,848	88,861	80,308	71,159	52,525	36,657	18,951
18	66,707	81,221	82,550	91,188	94,504	96,832	88,343	79,825	71,040	51,931	35,716	18,550
19	66,783	81,365	83,302	90,990	94,291	96,591	87,898	79,548	70,589	51,954	34,904	18,311
20	66,821	81,568	83,764	90,868	94,368	96,334	87,435	78,857	70,099	52,257	34,131	18,093
21	66,847	81,755	84,082	90,564	94,535	96,108	86,987	78,125	69,847	51,558	33,774	17,840
22	66,885	81,828	84,342	90,245	94,459	95,915	86,525	77,379	69,834	50,717	33,102	17,537
23	67,437	81,698	84,776	89,895	94,291	95,738	86,063	76,633	69,450	49,889	32,546	17,376
24	68,020	81,597	85,167	89,560	94,094	95,554	85,557	75,777	68,974	49,247	31,962	17,249
25	68,603	81,467	86,828	89,195	93,820	95,326	85,268	74,851	68,550	48,670	31,202	17,144
26	69,066	81,322	90,458	88,845	93,577	95,113	84,979	74,243	68,099	48,103	30,516	17,024
27	69,675	81,192	91,736	88,450	93,470	94,854	84,689	73,874	67,689	47,558	30,182	16,996
28	70,497	81,091	92,405	88,042	93,303	94,520	84,241	73,622	67,450	46,969	29,709	17,319
29	71,291	80,946	92,816	87,826	93,059	94,200	84,328	73,424	67,216	46,435	29,542	17,755
30	72,033	80,778	—	87,666	92,816	93,820	84,212	73,159	66,681	46,024	29,144	18,430
31	72,960	80,557	—	87,536	—	93,440	—	73,079	66,095	—	28,764	—
Change[1]	+10,112	+6,643	+12438	–5,463	+5,381	+898	–8,802	–11,407	–6,865	–19,511	–16,770	–9,966
Equivalent change[2] (Mgal/d)	+326.2	+214.3	+428.9	–176.2	+179.4	+29.0	–293.4	–356.4	–221.5	–650.4	–541.0	–332.2
Equivalent change[3] (ft^3/s)	+505	+332	+664	–273	+278	–44.9	–454	–551	–343	–1,006	–837	–514

[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 −17,404.0 million gallons. Minimum and maximum storage for December–May are 62,848 and 96,848 million gallons, respectively. Minimum and maximum storage for June–November are 16,996 and 93,014, respectively.

[2]Net equivalent for the year is –120.7 million gallons per day.

[3]Net equivalent for the year is –186.8 cubic feet per second.

Table 5. Storage in Neversink Reservoir, New York, for report year ending November 30, 2016.

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

Day	Dec. 2015	Jan. 2016	Feb. 2016	Mar. 2016	Apr. 2016	May 2016	June 2016	July 2016	Aug. 2016	Sept. 2016	Oct. 2016	Nov. 2016
1	33,177	32,834	31,560	34,591	32,615	34,518	34,072	32,401	28,716	26,949	25,329	22,811
2	33,297	32,786	31,555	34,483	32,667	34,596	34,037	32,264	28,734	26,906	25,304	22,791
3	33,269	32,723	31,541	34,350	32,747	34,665	34,003	32,194	28,712	26,864	25,275	22,768
4	33,240	32,619	31,813	34,214	32,786	34,587	33,993	32,140	28,646	26,804	25,246	22,752
5	33,153	32,444	31,962	34,052	32,843	34,572	33,983	32,090	28,592	26,766	25,197	22,713
6	33,067	32,203	32,014	33,925	32,838	34,533	34,160	31,929	28,425	26,710	25,172	22,694
7	32,972	32,085	32,066	33,775	32,876	34,725	34,204	31,713	28,368	26,668	25,122	22,669
8	32,885	31,939	32,099	33,625	33,201	34,922	34,204	31,475	28,311	26,617	25,089	22,525
9	32,767	31,914	32,118	33,490	33,307	35,011	34,194	31,313	28,250	26,511	25,056	22,501
10	32,628	32,014	32,131	33,341	33,446	35,026	34,126	31,484	28,184	26,397	25,014	22,470
11	32,505	32,552	32,146	33,235	33,563	35,041	34,086	31,541	28,154	26,359	24,977	22,443
12	32,377	32,767	32,066	33,129	33,746	35,055	34,067	31,438	27,983	26,312	24,936	22,412
13	32,245	32,714	31,953	33,005	33,959	35,065	34,032	31,271	27,835	26,261	24,895	22,388
14	32,108	32,486	31,667	32,862	34,121	35,070	33,998	31,026	27,896	26,215	24,863	22,369
15	32,056	32,363	31,429	32,805	33,843	35,050	33,969	30,795	27,970	26,156	24,764	22,186
16	32,014	32,288	31,429	32,647	33,543	34,892	33,929	30,373	27,875	26,106	24,711	21,988
17	31,914	32,231	32,155	32,486	33,620	34,730	33,896	30,128	27,757	26,022	24,682	21,737
18	32,005	32,118	32,368	32,349	33,717	34,587	33,848	30,100	27,740	25,959	24,645	21,500
19	32,009	31,986	32,245	32,377	33,804	34,448	33,809	29,910	27,653	25,929	24,515	21,237
20	32,122	31,944	32,122	32,386	33,872	34,428	33,761	29,860	27,528	25,908	24,389	20,991
21	32,245	31,881	32,222	32,396	33,925	34,433	33,539	29,819	27,494	25,862	24,173	20,742
22	32,368	31,686	32,288	32,405	33,993	34,478	33,379	29,760	27,472	25,813	23,983	20,484
23	32,519	31,560	32,349	32,410	34,028	34,523	33,211	29,724	27,434	25,750	23,938	20,220
24	32,786	31,569	32,405	32,396	34,067	34,562	33,168	29,665	27,391	25,703	23,914	20,053
25	33,048	31,578	33,620	32,396	34,111	34,591	33,105	29,611	27,331	25,642	23,882	19,862
26	33,101	31,591	34,587	32,396	34,160	34,487	33,048	29,589	27,288	25,591	23,705	19,675
27	33,057	31,600	34,720	32,386	34,228	34,370	32,995	29,414	27,227	25,533	23,501	19,485
28	33,005	31,606	34,725	32,386	34,291	34,296	32,857	29,195	27,180	25,487	23,382	19,311
29	32,948	31,582	34,675	32,481	34,340	34,291	32,738	28,977	27,124	25,433	23,207	19,307
30	32,862	31,578	—	32,515	34,443	34,296	32,567	28,756	27,073	25,387	23,012	19,708
31	32,819	31,569	—	32,567	—	34,296	—	28,738	27,009	—	22,826	—
Change[1]	–358	–1,265	+3,115	–2,024	+1,828	–222	–1,505	–3,663	–1,707	–1,562	–2,503	–3,103
Equivalent change[2] (Mgal/d)	–11.5	–40.8	+107.4	–65.3	+60.9	–7.2	–50.2	–118.2	–55.1	–52.1	–80.7	–103.4
Equivalent change[3] (ft^3/s)	–17.8	–63.1	+166	–101	+94.2	–11.1	–77.7	–183	–85.2	–80.6	–125	–160

[1]Change is calculated as the storage on the last day of each month minus the storage on the first day of each month. The net change for the year is –13,469.0 million gallons. Minimum and maximum storage for December–May are 31,429 and 35,070 million gallons, respectively; minimum and maximum storage for June–November are 19,307 and 34,204 million gallons, respectively.

[2]The net equivalent for the year is –36.8 million gallons per day.

[3]The net equivalent for the year is –56.9 cubic feet per second.

Table 6. Diversions to New York City water supply system for report year ending November 30, 2016.

[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
12/1/2015	299	0	0	501
12/2/2015	75	0	204	500
12/3/2015	0	0	203	498
12/4/2015	0	0	203	497
12/5/2015	0	0	203	495
12/6/2015	0	0	203	493
12/7/2015	0	0	170	492
12/8/2015	0	0	203	490
12/9/2015	0	0	203	489
12/10/2015	0	0	203	487
12/11/2015	0	0	203	486
12/12/2015	0	0	203	484
12/13/2015	0	0	203	483
12/14/2015	0	207	203	483
12/15/2015	0	152	203	482
12/16/2015	0	0	203	480
12/17/2015	0	296	203	481
12/18/2015	0	298	203	481
12/19/2015	0	298	0	480
12/20/2015	0	298	0	479
12/21/2015	0	299	1	478
12/22/2015	0	12	198	477
12/23/2015	0	237	276	477
12/24/2015	0	300	298	477
12/25/2015	0	300	298	478
12/26/2015	0	103	298	478
12/27/2015	0	0	298	477
12/28/2015	0	0	298	476
12/29/2015	0	0	298	475
12/30/2015	0	0	198	474
12/31/2015	0	0	198	473
Total	**374**	**2,800**	**6,078**	—

Date	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average from June 1
1/1/2016	0	0	198	471
1/2/2016	0	0	198	470
1/3/2016	0	0	198	469
1/4/2016	58	0	229	468
1/5/2016	171	0	288	468
1/6/2016	0	297	198	468
1/7/2016	0	300	199	468
1/8/2016	0	300	68	468
1/9/2016	0	300	0	467
1/10/2016	0	288	0	466
1/11/2016	0	146	0	465
1/12/2016	76	301	212	465
1/13/2016	76	301	320	466
1/14/2016	0	206	232	466
1/15/2016	0	202	198	466
1/16/2016	0	202	198	466
1/17/2016	0	202	198	465
1/18/2016	76	202	198	465
1/19/2016	0	66	66	464
1/20/2016	52	110	123	463
1/21/2016	171	202	238	464
1/22/2016	290	298	151	465
1/23/2016	299	300	0	466
1/24/2016	299	300	0	466
1/25/2016	251	300	0	466
1/26/2016	251	300	0	467
1/27/2016	251	300	0	467
1/28/2016	251	300	0	467
1/29/2016	251	300	0	468
1/30/2016	251	300	0	468
1/31/2016	251	300	0	469
Total	**3,325**	**6,623**	**3,710**	—

Table 6. Diversions to New York City water supply system for report year ending November 30, 2016.

[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
2/1/2016	253	300	0	469
2/2/2016	451	299	0	470
2/3/2016	267	300	0	470
2/4/2016	251	300	0	471
2/5/2016	84	300	0	470
2/6/2016	0	300	0	470
2/7/2016	0	300	0	469
2/8/2016	251	300	0	469
2/9/2016	251	300	0	470
2/10/2016	125	300	0	469
2/11/2016	77	300	77	469
2/12/2016	96	300	98	470
2/13/2016	283	300	281	471
2/14/2016	225	300	223	472
2/15/2016	0	1	0	470
2/16/2016	0	0	0	468
2/17/2016	0	0	0	467
2/18/2016	0	0	244	466
2/19/2016	0	180	221	466
2/20/2016	0	298	9	465
2/21/2016	0	284	0	464
2/22/2016	0	0	0	463
2/23/2016	0	0	0	461
2/24/2016	0	0	0	459
2/25/2016	0	0	0	457
2/26/2016	0	0	174	456
2/27/2016	0	0	198	455
2/28/2016	0	0	198	455
2/29/2016	0	0	198	454
Total	**2,614**	**4,962**	**1,921**	—

Date	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average from June 1
3/1/2016	0	0	200	453
3/2/2016	0	0	200	452
3/3/2016	169	0	200	451
3/4/2016	200	0	200	451
3/5/2016	200	0	200	451
3/6/2016	200	0	200	451
3/7/2016	200	0	200	451
3/8/2016	200	0	200	451
3/9/2016	200	0	200	450
3/10/2016	200	0	200	450
3/11/2016	200	0	200	450
3/12/2016	192	0	192	450
3/13/2016	193	0	196	450
3/14/2016	120	0	111	449
3/15/2016	200	0	198	449
3/16/2016	200	195	198	449
3/17/2016	200	299	198	450
3/18/2016	264	286	0	450
3/19/2016	120	166	0	450
3/20/2016	204	298	0	450
3/21/2016	201	298	0	450
3/22/2016	201	297	0	450
3/23/2016	201	299	0	450
3/24/2016	197	299	0	451
3/25/2016	201	299	0	451
3/26/2016	201	299	0	451
3/27/2016	201	299	0	451
3/28/2016	201	299	0	451
3/29/2016	201	299	0	451
3/30/2016	201	299	0	452
3/31/2016	201	299	0	452
Total	**3,325**	**6,623**	**3,710**	—

Table 6. Diversions to New York City water supply system for report year ending November 30, 2016.

[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
4/1/2016	201	299	0	452
4/2/2016	185	269	0	452
4/3/2016	0	0	0	450
4/4/2016	137	204	0	450
4/5/2016	199	299	0	450
4/6/2016	199	299	0	450
4/7/2016	200	299	0	451
4/8/2016	199	300	109	451
4/9/2016	0	300	0	451
4/10/2016	2	301	0	450
4/11/2016	10	438	0	450
4/12/2016	0	481	0	450
4/13/2016	0	481	0	450
4/14/2016	0	481	446	452
4/15/2016	0	481	446	453
4/16/2016	0	481	1	453
4/17/2016	0	481	0	453
4/18/2016	0	481	0	454
4/19/2016	324	129	0	454
4/20/2016	450	0	0	453
4/21/2016	151	250	0	453
4/22/2016	0	299	0	453
4/23/2016	0	299	0	452
4/24/2016	0	299	0	452
4/25/2016	0	299	0	451
4/26/2016	0	299	0	451
4/27/2016	0	299	0	451
4/28/2016	380	299	0	451
4/29/2016	450	299	0	452
4/30/2016	0	299	0	452
Total	**3,087**	**9,445**	**1,002**	**—**

Date	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average from June 1
5/1/2016	0	298	0	451
5/2/2016	0	88	152	451
5/3/2016	193	0	266	451
5/4/2016	293	0	206	451
5/5/2016	300	0	198	451
5/6/2016	233	0	33	450
5/7/2016	199	0	0	450
5/8/2016	295	0	0	449
5/9/2016	385	0	0	449
5/10/2016	399	0	0	449
5/11/2016	399	0	0	449
5/12/2016	399	0	0	449
5/13/2016	399	0	76	449
5/14/2016	443	0	0	449
5/15/2016	450	0	182	449
5/16/2016	450	0	198	450
5/17/2016	450	0	198	450
5/18/2016	400	262	198	451
5/19/2016	400	299	25	452
5/20/2016	325	300	0	453
5/21/2016	301	300	0	453
5/22/2016	298	297	0	453
5/23/2016	101	300	0	453
5/24/2016	0	300	0	453
5/25/2016	199	300	95	453
5/26/2016	199	299	103	454
5/27/2016	233	299	95	454
5/28/2016	297	299	0	455
5/29/2016	297	299	0	455
5/30/2016	296	299	0	455
5/31/2016	449	299	229	457
Total	**3,325**	**6,623**	**3,710**	**—**

Table 6. Diversions to New York City water supply system for report year ending November 30, 2016.

[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
6/1/2016	300	299	0	599
6/2/2016	300	269	0	584
6/3/2016	100	79	0	449
6/4/2016	0	0	0	337
6/5/2016	0	0	0	269
6/6/2016	253	0	0	267
6/7/2016	300	0	0	271
6/8/2016	300	0	0	275
6/9/2016	439	0	0	293
6/10/2016	450	249	0	334
6/11/2016	450	299	0	372
6/12/2016	449	299	0	403
6/13/2016	450	299	0	430
6/14/2016	450	299	0	452
6/15/2016	449	299	0	472
6/16/2016	300	299	0	480
6/17/2016	300	298	0	487
6/18/2016	300	230	0	489
6/19/2016	300	229	0	491
6/20/2016	300	229	189	503
6/21/2016	300	229	112	509
6/22/2016	300	229	112	515
6/23/2016	302	229	0	516
6/24/2016	449	2	0	513
6/25/2016	449	0	0	511
6/26/2016	449	0	0	508
6/27/2016	449	294	149	523
6/28/2016	450	298	114	535
6/29/2016	450	52	114	537
6/30/2016	450	0	114	538
Total	**10,238**	**5,009**	**904**	—

Date	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average from June 1
7/1/2016	450	0	113	539
7/2/2016	450	0	0	536
7/3/2016	450	0	0	534
7/4/2016	450	0	0	531
7/5/2016	449	295	113	541
7/6/2016	449	5	151	542
7/7/2016	377	0	207	544
7/8/2016	338	0	206	544
7/9/2016	0	0	0	530
7/10/2016	0	0	0	516
7/11/2016	0	0	81	506
7/12/2016	446	0	134	508
7/13/2016	445	0	206	511
7/14/2016	449	0	227	515
7/15/2016	449	0	434	523
7/16/2016	449	0	244	526
7/17/2016	431	218	0	529
7/18/2016	380	40	153	530
7/19/2016	0	461	0	529
7/20/2016	0	472	0	527
7/21/2016	0	471	0	526
7/22/2016	0	471	0	525
7/23/2016	0	471	0	524
7/24/2016	0	470	0	523
7/25/2016	0	470	0	522
7/26/2016	358	115	134	524
7/27/2016	449	0	172	526
7/28/2016	449	0	172	527
7/29/2016	449	0	172	529
7/30/2016	449	0	0	527
7/31/2016	449	0	0	526
Total	**9,065**	**3,959**	**2,919**	—

Table 6. Diversions to New York City water supply system for report year ending November 30, 2016.

[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
8/1/2016	449	0	0	525
8/2/2016	416	0	0	523
8/3/2016	450	0	0	522
8/4/2016	450	0	0	521
8/5/2016	450	0	113	522
8/6/2016	450	0	0	520
8/7/2016	450	0	0	519
8/8/2016	450	0	0	518
8/9/2016	450	0	0	517
8/10/2016	450	227	96	521
8/11/2016	449	299	152	526
8/12/2016	450	76	171	529
8/13/2016	218	0	0	524
8/14/2016	376	0	0	522
8/15/2016	450	0	115	523
8/16/2016	341	0	76	522
8/17/2016	450	0	0	521
8/18/2016	450	287	77	524
8/19/2016	450	298	96	528
8/20/2016	450	15	0	528
8/21/2016	450	0	0	527
8/22/2016	450	258	0	529
8/23/2016	450	285	0	531
8/24/2016	450	224	0	533
8/25/2016	450	220	0	535
8/26/2016	447	200	0	536
8/27/2016	446	7	0	535
8/28/2016	428	0	0	534
8/29/2016	0	277	0	531
8/30/2016	0	333	0	529
8/31/2016	6	333	3	523
Total	**12,126**	**3,339**	**899**	—

Date	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average from June 1
9/1/2016	0	426	0	522
9/2/2016	373	289	0	524
9/3/2016	446	224	0	525
9/4/2016	446	223	0	527
9/5/2016	446	223	0	528
9/6/2016	450	58	0	528
9/7/2016	1	0	0	523
9/8/2016	80	0	77	519
9/9/2016	76	0	77	515
9/10/2016	0	0	0	510
9/11/2016	0	0	0	505
9/12/2016	357	207	0	506
9/13/2016	403	204	0	507
9/14/2016	422	218	0	508
9/15/2016	450	238	0	510
9/16/2016	450	292	31	512
9/17/2016	450	299	0	514
9/18/2016	450	299	0	516
9/19/2016	450	299	0	519
9/20/2016	450	289	0	521
9/21/2016	450	299	0	523
9/22/2016	450	299	0	525
9/23/2016	450	299	0	526
9/24/2016	451	298	0	528
9/25/2016	451	298	0	530
9/26/2016	451	299	0	532
9/27/2016	450	298	0	534
9/28/2016	450	299	0	536
9/29/2016	356	245	0	536
9/30/2016	451	300	0	538
Total	**10,610**	**6,722**	**185**	—

Table 6. Diversions to New York City water supply system for report year ending November 30, 2016.

[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
10/1/2016	304	299	0	539
10/2/2016	304	299	0	539
10/3/2016	302	298	0	540
10/4/2016	302	298	0	540
10/5/2016	302	298	0	541
10/6/2016	302	298	0	541
10/7/2016	402	298	0	542
10/8/2016	451	298	0	544
10/9/2016	451	297	0	545
10/10/2016	451	299	0	547
10/11/2016	451	299	0	548
10/12/2016	451	299	0	550
10/13/2016	482	299	0	552
10/14/2016	492	298	77	554
10/15/2016	492	298	0	556
10/16/2016	492	297	0	557
10/17/2016	492	299	0	559
10/18/2016	491	299	95	561
10/19/2016	491	299	95	564
10/20/2016	491	298	205	567
10/21/2016	490	299	133	569
10/22/2016	490	299	0	571
10/23/2016	490	299	0	572
10/24/2016	489	298	2	574
10/25/2016	490	298	151	576
10/26/2016	491	298	170	579
10/27/2016	491	299	154	581
10/28/2016	491	299	203	584
10/29/2016	490	299	203	587
10/30/2016	490	294	203	589
10/31/2016	459	324	0	591
Total	**13,757**	**9,273**	**1,691**	—

Date	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average from June 1
11/1/2016	481	341	0	592
11/2/2016	481	341	0	594
11/3/2016	300	341	0	594
11/4/2016	283	341	0	594
11/5/2016	295	355	0	594
11/6/2016	283	340	0	595
11/7/2016	411	340	116	596
11/8/2016	271	339	0	596
11/9/2016	283	338	0	597
11/10/2016	403	337	0	597
11/11/2016	478	320	0	599
11/12/2016	477	285	0	600
11/13/2016	476	247	0	600
11/14/2016	545	7	147	601
11/15/2016	549	0	264	602
11/16/2016	549	0	264	603
11/17/2016	549	0	264	605
11/18/2016	549	0	263	606
11/19/2016	548	0	263	607
11/20/2016	548	0	263	608
11/21/2016	548	0	263	609
11/22/2016	548	0	263	611
11/23/2016	397	0	166	610
11/24/2016	452	0	203	611
11/25/2016	452	0	203	611
11/26/2016	452	0	203	611
11/27/2016	451	0	203	611
11/28/2016	342	0	0	610
11/29/2016	400	0	0	609
11/30/2016	101	0	194	607
Total	**12,902**	**4,272**	**3,542**	—

Table 7. Consumption of water by New York City from 1950 to 2016.

[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
1991	1,469.9	123.6	1,593.5	581.6

Table 7. Consumption of water by New York City from 1950 to 2016.

[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)	
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

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 report year ending November 30, 2016.

[Data from 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. 2015	Jan. 2016	Feb. 2016	Mar. 2016	Apr. 2016	May 2016	June 2016	July 2016	Aug. 2016	Sept. 2016	Oct. 2016	Nov. 2016
1	98	107	98	99	99	98	97e	73	69	81	85	96
2	100	104	100	100	99	100	89e	70	69	81	85	94
3	100	103	89	98	98	98	100e	68	56	79	85	96
4	100	103	84	98	101	97	96e	65	52	78	86	96
5	100	102	93	98	100	96	97e	66	52	77	86	98
6	98	101	100	100	99	99	99e	59	56	77	86	97
7	98	101	99	99	99	95	92e	58	56	78	85	97
8	99	101	101	98	99	98	90e	65	59	78	86	96
9	99	101	98	81	100	99	89e	76	59	79	90	99
10	99	74	91	91	99	99	90	79	59	79	90	98
11	99	98	94	97	99	100	91	77	60	80	92	97
12	99	107	94	97	100	96	90	72	62	81	90	98
13	99	105	93	95	100	98	89	69	64	81	89	97
14	99	100	87	97	99	98	90	62	63	82	89	97
15	100	96	90	100	98	97	89	56	64	83	90	101
16	100	95	83	91	98	96	89	53	64	83	89	100
17	95	96	98	85	98	98	85	49	64	85	89	100
18	100	94	103	96	97	96	83	49	65	85	89	99
19	103	95	99	98	98	95	78	47	65	89	89	98
20	103	89	96	99	97	96	81	46	67	89	89	102
21	101	92	97	98	100	99	83	47	70	88	87	101
22	100	87	96	98	99	100	81	46	72	88	90	101
23	98	79	96	99	98	96	79	46	75	86	90	101
24	96	70	87	99	99	100	78	38	76	85	90	101
25	105	75	–16	99	98	96	79	42	76	84	90	101
26	102	93	105	99	99	98	76	43	77	83	90	101
27	103	97	104	98	99	100	76	41	78	84	92	100
28	99	101	105	99	100	96	77	36	78	84	91	100
29	96	100	103	99	100	93	76	36	78	87	93	102
30	103	100	—	100	99	83e	70	–52	77	87	94	97
31	104	100	—	99	—	85e	—	–5	76	—	94	—
Total[1]	**3,095**	**2,966**	**2,667**	**3,004**	**2,968**	**2,995**	**2,579**	**1,577**	**2,058**	**2,481**	**2,760**	**2,961**
Mean[2]	**99.8**	**95.7**	**92.0**	**96.9**	**98.9**	**96.6**	**86.0**	**50.9**	**66.4**	**82.7**	**89.0**	**98.7**

[1]The year's total is 32,111 million gallons.

[2]The combined mean is 87.8 million gallons per day.

Table 9. New York City reservoir-release design data from December 1, 2015, to November 30, 2016.

[Delaware River Master daily operations record. The Montague design rate was 1,750 cubic feet per second (ft³/s) through November 22, 2016, and 1,650 ft³/s thereafter. Column (col.) 1 was provided by electric utilities Talen Energy Corp. and Brookfield Renewable U.S.; col. 2 provided by electric utility Eagle Creek Renewable Energy, LLC; col. 3 computed from index gaging stations; col. 4 computed increase in runoff based on quantitative precipitation forecasts; col. 5 = col. 1 + col. 2 + col. 3 + col. 4; col. 6 = design rate − col. 5, when positive, otherwise col. 6 = 0; col. 7 = col. 14 (4 days earlier); col. 8, directed release amount from the Office of 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; cols. 10, 12, 13, and 14 are accumulated from the previous water year starting June 1, 2015, with these values being reset on June 1, 2016; June 23, 2016, 11 ft³/s calculated balancing adjustment, applied balancing adjustment was 10 ft³/s; June 23, 2016, –10 ft³/s calculated balancing adjustment, applied balancing adjustment was 10 ft³/s; July 2, 2016, no directed release called for, river was not in recession. (ft³/s)-d, cubic foot per second accumulated daily]

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 12/1/2015 to 6/16/2015															
6/14/2016	399	0	1,205	73	6/17/2016	1,677	73	0	73	73	73	176	176	–103	10
6/15/2016	312	0	1,160	18	6/18/2016	1,490	260	0	260	260	333	264	440	–107	11
6/16/2016	0	0	1,100	43	6/19/2016	1,143	607	0	607	607	940	404	844	96	–10
6/17/2016	90	0	1,075	0	6/20/2016	1,165	585	0	585	585	1,525	412	1,256	269	–27
6/18/2016	240	0	1,045	9	6/21/2016	1,294	456	10	466	466	1,991	364	1,620	371	–37
6/19/2016	503	0	1,005	36	6/22/2016	1,544	206	10	216	216	2,207	229	1,849	358	–36
6/20/2016	399	0	940	21	6/23/2016	1,360	390	10	400	400	2,607	362	2,211	396	–40
6/21/2016	75	0	935	135	6/24/2016	1,145	605	–27	578	578	3,185	684	2,895	290	–29
6/22/2016	75	0	920	35	6/25/2016	1,030	720	–37	683	683	3,868	727	3,622	246	–25
6/23/2016	0	0	905	0	6/26/2016	905	845	–36	809	814	4,682	614	4,236	446	–45
6/24/2016	0	0	870	0	6/27/2016	870	880	–40	840	845	5,527	675	4,911	616	–50
6/25/2016	248	35	800	24	6/28/2016	1,107	643	–29	614	614	6,141	411	5,322	819	–50
6/26/2016	248	71	850	72	6/29/2016	1,241	509	–25	484	484	6,625	86	5,408	1,217	–50
6/27/2016	248	0	790	424	6/30/2016	1,462	288	–45	243	243	6,868	0	5,408	1,460	–50
6/28/2016	79	0	835	669	7/1/2016	1,583	167	–50	117	117	6,985	86	5,494	1,491	–50
6/29/2016	311	0	980	38	7/2/2016	1,329	421	–50	0	0	6,985	0	5,494	1,491	–50
6/30/2016	79	0	1,195	195	7/3/2016	1,469	281	–50	231	231	7,216	496	5,990	1,226	–50
7/1/2016	79	0	1,775	214	7/4/2016	2,068	0	–50	0	0	7,216	0	5,990	1,226	–50
7/2/2016	141	0	1,200	0	7/5/2016	1,341	409	–50	359	359	7,575	667	6,657	918	–50
7/3/2016	176	0	1,040	52	7/6/2016	1,268	482	–50	432	432	8,007	528	7,185	822	–50
7/4/2016	198	0	1,000	13	7/7/2016	1,211	539	–50	489	489	8,496	355	7,540	956	–50
7/5/2016	192	0	910	10	7/8/2016	1,112	638	–50	588	588	9,084	0	7,540	1,544	–50

Table 9. New York City reservoir-release design data from December 1, 2015, to November 30, 2016.—Continued

[Delaware River Master daily operations record. The Montague design rate was 1,750 cubic feet per second (ft³/s) through November 22, 2016, and 1,650 ft³/s thereafter. Column (col.) 1 was provided by electric utilities Talen Energy Corp. and Brookfield Renewable U.S.; col. 2 provided by electric utility Eagle Creek Renewable Energy, LLC; col. 3 computed from index gaging stations; col. 4 computed increase in runoff based on quantitative precipitation forecasts; col. 5 = col. 1 + col. 2 + col. 3 + col. 4; col. 6 = design rate − col. 5, when positive, otherwise col. 6 = 0; col. 7 = col. 14 (4 days earlier); col. 8, directed release amount from the Office of 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; cols. 10, 12, 13, and 14 are accumulated from the previous water year starting June 1, 2015, with these values being reset on June 1, 2016; June 23, 2016, 11 ft³/s calculated balancing adjustment, applied balancing adjustment was 10 ft³/s; June 23, 2016, –10 ft³/s calculated balancing adjustment, applied balancing adjustment was 10 ft³/s; July 2, 2016, no directed release called for, river was not in recession. (ft³/s)-d, cubic foot per second accumulated daily]

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
7/6/2016	340	284	800	284	7/9/2016	1,708	42	–50	0	0	9,084	0	7,540	1,544	–50
7/7/2016	192	0	790	387	7/10/2016	1,369	381	–50	331	331	9,415	0	7,540	1,875	–50
7/8/2016	192	0	680	663	7/11/2016	1,535	215	–50	165	165	9,580	0	7,540	2,040	–50
The estimated Montague discharge was greater than the Montague design rate from 7/12/2015 to 7/21/2015															
7/19/2016	400	71	1,405	1	7/22/2016	1,877	0	–50	0	0	9,580	438	8,700	880	–50
7/20/2016	475	110	1,250	80	7/23/2016	1,915	0	–50	0	0	9,580	312	9,012	568	–50
7/21/2016	398	0	1,090	28	7/24/2016	1,516	234	–50	184	184	9,764	526	9,538	226	–23
7/22/2016	191	0	986	13	7/25/2016	1,190	560	–50	510	510	10,274	575	10,113	161	–16
7/23/2016	191	142	895	200	7/26/2016	1,428	322	–50	272	272	10,546	365	10,478	68	–7
7/24/2016	191	71	1,075	60	7/27/2016	1,397	353	–50	303	303	10,849	110	10,588	261	–26
7/25/2016	191	53	780	103	7/28/2016	1,127	623	–50	573	573	11,422	286	10,874	548	–50
7/26/2016	191	71	1,750	6	7/29/2016	2,018	0	–16	0	0	11,422	594	11,468	–46	5
7/27/2016	191	0	947	135	7/30/2016	1,273	477	–7	470	470	†11,732	532	12,000	–268	27
7/28/2016	191	0	1,170	769	7/31/2016	2,130	0	–26	0	0	11,732	0	12,000	–268	27
7/29/2016	191	54	1,037	752	8/1/2016	2,034	0	–50	0	0	11,732	0	12,000	–268	27
7/30/2016	191	106	875	1,480	8/2/2016	2,652	0	4	0	0	11,732	0	12,000	–268	27
7/31/2016	191	71	973	847	8/3/2016	2,082	0	50	0	0	11,732	0	12,000	–268	27
8/1/2016	43	53	1,892	385	8/4/2016	2,373	0	50	0	0	11,732	0	12,000	–268	27
8/2/2016	118	106	1,750	15	8/5/2016	1,989	0	50	0	0	11,732	0	12,000	–268	27
8/3/2016	355	40	1,750	8	8/6/2016	2,153	0	50	0	0	11,732	0	12,000	–268	27
8/4/2016	161	0	1,750	49	8/7/2016	1,960	0	50	0	0	11,732	232	12,232	–500	50
8/5/2016	161	0	1,848	39	8/8/2016	2,048	0	50	0	0	11,732	340	12,572	–840	50
8/6/2016	161	71	1,518	7	8/9/2016	1,757	0	50	0	0	11,732	370	12,942	–1,210	50

Table 9. New York City reservoir-release design data from December 1, 2015, to November 30, 2016.—Continued

[Delaware River Master daily operations record. The Montague design rate was 1,750 cubic feet per second (ft³/s) through November 22, 2016, and 1,650 ft³/s thereafter. Column (col.) 1 was provided by electric utilities Talen Energy Corp. and Brookfield Renewable U.S.; col. 2 provided by electric utility Eagle Creek Renewable Energy, LLC; col. 3 computed from index gaging stations; col. 4 computed increase in runoff based on quantitative precipitation forecasts; col. 5 = col. 1 + col. 2 + col. 3 + col. 4; col. 6 = design rate − col. 5, when positive, otherwise col. 6 = 0; col. 7 = col. 14 (4 days earlier); col. 8, directed release amount from the Office of 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; cols. 10, 12, 13, and 14 are accumulated from the previous water year starting June 1, 2015, with these values being reset on June 1, 2016; June 23, 2016, 11 ft³/s calculated balancing adjustment, applied balancing adjustment was 10 ft³/s; June 23, 2016, –10 ft³/s calculated balancing adjustment, applied balancing adjustment was 10 ft³/s; July 2, 2016, no directed release called for, river was not in recession. (ft³/s)-d, cubic foot per second accumulated daily]

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
8/7/2016	0	124	1,350	3	8/10/2016	1,477	273	50	323	323	12,055	440	13,382	–1,327	50
8/8/2016	161	106	1,194	53	8/11/2016	1,514	236	50	286	286	12,341	0	13,382	–1,041	50
8/9/2016	161	106	1,090	223	8/12/2016	1,580	170	50	220	220	12,561	0	13,382	–821	50
8/10/2016	198	53	1,070	768	8/13/2016	2,089	0	50	0	0	12,561	0	13,382	–821	50
8/11/2016	198	106	873	333	8/14/2016	1,510	0	50	0	0	12,561	0	13,382	–821	50
8/12/2016	198	89	1,185	310	8/15/2016	1,782	0	50	0	0	12,561	0	13,382	–821	50
8/13/2016	300	106	1,940	118	8/16/2016	2,464	0	50	0	0	12,561	0	13,382	–821	50
The estimated Montague discharge was greater than the Montague design rate from 8/17/2016 to 8/29/2016															
8/27/2016	450	106	1,220	14	8/30/2016	1,790	0	50	0	0	12,561	34	13,415	–854	50
8/28/2016	450	106	1,280	0	8/31/2016	1,836	0	50	0	0	12,561	166	13,581	–1,020	50
8/29/2016	545	53	1,090	16	9/1/2016	1,704	46	50	96	96	12,657	342	13,923	–1,266	50
8/30/2016	310	0	1,040	46	9/2/2016	1,396	354	50	404	404	13,061	760	14,683	–1,622	50
8/31/2016	310	71	994	12	9/3/2016	1,387	363	50	413	413	13,474	842	15,525	–2,051	50
9/1/2016	0	0	800	0	9/4/2016	800	950	50	1,000	999	14,473	989	16,514	–2,041	50
9/2/2016	0	0	800	0	9/5/2016	800	950	50	1,000	1,001	15,474	1,061	17,575	–2,101	50
9/3/2016	0	0	800	0	9/6/2016	800	950	50	1,000	1,009	16,483	1,189	18,764	–2,281	50
9/4/2016	0	0	740	0	9/7/2016	740	1,010	50	1,060	1,059	17,542	1,199	19,963	–2,421	50
9/5/2016	0	0	650	0	9/8/2016	650	1,100	50	1,150	1,143	18,685	1,153	21,116	–2,431	50
9/6/2016	0	0	470	2	9/9/2016	472	1,278	50	1,323	1,321	20,006	1,211	22,327	–2,321	50
9/7/2016	250	0	510	7	9/10/2016	767	983	50	1,033	1,031	21,037	1,131	23,458	–2,421	50
9/8/2016	0	0	511	54	9/11/2016	565	1,185	50	1,235	1,232	22,269	1,172	24,630	–2,361	50
9/9/2016	0	0	496	233	9/12/2016	729	1,021	50	1,071	1,072	23,341	1,172	25,802	–2,461	50

Table 9. New York City reservoir-release design data from December 1, 2015, to November 30, 2016.—Continued

[Delaware River Master daily operations record. The Montague design rate was 1,750 cubic feet per second (ft^3/s) through November 22, 2016, and 1,650 ft^3/s thereafter. Column (col.) 1 was provided by electric utilities Talen Energy Corp. and Brookfield Renewable U.S.; col. 2 provided by electric utility Eagle Creek Renewable Energy, LLC; col. 3 computed from index gaging stations; col. 4 computed increase in runoff based on quantitative precipitation forecasts; col. 5 = col. 1 + col. 2 + col. 3 + col. 4; col. 6 = design rate − col. 5, when positive, otherwise col. 6 = 0; col. 7 = col. 14 (4 days earlier); col. 8, directed release amount from the Office of 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; cols. 10, 12, 13, and 14 are accumulated from the previous water year starting June 1, 2015, with these values being reset on June 1, 2016; June 23, 2016, 11 ft^3/s calculated balancing adjustment, applied balancing adjustment was 10 ft^3/s; June 23, 2016, –10 ft^3/s calculated balancing adjustment, applied balancing adjustment was 10 ft^3/s; July 2, 2016, no directed release called for, river was not in recession. (ft^3/s)-d, cubic foot per second accumulated daily]

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
9/10/2016	0	0	499	39	9/13/2016	538	1,212	50	1,262	1,259	24,600	1,289	27,091	–2,491	50
9/11/2016	0	0	555	1	9/14/2016	556	1,194	50	1,244	1,242	25,842	1,302	28,393	–2,551	50
9/12/2016	0	0	525	7	9/15/2016	532	1,218	50	1,268	1,267	27,109	1,287	29,680	–2,571	50
9/13/2016	0	0	400	34	9/16/2016	434	1,316	50	1,366	1,365	28,474	1,275	30,955	–2,481	50
9/14/2016	0	0	160	0	9/17/2016	160	1,590	50	1,640	1,635	30,109	1,365	32,320	–2,211	50
9/15/2016	0	0	160	32	9/18/2016	192	1,558	50	1,608	1,605	31,714	1,275	33,595	–1,881	50
9/16/2016	0	0	160	724	9/19/2016	884	866	50	916	916	32,630	1,166	34,761	–2,131	50
9/17/2016	390	0	160	586	9/20/2016	1,136	614	50	664	670	33,300	390	35,151	–1,851	50
9/18/2016	405	0	160	785	9/21/2016	1,350	400	50	450	450	33,750	38	35,189	–1,439	50
9/19/2016	420	0	160	21	9/22/2016	601	1,149	50	1,199	1,198	34,948	538	35,727	–779	50
9/20/2016	350	0	300	0	9/23/2016	650	1,100	50	1,150	1,147	36,095	797	36,524	–429	43
9/21/2016	363	0	300	10	9/24/2016	673	1,077	50	1,127	1,128	37,223	718	37,242	–19	2
9/22/2016	480	0	500	4	9/25/2016	984	766	50	816	822	38,045	842	38,084	–39	4
9/23/2016	480	0	500	0	9/26/2016	980	770	50	820	816	38,861	836	38,920	–59	6
9/24/2016	480	0	500	55	9/27/2016	1,035	715	50	765	765	39,626	795	39,715	–89	9
9/25/2016	480	0	500	160	9/28/2016	1,140	610	2	612	614	40,240	824	40,539	–299	30
9/26/2016	480	0	400	89	9/29/2016	969	781	4	785	785	41,025	895	41,434	–409	41
9/27/2016	467	0	400	131	9/30/2016	998	752	6	758	749	41,774	799	42,233	–459	46
9/28/2016	467	0	400	425	10/1/2016	1,292	458	9	467	494	42,268	454	42,687	–419	42
9/29/2016	467	0	400	158	10/2/2016	1,025	725	30	755	752	43,020	512	43,199	–179	18
9/30/2016	467	0	400	300	10/3/2016	1,167	583	41	624	623	43,643	363	43,562	81	–8

Table 9. New York City reservoir-release design data from December 1, 2015, to November 30, 2016.—Continued

[Delaware River Master daily operations record. The Montague design rate was 1,750 cubic feet per second (ft³/s) through November 22, 2016, and 1,650 ft³/s thereafter. Column (col.) 1 was provided by electric utilities Talen Energy Corp. and Brookfield Renewable U.S.; col. 2 provided by electric utility Eagle Creek Renewable Energy, LLC; col. 3 computed from index gaging stations; col. 4 computed increase in runoff based on quantitative precipitation forecasts; col. 5 = col. 1 + col. 2 + col. 3 + col. 4; col. 6 = design rate − col. 5, when positive, otherwise col. 6 = 0; col. 7 = col. 14 (4 days earlier); col. 8, directed release amount from the Office of 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; cols. 10, 12, 13, and 14 are accumulated from the previous water year starting June 1, 2015, with these values being reset on June 1, 2016; June 23, 2016, 11 ft³/s calculated balancing adjustment, applied balancing adjustment was 10 ft³/s; June 23, 2016, –10 ft³/s calculated balancing adjustment, applied balancing adjustment was 10 ft³/s; July 2, 2016, no directed release called for, river was not in recession. (ft³/s)-d, cubic foot per second accumulated daily]

Advance estimate of discharge of Delaware River at Montague, New Jersey, exclusive of New York City reservoir releases										Computation of balancing adjustment					
Date of advance estimate	Powerplant release forecasts		Uncontrolled runoff		Montague date	Discharge (ft³/s)	Indicated deficiency	Balancing adjustment	Directed release (ft³/s)	Adjusted directed release		Actual deficiency		Cumulative difference ([ft³/s]-d)	Balancing adjustment (ft³/s)
	Lake Wallenpaupack (ft³/s)	Rio Reservoir (ft³/s)	Current condition (ft³/s)	Weather adjustment (ft³/s)						Daily (ft³/s)	Cumulative ([ft³/s]-d)	Daily (ft³/s)	Cumulative ([ft³/s]-d)		
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12	Col. 13	Col. 14
10/1/2016	467	0	400	86	10/4/2016	953	797	46	843	838	44,481	148	43,710	771	–50
10/2/2016	467	0	400	31	10/5/2016	898	852	42	894	898	45,379	388	44,098	1,281	–50
10/3/2016	720	0	550	4	10/6/2016	1,274	476	18	494	559	45,938	199	44,297	1,641	–50
10/4/2016	810	0	550	0	10/7/2016	1,360	390	–8	382	381	46,319	491	44,788	1,531	–50
10/5/2016	740	0	540	7	10/8/2016	1,287	463	–50	413	414	46,733	414	45,202	1,531	–50
10/6/2016	670	0	530	23	10/9/2016	1,223	527	–50	477	473	47,206	443	45,645	1,561	–50
10/7/2016	750	0	530	28	10/10/2016	1,308	442	–50	392	395	47,601	305	45,950	1,651	–50
10/8/2016	750	0	600	8	10/11/2016	1,358	392	–50	342	344	47,945	324	46,274	1,671	–50
10/9/2016	750	0	600	0	10/12/2016	1,350	400	–50	350	350	48,295	440	46,714	1,581	–50
10/10/2016	750	0	550	0	10/13/2016	1,300	450	–50	400	401	48,696	431	47,145	1,551	–50
10/11/2016	750	0	550	17	10/14/2016	1,317	433	–50	383	382	49,078	12	47,157	1,921	–50
10/12/2016	670	0	550	43	10/15/2016	1,263	487	–50	437	434	49,512	484	47,641	1,871	–50
10/13/2016	0	177	500	17	10/16/2016	694	1,056	–50	1,006	809	50,321	1,229	48,870	1,451	–50
10/14/2016	0	0	400	8	10/17/2016	408	1,342	–50	1,292	1,290	51,611	1,280	50,150	1,461	–50
10/15/2016	0	0	400	12	10/18/2016	412	1,338	–50	1,288	1,289	52,900	1,229	51,379	1,521	–50
10/16/2016	0	0	400	3	10/19/2016	403	1,347	–50	1,297	1,294	54,194	1,254	52,633	1,561	–50
10/17/2016	0	0	400	13	10/20/2016	413	1,337	–50	1,287	1,286	55,480	1,296	53,929	1,551	–50
10/18/2016	0	0	400	52	10/21/2016	452	1,298	–50	1,248	1,246	56,726	1,266	55,195	1,531	–50
10/19/2016	0	0	400	584	10/22/2016	984	766	–50	716	715	57,441	1,015	56,210	1,231	–50
10/20/2016	0	0	400	100	10/23/2016	500	1,250	–50	1,200	792	58,233	1,162	57,372	861	–50
10/21/2016	0	0	400	867	10/24/2016	1,267	483	–50	433	862	59,095	862	58,234	861	–50
10/22/2016	0	0	400	125	10/25/2016	525	1,225	–50	1,175	1,173	60,268	833	59,067	1,201	–50
10/23/2016	0	0	400	44	10/26/2016	444	1,306	–50	1,256	1,256	†61,721	973	60,040	1,681	–50

Table 9. New York City reservoir-release design data from December 1, 2015, to November 30, 2016.—Continued

[Delaware River Master daily operations record. The Montague design rate was 1,750 cubic feet per second (ft³/s) through November 22, 2016, and 1,650 ft³/s thereafter. Column (col.) 1 was provided by electric utilities Talen Energy Corp. and Brookfield Renewable U.S.; col. 2 provided by electric utility Eagle Creek Renewable Energy, LLC; col. 3 computed from index gaging stations; col. 4 computed increase in runoff based on quantitative precipitation forecasts; col. 5 = col. 1 + col. 2 + col. 3 + col. 4; col. 6 = design rate − col. 5, when positive, otherwise col. 6 = 0; col. 7 = col. 14 (4 days earlier); col. 8, directed release amount from the Office of 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; cols. 10, 12, 13, and 14 are accumulated from the previous water year starting June 1, 2015, with these values being reset on June 1, 2016; June 23, 2016, 11 ft³/s calculated balancing adjustment, applied balancing adjustment was 10 ft³/s; June 23, 2016, –10 ft³/s calculated balancing adjustment, applied balancing adjustment was 10 ft³/s; July 2, 2016, no directed release called for, river was not in recession. (ft³/s)-d, cubic foot per second accumulated daily]

Advance estimate of discharge of Delaware River at Montague, New Jersey, exclusive of New York City reservoir releases										Computation of balancing adjustment					
Date of advance estimate	Powerplant release forecasts		Uncontrolled runoff		Montague date	Discharge (ft³/s)	Indicated deficiency	Balancing adjustment	Directed release (ft³/s)	Adjusted directed release		Actual deficiency		Cumulative difference ([ft³/s]-d)	Balancing adjustment (ft³/s)
	Lake Wallenpaupack (ft³/s)	Rio Reservoir (ft³/s)	Current condition (ft³/s)	Weather adjustment (ft³/s)						Daily (ft³/s)	Cumulative ([ft³/s]-d)	Daily (ft³/s)	Cumulative ([ft³/s]-d)		
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12	Col. 13	Col. 14
10/24/2016	0	0	400	0	10/27/2016	400	1,350	–50	1,300	1,300	†63,219	1,138	61,178	2,041	–50
10/25/2016	0	0	400	818	10/28/2016	1,218	532	–50	482	482	†64,004	695	61,873	2,131	–50
10/26/2016	0	71	499	500	10/29/2016	1,070	680	–50	630	630	64,634	0	61,873	2,761	–50
10/27/2016	0	0	450	449	10/30/2016	899	851	–50	801	806	65,440	26	61,899	3,541	–50
10/28/2016	0	0	500	19	10/31/2016	519	1,231	–50	1,181	1,184	66,624	354	62,253	4,371	–50
10/29/2016	0	0	525	10	11/1/2016	535	1,215	–50	1,165	1,167	67,791	457	62,710	5,081	–50
10/30/2016	0	0	600	46	11/2/2016	646	1,104	–50	1,054	1,053	68,844	663	63,373	5,471	–50
10/31/2016	0	0	1,200	0	11/3/2016	1,200	550	–50	500	499	69,343	629	64,002	5,341	–50
11/1/2016	0	0	1,200	122	11/4/2016	1,322	428	–50	378	378	69,721	728	64,730	4,991	–50
11/2/2016	0	0	1,000	88	11/5/2016	1,088	662	–50	612	613	70,334	863	65,593	4,741	–50
11/3/2016	0	0	900	14	11/6/2016	914	836	–50	786	783	71,117	953	66,546	4,571	–50
11/4/2016	0	0	900	0	11/7/2016	900	850	–50	800	803	71,920	993	67,539	4,381	–50
11/5/2016	0	0	886	0	11/8/2016	886	864	–50	814	869	72,789	1,069	68,608	4,181	–50
11/6/2016	0	0	700	0	11/9/2016	700	1,050	–50	1,000	1,051	73,840	1,131	69,739	4,101	–50
11/7/2016	0	0	600	0	11/10/2016	600	1,150	–50	1,100	1,041	74,881	1,021	70,760	4,121	–50
11/8/2016	0	0	500	0	11/11/2016	500	1,250	–50	1,200	1,197	76,078	1,147	71,907	4,171	–50
11/9/2016	0	0	500	0	11/12/2016	500	1,250	–50	1,200	1,194	77,272	1,154	73,061	4,211	–50
11/10/2016	0	0	400	0	11/13/2016	400	1,350	–50	1,300	1,296	78,568	1,146	74,207	4,361	–50
11/11/2016	0	0	400	0	11/14/2016	400	1,350	–50	1,300	1,299	79,867	1,219	75,426	4,441	–50
11/12/2016	0	0	400	0	11/15/2016	400	1,350	–50	1,300	1,303	81,170	1,143	76,569	4,601	–50
11/13/2016	0	0	400	0	11/16/2016	400	1,350	–50	1,300	1,291	82,461	1,151	77,720	4,741	–50

Table 9. New York City reservoir-release design data from December 1, 2015, to November 30, 2016.—Continued

[Delaware River Master daily operations record. The Montague design rate was 1,750 cubic feet per second (ft³/s) through November 22, 2016, and 1,650 ft³/s thereafter. Column (col.) 1 was provided by electric utilities Talen Energy Corp. and Brookfield Renewable U.S.; col. 2 provided by electric utility Eagle Creek Renewable Energy, LLC; col. 3 computed from index gaging stations; col. 4 computed increase in runoff based on quantitative precipitation forecasts; col. 5 = col. 1 + col. 2 + col. 3 + col. 4; col. 6 = design rate − col. 5, when positive, otherwise col. 6 = 0; col. 7 = col. 14 (4 days earlier); col. 8, directed release amount from the Office of 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; cols. 10, 12, 13, and 14 are accumulated from the previous water year starting June 1, 2015, with these values being reset on June 1, 2016; June 23, 2016, 11 ft³/s calculated balancing adjustment, applied balancing adjustment was 10 ft³/s; June 23, 2016, –10 ft³/s calculated balancing adjustment, applied balancing adjustment was 10 ft³/s; July 2, 2016, no directed release called for, river was not in recession. (ft³/s)-d, cubic foot per second accumulated daily]

Advance estimate of discharge of Delaware River at Montague, New Jersey, exclusive of New York City reservoir releases										Computation of balancing adjustment					
Date of advance estimate	Powerplant release forecasts		Uncontrolled runoff		Montague date	Discharge (ft³/s)	Indicated deficiency	Balancing adjustment	Directed release (ft³/s)	Adjusted directed release		Actual deficiency		Cumulative difference ([ft³/s]-d)	Balancing adjustment (ft³/s)
	Lake Wallenpaupack (ft³/s)	Rio Reservoir (ft³/s)	Current condition (ft³/s)	Weather adjustment (ft³/s)						Daily (ft³/s)	Cumulative ([ft³/s]-d)	Daily (ft³/s)	Cumulative ([ft³/s]-d)		
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12	Col. 13	Col. 14
11/14/2016	0	0	444	51	11/17/2016	495	1,255	–50	1,205	1,204	83,665	944	78,664	5,001	–50
11/15/2016	0	0	400	56	11/18/2016	456	1,294	–50	1,244	1,235	84,900	995	79,659	5,241	–50
11/16/2016	0	0	550	0	11/19/2016	550	1,200	–50	1,150	1,143	86,043	1,107	80,766	5,277	–50
11/17/2016	0	0	600	52	11/20/2016	652	1,098	–50	1,048	1,047	87,090	947	81,713	5,377	–50
11/18/2016	0	0	600	233	11/21/2016	833	917	–50	867	870	87,960	820	82,533	5,427	–50
11/19/2016	0	0	600	181	11/22/2016	781	969	–50	919	918	88,878	858	83,391	5,487	–50
11/20/2016	0	0	600	37	11/23/2016	637	1,113	–50	1,063	1,059	89,937	949	84,340	5,597	–50
11/21/2016	0	0	800	37	11/24/2016	837	913	–50	863	861	90,798	951	85,291	5,507	–50
11/22/2016	0	0	900	32	11/25/2016	932	818	–50	768	766	91,564	906	86,197	5,367	–50
11/23/2016	0	0	870	50	11/26/2016	920	730	–50	680	680	92,244	720	86,917	5,327	–50
11/24/2016	0	0	740	21	11/27/2016	761	889	–50	839	839	93,083	541	87,458	5,625	–50
11/25/2016	0	0	730	0	11/28/2016	730	920	–50	870	870	93,953	345	87,803	6,150	–50
11/26/2016	0	0	1,000	0	11/29/2016	1,000	650	–50	600	602	94,555	254	88,057	6,498	–50
11/27/2016	0	0	1,000	403	11/30/2016	1,403	247	–50	197	199	94,754	0	88,057	6,697	–50

[†]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, 2016.

[Delaware River Master daily operations record. All provided measurements are the mean discharge in cubic feet per second for 24 hours. 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 0800 of date shown until July 31, 2016, then beginning 0000 of date shown thereafter; 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 = The portion of col. 8 attributed to Interim Excess Release Quantity (IERQ) bank releases. IERQ used to meet the Trenton, New Jersey, flow objective, unless otherwise noted.—, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from powerplant reservoirs			Segregation of flow, Delaware River at Montague, New Jersey						IERQ and drought bank releases
Directed								Controlled releases						
Date	Amount	Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	New York City reservoirs		Powerplants	Computed uncontrolled	Total	
									Directed	Other				
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6		Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
11/28/2015	0	101	152	56	11/30/2015	126	71	12/1/2015	0	309	197	2,434	2,940	0
11/29/2015	0	101	152	56	12/1/2015	591	89	12/2/2015	0	309	680	3,161	4,150	0
11/30/2015	0	101	152	56	12/2/2015	723	0	12/3/2015	0	309	723	5,288	6,320	0
12/1/2015	0	101	152	56	12/3/2015	601	355	12/4/2015	0	309	956	5,365	6,630	0
12/2/2015	0	101	153	56	12/4/2015	365	195	12/5/2015	0	310	560	4,220	5,090	0
12/3/2015	0	101	152	56	12/5/2015	0	0	12/6/2015	0	309	0	3,861	4,170	0
12/4/2015	0	101	153	56	12/6/2015	0	355	12/7/2015	0	310	355	3,425	4,090	0
12/5/2015	0	101	153	56	12/7/2015	0	284	12/8/2015	0	310	284	3,196	3,790	0
12/6/2015	0	101	152	56	12/8/2015	0	638	12/9/2015	0	309	638	3,053	4,000	0
12/7/2015	0	101	152	56	12/9/2015	0	656	12/10/2015	0	309	656	2,875	3,840	0
12/8/2015	0	101	152	56	12/10/2015	0	372	12/11/2015	0	309	372	2,739	3,420	0
12/9/2015	0	101	152	56	12/11/2015	0	106	12/12/2015	0	309	106	2,655	3,070	0
12/10/2015	0	101	152	56	12/12/2015	0	71	12/13/2015	0	309	71	2,520	2,900	0
12/11/2015	0	102	152	56	12/13/2015	0	177	12/14/2015	0	310	177	2,413	2,900	0
12/12/2015	0	102	152	56	12/14/2015	0	89	12/15/2015	0	310	89	2,701	3,100	0
12/13/2015	0	102	152	56	12/15/2015	0	53	12/16/2015	0	310	53	3,707	4,070	0
12/14/2015	0	102	152	54	12/16/2015	0	0	12/17/2015	0	308	0	3,682	3,990	0
12/15/2015	0	99	138	50	12/17/2015	0	284	12/18/2015	0	287	284	4,199	4,770	0
12/16/2015	0	80	128	50	12/18/2015	0	53	12/19/2015	0	258	53	4,599	4,910	0
12/17/2015	0	80	128	50	12/19/2015	0	71	12/20/2015	0	258	71	4,011	4,340	0
12/18/2015	0	80	128	50	12/20/2015	55	18	12/21/2015	0	258	73	3,699	4,030	0
12/19/2015	0	80	128	50	12/21/2015	680	106	12/22/2015	0	258	786	3,426	4,470	0
12/20/2015	0	80	128	50	12/22/2015	317	35	12/23/2015	0	258	352	4,400	5,010	0
12/21/2015	0	80	128	50	12/23/2015	282	337	12/24/2015	0	258	619	8,983	9,860	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, 2016.—Continued

[Delaware River Master daily operations record. All provided measurements are the mean discharge in cubic feet per second for 24 hours. 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 0800 of date shown until July 31, 2016, then beginning 0000 of date shown thereafter; 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 = The portion of col. 8 attributed to Interim Excess Release Quantity (IERQ) bank releases. IERQ used to meet the Trenton, New Jersey, flow objective, unless otherwise noted.—, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from powerplant reservoirs			Segregation of flow, Delaware River at Montague, New Jersey					IERQ and drought bank releases
Directed								Controlled releases					
Date	Amount	Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	New York City reservoirs		Powerplants	Computed uncontrolled	Total	
									Directed	Other				
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6		Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
12/22/2015	0	80	128	50	12/24/2015	546	443	12/25/2015	0	258	989	10,253	11,500	0
12/23/2015	0	80	128	50	12/25/2015	610	461	12/26/2015	0	258	1,071	7,871	9,200	0
12/24/2015	0	80	128	50	12/26/2015	633	585	12/27/2015	0	258	1,218	6,624	8,100	0
12/25/2015	0	80	128	50	12/27/2015	395	550	12/28/2015	0	258	945	6,127	7,330	0
12/26/2015	0	80	130	50	12/28/2015	330	514	12/29/2015	0	260	844	5,816	6,920	0
12/27/2015	0	80	125	50	12/29/2015	357	266	12/30/2015	0	255	623	5,852	6,730	0
12/28/2015	0	80	127	50	12/30/2015	339	284	12/31/2015	0	257	623	6,480	7,360	0
12/29/2015	0	80	128	76	12/31/2015	269	266	1/1/2016	0	284	535	7,451	8,270	0
12/30/2015	0	96	181	125	1/1/2016	0	390	1/2/2016	0	402	390	6,808	7,600	0
12/31/2015	0	150	204	125	1/2/2016	0	426	1/3/2016	0	479	426	5,815	6,720	0
1/1/2016	0	150	204	125	1/3/2016	87	426	1/4/2016	0	479	513	5,298	6,290	0
1/2/2016	0	150	204	125	1/4/2016	691	301	1/5/2016	0	479	992	4,279	5,750	0
1/3/2016	0	150	201	125	1/5/2016	493	230	1/6/2016	0	476	723	3,661	4,860	0
1/4/2016	0	150	196	125	1/6/2016	433	284	1/7/2016	0	471	717	3,412	4,600	0
1/5/2016	0	150	196	125	1/7/2016	416	248	1/8/2016	0	471	664	3,305	4,440	0
1/6/2016	0	150	200	125	1/8/2016	391	230	1/9/2016	0	475	621	3,444	4,540	0
1/7/2016	0	150	203	125	1/9/2016	0	177	1/10/2016	0	478	177	4,685	5,340	0
1/8/2016	0	150	203	125	1/10/2016	703	337	1/11/2016	0	478	1,040	14,482	16,000	0
1/9/2016	0	150	204	125	1/11/2016	1,071	390	1/12/2016	0	479	1,461	10,460	12,400	0
1/10/2016	0	150	204	125	1/12/2016	1,136	319	1/13/2016	0	479	1,455	7,596	9,530	0
1/11/2016	0	150	201	125	1/13/2016	1,178	319	1/14/2016	0	476	1,497	6,797	8,770	0
1/12/2016	0	150	200	125	1/14/2016	976	426	1/15/2016	0	475	1,402	5,483	7,360	0
1/13/2016	0	150	200	125	1/15/2016	692	426	1/16/2016	0	475	1,118	5,697	7,290	0
1/14/2016	0	150	217	125	1/16/2016	701	301	1/17/2016	0	492	1,002	6,226	7,720	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, 2016.—Continued

[Delaware River Master daily operations record. All provided measurements are the mean discharge in cubic feet per second for 24 hours. 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 0800 of date shown until July 31, 2016, then beginning 0000 of date shown thereafter; 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 = The portion of col. 8 attributed to Interim Excess Release Quantity (IERQ) bank releases. IERQ used to meet the Trenton, New Jersey, flow objective, unless otherwise noted.—, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from powerplant reservoirs			Segregation of flow, Delaware River at Montague, New Jersey						IERQ and drought bank releases
Directed								Controlled releases						
Date	Amount	Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	New York City reservoirs		Powerplants	Computed uncontrolled	Total	
									Directed	Other				
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6		Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
1/15/2016	0	150	229	125	1/17/2016	708	337	1/18/2016	0	504	1,045	5,711	7,260	0
1/16/2016	0	150	227	125	1/18/2016	816	479	1/19/2016	0	502	1,295	4,953	6,750	0
1/17/2016	0	150	227	125	1/19/2016	861	532	1/20/2016	0	502	1,393	4,005	5,900	0
1/18/2016	0	150	224	125	1/20/2016	537	479	1/21/2016	0	499	1,016	3,635	5,150	0
1/19/2016	0	150	221	125	1/21/2016	419	461	1/22/2016	0	496	880	3,434	4,810	0
1/20/2016	0	150	220	125	1/22/2016	377	319	1/23/2016	0	495	696	3,069	4,260	0
1/21/2016	0	150	221	125	1/23/2016	373	106	1/24/2016	0	496	479	3,365	4,340	0
1/22/2016	0	150	223	125	1/24/2016	372	89	1/25/2016	0	498	461	3,501	4,460	0
1/23/2016	0	150	223	125	1/25/2016	523	160	1/26/2016	0	498	683	3,169	4,350	0
1/24/2016	0	150	223	125	1/26/2016	595	53	1/27/2016	0	498	648	2,994	4,140	0
1/25/2016	0	150	224	125	1/27/2016	518	0	1/28/2016	0	499	518	2,833	3,850	0
1/26/2016	0	150	224	125	1/28/2016	676	0	1/29/2016	0	499	676	2,675	3,850	0
1/27/2016	0	150	224	125	1/29/2016	572	0	1/30/2016	0	499	572	2,519	3,590	0
1/28/2016	0	149	224	125	1/30/2016	0	0	1/31/2016	0	498	0	2,412	2,910	0
1/29/2016	0	152	224	125	1/31/2016	0	71	2/1/2016	0	501	71	2,378	2,950	0
1/30/2016	0	152	223	125	2/1/2016	0	230	2/2/2016	0	500	230	2,330	3,060	0
1/31/2016	0	152	224	125	2/2/2016	0	266	2/3/2016	0	501	266	2,603	3,370	0
2/1/2016	0	150	224	125	2/3/2016	2	337	2/4/2016	0	499	339	4,072	4,910	0
2/2/2016	0	150	224	125	2/4/2016	0	71	2/5/2016	0	499	71	4,990	5,560	0
2/3/2016	0	149	224	125	2/5/2016	0	53	2/6/2016	0	498	53	4,049	4,600	0
2/4/2016	0	150	224	125	2/6/2016	0	89	2/7/2016	0	499	89	3,482	4,070	0
2/5/2016	0	150	224	125	2/7/2016	92	266	2/8/2016	0	499	358	3,103	3,960	0
2/6/2016	0	150	224	125	2/8/2016	686	160	2/9/2016	0	499	846	3,005	4,350	0
2/7/2016	0	150	224	125	2/9/2016	669	89	2/10/2016	0	499	758	2,983	4,240	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, 2016.—Continued

[Delaware River Master daily operations record. All provided measurements are the mean discharge in cubic feet per second for 24 hours. 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 0800 of date shown until July 31, 2016, then beginning 0000 of date shown thereafter; 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 = The portion of col. 8 attributed to Interim Excess Release Quantity (IERQ) bank releases. IERQ used to meet the Trenton, New Jersey, flow objective, unless otherwise noted.—, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from powerplant reservoirs			Segregation of flow, Delaware River at Montague, New Jersey					IERQ and drought bank releases
Directed								Controlled releases					
Date	Amount	Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	New York City reservoirs		Powerplants	Computed uncontrolled	Total	
									Directed	Other				
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6		Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
2/8/2016	0	150	224	125	2/10/2016	650	266	2/11/2016	0	499	916	2,855	4,270	0
2/9/2016	0	150	224	125	2/11/2016	640	284	2/12/2016	0	499	924	2,627	4,050	0
2/10/2016	0	150	224	125	2/12/2016	699	319	2/13/2016	0	499	1,018	2,423	3,940	0
2/11/2016	0	150	224	125	2/13/2016	915	461	2/14/2016	0	499	1,376	2,265	4,140	0
2/12/2016	0	150	224	125	2/14/2016	875	621	2/15/2016	0	499	1,496	2,365	4,360	0
2/13/2016	0	150	224	125	2/15/2016	893	408	2/16/2016	0	499	1,301	2,790	4,590	0
2/14/2016	0	150	224	125	2/16/2016	889	142	2/17/2016	0	499	1,031	12,270	13,800	0
2/15/2016	0	149	224	125	2/17/2016	877	266	2/18/2016	0	498	1,143	10,459	12,100	0
2/16/2016	0	150	227	125	2/18/2016	843	284	2/19/2016	0	502	1,127	6,951	8,580	0
2/17/2016	0	150	226	125	2/19/2016	1,106	124	2/20/2016	0	501	1,230	5,639	7,370	0
2/18/2016	0	150	227	125	2/20/2016	1,150	0	2/21/2016	0	502	1,150	5,688	7,340	0
2/19/2016	0	150	227	125	2/21/2016	1,132	160	2/22/2016	0	502	1,292	5,326	7,120	0
2/20/2016	0	150	227	125	2/22/2016	999	266	2/23/2016	0	502	1,265	4,753	6,520	0
2/21/2016	0	150	227	125	2/23/2016	1,169	106	2/24/2016	0	502	1,275	4,323	6,100	0
2/22/2016	0	150	227	125	2/24/2016	100	213	2/25/2016	0	502	313	25,885	26,700	0
2/23/2016	0	150	224	125	2/25/2016	1,260	851	2/26/2016	0	499	2,111	29,190	31,800	0
2/24/2016	0	118	464	138	2/26/2016	1,565	851	2/27/2016	0	720	2,416	17,364	20,500	0
2/25/2016	0	131	1,083	190	2/27/2016	1,569	851	2/28/2016	0	1,404	2,420	12,276	16,100	0
2/26/2016	0	152	1,497	190	2/28/2016	1,569	851	2/29/2016	0	1,839	2,420	9,941	14,200	0
2/27/2016	0	469	1,497	189	2/29/2016	1,569	851	3/1/2016	0	2,155	2,420	8,025	12,600	0
2/28/2016	0	504	1,501	189	3/1/2016	115	656	3/2/2016	0	2,194	771	7,135	10,100	0
2/29/2016	0	688	1,501	190	3/2/2016	0	514	3/3/2016	0	2,379	514	5,947	8,840	0
3/1/2016	0	701	1,507	190	3/3/2016	0	408	3/4/2016	0	2,398	408	5,244	8,050	0
3/2/2016	0	701	1,507	190	3/4/2016	0	372	3/5/2016	0	2,398	372	4,750	7,520	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, 2016.—Continued

[Delaware River Master daily operations record. All provided measurements are the mean discharge in cubic feet per second for 24 hours. 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 0800 of date shown until July 31, 2016, then beginning 0000 of date shown thereafter; 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 = The portion of col. 8 attributed to Interim Excess Release Quantity (IERQ) bank releases. IERQ used to meet the Trenton, New Jersey, flow objective, unless otherwise noted.—, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from powerplant reservoirs			Segregation of flow, Delaware River at Montague, New Jersey						IERQ and drought bank releases
Directed								Controlled releases						
Date	Amount	Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	New York City reservoirs		Powerplants	Computed uncontrolled	Total	
									Directed	Other				
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6		Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
3/3/2016	0	699	1,505	170	3/5/2016	0	71	3/6/2016	0	2,374	71	4,335	6,780	0
3/4/2016	0	682	1,502	124	3/6/2016	0	160	3/7/2016	0	2,308	160	4,032	6,500	0
3/5/2016	0	583	1,501	125	3/7/2016	61	248	3/8/2016	0	2,209	309	3,852	6,370	0
3/6/2016	0	500	1,451	125	3/8/2016	523	106	3/9/2016	0	2,076	629	3,615	6,320	0
3/7/2016	0	498	1,236	125	3/9/2016	446	266	3/10/2016	0	1,859	712	3,529	6,100	0
3/8/2016	0	498	992	125	3/10/2016	479	266	3/11/2016	0	1,615	745	3,800	6,160	0
3/9/2016	0	500	730	125	3/11/2016	335	266	3/12/2016	0	1,355	601	4,774	6,730	0
3/10/2016	0	501	668	125	3/12/2016	0	106	3/13/2016	0	1,294	106	4,400	5,800	0
3/11/2016	0	368	599	119	3/13/2016	87	160	3/14/2016	0	1,086	247	4,087	5,420	0
3/12/2016	0	288	575	125	3/14/2016	392	266	3/15/2016	0	988	658	4,154	5,800	0
3/13/2016	0	300	600	125	3/15/2016	406	266	3/16/2016	0	1,025	672	4,053	5,750	0
3/14/2016	0	302	600	125	3/16/2016	607	266	3/17/2016	0	1,027	873	4,040	5,940	0
3/15/2016	0	300	600	125	3/17/2016	569	248	3/18/2016	0	1,025	817	4,048	5,890	0
3/16/2016	0	300	600	125	3/18/2016	646	266	3/19/2016	0	1,025	912	3,753	5,690	0
3/17/2016	0	300	600	125	3/19/2016	644	106	3/20/2016	0	1,025	750	3,555	5,330	0
3/18/2016	0	300	600	125	3/20/2016	612	160	3/21/2016	0	1,025	772	3,343	5,140	0
3/19/2016	0	302	599	125	3/21/2016	423	160	3/22/2016	0	1,026	583	3,241	4,850	0
3/20/2016	0	300	599	125	3/22/2016	360	71	3/23/2016	0	1,024	431	3,135	4,590	0
3/21/2016	0	300	602	125	3/23/2016	0	213	3/24/2016	0	1,027	213	2,950	4,190	0
3/22/2016	0	299	606	125	3/24/2016	0	106	3/25/2016	0	1,030	106	2,874	4,010	0
3/23/2016	0	153	600	125	3/25/2016	0	71	3/26/2016	0	878	71	2,801	3,750	0
3/24/2016	0	101	600	125	3/26/2016	0	53	3/27/2016	0	826	53	2,731	3,610	0
3/25/2016	0	101	599	125	3/27/2016	0	0	3/28/2016	0	825	0	2,675	3,500	0
3/26/2016	0	102	599	121	3/28/2016	0	0	3/29/2016	0	822	0	3,018	3,840	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, 2016.—Continued

[Delaware River Master daily operations record. All provided measurements are the mean discharge in cubic feet per second for 24 hours. 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 0800 of date shown until July 31, 2016, then beginning 0000 of date shown thereafter; 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 = The portion of col. 8 attributed to Interim Excess Release Quantity (IERQ) bank releases. IERQ used to meet the Trenton, New Jersey, flow objective, unless otherwise noted.—, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from powerplant reservoirs			Segregation of flow, Delaware River at Montague, New Jersey					IERQ and drought bank releases
Directed								Controlled releases					
Date	Amount	Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	New York City reservoirs		Powerplants	Computed uncontrolled	Total	
									Directed	Other				
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6		Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
3/27/2016	0	101	540	96	3/29/2016	0	284	3/30/2016	0	737	284	3,049	4,070	0
3/28/2016	0	101	374	65	3/30/2016	0	0	3/31/2016	0	540	0	2,790	3,330	0
3/29/2016	0	88	189	65	3/31/2016	0	0	4/1/2016	0	342	0	2,388	2,730	0
3/30/2016	0	85	138	65	4/1/2016	0	0	4/2/2016	0	288	0	2,342	2,630	0
3/31/2016	0	85	113	65	4/2/2016	0	0	4/3/2016	0	263	0	2,417	2,680	0
4/1/2016	0	85	113	65	4/3/2016	0	89	4/4/2016	0	263	89	2,448	2,800	0
4/2/2016	0	85	113	65	4/4/2016	0	195	4/5/2016	0	263	195	2,372	2,830	0
4/3/2016	0	85	113	65	4/5/2016	37	106	4/6/2016	0	263	143	2,234	2,640	0
4/4/2016	0	85	107	65	4/6/2016	0	0	4/7/2016	0	257	0	2,293	2,550	0
4/5/2016	0	85	110	65	4/7/2016	0	0	4/8/2016	0	260	0	7,400	7,660	0
4/6/2016	0	85	110	65	4/8/2016	0	0	4/9/2016	0	260	0	10,340	10,600	0
4/7/2016	0	85	111	65	4/9/2016	0	124	4/10/2016	0	261	124	7,835	8,220	0
4/8/2016	0	85	110	65	4/10/2016	0	284	4/11/2016	0	260	284	6,126	6,670	0
4/9/2016	0	85	111	65	4/11/2016	0	355	4/12/2016	0	261	355	5,644	6,260	0
4/10/2016	0	84	193	65	4/12/2016	0	124	4/13/2016	0	342	124	6,014	6,480	0
4/11/2016	0	87	402	65	4/13/2016	1	0	4/14/2016	0	554	1	5,245	5,800	0
4/12/2016	0	87	402	65	4/14/2016	11	0	4/15/2016	0	554	11	4,595	5,160	0
4/13/2016	0	88	402	65	4/15/2016	68	177	4/16/2016	0	555	245	4,080	4,880	0
4/14/2016	0	87	402	65	4/16/2016	0	0	4/17/2016	0	554	0	3,756	4,310	0
4/15/2016	0	85	402	65	4/17/2016	0	0	4/18/2016	0	552	0	3,458	4,010	0
4/16/2016	0	85	404	65	4/18/2016	0	0	4/19/2016	0	554	0	3,036	3,590	0
4/17/2016	0	85	401	65	4/19/2016	0	0	4/20/2016	0	551	0	2,779	3,330	0
4/18/2016	0	85	402	65	4/20/2016	0	0	4/21/2016	0	552	0	2,588	3,140	0
4/19/2016	0	85	402	65	4/21/2016	0	0	4/22/2016	0	552	0	2,448	3,000	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, 2016.—Continued

[Delaware River Master daily operations record. All provided measurements are the mean discharge in cubic feet per second for 24 hours. 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 0800 of date shown until July 31, 2016, then beginning 0000 of date shown thereafter; 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 = The portion of col. 8 attributed to Interim Excess Release Quantity (IERQ) bank releases. IERQ used to meet the Trenton, New Jersey, flow objective, unless otherwise noted.—, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from powerplant reservoirs			Segregation of flow, Delaware River at Montague, New Jersey						IERQ and drought bank releases
Directed								Controlled releases						
Date	Amount	Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	New York City reservoirs		Powerplants	Computed uncontrolled	Total	
									Directed	Other				
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6		Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
4/20/2016	0	85	402	65	4/22/2016	35	0	4/23/2016	0	552	35	2,313	2,900	0
4/21/2016	0	85	402	65	4/23/2016	0	0	4/24/2016	0	552	0	2,168	2,720	0
4/22/2016	0	85	402	65	4/24/2016	0	0	4/25/2016	0	552	0	2,028	2,580	0
4/23/2016	0	85	402	65	4/25/2016	0	0	4/26/2016	0	552	0	1,998	2,550	0
4/24/2016	0	85	402	65	4/26/2016	0	0	4/27/2016	0	552	0	2,128	2,680	0
4/25/2016	0	85	402	56	4/27/2016	0	0	4/28/2016	0	543	0	2,287	2,830	0
4/26/2016	0	85	401	36	4/28/2016	0	0	4/29/2016	0	522	0	2,038	2,560	0
4/27/2016	0	85	401	36	4/29/2016	0	0	4/30/2016	0	522	0	1,988	2,510	†224
4/28/2016	0	85	401	36	4/30/2016	0	71	5/1/2016	0	522	71	2,257	2,850	†362
4/29/2016	0	85	401	36	5/1/2016	0	0	5/2/2016	0	522	0	2,858	3,380	†362
4/30/2016	0	84	339	56	5/2/2016	0	0	5/3/2016	0	479	0	5,511	5,990	†240
5/1/2016	0	74	166	56	5/3/2016	0	53	5/4/2016	0	296	53	7,331	7,680	†15
5/2/2016	0	74	150	56	5/4/2016	0	266	5/5/2016	0	280	266	6,924	7,470	0
5/3/2016	0	74	149	56	5/5/2016	0	284	5/6/2016	0	279	284	6,377	6,940	0
5/4/2016	0	74	150	57	5/6/2016	0	284	5/7/2016	0	281	284	8,775	9,340	0
5/5/2016	0	74	183	70	5/7/2016	404	496	5/8/2016	0	327	900	8,433	9,660	0
5/6/2016	0	90	226	70	5/8/2016	0	585	5/9/2016	0	386	585	7,249	8,220	0
5/7/2016	0	91	226	70	5/9/2016	473	674	5/10/2016	0	387	1,147	5,846	7,380	0
5/8/2016	0	91	227	70	5/10/2016	491	266	5/11/2016	0	388	757	5,005	6,150	0
5/9/2016	0	90	227	70	5/11/2016	589	0	5/12/2016	0	387	589	4,604	5,580	0
5/10/2016	0	90	224	71	5/12/2016	682	0	5/13/2016	0	385	682	4,183	5,250	0
5/11/2016	0	90	249	101	5/13/2016	401	230	5/14/2016	0	440	631	4,969	6,040	0
5/12/2016	0	108	302	101	5/14/2016	0	142	5/15/2016	0	511	142	5,647	6,300	0
5/13/2016	0	111	302	101	5/15/2016	81	213	5/16/2016	0	514	294	5,292	6,100	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, 2016.—Continued

[Delaware River Master daily operations record. All provided measurements are the mean discharge in cubic feet per second for 24 hours. 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 0800 of date shown until July 31, 2016, then beginning 0000 of date shown thereafter; 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 = The portion of col. 8 attributed to Interim Excess Release Quantity (IERQ) bank releases. IERQ used to meet the Trenton, New Jersey, flow objective, unless otherwise noted.—, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from powerplant reservoirs			Segregation of flow, Delaware River at Montague, New Jersey					IERQ and drought bank releases
Directed								Controlled releases					
Date	Amount	Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	New York City reservoirs		Powerplants	Computed uncontrolled	Total	
									Directed	Other				
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6		Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
5/14/2016	0	111	302	101	5/16/2016	636	177	5/17/2016	0	514	813	4,483	5,810	0
5/15/2016	0	110	297	101	5/17/2016	578	89	5/18/2016	0	508	667	3,915	5,090	0
5/16/2016	0	110	299	101	5/18/2016	202	0	5/19/2016	0	510	202	3,798	4,510	0
5/17/2016	0	110	299	101	5/19/2016	207	89	5/20/2016	0	510	296	3,484	4,290	0
5/18/2016	0	110	299	101	5/20/2016	165	426	5/21/2016	0	510	591	2,929	4,030	0
5/19/2016	0	111	297	94	5/21/2016	0	106	5/22/2016	0	502	106	2,732	3,340	0
5/20/2016	0	111	288	80	5/22/2016	0	0	5/23/2016	0	479	0	2,551	3,030	0
5/21/2016	0	110	269	80	5/23/2016	180	0	5/24/2016	0	459	180	2,391	3,030	0
5/22/2016	0	110	261	80	5/24/2016	73	0	5/25/2016	0	451	73	2,206	2,730	0
5/23/2016	0	110	261	80	5/25/2016	454	0	5/26/2016	0	451	454	1,985	2,890	0
5/24/2016	0	111	260	80	5/26/2016	503	0	5/27/2016	0	451	503	1,896	2,850	0
5/25/2016	0	111	261	82	5/27/2016	202	0	5/28/2016	0	454	202	1,844	2,500	0
5/26/2016	0	110	320	94	5/28/2016	423	89	5/29/2016	0	524	512	1,794	2,830	0
5/27/2016	0	127	377	94	5/29/2016	376	35	5/30/2016	0	598	411	1,851	2,860	0
5/28/2016	0	127	379	94	5/30/2016	356	0	5/31/2016	0	600	356	1,954	2,910	0
5/29/2016	0	127	377	94	5/31/2016	384	0	6/1/2016	0	598	384	1,778	2,760	0
5/30/2016	0	125	377	99	6/1/2016	413	0	6/2/2016	0	601	413	1,596	2,610	0
5/31/2016	0	127	461	110	6/2/2016	206	0	6/3/2016	0	698	206	1,456	2,360	0
6/1/2016	0	139	506	110	6/3/2016	114	0	6/4/2016	0	755	114	1,481	2,350	0
6/2/2016	0	139	504	110	6/4/2016	0	0	6/5/2016	0	753	0	1,607	2,360	0
6/3/2016	0	139	503	110	6/5/2016	25	35	6/6/2016	0	752	60	3,048	3,860	0
6/4/2016	0	139	504	110	6/6/2016	135	89	6/7/2016	0	753	224	4,063	5,040	0
6/5/2016	0	139	503	110	6/7/2016	118	106	6/8/2016	0	752	224	2,894	3,870	0
6/6/2016	0	139	501	110	6/8/2016	296	160	6/9/2016	0	750	456	2,524	3,730	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, 2016.—Continued

[Delaware River Master daily operations record. All provided measurements are the mean discharge in cubic feet per second for 24 hours. 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 0800 of date shown until July 31, 2016, then beginning 0000 of date shown thereafter; 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 = The portion of col. 8 attributed to Interim Excess Release Quantity (IERQ) bank releases. IERQ used to meet the Trenton, New Jersey, flow objective, unless otherwise noted.—, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from powerplant reservoirs			Segregation of flow, Delaware River at Montague, New Jersey						IERQ and drought bank releases
Directed								Controlled releases						
Date	Amount	Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	New York City reservoirs		Powerplants	Computed uncontrolled	Total	
									Directed	Other				
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6		Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
6/7/2016	0	139	501	110	6/9/2016	321	160	6/10/2016	0	750	481	2,179	3,410	0
6/8/2016	0	139	501	110	6/10/2016	376	213	6/11/2016	0	750	589	1,761	3,100	0
6/9/2016	0	139	501	110	6/11/2016	0	35	6/12/2016	0	750	35	1,595	2,380	0
6/10/2016	0	139	498	110	6/12/2016	23	35	6/13/2016	0	747	58	1,405	2,210	0
6/11/2016	0	139	500	110	6/13/2016	376	0	6/14/2016	0	749	376	1,405	2,530	0
6/12/2016	0	139	498	110	6/14/2016	370	0	6/15/2016	0	747	370	1,323	2,440	0
6/13/2016	0	139	498	110	6/15/2016	387	0	6/16/2016	0	747	387	1,276	2,410	0
6/14/2016	73	139	497	110	6/16/2016	340	0	6/17/2016	73	673	340	1,234	2,320	0
6/15/2016	260	139	495	110	6/17/2016	352	0	6/18/2016	260	484	352	1,134	2,230	0
6/16/2016	607	139	495	110	6/18/2016	260	0	6/19/2016	607	137	260	1,086	2,090	0
6/17/2016	585	139	503	110	6/19/2016	305	0	6/20/2016	585	167	305	1,033	2,090	0
6/18/2016	466	139	507	108	6/20/2016	394	0	6/21/2016	466	288	394	992	2,140	0
6/19/2016	216	139	500	110	6/21/2016	556	0	6/22/2016	216	533	556	965	2,270	0
6/20/2016	400	139	493	110	6/22/2016	406	0	6/23/2016	400	342	406	982	2,130	0
6/21/2016	578	139	495	110	6/23/2016	158	0	6/24/2016	578	166	158	908	1,810	0
6/22/2016	683	139	498	110	6/24/2016	143	0	6/25/2016	683	64	143	880	1,770	0
6/23/2016	809	139	565	110	6/25/2016	217	71	6/26/2016	814	0	288	848	1,950	0
6/24/2016	840	139	596	110	6/26/2016	177	0	6/27/2016	845	0	177	898	1,920	0
6/25/2016	614	139	492	110	6/27/2016	189	0	6/28/2016	614	127	189	1,150	2,080	0
6/26/2016	484	139	497	110	6/28/2016	243	0	6/29/2016	484	262	243	1,421	2,410	0
6/27/2016	243	139	497	110	6/29/2016	190	0	6/30/2016	243	503	190	2,104	3,040	0
6/28/2016	117	139	497	110	6/30/2016	225	0	7/1/2016	117	629	225	1,439	2,410	0
6/29/2016	0	139	497	110	7/1/2016	334	0	7/2/2016	0	746	334	1,200	2,280	0
6/30/2016	231	139	497	110	7/2/2016	239	0	7/3/2016	231	515	239	1,015	2,000	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, 2016.—Continued

[Delaware River Master daily operations record. All provided measurements are the mean discharge in cubic feet per second for 24 hours. 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 0800 of date shown until July 31, 2016, then beginning 0000 of date shown thereafter; 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 = The portion of col. 8 attributed to Interim Excess Release Quantity (IERQ) bank releases. IERQ used to meet the Trenton, New Jersey, flow objective, unless otherwise noted.—, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from powerplant reservoirs			Segregation of flow, Delaware River at Montague, New Jersey					IERQ and drought bank releases
Directed								Controlled releases					
Date	Amount	Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	New York City reservoirs		Powerplants	Computed uncontrolled	Total	
									Directed	Other				
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6		Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
7/1/2016	0	139	497	110	7/3/2016	182	0	7/4/2016	0	746	182	982	1,910	0
7/2/2016	359	139	500	108	7/4/2016	170	0	7/5/2016	359	388	170	913	1,830	0
7/3/2016	432	139	509	110	7/5/2016	295	53	7/6/2016	432	326	348	874	1,980	0
7/4/2016	489	139	506	110	7/6/2016	349	248	7/7/2016	489	266	597	798	2,150	0
7/5/2016	588	139	504	110	7/7/2016	563	284	7/8/2016	588	165	847	910	2,510	0
7/6/2016	0	139	504	110	7/8/2016	462	284	7/9/2016	0	753	746	1,041	2,540	0
7/7/2016	331	139	503	110	7/9/2016	228	0	7/10/2016	331	421	228	2,750	3,730	0
7/8/2016	165	139	501	110	7/10/2016	69	0	7/11/2016	165	585	69	3,871	4,690	0
7/9/2016	0	139	504	110	7/11/2016	265	18	7/12/2016	0	753	283	2,424	3,460	0
7/10/2016	0	139	500	110	7/12/2016	397	89	7/13/2016	0	749	486	1,675	2,910	0
7/11/2016	0	139	500	110	7/13/2016	397	89	7/14/2016	0	749	486	1,425	2,660	0
7/12/2016	0	139	500	110	7/14/2016	533	230	7/15/2016	0	749	763	1,328	2,840	0
7/13/2016	0	139	500	110	7/15/2016	529	53	7/16/2016	0	749	582	1,399	2,730	0
7/14/2016	0	139	500	110	7/16/2016	514	0	7/17/2016	0	749	514	1,367	2,630	0
7/15/2016	0	139	498	110	7/17/2016	484	71	7/18/2016	0	747	555	1,658	2,960	0
7/16/2016	0	139	498	110	7/18/2016	337	89	7/19/2016	0	747	426	1,397	2,570	0
7/17/2016	0	139	497	110	7/19/2016	293	35	7/20/2016	0	746	328	1,146	2,220	0
7/18/2016	0	139	507	110	7/20/2016	280	0	7/21/2016	0	756	280	1,024	2,060	0
7/19/2016	0	139	509	110	7/21/2016	233	124	7/22/2016	0	758	357	955	2,070	0
7/20/2016	0	139	503	110	7/22/2016	487	149	7/23/2016	0	752	636	802	2,190	††67
7/21/2016	184	139	497	110	7/23/2016	259	124	7/24/2016	184	562	383	841	1,970	††257
7/22/2016	510	139	566	110	7/24/2016	249	142	7/25/2016	510	305	391	784	1,990	††175
7/23/2016	272	139	756	110	7/25/2016	211	177	7/26/2016	272	733	388	997	2,390	0
7/24/2016	303	139	681	110	7/26/2016	200	160	7/27/2016	303	627	360	1,280	2,570	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, 2016.—Continued

[Delaware River Master daily operations record. All provided measurements are the mean discharge in cubic feet per second for 24 hours. 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 0800 of date shown until July 31, 2016, then beginning 0000 of date shown thereafter; 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 = The portion of col. 8 attributed to Interim Excess Release Quantity (IERQ) bank releases. IERQ used to meet the Trenton, New Jersey, flow objective, unless otherwise noted.—, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from powerplant reservoirs			Segregation of flow, Delaware River at Montague, New Jersey						IERQ and drought bank releases
Directed								Controlled releases						
Date	Amount	Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	New York City reservoirs		Powerplants	Computed uncontrolled	Total	
									Directed	Other				
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6		Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
7/25/2016	573	139	497	110	7/27/2016	186	248	7/28/2016	573	173	434	1,030	2,210	0
7/26/2016	0	141	493	110	7/28/2016	203	142	7/29/2016	0	744	345	811	1,900	0
7/27/2016	470	141	501	110	7/29/2016	191	35	7/30/2016	470	282	226	992	1,970	0
7/28/2016	0	139	506	110	7/30/2016	191	0	7/31/2016	0	755	191	2,174	3,120	0
7/29/2016	0	139	503	110	7/31/2016	191	53	8/1/2016	0	752	244	4,044	5,040	0
7/30/2016	0	139	504	110	8/1/2016	33	89	8/2/2016	0	753	122	3,075	3,950	0
7/31/2016	0	139	504	110	8/2/2016	53	106	8/3/2016	0	753	159	2,798	3,710	0
8/1/2016	0	139	504	110	8/3/2016	77	89	8/4/2016	0	753	166	2,311	3,230	0
8/2/2016	0	139	504	110	8/4/2016	145	124	8/5/2016	0	753	269	1,778	2,800	0
8/3/2016	0	139	503	110	8/5/2016	387	142	8/6/2016	0	752	529	1,479	2,760	0
8/4/2016	0	139	503	110	8/6/2016	194	0	8/7/2016	0	752	194	1,324	2,270	0
8/5/2016	0	139	501	110	8/7/2016	197	53	8/8/2016	0	750	250	1,160	2,160	0
8/6/2016	0	139	501	110	8/8/2016	242	106	8/9/2016	0	750	348	1,032	2,130	0
8/7/2016	323	139	501	110	8/9/2016	194	177	8/10/2016	323	427	371	939	2,060	0
8/8/2016	286	139	501	110	8/10/2016	471	266	8/11/2016	286	464	737	1,303	2,790	0
8/9/2016	220	139	498	110	8/11/2016	613	213	8/12/2016	220	527	826	2,337	3,910	0
8/10/2016	0	139	500	110	8/12/2016	622	248	8/13/2016	0	749	870	2,451	4,070	0
8/11/2016	0	139	497	110	8/13/2016	710	177	8/14/2016	0	746	887	3,407	5,040	0
8/12/2016	0	139	500	110	8/14/2016	640	160	8/15/2016	0	749	800	3,641	5,190	0
8/13/2016	0	139	495	110	8/15/2016	487	106	8/16/2016	0	744	593	3,583	4,920	0
8/14/2016	0	139	506	110	8/16/2016	570	106	8/17/2016	0	755	676	2,689	4,120	0
8/15/2016	0	139	507	110	8/17/2016	574	35	8/18/2016	0	756	609	2,205	3,570	0
8/16/2016	0	139	506	110	8/18/2016	563	18	8/19/2016	0	755	581	1,864	3,200	0
8/17/2016	0	139	501	110	8/19/2016	407	18	8/20/2016	0	750	425	1,815	2,990	0

Table 10. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey, for report year ending November 30, 2016.—Continued

[Delaware River Master daily operations record. All provided measurements are the mean discharge in cubic feet per second for 24 hours. 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 0800 of date shown until July 31, 2016, then beginning 0000 of date shown thereafter; 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 = The portion of col. 8 attributed to Interim Excess Release Quantity (IERQ) bank releases. IERQ used to meet the Trenton, New Jersey, flow objective, unless otherwise noted.—, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from powerplant reservoirs			Segregation of flow, Delaware River at Montague, New Jersey					IERQ and drought bank releases
Directed								Controlled releases					
Date	Amount	Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	New York City reservoirs		Powerplants	Computed uncontrolled	Total	
									Directed	Other				
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6		Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
8/18/2016	0	139	501	110	8/20/2016	385	177	8/21/2016	0	750	562	1,598	2,910	0
8/19/2016	0	139	498	110	8/21/2016	380	0	8/22/2016	0	747	380	1,723	2,850	0
8/20/2016	0	139	498	110	8/22/2016	365	0	8/23/2016	0	747	365	2,458	3,570	0
8/21/2016	0	139	500	110	8/23/2016	213	0	8/24/2016	0	749	213	1,828	2,790	0
8/22/2016	0	139	498	110	8/24/2016	343	0	8/25/2016	0	747	343	1,530	2,620	0
8/23/2016	0	139	490	110	8/25/2016	426	53	8/26/2016	0	739	479	1,382	2,600	0
8/24/2016	0	139	501	110	8/26/2016	491	35	8/27/2016	0	750	526	1,304	2,580	0
8/25/2016	0	139	503	110	8/27/2016	622	0	8/28/2016	0	752	622	1,156	2,530	0
8/26/2016	0	139	492	110	8/28/2016	571	89	8/29/2016	0	741	660	1,089	2,490	0
8/27/2016	0	139	515	110	8/29/2016	565	124	8/30/2016	0	764	689	1,027	2,480	0
8/28/2016	0	139	517	110	8/30/2016	612	35	8/31/2016	0	766	647	937	2,350	0
8/29/2016	96	139	503	110	8/31/2016	403	53	9/1/2016	96	656	456	952	2,160	0
8/30/2016	404	139	497	104	9/1/2016	90	0	9/2/2016	404	336	90	900	1,730	0
8/31/2016	413	139	433	90	9/2/2016	0	71	9/3/2016	413	249	71	837	1,570	0
9/1/2016	1,000	139	770	90	9/3/2016	0	0	9/4/2016	999	0	0	761	1,760	0
9/2/2016	1,000	139	772	90	9/4/2016	0	0	9/5/2016	1,001	0	0	689	1,690	0
9/3/2016	1,000	139	780	90	9/5/2016	0	0	9/6/2016	1,009	0	0	561	1,570	0
9/4/2016	1,060	139	1,030	90	9/6/2016	0	0	9/7/2016	1,059	200	0	551	1,810	200
9/5/2016	1,150	139	1,114	90	9/7/2016	0	53	9/8/2016	1,143	200	53	544	1,940	200
9/6/2016	1,323	139	1,292	90	9/8/2016	0	53	9/9/2016	1,321	200	53	486	2,060	200
9/7/2016	1,033	139	1,052	90	9/9/2016	0	0	9/10/2016	1,031	250	0	619	1,900	250
9/8/2016	1,235	139	1,253	90	9/10/2016	0	0	9/11/2016	1,232	250	0	578	2,060	250
9/9/2016	1,071	139	993	90	9/11/2016	0	0	9/12/2016	1,072	150	0	578	1,800	150
9/10/2016	1,262	139	1,330	90	9/12/2016	0	0	9/13/2016	1,259	300	0	461	2,020	300

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, 2016.—Continued

[Delaware River Master daily operations record. All provided measurements are the mean discharge in cubic feet per second for 24 hours. 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 0800 of date shown until July 31, 2016, then beginning 0000 of date shown thereafter; 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 = The portion of col. 8 attributed to Interim Excess Release Quantity (IERQ) bank releases. IERQ used to meet the Trenton, New Jersey, flow objective, unless otherwise noted.—, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from powerplant reservoirs			Segregation of flow, Delaware River at Montague, New Jersey						IERQ and drought bank releases
Directed								Controlled releases						
Date	Amount	Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	New York City reservoirs		Powerplants	Computed uncontrolled	Total	
									Directed	Other				
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6		Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
9/11/2016	1,244	139	1,163	90	9/13/2016	0	0	9/14/2016	1,242	150	0	448	1,840	150
9/12/2016	1,268	139	1,188	90	9/14/2016	0	0	9/15/2016	1,267	150	0	463	1,880	150
9/13/2016	1,366	139	1,286	90	9/15/2016	0	0	9/16/2016	1,365	150	0	475	1,990	150
9/14/2016	1,640	139	1,556	90	9/16/2016	0	0	9/17/2016	1,635	150	0	385	2,170	150
9/15/2016	1,608	133	1,482	90	9/17/2016	0	177	9/18/2016	1,605	100	177	298	2,180	100
9/16/2016	916	99	727	90	9/18/2016	0	0	9/19/2016	916	0	0	584	1,500	0
9/17/2016	664	102	478	90	9/19/2016	301	0	9/20/2016	670	0	301	1,059	2,030	0
9/18/2016	450	102	306	90	9/20/2016	309	0	9/21/2016	450	48	309	1,403	2,210	0
9/19/2016	1,199	101	1,007	90	9/21/2016	330	0	9/22/2016	1,198	0	330	882	2,410	0
9/20/2016	1,150	101	1,156	90	9/22/2016	331	0	9/23/2016	1,147	200	331	622	2,300	200
9/21/2016	1,127	101	1,137	90	9/23/2016	528	0	9/24/2016	1,128	200	528	504	2,360	200
9/22/2016	816	101	831	90	9/24/2016	439	0	9/25/2016	822	200	439	469	1,930	200
9/23/2016	820	101	625	90	9/25/2016	432	0	9/26/2016	816	0	432	482	1,730	0
9/24/2016	765	101	574	90	9/26/2016	469	0	9/27/2016	765	0	469	486	1,720	0
9/25/2016	612	101	523	90	9/27/2016	473	0	9/28/2016	614	100	473	453	1,640	100
9/26/2016	785	101	594	90	9/28/2016	442	0	9/29/2016	785	0	442	413	1,640	0
9/27/2016	758	101	558	90	9/29/2016	447	0	9/30/2016	749	0	447	504	1,700	0
9/28/2016	467	101	303	90	9/30/2016	461	71	10/1/2016	494	0	532	764	1,790	0
9/29/2016	755	101	572	79	10/1/2016	472	0	10/2/2016	752	0	472	766	1,990	0
9/30/2016	624	101	466	56	10/2/2016	479	0	10/3/2016	623	0	479	908	2,010	0
10/1/2016	843	101	681	56	10/3/2016	698	0	10/4/2016	838	0	698	904	2,440	0
10/2/2016	894	101	741	56	10/4/2016	780	0	10/5/2016	898	0	780	582	2,260	0
10/3/2016	494	101	402	56	10/5/2016	668	0	10/6/2016	559	0	668	883	2,110	0
10/4/2016	382	101	224	56	10/6/2016	533	0	10/7/2016	381	0	533	726	1,640	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, 2016.—Continued

[Delaware River Master daily operations record. All provided measurements are the mean discharge in cubic feet per second for 24 hours. 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 0800 of date shown until July 31, 2016, then beginning 0000 of date shown thereafter; 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 = The portion of col. 8 attributed to Interim Excess Release Quantity (IERQ) bank releases. IERQ used to meet the Trenton, New Jersey, flow objective, unless otherwise noted.—, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from powerplant reservoirs			Segregation of flow, Delaware River at Montague, New Jersey					IERQ and drought bank releases
Directed								Controlled releases					
Date	Amount	Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	New York City reservoirs		Powerplants	Computed uncontrolled	Total	
									Directed	Other				
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6		Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
10/5/2016	413	101	257	56	10/7/2016	699	0	10/8/2016	414	0	699	637	1,750	0
10/6/2016	477	101	316	56	10/8/2016	685	0	10/9/2016	473	0	685	622	1,780	0
10/7/2016	392	101	238	56	10/9/2016	769	0	10/10/2016	395	0	769	676	1,840	0
10/8/2016	342	101	187	56	10/10/2016	763	50	10/11/2016	344	0	813	613	1,770	0
10/9/2016	350	101	193	56	10/11/2016	754	0	10/12/2016	350	0	754	556	1,660	0
10/10/2016	400	101	244	56	10/12/2016	805	0	10/13/2016	401	0	805	514	1,720	0
10/11/2016	383	101	325	56	10/13/2016	942	0	10/14/2016	382	100	942	796	2,220	100
10/12/2016	437	101	377	56	10/14/2016	1,000	0	10/15/2016	434	100	1,000	266	1,800	100
10/13/2016	1,006	101	752	56	10/15/2016	0	177	10/16/2016	809	100	177	344	1,430	100
10/14/2016	1,292	101	1,233	56	10/16/2016	0	0	10/17/2016	1,290	100	0	470	1,860	100
10/15/2016	1,288	101	1,132	56	10/17/2016	0	0	10/18/2016	1,289	0	0	521	1,810	0
10/16/2016	1,297	101	1,137	56	10/18/2016	0	0	10/19/2016	1,294	0	0	496	1,790	0
10/17/2016	1,287	300	930	56	10/19/2016	0	0	10/20/2016	1,286	0	0	454	1,740	0
10/18/2016	1,248	308	882	56	10/20/2016	0	0	10/21/2016	1,246	0	0	484	1,730	0
10/19/2016	716	232	433	50	10/21/2016	0	0	10/22/2016	715	0	0	735	1,450	0
10/20/2016	1,200	71	532	189	10/22/2016	0	0	10/23/2016	792	0	0	588	1,380	0
10/21/2016	433	70	741	51	10/23/2016	0	0	10/24/2016	862	0	0	888	1,750	0
10/22/2016	1,175	371	752	50	10/24/2016	0	35	10/25/2016	1,173	0	35	882	2,090	0
10/23/2016	1,256	387	1,016	50	10/25/2016	0	0	10/26/2016	1256	197	0	777	2,230	200
10/24/2016	1,300	540	908	50	10/26/2016	0	0	10/27/2016	1,300	198	0	612	2,110	200
10/25/2016	482	316	419	50	10/27/2016	0	0	10/28/2016	482	303	0	1,055	1,840	300
10/26/2016	630	77	503	50	10/28/2016	0	71	10/29/2016	630	0	71	2,029	2,730	0
10/27/2016	801	303	453	50	10/29/2016	0	0	10/30/2016	806	0	0	1,724	2,530	0
10/28/2016	1,181	535	599	50	10/30/2016	0	0	10/31/2016	1,184	0	0	1,396	2,580	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, 2016.—Continued

[Delaware River Master daily operations record. All provided measurements are the mean discharge in cubic feet per second for 24 hours. 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 0800 of date shown until July 31, 2016, then beginning 0000 of date shown thereafter; 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 = The portion of col. 8 attributed to Interim Excess Release Quantity (IERQ) bank releases. IERQ used to meet the Trenton, New Jersey, flow objective, unless otherwise noted.—, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from powerplant reservoirs			Segregation of flow, Delaware River at Montague, New Jersey						IERQ and drought bank releases
Directed								Controlled releases						
Date	Amount	Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	New York City reservoirs		Powerplants	Computed uncontrolled	Total	
									Directed	Other				
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6		Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
10/29/2016	1,165	540	577	50	10/31/2016	0	0	11/1/2016	1,167	0	0	1,293	2,460	0
10/30/2016	1,054	463	540	50	11/1/2016	0	0	11/2/2016	1,053	0	0	1,087	2,140	0
10/31/2016	500	167	282	50	11/2/2016	0	0	11/3/2016	499	0	0	1,121	1,620	0
11/1/2016	378	155	173	50	11/3/2016	0	0	11/4/2016	378	0	0	1,022	1,400	0
11/2/2016	612	158	405	50	11/4/2016	0	0	11/5/2016	613	0	0	887	1,500	0
11/3/2016	786	385	648	50	11/5/2016	0	0	11/6/2016	783	300	0	797	1,880	300
11/4/2016	800	464	588	51	11/6/2016	0	0	11/7/2016	803	300	0	757	1,860	300
11/5/2016	814	565	653	51	11/7/2016	0	0	11/8/2016	869	400	0	681	1,950	400
11/6/2016	1,000	619	730	46	11/8/2016	0	0	11/9/2016	1,051	344	0	675	2,070	400
11/7/2016	1,100	619	829	50	11/9/2016	0	0	11/10/2016	1,041	457	0	672	2,170	400
11/8/2016	1,200	619	928	50	11/10/2016	0	0	11/11/2016	1,197	400	0	603	2,200	400
11/9/2016	1,200	619	880	45	11/11/2016	0	0	11/12/2016	1,194	350	0	596	2,140	350
11/10/2016	1,300	619	862	45	11/12/2016	0	0	11/13/2016	1,296	230	0	604	2,130	230
11/11/2016	1,300	619	985	45	11/13/2016	0	0	11/14/2016	1,299	350	0	531	2,180	350
11/12/2016	1,300	619	989	45	11/14/2016	0	0	11/15/2016	1,303	350	0	607	2,260	350
11/13/2016	1,300	617	979	45	11/15/2016	0	0	11/16/2016	1,291	350	0	599	2,240	350
11/14/2016	1,205	394	1,115	45	11/16/2016	0	0	11/17/2016	1,204	350	0	806	2,360	350
11/15/2016	1,244	387	1,153	45	11/17/2016	0	0	11/18/2016	1,235	350	0	755	2,340	350
11/16/2016	1,150	387	1,055	45	11/18/2016	0	0	11/19/2016	1,143	344	0	643	2,130	344
11/17/2016	1,048	235	767	45	11/19/2016	0	0	11/20/2016	1,047	0	0	803	1,850	0
11/18/2016	867	155	670	45	11/20/2016	0	0	11/21/2016	870	0	0	930	1,800	0
11/19/2016	919	155	718	45	11/21/2016	0	0	11/22/2016	918	0	0	892	1,810	0
11/20/2016	1,063	155	859	45	11/22/2016	0	0	11/23/2016	1,059	0	0	801	1,860	0
11/21/2016	863	155	670	36	11/23/2016	0	0	11/24/2016	861	0	0	799	1,660	0

Table 10. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey, for report year ending November 30, 2016.—Continued

[Delaware River Master daily operations record. All provided measurements are the mean discharge in cubic feet per second for 24 hours. 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 0800 of date shown until July 31, 2016, then beginning 0000 of date shown thereafter; 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 = The portion of col. 8 attributed to Interim Excess Release Quantity (IERQ) bank releases. IERQ used to meet the Trenton, New Jersey, flow objective, unless otherwise noted.—, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from powerplant reservoirs			Segregation of flow, Delaware River at Montague, New Jersey						IERQ and drought bank releases
Directed								Controlled releases						
Date	Amount	Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	New York City reservoirs		Powerplants	Computed uncontrolled	Total	
									Directed	Other				
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6		Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
11/22/2016	768	155	575	36	11/24/2016	0	0	11/25/2016	766	0	0	844	1,610	0
11/23/2016	680	155	509	36	11/25/2016	0	0	11/26/2016	680	20	0	910	1,610	‡20
11/24/2016	839	155	670	36	11/26/2016	0	0	11/27/2016	839	22	0	1,087	1,948	‡22
11/25/2016	870	155	704	36	11/27/2016	0	0	11/28/2016	870	25	0	1,280	2,175	‡25
11/26/2016	600	155	433	36	11/28/2016	29	0	11/29/2016	602	22	29	1,345	1,998	‡22
11/27/2016	197	50	113	36	11/29/2016	0	0	11/30/2016	199	0	0	2,001	2,200	0
Monthly totals														
Dec. 2015	0	2,860	4,387	1,650	—	6,950	7,518	Dec. 2015	0	8,897	14,468	139,635	163,000	0
Jan. 2016	0	4,525	6,480	3,826	—	16,584	8,511	Jan. 2016	0	14,831	25,095	153,174	193,100	0
Feb. 2016	0	4,305	8,887	3,768	—	20,349	8,956	Feb. 2016	0	16,960	29,305	198,385	244,650	0
Mar. 2016	0	11,842	27,590	4,143	—	8,274	6,986	Mar. 2016	0	43,575	15,260	123,735	182,570	0
Apr. 2016	0	2,561	8,464	1,883	—	152	1,454	Apr. 2016	0	12,908	1,606	108,786	123,300	224
May 2016	0	3,074	8,391	2,440	—	7,476	4,575	May 2016	0	13,905	12,051	131,074	157,030	979
June 2016	6,858	4,132	14,863	3,271	—	7,474	904	June 2016	6,868	15,398	8,378	47,026	77,670	0
July 2016	5,024	4,313	16,028	3,408	—	9,555	2,844	July 2016	5,024	18,725	12,399	41,302	77,450	499
Aug. 2016	829	4,309	15,552	3,410	—	12,343	2,799	Aug. 2016	829	22,442	15,142	61,267	99,680	0
Sep. 2016	29,235	3,708	27,010	2,734	—	4,994	407	Sep. 2016	29,213	4,239	5,401	18,447	57,300	2,950
Oct. 2016	24,245	5,429	17,948	1,873	—	10,508	404	Oct. 2016	24,152	1,098	10,912	23,668	59,830	1,100
Nov. 2016	26,972	10,695	21,059	1,340	—	29	0	Nov. 2016	28,130	4,964	29	26,428	59,551	4,963

†Temporary release program.

††Thermal release.

‡New Jersey Diversion Offset Bank release (used during drought conditions).

Table 11. Daily mean discharge, Delaware River at Montague, New Jersey (U.S. Geological Survey site number 01438500), for report year ending November 30, 2016.

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

Day	Dec. 2015	Jan. 2016	Feb. 2016	Mar. 2016	Apr. 2016	May 2016	June 2016	July 2016	Aug. 2016	Sept. 2016	Oct. 2016	Nov. 2016
1	2,940	8,270	2,950	12,500	2,690	2,870	2,750	2,370	5,070	2,090	1,950	2,410
2	4,150	7,600	3,060	9,900	2,550	3,430	2,590	2,250	3,950	1,680	2,160	[1]2,080
3	6,320	6,720	3,370	8,680	2,560	6,140	2,340	1,970	3,690	1,530	2,190	1,570
4	6,630	6,290	4,910	7,870	2,660	7,680	2,320	1,870	3,210	1,720	2,450	1,360
5	5,090	5,750	5,560	7,320	[1]2,810	7,440	2,340	1,790	2,780	1,690	2,230	1,480
6	4,170	4,860	4,600	6,560	2,610	6,960	3,930	1,940	2,740	1,580	2,110	1,860
7	4,090	4,600	4,070	6,260	2,560	9,430	4,950	2,110	2,260	1,830	1,640	1,830
8	3,790	4,440	3,960	6,110	8,050	9,620	3,770	2,440	2,170	1,970	1,760	1,910
9	4,000	4,540	4,350	6,040	10,500	8,230	3,640	2,440	2,130	2,060	1,790	2,030
10	3,840	5,340	4,240	5,810	8,120	7,320	3,320	3,770	2,060	1,930	1,850	2,130
11	3,420	16,000	4,270	5,850	6,570	6,100	2,970	4,510	2,840	2,080	1,790	2,170
12	3,070	12,400	4,050	6,380	6,190	5,560	2,280	3,310	3,970	1,830	1,680	2,110
13	2,900	9,530	3,470e	5,410	6,380	5,250	2,130	2,760	4,040	2,050	1,750	2,090
14	2,900	8,770	2,950e	5,090	5,670	6,070	2,430	2,530	5,090	1,870	2,310	2,150
15	3,100	7,360	4,360	5,420	5,040	6,300	2,340	2,700	5,210	1,920	1,770	2,220
16	4,070	7,290	4,590	5,350	4,720	6,110	2,310	2,570	4,880	2,020	1,490	2,200
17	3,990	7,720	13,800	5,510	4,150	5,790	2,220	2,490	4,070	2,200	1,770	2,320
18	4,770	7,260	12,100	5,430	3,850	5,020	2,130	2,840	3,540	2,210	1,730	2,310
19	4,910	6,750	8,580	5,210	[1]3,580	4,500	1,980	2,560	3,180	1,520	1,710	2,090
20	4,340	5,900	7,370	4,840	3,320	4,290	1,980	2,220	2,960	2,120	1,660	1,820
21	4,030	5,150	7,340	4,650	3,130	4,010	2,030	2,070	2,890	2,260	1,660	1,770
22	4,470	4,810	7,120	4,350	3,000	3,310	2,150	2,110	2,880	2,490	1,380	1,770
23	5,010	4,060e	6,520	4,070	2,890	3,020	2,010	2,210	3,520	2,400	1,340	1,820
24	9,860	3,380e	6,110	3,700	2,720	3,020	1,690	1,960	2,740	2,430	1,710	1,630
25	11,500	4,460	27,500	3,500	2,580	2,750	1,660	2,050	2,590	2,030	2,040	1,580
26	9,200	4,350	31,800	3,240	2,550	2,880	1,830	2,420	2,590	1,830	2,160	1,600
27	8,100	4,140	20,500	3,090	2,690	2,850	1,790	2,570	2,550	1,840	2,050	1,930
28	7,330	3,850	16,100	2,990	2,820	2,500	1,950	2,220	2,490	1,750	1,790	2,160
29	6,920	3,850	14,100	3,300	2,550	2,840	2,280	1,900	2,470	1,770	2,710	1,980
30	6,730	3,590	—	3,480	2,520	2,860	3,040	2,030	2,410	1,840	2,480	2,170
31	7,360	2,910	—	3,050	—	2,910	—	3,190	2,300	—	2,530	—
Total[1]	**163,000**	**191,940**	**243,700**	**170,960**	**122,030**	**157,060**	**75,150**	**76,170**	**99,270**	**58,540**	**59,640**	**58,550**
Mean[2]	**5,258**	**6,192**	**8,403**	**5,515**	**4,068**	**5,066**	**2,505**	**2,457**	**3,202**	**1,951**	**1,924**	**1,952**

[1]The year's total is 1,476,010 cubic feet per second accumulated daily.

[2]The combined mean is 4,033 cubic feet per second.

Table 13. Daily mean discharge, East Branch Delaware River at Downsville, New York (U.S. Geological Survey site number 01417000), for report year ending November 30, 2016.

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

Day	Dec. 2015	Jan. 2016	Feb. 2016	Mar. 2016	Apr. 2016	May 2016	June 2016	July 2016	Aug. 2016	Sept. 2016	Oct. 2016	Nov. 2016
1	103	147	148	709	88	84	129	127	129	130	101	155
2	103	147	148	706	88	82	132	127	130	130	102	155
3	103	147	148	707	89	80	132	127	130	130	103	282
4	102	147	148	706	90	80	132	127	130	130	103	430
5	102	147	148	635	89	81	133	127	129	130	103	510
6	102	146	148	531	89	87	132	128	129	130	103	588
7	102	144	148	496	89	94	132	128	129	130	103	631
8	102	144	148	496	89	94	131	128	129	130	103	631
9	102	144	148	496	89	95	130	128	129	130	103	631
10	101	144	148	496	89	95	130	128	130	130	103	631
11	101	144	148	464	89	97	130	129	130	130	103	631
12	101	144	148	300	89	103	130	129	130	130	103	631
13	101	144	148	301	89	112	130	128	130	130	105	631
14	101	145	147	299	89	112	130	127	130	130	106	519
15	101	145	148	301	88	111	130	127	130	130	106	393
16	90	146	148	301	87	111	130	127	130	109	106	392
17	83	145	148	301	88	111	130	127	130	101	212	319
18	83	144	148	301	88	111	129	128	130	101	315	199
19	83	144	149	302	88	111	129	127	130	101	274	159
20	83	146	149	302	88	111	129	128	130	101	155	159
21	84	147	150	301	88	111	128	129	130	101	76	159
22	85	147	150	302	88	111	128	128	130	101	231	160
23	85	147	150	246	88	111	128	128	130	101	393	160
24	85	148	150	100	88	111	128	129	130	101	477	159
25	85	148	105	100	88	111	129	130	130	101	432	159
26	85	148	150	102	89	111	130	130	130	101	194	159
27	83	148	292	102	90	118	129	130	130	101	195	108
28	83	148	496	102	90	124	129	129	130	101	434	51
29	83	148	591	97	90	124	128	130	130	101	546	49
30	83	148	—	88	90	123	127	130	130	102	504	49
31	126	148	—	88	—	121	—	130	130	—	315	—
Total[1]	**2,917**	**4,529**	**5,195**	**10,779**	**2,659**	**3,240**	**3,894**	**3,975**	**4,024**	**3,474**	**6,408**	**9,890**
Mean[2]	**94.1**	**146**	**179**	**348**	**88.6**	**104**	**130**	**128**	**130**	**116**	**207**	**330**

[1]The year's total is 60,984 cubic feet per second accumulated daily.

[2]The combined mean is 167 cubic feet per second.

Table 14. Daily mean discharge, West Branch Delaware River at Stilesville, New York (U.S. Geological Survey site number 01425000), for report year ending November 30, 2016.

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

Day	Dec. 2015	Jan. 2016	Feb. 2016	Mar. 2016	Apr. 2016	May 2016	June 2016	July 2016	Aug. 2016	Sept. 2016	Oct. 2016	Nov. 2016
1	153	209	222	1,460	108	345	461	507	495	429	423	268
2	154	210	221	1,460	108	174	498	506	490	781	622	154
3	153	209	227	1,460	108	145	499	506	490	785	674	341
4	153	204	221	1,460	108	143	502	506	490	778	366	576
5	153	204	220	1,460	107	145	506	506	490	1,010	183	522
6	153	204	223	1,460	107	186	501	506	491	1,100	226	560
7	153	204	226	1,420	108	246	501	507	490	1,270	300	658
8	153	207	226	1,210	108	246	498	506	490	1,030	214	761
9	153	209	226	977	108	247	496	510	490	1,210	164	857
10	153	217	223	702	108	247	496	506	496	960	166	827
11	154	209	220	623	184	269	496	506	493	1,280	218	805
12	153	206	223	550	387	350	492	506	500	1,120	311	913
13	153	199	220	550	385	483	497	505	496	1,140	353	930
14	157	199	215	544	386	641	493	505	499	1,230	715	924
15	156	218	215	541	388	736	493	503	506	1,500	1,170	1,050
16	144	238	233	545	389	768	490	498	506	1,420	1,070	1,090
17	129	238	228	548	386	772	490	504	506	663	1,070	1,010
18	129	232	223	544	386	729	499	506	506	440	871	726
19	129	229	221	551	388	567	501	506	506	300	824	615
20	129	221	223	551	391	458	494	504	500	953	404	656
21	129	220	226	549	391	374	492	500	503	1,090	490	793
22	131	223	223	555	391	303	490	498	501	1,070	675	619
23	132	226	223	556	391	262	491	583	494	775	683	518
24	132	226	229	551	391	255	553	777	482	563	943	466
25	131	226	451	550	391	255	584	697	482	508	847	601
26	131	226	1,030	551	392	255	503	493	482	464	393	637
27	132	225	1,460	550	391	319	507	490	484	530	463	419
28	129	226	1,460	501	391	390	508	493	490	514	429	113
29	129	226	1,460	361	392	390	506	498	490	288	526	90
30	129	226	—	193	391	390	506	498	485	509	505	80
31	175	226	—	126	—	389	—	502	482	—	473	—
Total[1]	**4,444**	**6,742**	**11,218**	**23,659**	**8,660**	**11,479**	**15,043**	**16,138**	**15,305**	**25,710**	**16,771**	**18,579**
Mean[2]	**143**	**218**	**387**	**763**	**289**	**370**	**501**	**521**	**494**	**857**	**541**	**619**

[1]The year's total is 60,984 cubic feet per second accumulated daily.

[2]The combined mean is 167 cubic feet per second.

Table 15. Daily mean discharge, Neversink River at Neversink, New York (U.S. Geological Survey site number 01436000) for report year ending November 30, 2016.

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

Day	Dec. 2015	Jan. 2016	Feb. 2016	Mar. 2016	Apr. 2016	May 2016	June 2016	July 2016	Aug. 2016	Sept. 2016	Oct. 2016	Nov. 2016
1	56	121	122	180	66	46	108	114	114	100	71	54
2	55	121	122	179	66	57	114	112	114	94	61	54
3	55	121	123	178	62	57	114	113	114	94	61	54
4	55	120	123	179	64	57	114	114	114	95	62	54
5	55	120	121	142	64	57	114	113	114	95	62	54
6	55	120	123	123	64	64	113	114	113	95	62	53
7	55	120	123	122	66	70	113	114	113	96	62	54
8	55	120	123	123	65	135	112	114	113	96	62	54
9	55	122	123	123	66	194	112	114	114	96	62	54
10	55	123	122	123	66	207	112	113	114	96	61	52
11	55	121	121	122	66	178	114	114	114	94	62	47
12	55	122	122	122	66	160	112	114	114	94	62	48
13	56	120	119	123	66	167	112	114	114	95	62	48
14	57	120	120	122	66	222	113	114	114	95	62	48
15	55	122	120	123	66	240	114	114	114	94	62	49
16	52	123	122	123	66	150	114	114	114	94	62	49
17	50	122	123	122	66	103	114	114	113	94	62	48
18	50	120	122	121	66	105	114	113	114	95	62	48
19	49	118	123	121	65	104	114	113	114	96	62	48
20	49	120	123	120	66	105	113	114	114	95	59	47
21	50	120	123	120	66	90	113	114	114	95	110	46
22	50	120	123	122	66	84	112	113	113	95	136	42
23	51	120	123	123	66	84	113	113	114	96	53	38
24	50	120	124	122	66	84	114	113	114	95	54	38
25	50	120	124	122	66	84	114	114	114	94	53	38
26	50	121	152	123	66	84	114	113	114	94	54	37
27	50	121	179	123	46	91	114	114	114	96	55	37
28	50	121	179	107	37	97	114	114	114	95	54	38
29	50	120	179	80	38	97	113	114	114	94	54	36
30	50	120	—	64	38	97	114	114	114	94	54	31
31	100	122	—	66	—	96	—	114	114	—	54	—
Total[1]	**4,444**	**6,742**	**11,218**	**23,659**	**8,660**	**11,479**	**15,043**	**16,138**	**15,305**	**25,710**	**16,771**	**18,579**
Mean[2]	**143**	**218**	**387**	**763**	**289**	**370**	**501**	**521**	**494**	**857**	**541**	**619**

[1]The year's total is 60,984 cubic feet per second accumulated daily.

[2]The combined mean is 167 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, 2016.

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

Day	Dec. 2015	Jan. 2016	Feb. 2016	Mar. 2016	Apr. 2016	May 2016	June 2016	July 2016	Aug. 2016	Sept. 2016	Oct. 2016	Nov. 2016
1	6,010	17,200	6,820	26,200	6,750	5,390	7,440	4,530	7,830	3,630	4,930	3,990
2	6,770	16,700	7,100	22,900	6,150	5,640	7,200	4,740	8,620	3,550	4,570	3,960
3	8,830	15,300	9,820	19,300	5,940	7,690	6,290	4,300	8,210	3,260	3,840	3,800
4	11,400	13,900	27,900	17,100	5,840	11,200	5,550	4,010	6,850	2,780	3,860	3,550
5	11,800	12,700	24,700	15,500	6,020	14,100	5,380	3,940	5,980	2,690	3,730	3,070
6	10,400	11,400	19,400	14,300	6,040	[1]14,000	6,030	4,030	5,260	2,810	3,780	2,680
7	8,810	9,690	15,300	13,200	6,050	[1]15,100	7,640	3,730	5,160	2,630	3,480	2,550
8	8,430	9,500	13,300e	12,500	7,000	15,800	9,480	3,870	4,790	2,510	3,250	2,910
9	7,760	9,360	12,400e	12,200	11,300	16,000	8,860	4,540	4,190	2,580	2,830	3,030
10	7,570	13,700	11,900e	11,800	15,400	14,000	7,620	5,300	3,710	2,700	2,780	3,140
11	7,470	21,000	11,100	11,200	12,800	12,900	6,970	5,060	3,700	2,930	2,720	3,090
12	7,160	28,100	10,300	11,100	11,400	11,400	6,230	6,810	4,670	2,800	2,820	3,090
13	6,510	22,500	9,340	11,400	11,400	10,300	5,550	6,290	6,670	2,980	2,710	3,100
14	6,180	17,800	8,600e	11,100	11,100	10,300	4,850	5,240	7,180	2,740	2,680	2,980
15	6,180	16,300	7,760e	10,900	10,300	10,900	4,590	4,680	7,310	2,870	2,710	2,980
16	6,760	15,100	11,200e	11,000	9,180	10,700	4,590	4,590	7,870	2,700	2,970	3,020
17	7,800	14,900	25,300	10,700	8,520	10,100	4,610	4,420	7,350	2,740	[1]2,850	3,170
18	10,600	14,500	29,300	10,400	8,000	9,810	4,530	4,080	6,570	2,870	2,370	3,190
19	10,300	13,100	22,900	10,400	7,380	9,130	4,310	4,370	5,960	3,240	[1]3,020	[1]3,300
20	9,750	11,800	17,600	9,890	6,950	8,100	4,060	4,550	5,220	3,870	[1]3,020	3,250
21	8,870	11,300	15,800	9,180	6,580	7,660	3,850	3,960	4,820	3,290	[1]3,000	3,070
22	8,090	10,700	15,400	8,560	6,300	7,790	3,830	3,550	5,280	3,260	3,120	2,750
23	9,010	10,200e	14,800	8,160	6,190	7,110	3,810	3,280	5,610	3,430	3,020	2,630
24	16,200	7,950e	16,500	7,790	6,020	6,340	3,820	3,170	5,150	3,450	2,810	2,670
25	21,100	8,640e	47,400	7,200	5,700	5,990	3,650	3,750	4,990	3,260	2,690	2,780
26	20,200	9,070e	66,300	7,130	5,520	5,630	3,290	5,140	4,230	3,170	2,990	2,630
27	17,100	8,860e	49,100	6,690	5,640	5,630	3,430	4,420	4,000	2,900	3,540	2,590
28	15,800	8,800e	35,600	6,570	5,690	5,520	3,610	4,090	4,080	2,910	3,670	2,600
29	18,000	8,750	29,900	6,850	5,710	5,270	4,260	4,310	4,420	2,890	3,450	3,160
30	19,700	8,160	—	6,910	5,540	6,180	4,630	4,560	4,010	3,000	3,250	5,080
31	18,100	7,690	—	6,940	—	8,560	—	8,830	3,600	—	4,160	—
Total[1]	**338,660**	**404,670**	**592,840**	**355,070**	**232,410**	**294,240**	**159,960**	**142,140**	**173,290**	**90,440**	**100,620**	**93,810**
Mean[2]	**10,924**	**13,054**	**20,443**	**11,454**	**7,747**	**9,492**	**5,332**	**4,585**	**5,590**	**3,015**	**3,246**	**3,127**

[1]The year's total is 60,984 cubic feet per second accumulated daily.

[2]The combined mean is 167 cubic feet per second.

Table 17. Daily maximum and minimum specific conductance, Delaware River at Reedy Island Jetty, Delaware (U.S. Geological Survey site number 01482800), for report year ending November 30, 2016.

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

Day	Dec. 2015		Jan. 2016		Feb. 2016		Mar. 2016		Apr. 2016		May 2016		June 2016		July 2016		Aug. 2016		Sept. 2016		Oct. 2016		Nov. 2016	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
1	17,300	8,640	7,250	2,470	15,600	7,710	2,950	453	8,940	3,270	11,900	5,270	10,900	4,320	15,600	8,930	15,100	8,350	16,900	9,090	22,100	14,400	22,500	15,300
2	15,100	8,500	8,320	2,250	16,700	7,700	4,380	445	10,500	2,460	12,100	5,180	12,400	4,190	14,900	8,350	15,900	8,260	16,400	9,050	20,300	13,600	22,000	15,100
3	12,500	8,400	10,400	2,110	16,700	8,430	5,410	430	8,130	1,750	11,500	4,990	12,100	4,450	15,500	8,300	16,000	8,450	17,700	10,500	20,500	14,000	21,500	14,900
4	13,900	7,630	13,400	3,810	16,700	5,690	8,400	1,100	10,800	2,800	12,300	5,350	12,300	4,480	15,700	8,300	15,100	8,400	18,300	10,800	21,100	13,900	22,400	15,100
5	16,400	7,150	18,800	6,820	12,700	4,920	11,300	2,170	12,500	3,030	12,500	5,400	12,200	4,780	15,600	7,910	15,000	8,050	18,400	11,100	21,600	14,300	22,400	14,900
6	17,100	7,590	18,700	8,900	13,800	3,300	12,600	3,160	13,400	4,240	13,700	5,330	11,800	4,670	15,500	7,940	14,500	8,180	20,200	12,500	20,500	14,100	21,800	15,300
7	17,100	7,620	17,900	8,710	12,300	3,550	11,500	3,390	12,800	5,310	12,400	4,300	11,500	4,540	15,500	8,400	14,100	7,950	19,100	11,500	19,800	13,900	24,000	14,700
8	17,300	8,260	18,600	9,620	16,000	4,110	9,480	3,080	10,800	4,380	10,700	3,650	10,900	4,500	15,200	8,470	15,000	8,050	19,400	11,300	20,300	14,300	25,100	16,300
9	19,900	9,050	19,900	9,850	16,300	5,600	9,710	2,870	10,800	4,060	10,200	3,350	9,720	4,010	16,600	9,090	15,200	8,320	19,100	11,800	21,800	13,900	23,900	16,400
10	18,700	9,110	20,400	11,500	13,300	4,870	8,880	2,630	10,400	3,860	8,490	3,270	11,300	3,960	15,800	9,190	15,200	8,400	19,300	11,500	24,800	15,100	24,800	16,000
11	18,500	8,800	14,800	7,490	8,210	3,840	8,440	2,520	12,200	4,220	7,760	2,930	12,400	3,880	16,000	8,750	14,100	7,620	19,700	11,200	24,300	15,800	23,000	16,500
12	17,500	8,440	15,000	7,320	9,490	3,570	8,320	2,530	8,480	3,850	8,260	2,680	12,400	4,750	16,000	9,460	14,100	6,990	21,100	11,700	25,100	15,900	23,400	16,000
13	17,300	8,370	10,100	4,510	10,400	3,290	8,180	2,540	8,430	3,330	8,300	2,820	16,000	4,580	15,000	9,450	15,200	6,860	20,300	12,100	24,200	15,800	23,200	15,800
14	17,600	9,290	10,400	4,050	9,290	2,900	8,350	2,610	9,030	3,110	8,390	2,940	16,100	6,200	15,100	9,000	16,100	6,990	19,300	12,000	23,900	15,800	23,100	15,500
15	15,200	8,650	11,000	3,780	11,500	3,100	9,290	2,780	9,040	3,230	7,560	2,690	16,600	6,600	15,300	8,300	16,200	7,380	19,400	12,000	24,000	15,800	24,300	16,000
16	16,100	8,100	12,500	4,110	13,300	3,630	8,530	3,010	10,100	3,370	9,390	2,560	18,000	7,780	16,500	8,010	16,200	7,520	20,300	12,800	24,300	16,200	24,500	16,600
17	17,800	8,630	11,700	4,050	9,900	3,300	8,540	2,960	11,000	3,590	10,800	2,700	17,900	8,370	16,800	7,940	16,300	7,150	19,700	12,900	24,100	16,400	22,900	16,500
18	14,400	8,540	12,800	3,910	8,600	2,180	8,700	2,880	9,730	3,830	12,200	3,350	17,900	8,200	*	*	14,900	7,060	18,700	12,500	24,200	16,400	24,200	16,200
19	12,800	7,990	8,390	2,680	9,600	1,980	8,210	2,650	9,730	3,550	12,400	3,280	16,500	8,470	*	*	15,800	7,720	18,900	12,700	23,600	16,300	25,500	16,900
20	12,600	6,180	11,000	2,040	8,690	1,850	9,800	2,760	10,100	3,620	12,400	4,290	16,100	8,050	16,100	8,060	15,900	8,070	18,500	12,400	23,700	16,200	20,500	16,100
21	14,800	6,240	13,600	3,560	7,790	1,650	12,000	3,180	10,900	3,620	12,100	4,480	16,600	8,410	17,000	8,410	16,200	8,920	18,100	12,400	23,900	16,900	18,300	12,600
22	14,500	5,640	14,900	3,680	9,790	1,680	10,900	3,180	9,550	3,400	12,400	4,920	16,700	8,260	16,600	8,980	14,100	8,170	19,500	12,500	22,100	17,000	20,000	11,500
23	15,000	5,850	22,100	7,150	8,800	1,800	8,720	2,870	10,200	3,450	13,600	4,720	16,900	7,910	15,800	8,850	14,000	7,980	19,000	12,800	20,000	15,600	22,900	11,800
24	13,900	5,580	23,500	9,470	10,000	2,200	8,690	2,880	10,900	3,760	13,500	5,040	16,600	8,380	15,900	8,830	14,100	8,050	19,800	12,500	20,400	14,100	23,900	13,900
25	12,100	4,850	21,800	10,100	9,010	1,020	10,800	3,570	11,900	4,090	12,600	4,970	16,300	8,220	16,900	9,180	14,800	8,340	20,000	13,100	21,300	14,100	24,400	15,100
26	11,900	4,420	17,800	9,580	1,810	489	9,640	3,150	11,700	4,520	12,400	4,710	16,500	8,810	14,900	9,260	14,200	7,530	20,500	12,800	22,200	14,500	24,500	15,800
27	11,600	3,940	15,600	8,620	720	513	10,600	3,550	12,100	4,590	12,100	4,930	15,500	9,300	15,700	8,840	16,500	7,350	19,700	13,700	22,300	15,300	25,200	16,100
28	9,920	3,690	17,600	8,580	1,200	472	10,500	4,030	12,300	4,450	12,200	5,120	14,800	9,360	16,600	9,040	16,600	8,150	19,800	13,400	22,100	14,700	26,100	16,100
29	11,700	3,470	17,400	9,170	593	464	8,120	3,330	11,900	5,000	10,300	4,910	15,100	8,860	16,300	8,700	16,000	8,670	21,200	15,600	21,700	14,800	24,300	16,500
30	8,290	3,350	16,200	8,360	—	—	10,200	2,920	12,600	4,560	11,500	4,720	16,000	8,550	16,100	9,080	16,000	8,480	21,300	15,400	21,200	14,200	23,300	14,000
31	8,660	2,730	15,700	8,120	—	—	11,900	4,500	—	—	10,200	4,370	—	—	15,000	8,590	16,200	8,620	—	—	22,500	15,200	—	—
Mean	14,757	6,926	15,083	6,275	10,303	3,304	9,130	2,714	10,699	3,743	11,198	4,168	14,534	6,561	15,845	8,676	15,310	7,936	19,320	12,188	22,384	15,113	23,263	15,317
Max	19,900	9,290	23,500	11,500	16,700	8,430	12,600	4,500	13,400	5,310	13,700	5,400	18,000	9,360	17,000	9,460	16,600	8,920	21,300	15,600	25,100	17,000	26,100	16,900
Min	8,290	2,730	7,250	2,040	593	464	2,950	430	8,130	1,750	7,560	2,560	9,720	3,880	14,900	7,910	14,000	6,860	16,400	9,050	19,800	13,600	18,300	11,500

Table 18. Daily maximum and minimum chloride concentrations, Delaware River at Chester, Pennsylvania (U.S. Geological Survey site number 01477050), for report year ending November 30, 2016.

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

Day	Dec. 2015		Jan. 2016		Feb. 2016		Mar. 2016		Apr. 2016		May 2016		June 2016		July 2016		Aug. 2016		Sept. 2016		Oct. 2016		Nov. 2016	
	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	74	59	59	52	59	59	59	52	58	58	66	51	58	51	98	82	82	82	143	109	280	280	651	558
2	59	39	52	52	74	67	59	52	58	45	66	51	51	45	98	90	90	73	143	90	385	310	651	558
3	67	33	52	49	74	67	52	45	45	45	58	51	58	51	98	90	82	73	169	120	480	310	651	480
4	59	52	67	52	82	67	51	45	51	51	58	51	51	51	99	90	90	73	213	120	480	267	651	651
5	59	52	52	46	82	66	45	45	51	45	58	51	51	51	99	82	90	82	267	143	446	333	651	558
6	59	52	52	46	73	66	52	45	51	45	58	51	58	45	109	90	82	73	248	143	333	288	651	480
7	67	52	52	46	82	51	51	45	51	45	58	51	58	51	129	82	82	73	248	155	446	288	651	580
8	59	52	59	52	73	66	51	45	66	51	51	51	51	51	141	90	90	73	310	183	414	333	651	480
9	59	52	52	46	73	66	45	45	58	51	51	51	51	45	141	90	90	82	198	143	333	230	651	651
10	67	59	52	52	73	66	45	45	58	51	58	45	58	51	141	99	90	82	193	129	517	310	651	602
11	67	52	52	52	73	73	45	45	58	51	58	51	51	45	129	90	90	82	224	153	333	288	651	517
12	67	59	51	45	82	58	45	45	58	45	58	45	51	45	129	109	90	73	280	129	414	267	651	446
13	59	52	51	45	73	66	45	45	45	45	51	45	58	51	129	109	90	66	301	165	358	333	651	480
14	74	59	51	45	66	58	45	45	45	45	51	45	51	51	129	82	90	66	224	141	333	310	651	558
15	67	52	45	45	74	66	45	45	51	45	51	51	51	51	119	82	90	73	208	141	333	310	651	558
16	67	59	45	45	116	74	51	45	51	45	58	51	51	51	99	82	90	73	241	193	446	257	651	651
17	74	59	45	45	90	90	45	45	51	45	51	51	51	45	90	82	90	73	280	193	446	333	651	602
18	82	52	45	45	90	90	51	51	51	45	51	51	51	51	90	90	82	73	324	208	602	310	651	651
19	59	52	45	45	90	90	51	51	51	45	58	51	51	45	90	82	90	66	280	208	651	310	651	602
20	67	59	45	42	90	90	55	51	51	45	51	45	51	45	109	90	119	73	403	193	651	558	651	651
21	67	59	45	45	90	82	66	51	51	45	58	51	51	45	119	82	99	82	324	208	651	558	651	651
22	67	59	45	45	90	82	57	57	51	45	51	45	66	51	161	92	109	82	324	193	651	651	651	602
23	67	59	52	45	90	82	51	50	51	45	51	45	66	51	174	102	90	82	435	241	617	517	651	517
24	59	52	52	52	90	82	57	57	45	45	51	48	82	59	151	124	90	82	591	193	651	480	651	558
25	59	52	52	52	90	82	57	50	66	45	58	45	90	67	148	113	90	82	468	241	558	446	651	558
26	52	52	52	52	89	67	57	50	51	45	58	45	90	74	129	90	99	82	468	260	651	446	651	651
27	59	52	59	52	59	52	66	50	66	51	51	51	90	82	129	82	129	90	435	241	651	517	651	651
28	59	52	52	52	59	45	58	51	66	51	51	45	98	82	129	82	129	90	348	280	651	651	651	602
29	52	52	67	52	52	45	58	51	58	51	66	51	90	82	129	90	100	82	403	280	651	558	651	651
30	59	52	67	52	—	—	66	51	58	45	51	51	116	82	129	82	120	90	403	280	651	651	651	568
31	59	52	59	52	—	—	66	51	—	—	51	45	—	—	119	82	131	90	—	—	651	558	—	—
Mean	64	53	52	48	79	69	53	48	54	47	55	49	63	55	122	90	96	78	303	183	507	395	651	574
Maximum	82	59	67	52	116	90	66	57	66	58	66	51	11	82	174	124	131	90	591	280	651	651	651	651
Minimum	52	33	52	45	52	45	45	45	45	45	51	45	51	45	90	82	82	66	143	90	280	230	651	446

Table 19. Daily mean dissolved-oxygen concentration, Delaware River at Benjamin Franklin Bridge at Philadelphia, Pennsylvania (U.S. Geological Survey site number 01467200), from April 1 to November 30, 2016.

[Data from U.S. Geological Survey (2020e). Concentrations are in milligrams per liter. U.S. Geological Survey site number 01467200 was renamed "Delaware River at Penn's Landing, Philadelphia, PA," in January 2020.*, missing data; —, not applicable]

Day	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
1	10.5	7.5	5.9	5.3	4.1	5.0	6.1	7.2
2	10.3	7.1	5.6	5.2	4.0	5.0	6.0	7.1
3	10.2	6.8	5.3	5.2	4.1	5.1	5.9	7.1
4	10.1	6.7	4.9	5.2	4.2	5.3	5.9	7.2
5	10.0	6.6	4.6	5.0	4.3	5.3	5.9	7.2
6	9.9	6.7	4.4	4.9	4.4	5.3	6.1	7.3
7	9.9	6.8	4.3	4.8	4.5	5.4	6.0	7.3
8	9.8	7.1	4.5	4.9	4.7	5.4	6.0	7.2
9	9.7	7.5	5.0	5.0	4.8	5.3	6.1	7.2
10	9.6	7.9	5.3	4.9	4.9	5.3	6.3	7.2
11	9.7	7.9	5.6	5.2	5.1	5.4	6.4	7.4
12	9.7	7.9	5.8	5.4	5.4	5.4	6.4	7.6
13	9.8	7.9	6.2	5.5	5.6	5.3	6.3	7.7
14	9.9	7.8	6.3	5.3	5.8	5.4	6.4	7.7
15	9.9	7.9	6.5	5.3	6.0	5.5	6.3	7.5
16	10.0	8.1	6.3	5.4	6.0	5.5	6.3	7.4
17	9.9	8.2	6.0	5.4	6.0	5.5	6.3	7.5
18	10.0	8.1	6.1	5.4	5.8	5.4	6.2	7.5
19	9.9	8.0	6.1	5.2	5.7	5.2	6.1	7.4
20	9.9	7.9	6.2	5.1	5.6	4.8	6.2	7.9
21	9.9	7.7	6.2	5.0	5.5	4.6	6.0	8.8
22	9.8	7.3	6.2	5.0	5.2	4.5	6.2	9.2
23	9.5	7.0	6.2	5.0	5.1	4.4	6.6	9.2
24	9.4	6.8	6.2	4.8	5.0	4.5	6.8	9.2
25	9.2	6.6	6.2	4.7	5.2	4.6	6.9	9.1
26	9.0	6.5	6.1	4.5	5.2	4.8	7.0	9.0
27	8.7	6.4	6.1	4.4	5.2	4.9	7.0	9.0
28	8.4	6.5	5.7	4.2	5.2	5.0	7.1	9.0
29	8.1	6.6	*	4.1	5.2	5.5	7.2	9.0
30	7.8	6.4	*	4.0	5.3	5.9	7.2	8.9
31	—	6.2	—	4.1	5.2	—	7.2	—
Mean	9.6	7.2	5.7	4.9	5.1	5.2	6.4	7.9
Maximum	10.5	8.2	6.5	5.5	6.0	5.9	7.2	9.2
Minimum	7.8	6.2	4.3	4.0	4.0	4.4	5.9	7.1

Table 20. Daily mean dissolved-oxygen concentration, Delaware River at Chester, Pennsylvania (U.S. Geological Survey site number 01477050), from April 1 to November 30, 2016.

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

Day	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
1	10.3	7.7	5.9	5.6	4.9	5.8	7.5	8.2
2	10.1	7.4	6.3	5.8	4.9	5.8	7.1	8.1
3	10.2	7.2	6.1	5.7	5.5	6.1	6.8	7.9
4	10.1	7.0	5.9	5.8	5.7	6.6	6.8	7.9
5	10.1	6.9	5.7	5.8	6.0	6.7	6.9	8.0
6	10.0	6.9	5.7	5.6	6.2	6.8	6.9	8.0
7	10.1	7.0	5.6	5.6	6.2	6.8	6.8	8.2
8	10.0	6.9	5.6	5.7	6.2	6.7	6.8	8.2
9	9.8	7.1	6.1	5.7	6.4	6.5	6.8	8.1
10	9.8	7.1	6.3	5.7	6.6	6.5	7.1	8.1
11	9.8	6.8	6.6	5.9	6.7	6.5	7.3	8.3
12	9.7	6.7	7.0	6.2	6.6	6.4	7.3	8.3
13	9.5	6.5	7.3	6.2	6.5	6.4	7.2	8.5
14	9.4	6.6	7.6	6.1	6.4	6.4	7.2	8.4
15	9.3	7.1	7.6	6.1	6.3	6.3	7.2	8.5
16	9.2	7.7	7.2	6.0	6.2	6.4	7.3	8.5
17	9.1	7.8	6.9	6.2	6.3	6.4	7.2	8.4
18	9.0	7.7	6.9	6.2	6.0	6.2	7.1	8.4
19	8.9	7.6	6.7	6.0	6.0	5.9	7.0	8.5
20	8.9	7.4	6.5	6.0	6.0	5.6	7.0	8.8
21	9.0	7.2	6.5	6.1	6.0	5.4	7.1	9.5
22	9.0	7.2	6.4	6.2	5.8	5.4	7.1	9.9
23	8.8	6.9	6.2	6.1	5.8	5.5	7.5	10.0
24	8.9	6.7	6.0	6.0	5.9	5.5	7.8	10.0
25	8.8	6.5	6.0	6.0	6.0	5.7	8.0	9.9
26	8.6	6.4	5.9	5.7	6.0	5.8	8.1	9.9
27	8.3	6.3	6.0	5.6	5.9	6.0	8.3	9.9
28	8.2	6.3	5.8	5.5	6.0	6.2	8.4	10.0
29	8.2	6.5	5.6	5.4	6.0	7.1	8.3	10.0
30	8.0	6.4	5.6	5.3	5.9	7.6	8.3	9.8
31	—	6.0	—	5.4	5.9	—	8.3	—
Mean	9.3	7.0	6.3	5.8	6.0	6.2	7.4	8.8
Maximum	10.3	7.8	7.6	6.2	6.7	7.6	8.4	10.0
Minimum	8.0	6.0	5.6	5.3	4.9	5.4	6.8	7.9

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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 to the design of releases from the New York City reservoirs to meet the Montague flow objective at Montague, New Jersey. 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 procedure 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 adjusted flow objective.

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 June 1, 2016, Flexible Flow Management Plan:

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

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

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

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

- **L5**—Conservation releases when New York City combined reservoir storage is in the drought (L5) storage zone (also referred to as "Drought Emergency").

Directed releases Controlled releases from New York City reservoirs in the upper Delaware River Basin, designed by the Office of the Delaware River Master to meet the Montague flow objective.

Discharge mitigation release These are releases designed to help mitigate the effects of spilling immediately below the Delaware River Basin reservoirs. The 2016 Flexible Flow Management Program details the releases in section 7 (appendix 1).

Diversions The out-of-basin transfer of water by New York City from 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 water transfer by New Jersey from the Delaware River through the Delaware and Raritan Canals.

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

Flexible Flow Management Program (FFMP) A set of rules for the management of storage, diversions, releases, and flow targets relating to the apportioning of water from the Delaware River Basin under the 1954 Decree of the Supreme Court of the United States and unanimously agreed to by the Decree Parties (Delaware, New Jersey, New York, New York City, and Pennsylvania).

Index gaging stations Specific sites on tributaries of the upper Delaware River where systematic observations of gage height and discharge are made. These sites are used mainly during the directed-releases season to help estimate surface-water inflows to the upper Delaware River.

Interim Excess Release Quantity An Interim Excess Release Quantity (IERQ) was defined in the 2016 Flexible Flow Management Program. The IERQ is computed as 83 percent of the difference between the highest year's consumption of the New York City water supply system from 2002 to 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. During the 2016 report year, the IERQ available for release was 15,468 cubic feet per second accumulated daily ([ft^3/s]-d). 6,045 (ft^3/s)-d of the IERQ is incorporated into 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 may be used for additional releases to meet the Trenton flow objective or to establish an Extraordinary Needs Bank.

Interim Excess Release Quantity (IERQ) Extraordinary Needs Bank From the 2016 Flexible Flow Management Program (appendix 1): "In addition to the hydrologic criteria described in Section 2.5.6.A. [sic] of the Water Code and subject to other provisional uses of the IERQ as provided herein, the Decree Parties [Delaware, New Jersey, New York State, New York City, and Pennsylvania], the DRBC and the River Master may at any time review extraordinary water needs to support such research, aquatic-life, or other water-use activity as may be approved by the DRBC. Upon unanimous agreement, the Decree Parties may bank all or a portion of the IERQ remaining at such time, and such portion shall be placed in an IERQ Extraordinary Needs Bank and used to provide for such extraordinary water needs. Such quantity as may be so banked shall be deducted from the IERQ. Any unused Extraordinary Needs Bank water shall be returned to IERQ."

Key gaging stations Specific sites on the East Branch Delaware River, West Branch Delaware River, Neversink River, Delaware and Raritan Canal, and mainstem Delaware River where continuous, systematic gage height and discharge observations are made. These sites are used year-round in Office of the Delaware River Master operations.

Maximum reservoir depletion The minimum water-surface level or elevation below which a reservoir ceases to continue making deliveries of quantities of water for all purposes for which the reservoir was designed. This value is also referred to as the minimum full-operating level.

Montague Flow Objective In section 3a of the June 1, 2016, Flexible Flow Management Program (appendix 1), "Except with respect to limitations provided herein in Section 5, releases from the City Delaware Basin Reservoirs shall be in quantities designed to maintain, during Normal storage conditions, a minimum basic rate of flow at the gaging station of the U.S. Geological Survey at Montague, N. J. of 1,750 cubic feet per second (cfs), as directed by the River Master in accordance with Section VII. [sic] of the Decree. During Basinwide Drought Watch, Drought Warning, and Drought Emergency, in accordance with Section 5 of this Agreement and Section 2.5.3.B. [sic] and Tables 1 and 2 of the Delaware River Basin Water Code (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."

Rate of flow Mean discharge for a specified 24-hour period, measured 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. In the June 1, 2016, FFMP document (appendix 1 of this report), redirection of the Interim Excess Release Quantity used to support the seasonal flow increment was intended to increase the Montague flow objective from 1,750 to 1,850 cubic feet per second between June 15 and September 15. The objective is a benchmark used to control upstream releases and withdrawals of water in the Delaware River Basin.

Reservoir-controlled releases Controlled releases from the 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 the 250 parts per million isochlor, or line of equal chloride concentration, in the Delaware River estuary. One part per million is one part of solute (in this case, chloride) per one million parts of solvent (river water). The 7-day average location of the salt front is used as an indicator of salinity intrusion in the Delaware River estuary and a factor affecting the Montague and Trenton flow objectives during drought emergencies.

Storage or contents Usable volume of water in a reservoir. Unless otherwise indicated, volume is computed on the basis of the level of pool above the point of maximum depletion.

Time of day Time of day is expressed in 24-hour Eastern Standard Time, which, during the report year, included a 23-hour day on March 11 and a 25-hour day on November 4.

Trenton Flow Objective In section 3b of the June 1, 2016, Flexible Flow Management Program (appendix 1), "Section 2.5.3 of the Water Code establishes a set of equivalent flow objectives at Trenton, N.J. to control salinity intrusion in the Delaware Estuary. During Basinwide Drought Watch, Drought Warning, and Drought Emergency, in accordance with Section 5 of this Agreement and Section 2.5.3.B. [sic] and Tables 1 and 2 of the Water Code, the Trenton Equivalent Flow Objective shall vary based upon the time of year and location of the salt front, and minimum compensating releases shall be made by the City of New York from its reservoirs in the upper Delaware Basin." The Delaware River Basin Water Code can be found in 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 Rio Reservoir, but including spillway overflow at these dams.

Appendix 1. Agreement of the Parties to the 1954 Decree of the Supreme Court of the United States, Effective June 1, 2016

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 1-year successor to the Flexible Flow Management Program that ended on May 31, 2016. A copy of the agreement, which is in effect through May 31, 2017, is included as appendix 1 here; the original page numbers were removed to avoid confusion. The agreement is also available through the U.S. Geological Survey website (https://webapps.usgs.gov/odrm/documents/ffmp/2016_FFMP_Agreement_Signed.pdf) (fig 1.1).

Agreement of the Parties to the 1954 U.S. Supreme Court Decree Effective June 1, 2016

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10. LAKE WALLENPAUPACK
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17. TEMPORARY SUSPENSION OR MODIFICATION
18. RESERVATIONS
19. EFFECTIVE DATE
20. RENEWAL AND REVISION
21. REVERSION

An Agreement, consented to by the Parties (the State of Delaware (Del.), the State of New Jersey (N.J.), the State of New York (N.Y.), the Commonwealth of Pennsylvania (Pa.), and the City of New York (NYC or City); hereafter Decree Parties) to the Amended Decree of the U.S. Supreme Court in New Jersey v. New York, 347 U.S. 995 (1954), (hereafter Decree) that succeeds for a one-year period the Flexible Flow Management Program (FFMP) that terminated on May 31, 2016, for managing diversions and releases under the Decree. The Decree Parties hereby agree to support all provisions of this Agreement.

1. FLEXIBLE FLOW MANAGEMENT PROGRAM

a. Program History

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

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

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

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

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

b. Current Program

The original FFMP, effective October 1, 2007 and its subsequent modifications on December 10, 2008 and February 14, 2011, expired on May 31, 2011. Collectively, these programs are referred to herein as the Initial Implementation Cycle FFMP. The subsequent FFMP Agreement, effective June 1, 2011 and expired on May 31, 2012, was a one-year program unanimously approved by the Decree Parties and built upon the framework of the previous FFMP agreements. The FFMP Agreement effective June 1, 2012 and expiring on May 31, 2013 was a one-year extension of the June 1, 2011 Agreement and was unanimously approved by the Decree Parties. The 2013 FFMP, 2014 FFMP and 2015 FFMP were also extensions of the June 1, 2011 Agreement. The current FFMP is also an extension of the June 1, 2011 Agreement and incorporates the edits from the previous four extensions of the 2011 Agreement with no additional program modifications other than dates. This Agreement, the 2016 FFMP, shall be effective from June 1, 2016 to May 31, 2017.

Although several limited studies and evaluations have been conducted to assess the effectiveness of selected elements of the Initial Implementation Cycle FFMP and suggest opportunities for its improvement, some of which were incorporated in the previous extensions of the Agreement, additional analyses and studies are needed prior to the Decree Parties reaching a longer term agreement for managing diversions and releases under the Decree.

The current FFMP is informed by impact assessments of previous FFMP Agreements, information and experience accumulated during the previous programs, and input from various stakeholder groups and the public. The current FFMP differs from the Initial Implementation Cycle FFMP mainly in the following key elements:

- Use of additional tables (i.e., schedules) of reservoir releases rates for the City Delaware Basin Reservoirs, developed on the basis of Forecast-based Available Water (FAW) not needed contemporaneously for New York City's water supply;
- Use of new releases tables that replace releases tables utilized in the Initial Implementation Cycle FFMP;
- Use of new rule curves that replace rule curves utilized in the Initial Implementation Cycle FFMP;
- Use of New York City's Operations Support Tool (OST) to guide selection of appropriate releases tables;

- Releases rates based, in part, upon recommendations provided jointly by the New York State Department of Environmental Conservation and the Pennsylvania Fish and Boat Commission Joint Fisheries Paper (January 12, 2010);
- Drought condition releases rates (L3-L5) that are consistent among the releases tables;
- Modifications to New Jersey's diversion during drought conditions and the establishment of a Diversion Offset Bank for New Jersey;
- Incorporation of the seasonal releases design of the FFMP Temporary Summer 2010 fisheries program;
- Redirection of the IERQ used to support the seasonal flow increment, which was intended to increase the Montague flow objective from 1,750 cfs to 1,850 cfs between June 15 and September 15;
- Use of 3.91 billion gallons (6,045 cfs-days) of IERQ to increase the base releases rates in the tables;
- Reattachment of the Montague flow objective with the location of the Delaware Estuary salt front (salinity vernier);
- Modified spill mitigation program that endeavors to maintain reservoir levels at the Conditional Seasonal Storage Objective (CSSO), creating a high probability of maintaining ten (10) percent void spaces from September 1, 2016 through March 15, 2017; and
- Postponement of a water-resources reassessment study until more information is available.

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

The June 1, 2012 FFMP Agreement differed from the 2011 FFMP Agreement in the following elements:

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

The June 1, 2013 FFMP Agreement was an extension of the June 1, 2011 Agreement and incorporated the changes from the 2012 FFMP Agreement.

The June 1, 2014 FFMP Agreement was an extension of the June 1, 2011 Agreement and incorporated the changes of the 2012, and 2013 Agreements. The term Conditional Storage Objective (CSO) was changed to Conditional Seasonal Storage Objective (CSSO) in the 2014 Agreement.

The June 1, 2015 FFMP Agreement is an extension of the June 1, 2011 Agreement and incorporates the changes of the 2012, 2013 and 2014 Agreements.

The June 1, 2016 FFMP Agreement is an extension of the June 1, 2011 Agreement and incorporates the changes of the 2012, 2013, 2014, and 2015 Agreements.

c. Criteria for Flexible Flow Management Program Modification

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

i. Decree Party equity

ii. Net benefits and costs to environmental and economic resources

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

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

v. Scientific basis for modification

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

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

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

ix. Ease and practicability of operation

x. Consistency with adaptive management principles

xi. Applicability and implementation of water conservation practices

xii. Impacts to salinity

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

2. DIVERSIONS

a. New York City

In accordance with Section III.A. of the Decree, and subject to the limitations provided herein, at no time during the twelve-month period, commencing June 1, 2016 shall the aggregate total quantity of water diverted by the City, divided by the number of days elapsed since May 31, 2016 exceed 800 million gallons per day (mgd). The City shall be subject to the conditions and obligations in connection with the diversions, and releases to maintain the Montague flow objective, set forth in Section III.B. of the Decree. For this Agreement, the City shall make releases from its Delaware Basin Reservoirs in accordance with the releases schedules incorporated herein.

b. New Jersey

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

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

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

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

3. FLOW OBJECTIVES

a. Montague Flow Objective

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

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

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

b. Trenton Equivalent Flow Objective

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

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

4. RELEASES

a. Conservation Releases from the City Delaware Basin Reservoirs

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

b. Excess Release Quantity

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

c. Interim Excess Release Quantity

For the period of the current program, an IERQ equivalent to 10.0 billion gallons (15,468 cfs-days) shall be provided as computed in the Initial Implementation Cycle of the FFMP based upon 83 percent of the difference between 1,257 mgd, the highest year's consumption of the NYC water supply system between 2002 and 2006 inclusive and NYC's estimate of continuous safe yield of the NYC water supply system at that time, of 1,290 mgd obtainable without pumping.

For the current program, 3.91 billion gallons (6,045 cfs-days) of the IERQ is incorporated in the releases tables to enhance base releases from the City Delaware Basin Reservoirs. The IERQ balance of 6.09 billion gallons (9,423 cfs-days) is reserved and may be used for additional releases to meet the Trenton Equivalent Flow Objective or to establish an Extraordinary Needs Bank as provided for in Section d., below.

Upon request by the Lower Basin States or DRBC, NYC shall release from the IERQ, water in sufficient quantities to maintain a flow at Trenton of 3,000 cfs during basinwide Normal conditions for the period commencing on June 15, 2016 and continuing through March 15, 2017 (seasonal period). The IERQ required to be released in any seasonal period shall not exceed 70 billion gallons. In releasing the IERQ, NYC shall not be required to release at rates exceeding the capacity of its release works. NYC shall make releases from the IERQ as provided above until May 31, 2017 or until the aggregate quantity of the IERQ is exhausted, whichever occurs first.

d. Interim Excess Release Quantity Extraordinary Needs Bank

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

so banked shall be deducted from the IERQ. Any unused Extraordinary Needs Bank water shall be returned to IERQ.

5. DROUGHT MANAGEMENT

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

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

a. Drought Watch (L3)

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

b. Drought Warning (L4)

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

c. Drought Emergency (L5)

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

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

New Jersey's maximum average monthly diversion from the Delaware River Basin via the Delaware and Raritan Canal shall be in accordance with Table 1, and shall not exceed 100 mgd, except when the Basin is in Drought Emergency, when said diversion shall not exceed a daily running average of 85 mgd commencing on the day such Drought

Emergency becomes effective. Under all City Delaware Basin Reservoir combined storage conditions, New Jersey's diversion on any day shall not exceed 120 million gallons.

d. New Jersey Diversion Offset Bank

There is hereby established a Diversion Offset Bank, not to exceed 1.84 billion gallons (2,850 cfs-days) of water in the City Delaware Basin Reservoirs, for the purpose of offsetting the increased diversions by New Jersey as provided in Table 1 of this Agreement, during basinwide Drought Watch, Drought Warning, and Drought Emergency conditions. The additional increases are in increments, not to be exceeded on any day, as follows: 0 mgd during Normal conditions; up to 15 mgd during Drought Watch; up to 30 mgd during Drought Warning; and up to 20 mgd during Drought Emergency. The differences in New Jersey's diversion, computed on the basis of Table 1 of the Good Faith Agreement, and the corresponding rates in Table 1 of this Agreement, establish the additional increments for New Jersey's diversion as incorporated herein.

This Diversion Offset Bank shall be created by selective reduced levels of releases in the L2 storage zones from Cannonsville Reservoir, during the periods June 1 to August 31, 2016 and May 21 to May 31, 2017 as provided in Tables 4g (L2-a and L2-b) and 4f (L2-a). Water saved by these reductions shall be accumulated in the Diversion Offset Bank and shall be available to offset New Jersey's incremental increases in diversions through the Delaware and Raritan Canal during drought periods.

If the accumulated incremental increased diversions by New Jersey, at any time, exceed the available water in the Diversion Offset Bank, the Lower Basin Reservoirs in Pennsylvania will provide the additional water to offset New Jersey's increased diversions. At no time shall New Jersey's accumulated incremental increased diversions exceed 1.84 billion gallons (2,850 cfs-days).

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

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

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

The River Master's office will maintain the ongoing accounting for releases made from this bank. At no time during the releases year commencing June 1, 2016 shall releases from the Diversion Offset Bank exceed the unused balance of the bank. The Diversion Offset Bank shall terminate automatically on June 1, 2017; provided that it may be terminated at an earlier date and the remaining balance added to the IERQ, by agreement of the Decree Parties.

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

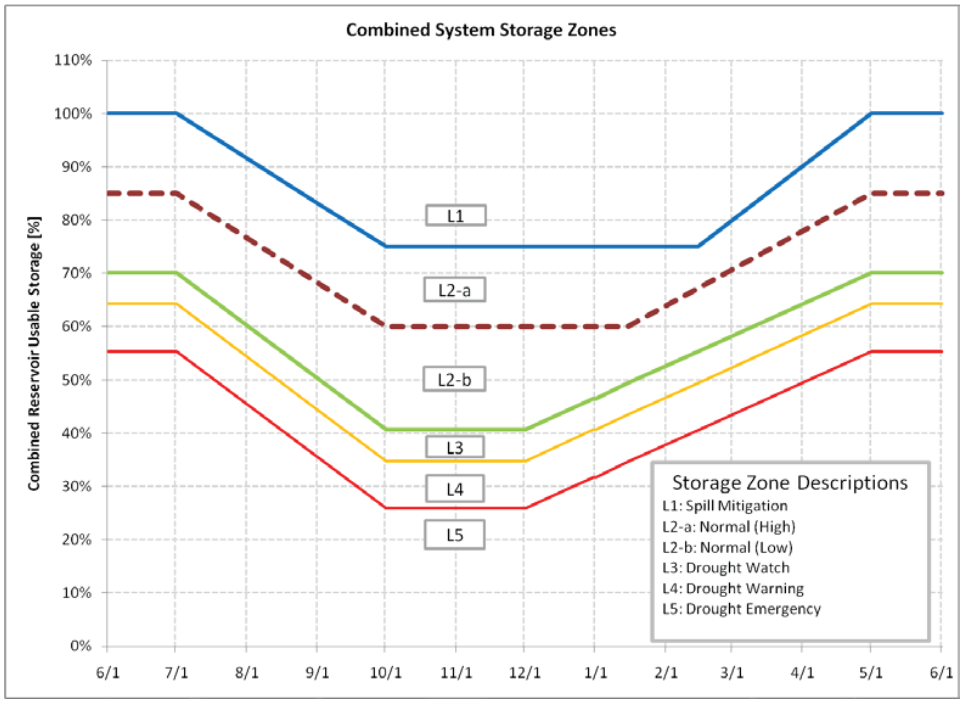


Table 1
Interstate Operation Formula for Diversions and Flow Objectives

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

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

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

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

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

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

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

Table 3
Schedule of Releases (cfs) during Drought Operations

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

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

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

e. Entry and Exit Criteria

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

f. Balancing Adjustment

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

6. HABITAT PROTECTION PROGRAM

a. Applicability and Management Objectives

The overall management goal of the Habitat Protection Program (HPP) is to protect the cold water fishery while maintaining aquatic community diversity, structure, and function through improved ecological flow releases. A series of four categorical protection levels for describing cold water ecosystem management objectives for waters downstream of the City Delaware Basin Reservoirs was developed by New York and Pennsylvania fishery managers and is shown on Plate 1. These protection levels apply in non-drought years and are defined as follows:

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

Good: River section provides cold water aquatic habitat and thermal protection and maintains opportunities for a cold water fishery. Summer water temperatures will occasionally exceed a daily maximum of 75ºF for short periods and water temperatures greater than 68ºF occur more frequently than with the Excellent protection level.

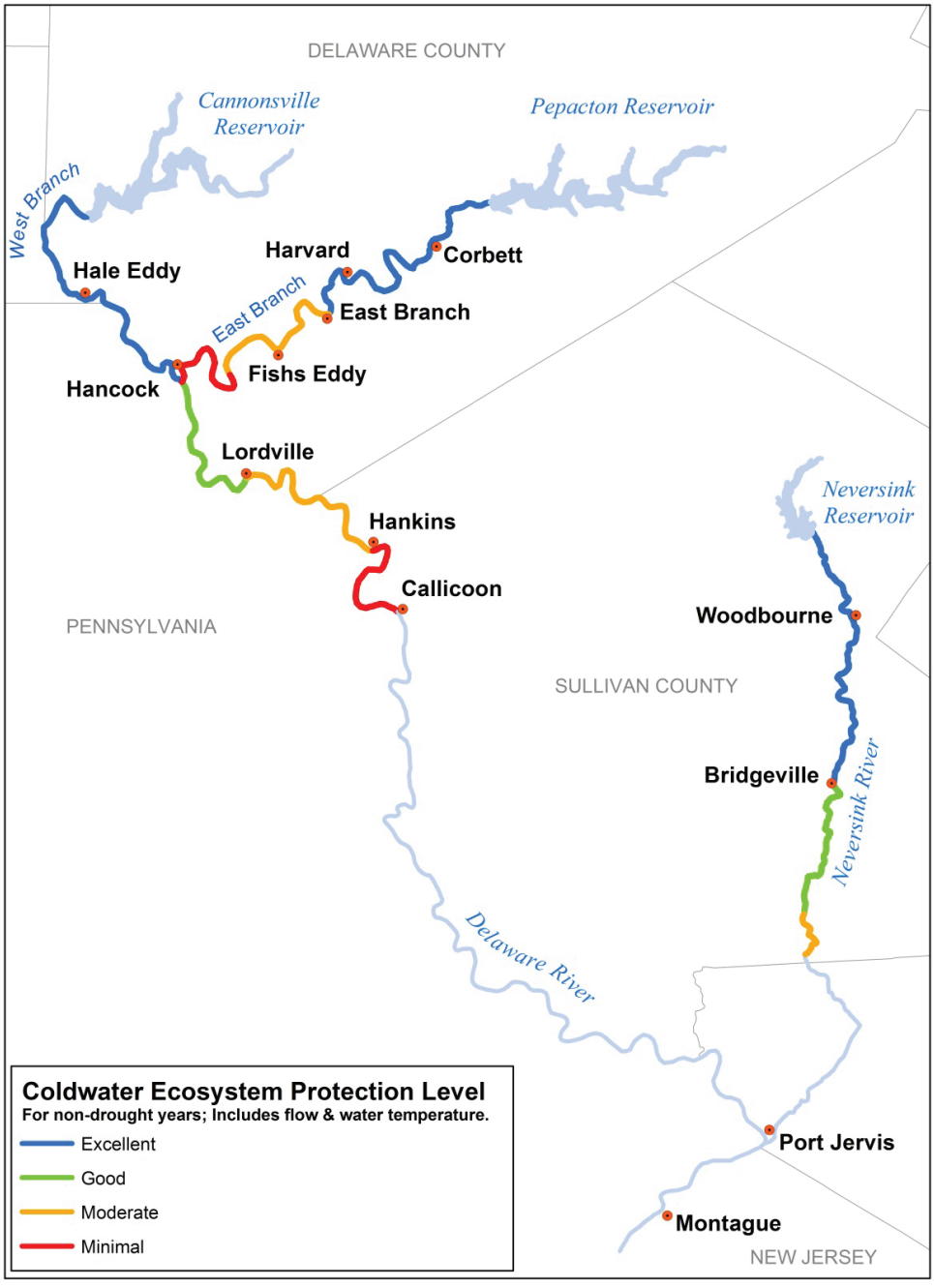
Elevated temperatures will occasionally be an issue. Good protection level applies to the Delaware River main stem from the junction of the West and East Branches to Lordville, N.Y. and the Neversink River from Bridgeville, N.Y. to the mouth of Eden Brook near Oakland Valley, N.Y.

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

Minimal: River sections with this designation will experience adequate flow, but only limited thermal protection. The quality of the fishery will be generally seasonal and will vary from year to year. Flows should be adequate to allow trout to reach cold water refugia and to protect dwarf wedgemussel populations in the vicinity of Callicoon, N.Y. Minimal protection level applies to the East Branch Delaware River from the mouth of Corn Creek near Peas Eddy, N.Y. to the junction with the West Branch Delaware River, and the Delaware River main stem from Hankins, N.Y. to Callicoon, N.Y.

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

Plate 1
Extent and Protection Level of the Cold Water Ecosystem



b. Controlled Releases for Habitat Protection Program

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

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

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

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

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

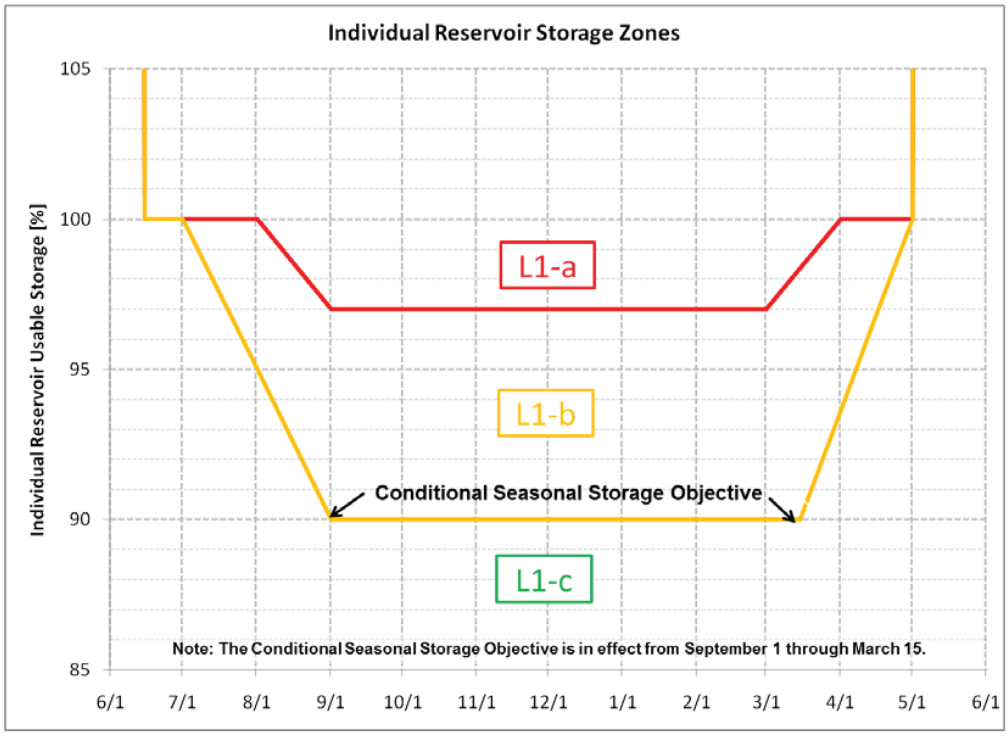


Table 4a
Schedule of Releases (cfs) during Normal Conditions
Base Releases with no Forecast-based Available Water (FAW)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

7. DISCHARGE MITIGATION PROGRAM

In order to enhance flood mitigation provided by the City Delaware Basin Reservoirs, NYC agrees to establish a Conditional Seasonal Storage Objective (CSSO) rule curve in Figure 2. Consistent with good practices for water supply reservoirs, and in order to ensure that sufficient resources are available during an extended dry period to support both lower basin and NYC needs, it is essential to ensure that the City Delaware Basin Reservoirs are filled on or around June 1st every year. To accomplish this, the CSSO (boundary between the L1-b and L1-c storage zones in Figure 2) must be limited and ramped. For the duration of the current program NYC shall endeavor, to the maximum extent possible without impacting water supply reliability, to maintain reservoir levels at the CSSO, thus creating a high probability of maintaining ten (10) percent void spaces from September 1, 2016 through March 15, 2017 to 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, snow water equivalent in the watershed ranging from 50 percent to 100 percent as appropriate, and the current usable reservoir storage. Based on any projected seven (7) day storage surplus, new release rates, above the FAW table releases in effect, are calculated and spread over the upcoming 7-day period, within the limitations of the release works for each reservoir.

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

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

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

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

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

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

iii. The NYCDEP and the New York State Department of Environmental Conservation (NYSDEC) reservoir releases managers, upon mutual agreement,

may transfer spills to bottom releases to the extent possible at any reservoir.

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

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

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

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

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

ix. To more naturally effect downward or upward transitions between discharge mitigation releases rates identified in Tables 4a through 4g, discharge mitigation releases rates may be ramped, in cooperation with NYSDEC, generally over a

period of three days at Cannonsville and Pepacton Reservoirs, and two days at Neversink Reservoir.

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

Table 5
Maximum Combined Discharge Rates

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

8. SALINITY REPULSION

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

9. DWARF WEDGEMUSSELS

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

10. LAKE WALLENPAUPACK

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

11. RECREATIONAL BOATING

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

12. ESTUARY AND BAY ECOLOGICAL HEALTH

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

13. WARM WATER AND MIGRATORY FISH

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

14. MONITORING AND REPORTING

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

a. Temperature:

During the one-year term of the current Agreement, NYSDEC shall monitor water temperatures within the stream reaches defined and categorized in Section 6. NYSDEC will submit to the Decree Parties and to the DRBC, by April 30, 2017, a scientific report summarizing the observed temperatures and assessing biological implications with respect to the stated management goal and defined protection levels of the HPP.

b. IERQ:

In order to assess the extent to which the downbasin parties' rights in the IERQ are preserved under this Agreement, the River Master shall maintain an accounting of the quantity of daily releases from the NYC reservoirs in accordance with Tables 4a through 4g which are attributable to the 3.91 billion gallons (6,045 cfs-days) IERQ component of the tables.

15. REASSESSMENT STUDY

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

16. PERIODIC EVALUATION AND REVISION

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

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

17. TEMPORARY SUSPENSION OR MODIFICATION

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

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

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

18. RESERVATIONS

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

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

19. EFFECTIVE DATE

This Agreement shall take effect upon unanimous approval of the Decree Parties and shall expire on May 31, 2017, unless renewed as provided for in Section 20, or if the expiration date is revised.

20. RENEWAL AND REVISION

This Agreement may be revised only through the unanimous written agreement of the Decree Parties. This Agreement, and any unanimously agreed to revisions, may be renewed for an additional one-year period beginning June 1, 2017 by unanimous written agreement of the Decree Parties. If this Agreement is not renewed for an additional one-year period, prior to May 31, 2017, the Decree Parties agree to enter into good faith negotiations to determine a course of action in the absence of such renewal, as provided in Section 21, below.

21. REVERSION

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

Agreement of the Parties to the 1954 U.S. Supreme Court Decree Effective June 1, 2016

STATE OF DELAWARE

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

//signed by Dr. David R Wunsch//

_____

Agreement of the Parties to the 1954 U.S. Supreme Court Decree Effective June 1, 2016

STATE OF NEW JERSEY

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

//signed by Daniel M. Kennedy//

_____

Agreement of the Parties to the 1954 U.S. Supreme Court Decree Effective June 1, 2016

CITY OF NEW YORK

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

//signed by Paul Rush//

_____

Agreement of the Parties to the 1954 U.S. Supreme Court Decree Effective June 1, 2016

STATE OF NEW YORK

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

//signed by Mark Klotz//

_____

Agreement of the Parties to the 1954 U.S. Supreme Court Decree Effective June 1, 2016

COMMONWEALTH OF PENNSYLVANIA

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

//signed by Kelly Jean Heffner//

_____

Appendix 2. Temporary Releases Program for April 28–May 1, 2016, "One Bug" Event

An agreement for a temporary modification to the 2015 Flexible Flow Management Program (FFMP) was signed by the Parties of the Amended Decree of the U.S. Supreme Court in *New Jersey* v. *New York*, 347 U.S. 995 (1954). The agreement allowed for reservoir release rates greater than those defined in the FFMP for April 28–May 1, 2016, in support of an event for the upper Delaware River Basin fishing community. A copy of the agreement is included as appendix 2 here and is also available through the U.S. Geological Survey website (https://webapps.usgs.gov/odrm/documents/ffmp/Temp.Releases.April.28-May.1.2016.One_Bug_Event.pdf) (fig 2.1).

AGREEMENT
Temporary Releases Program
For April 28-May 1, 2016 "One Bug" Event

In response to a request for flow support from the Upper Delaware fishing community the Decree Party Principals unanimously agree to temporarily modify releases from Cannonsville and Pepacton reservoirs to maintain higher flows for the "One Bug" fishing event from April 28-May 1, 2016.

The temporary agreement will prevent short term fluctuations and reductions in releases that would otherwise have occurred as a result of both current weather conditions and the current reservoir levels and time of year as described in the 2015-2016 Flexible Flow Management Program (FFMP).

Since the combined storage of Cannonsville, Pepacton and Neversink Reservoirs entered Zone L2 as of April 25, 2016, in the absence of a temporary modification to the FFMP, releases out of Cannonsville and Pepacton Reservoirs must be reduced by 0800 hours on Thursday, April 28, 2016.

The following temporary modifications to releases rates will be made:

- Cannonsville and Pepacton Reservoir releases will be maintained at the current April L1 rates of 400 cfs and 85 cfs respectively beginning 0800 hours on Thursday April 28, 2016.

- The Pepacton Reservoir release will be ramped down beginning 0800 on Sunday May 1, 2016 until 0800 on Monday May 2, 2016.

- The Cannonsville Reservoir release will be ramped down beginning at 1200 hours on Sunday May 1, 2016 until 0800 on Monday May 2, 2016.

- All release rates will be ramped down in accordance with established operational procedures, to releases called for under the operative OST-FFMP release table.

The difference in volume released under L1 rates compared to L2 rates shall be deducted from the IERQ for this temporary program.

This decision is made in the context of the current hydrologic conditions, the approach of the end of the FFMP water year, and the availability of Interim Excess Release Quantity (IERQ) water.

Future decisions to release IERQ water will continue to be made on a case-by-case basis, depending upon the hydrologic conditions at the time, in the context of ensuring a safe and reliable water supply for New York City and the Delaware River Basin water users.

The Decree Parties will continue to meet and identify opportunities to improve overall operations and address issues as they arise.

_____ _____

State of Delaware Date State of New Jersey Date

_____ _____

State of New York Date Commonwealth of Pennsylvania Date

_____

City of New York Date

Appendix 3. Agreement of the Parties to the 1954 Decree of the Supreme Court of the United States—Temporary Thermal Releases Program for Habitat Protection, July 2016

An agreement for a temporary modification to the 2016 Flexible Flow Management Program (FFMP) was signed by the Parties of the Amended Decree of the U.S. Supreme Court in *New Jersey* v. *New York*, 347 U.S. 995 (1954). The agreement granted approval for reservoir release rates greater than those defined in the FFMP for July 23–25, 2016, to mitigate negative effects of forecasted high water temperatures on the aquatic habitat on the main stem of the upper Delaware River. A copy of the agreement is included as appendix 3 here and is also available through the U.S. Geological Survey website (https://webapps.usgs.gov/odrm/documents/ffmp/TemporaryThermalRelease-IERQ20160722.pdf) (fig. 3.1).

Agreement of the Parties to the 1954 U.S. Supreme Court Decree

Temporary Thermal Releases Program
For Habitat Protection
July 2016

High forecasted nighttime air temperatures in the upper Delaware River Basin during July 23-25, 2016 are expected to increase the water temperature in the main stem of the upper Delaware River downstream of the New York City Delaware Basin reservoirs.

The Pennsylvania Department of Environmental Protection and the New York State Department of Environmental Conservation jointly requested the unanimous approval of the Delaware River Decree Parties to implement a temporary program of release augmentation on July 21, 2016 in response to the stress conditions these high water temperatures may cause to the cold-water fishery. These augmented releases will be made from Cannonsville Reservoir to partially mitigate the negative effects that may be caused by high water temperatures on the aquatic habitat of the main stem of the upper Delaware River.

On July 22, 2016, the Decree Parties unanimously agreed that during the period July 23 - 25, 2016, augmented releases would be made from Cannonsville Reservoir as follows:

Release an additional 250 cubic feet per second from Cannonsville Reservoir starting at 4:00 PM EDT July 23 and continue the additional release through 4:00 PM EDT July 25, 2016. Begin ramping down at 4:00 PM EDT on July 25, 2016, according to established operational procedures, down to the release rate prescribed under the currently applicable FFMP-OST release table.

The weather forecast for the Delaware River Region includes a potential for thunderstorms which could produce precipitation in the Upper Delaware Basin and naturally increase streamflows. Because the increased runoff would both reduce the need for thermal mitigation and reduce the effectiveness of the increased cold water release, no augmented releases shall be made to cause the Lordville flow to be greater than 1800 cfs.

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

_____ _____
State of Delaware Date State of New Jersey

_____ _____
State of New York Date Commonwealth of Pennsylvania Date

_____
City of New York Date

For more information about this report, contact:
Delaware River Master, Office of the Delaware River Master,
U.S. Geological Survey.
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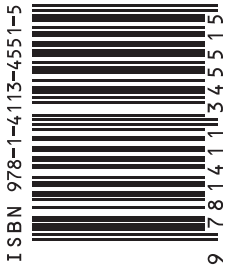

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