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Report of the River Master of the Delaware River for the Period December 1, 2014–November 30, 2015

Open-File Report 2024–1010

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

Calendar for Report Year 2015

December 2014

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November 2015

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Report of the River Master of the Delaware River for the Period December 1, 2014–November 30, 2015

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

Open-File Report 2024–1010

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

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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

April 11, 2024

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

The Honorable
John Carney
Governor of Delaware

The Honorable
Phil Murphy
Governor of New Jersey

The Honorable
Kathy Hochul
Governor of New York

The Honorable
Josh Shapiro
Governor of Pennsylvania

The Honorable
Eric Adams
Mayor of the City of New York

No. 5, Original—October Term, 1950
State of New Jersey, Complainant,

v.

State of New York and City of New York, Defendants,
Commonwealth of Pennsylvania and State of Delaware, Intervenors.

To the Chief Justice of the United States:

For the record, and in compliance with the provisions of the Amended Decree of the Supreme Court of the United States entered June 7, 1954, I hereby transmit the 62nd Annual Report of the River Master of the Delaware River for the 12-month period from December 1, 2014, to November 30, 2015. In this report, this period is referred to as the River Master "report year."

During the 2015 River Master report year, monthly precipitation in the upper Delaware River Basin ranged from 49 percent of the long-term average in May 2015 to 184 percent of the long-term average in June 2015. Precipitation from December to May, when reservoirs typically refill, was 14.23 inches. Precipitation was below normal in December, January, February, March, April, May, August, and November and above normal in the other 4 months.

When the report year began on December 1, 2014, combined useable storage in the New York City reservoirs in the upper Delaware River Basin was 154.457 billion gallons or 57 percent of combined storage capacity. The reservoirs were at 94.9 percent of usable capacity on May 31, 2015. Combined storage remained high (above 80 percent combined capacity) through late August 2015. The combined usable storage was 193.239 billion gallons at the end of the report year on November 30, 2015. During the report year, operations in the basin were conducted as stipulated by the Decree and the Flexible Flow Management Program (FFMP).

On July 13, 2015, the Delaware River Master Advisory Committee (Advisory Committee) met at the U.S. Geological Survey (USGS) New Jersey Water Science Center in Lawrenceville, New Jersey, to discuss the issues related to water use in the Delaware River Basin, safe yield, and Excess Release Quantity. The meeting adjourned early due to an emergency at Cannonsville Reservoir (where a major leakage was reported). During the report year, the following individuals served as members of the Advisory Committee:

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

During the report year, the River Master and staff participated in many water-supply related meetings of the Delaware River Basin Commission (DRBC). The Deputy Delaware River Master met periodically with representatives of the Decree Parties as a member of the Decree Parties Work Group and the DRBC's Regulated Flow Advisory Committee. In addition to the management of reservoir releases and streamflow in the upper Delaware River Basin, an issue of particular interest to the River Master was the impending expiration of the current FFMP on June 1, 2015.

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

During the report year, the ODRM continued the weekly distribution of a summary hydrologic report. These reports contain provisional data on precipitation in the upper Delaware River Basin, releases and spills from 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 Montague, New Jersey, gaging station, and diversions by 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. New York City diverted 184.722 billion gallons from the Delaware River Basin and released 94.972 billion gallons from the Pepacton, Cannonsville, and Neversink Reservoirs to the Delaware River for conservation purposes during the report year. A total of 4.219 billion gallons was spilled from the Pepacton, Cannonsville, and Neversink Reservoirs. The ODRM directed releases from these reservoirs to the Delaware River that totaled 38.129 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 chemical properties and physical characteristics of the water and presents summary statistics.

Throughout the year, diversions to New York City's water supply system and releases designed to maintain the flow of the Delaware River at Montague, New Jersey, 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 New Jersey were also within stipulated limits.

The River Master and staff are grateful for the continued cooperation and support of the Decree Parties. Also, the contributions of the PPL Corporation, the Talen Energy Corporation, 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 using 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 in this report 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 PPL Corporation (transferred to Talen Energy as of June 1, 2015). Data for Rio Reservoir were provided by Eagle Creek Renewable Energy, LLC. The contributions from these organizations 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 (Hynes), Margaret Philips, and Amy McHugh, all of the USGS, assisted with and contributed to this report by collecting, organizing, and reviewing data.

Contents

Figures

Tables

Conversion Factors

U.S. customary units to International System of Units

Multiply	By	To obtain
	Length	
inch (in.)	2.54	centimeter (cm)
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
	Area	
square mile (mi^2)	2.590	square kilometer (km^2)
	Volume	
million gallons (Mgal)	3,785	cubic meter (m^3)
billion gallons (Ggal)	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

The term "cubic feet per second accumulated daily" is used as the descriptor for the volume measurement ([ft^3/s]-d). Previous reports used the descriptor "cubic feet per second day" and "cubic feet per second for a day." The units of measure are the same; the descriptor was changed to clarify that the measurement is one of volume rather than flow rate.

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
NAD 83	North American Datum of 1983
N.J.	New Jersey
N.Y.	New York
NYCDEP	New York City Department of Environmental Protection
NWIS	National Water Information System
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

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

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 specific reservoirs owned by New York City be made under the supervision and direction of the River Master. The Decree stipulates that the River Master provide reports to the Court, not less frequently than annually. This report is the 62nd annual report of the River Master of the Delaware River. This report covers the 2015 River Master report year, which is the period from December 1, 2014, to November 30, 2015.

During the report year, precipitation in the upper Delaware River Basin was 42.22 inches or 95 percent of the long-term average. The combined storage remained above 80 percent of the combined capacity until August 2015. The lowest combined storage of the report year was 57 percent of the total combined capacity on December 1, 2014. Delaware River Master operations during the year were conducted as stipulated by the Decree and the Flexible Flow Management Program.

Diversions from the Delaware River Basin by New York City and New Jersey 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 72 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 are to be made under the supervision and direction of the Office of the Delaware River Master (ODRM). The Decree also stipulates that reports on Delaware River operations be made to the Court not less frequently than annually. The reports can be accessed at https://webapps.usgs.gov/odrm/publications/publications.

This report documents operations from December 1, 2014, to November 30, 2015—the 2015 River Master report year—hereafter referred to as the "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 (appendix 1). The 2014 FFMP and 2015 FFMP were in effect during the 2015 River Master report year: "The current FFMP is also an extension of the June 1, 2011, Agreement and incorporates the edits from the previous three extensions of the 2011 Agreement with no additional program modifications other than dates. This Agreement, the 2015 FFMP, shall be effective from June 1, 2015, to May 31, 2016." (appendix 1; also available at https://webapps.usgs.gov/odrm/documents/ffmp/FFMP_2015_Agreement1.pdf).

During this period, an additional agreement was signed to temporarily modify storage calculations related to a drought watch. As part of that agreement, one-half of the snow-water-equivalent was added to the actual combined storage in the New York City reservoirs to determine when storage conditions were assessed to enter zone L3 from

March 13 through April 15, 2015 (appendix 2; also available at https://webapps.usgs.gov/odrm/documents/ffmp/2015_Temporary_Modification.pdf).

Some hydrologic data presented in this report are streamflow and water quality records for U.S. Geological Survey (USGS) water-quality 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 streamflow components form the basic operational record used by the ODRM to carry out specific responsibilities related to the Montague flow objective. The operational record has two parts: (1) segregating the streamflow components of the current daily mean discharge at the USGS streamgage on the Delaware River 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 is used to determine whether the ODRM directs 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 the flow components, including releases from the New York City reservoirs, releases from Lake Wallenpaupack and Rio Reservoir for generation of hydroelectric power, and uncontrolled runoff. For the segregation of components of daily mean flow at the Montague site, the following data are used:

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

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

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 fill the channel before a steady flow arrives at the Montague site. During winter, ice formation and lower streamflow gradually increase the resistance to water flow, resulting in increased traveltimes. Because ice-affected traveltimes increase gradually over several days and releases were not directed to meet the Montague flow objective during periods of ice, no adjustments were made to compensate for increased traveltimes during these periods of the report year. The following list gives the average times for the effective travel of water from the various sources of controlled supply to the Montague site. These traveltimes, in hours, were used for flow routing during the 2015 report year: Pepacton Reservoir, 60; Cannonsville Reservoir, 48; Neversink Reservoir, 33; Lake Wallenpaupack, 16; and Rio Reservoir, 8.

Forecasting Streamflow—Delaware River at Montague, New Jersey

The releases from New York City's reservoirs necessary to meet the Montague flow objective were computed 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 PPL Corporation and Eagle Creek Renewable Energy, LLC, provided daily forecasts of power generation and releases to the Delaware River from Lake Wallenpaupack and Rio Reservoir, respectively, to the ODRM. Because the hydroelectric powerplants were primarily used for meeting rapidly varying peak-power demands, the forecasts were subject to various modifying factors, including the vagaries of weather on electricity demand. In addition, because the power companies are members of regional transmission organizations, 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 considerably from the forecasts used in the design of reservoir releases.

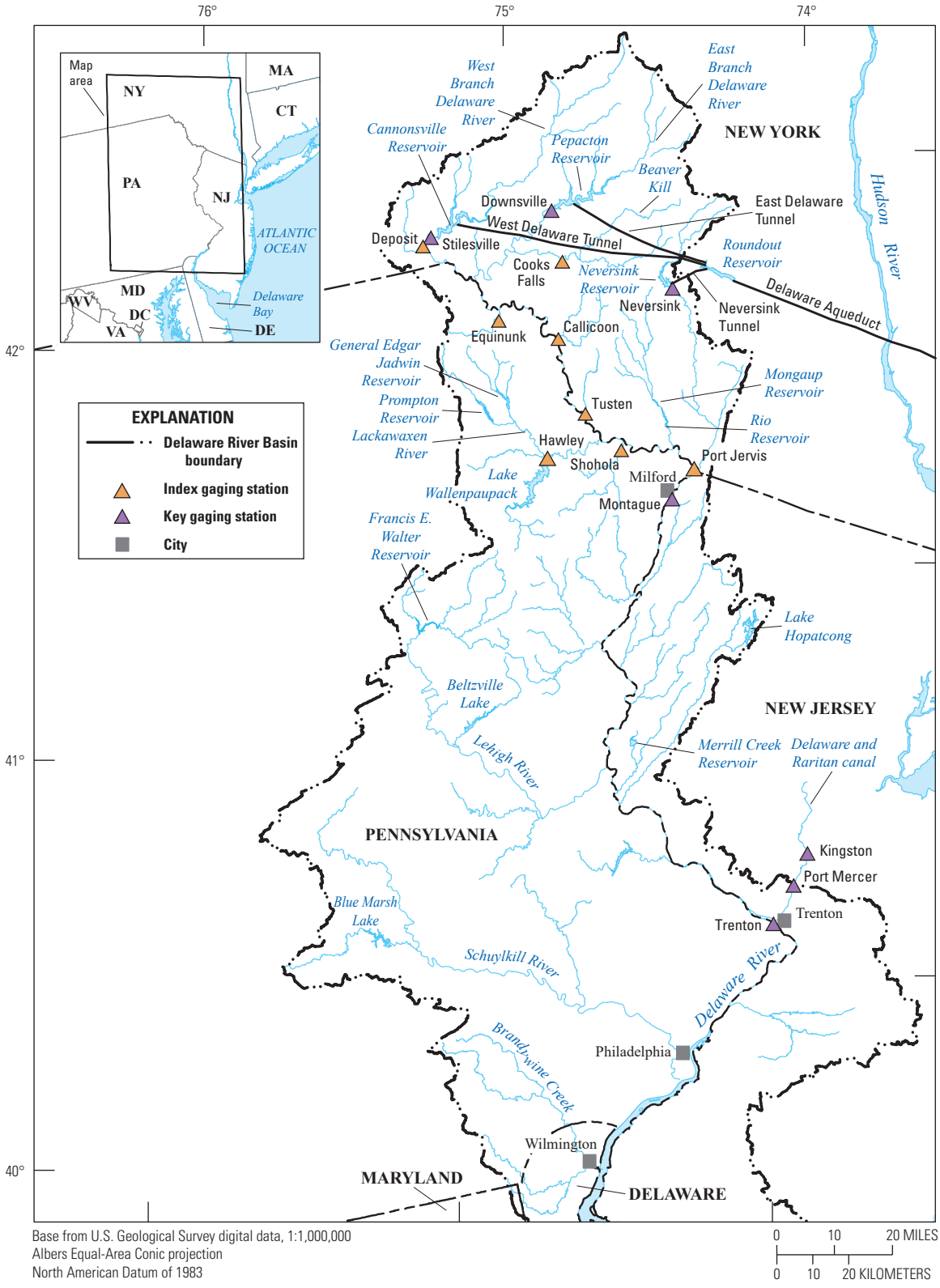


Figure 1. Map showing Delaware River Basin upstream from Wilmington, Delaware. The Delaware River Basin boundary is shown along with "key gaging stations" and "index gaging stations;" refer to the "Glossary" section for definitions.

For computational purposes during periods of low flow, estimates of uncontrolled runoff at the Montague site were treated as having 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 was used to forecast the uncontrolled portion of flow at Montague, N.J., 3 days in advance.

Forecasted runoff was determined from data provided by the National Weather Service office in Binghamton, New York (N.Y.), which included 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 forecast 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 feet per second (ft^3/s) magnitude. The balancing adjustment calls for more water to be released when previous directed releases (or lack of releases) were insufficient to meet the Montague flow objective. The adjustment calls for less water to be released when previous directed releases were higher than required to meet the Montague flow objective.

When updated forecasts of precipitation or powerplant releases showed appreciable changes after a release was directed, the release required from New York City's reservoirs was recomputed based on the updated forecasts. Commonly, this procedure resulted in a reduced release requirement for New York City reservoirs on 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., was 42.22 inches (in.) during the 2015 report year and was 95 percent of the long-term (74-year) average (table 1, in back of report). Monthly precipitation ranged from 49 percent of the long-term average in May 2015 to 184 percent of the long-term average in June 2015 (table 1). Precipitation data for the 2015 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's (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 2014–15, total precipitation was 14.23 in., which is about 69 percent of the 74-year long-term average. During the June–November period, total precipitation was 27.99 in., which is 117 percent of the 74-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. The NYCDEP provided this information.

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 the combined storage during the report year is shown in figure 2. On December 1, 2014, combined useable storage in the three reservoirs was 154.457 billion gallons or 57 percent of combined capacity. From December to May, the inflow to the New York City reservoirs typically exceeds the outflow, and, consequently, storage increases. Combined storage increased during the report year, and the reservoirs were at about 94.9 percent of usable capacity on May 31, 2015. Combined storage remained high (above 80 percent of combined capacity) until August 2015. The lowest combined storage was 154.457 billion gallons (57 percent) on December 1, 2014.

The three reservoirs spilled a total of 4.219 billion gallons when reservoirs reached maximum capacity during the year. The Pepacton Reservoir spilled from June 30, 2015, to July 3, 2015. The Cannonsville Reservoir spilled during the following periods: April 24–May 2, 2015, and July 1–7, 2015. The Neversink Reservoir spilled from June 27 to July 3, 2015. Combined storage reached a maximum for the report year on July 3, 2015, at 273.215 billion gallons. The reservoirs' storage decreased from this point and the combined storage was 193.239 billion gallons or 71.3 percent of combined capacity on November 30, 2015.

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

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

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

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

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

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

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

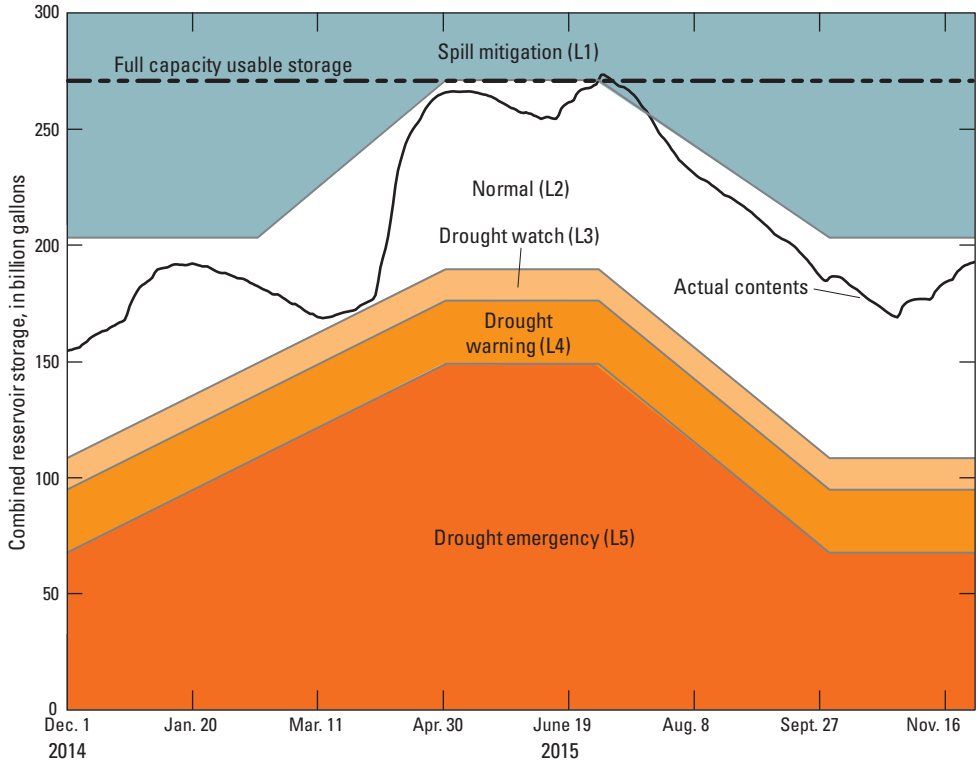


Figure 2. Graph showing rule curves and actual contents for three New York City reservoirs—Cannonsville, Neversink, and Pepacton—in the Delaware River Basin from December 1, 2014, to November 30, 2015. The full capacity usable-storage line and the five conservation release rate zones (L1–5) are shown. The conservation release rate zones are defined in the "conservation releases" definition in the "Glossary" section.

Operations

Operations for December 1, 2014–November 30, 2015, were conducted as described in the FFMP (revised, effective June 1, 2014, and continued for a second year, effective June 1, 2015). The allowable diversion to New York City was 800 million gallons per day (Mgal/d) throughout the year. The Montague flow objective was 1,750 ft^3/s. The allowable diversion to New Jersey was 100 Mgal/d.

Conservation releases from the New York City reservoirs were made at the rates shown in 2014 FFMP tables 4a–g (https://webapps.usgs.gov/odrm/ffmp/FFMP_2014_Agreement.pdf) and the June 1, 2015, FFMP (appendix 1), including table 4e of both FFMPs in December, table 4d in mid-January, table 4a in late January, table 4f in mid-February, table 4g in late February, table 4a in early March–May, table 4b in early June, table 4e in mid-June, tables 4f and 4g in late June–August, table 4g in September, and tables 4f and 4g in October–November 2015 (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 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, 2014, computed as stipulated by the Decree, is also shown in table 6. A total of 184.722 billion gallons of water were diverted to the New York City water supply system during the report year with an average of 506 Mgal/d, which is below the maximum diversion rate. The maximum daily diversion from a single reservoir was 501 million gallons (Mgal) on June 27 and 28, 2015, from the Pepacton Reservoir through the East Delaware Tunnel. The maximum daily combined diversion from all three reservoirs was 978 Mgal on January 26, 2015. Diversions by New York City did not exceed the limits stipulated by the Decree and the FFMP. Data on water consumption by New York City, for each calendar year since 1950, from all sources of supply, are presented in table 7 (in back of report).

The East Delaware Tunnel is used to divert water from Pepacton Reservoir to Rondout Reservoir. The hydroelectric powerplant at the downstream end of the East Delaware Tunnel operated for most days of the report year. When the powerplant was not in operation, water leaked through the wicket gates that 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 98 days during the 2015 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. Inspections of the channel below the outlet, when the valves were closed, revealed negligible leakage. A hydroelectric powerplant uses water diverted through the West Delaware Tunnel, but the plant operates only when diversions are less than 300 Mgal/d. When the powerplant is not operating, the valves on the pipelines to the plant are closed, and there is no leakage through the system.

The Neversink Tunnel is used to divert water from Neversink Reservoir to Rondout Reservoir. A hydroelectric powerplant uses water diverted through 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 instruments. 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 2015 report year, the powerplant operated part of the day on most days and was not operated for the equivalent of 225 days. About 2.4 billion gallons of water were diverted but not recorded, according to the leakage rate noted previously (16.2 ft^3/s [10.5 Mgal/d]) and powerplant records.

Diversions by New Jersey

The Decree authorizes New Jersey to divert water from the Delaware River and its tributaries in New Jersey to areas outside of the Delaware River Basin without compensating releases. Under the FFMP, New Jersey diversions shall not

exceed 100 Mgal/d as a monthly average, and the daily mean diversion shall not exceed 120 Mgal/d. When the lower part of the Delaware River Basin is in a drought warning period, diversions shall not exceed 85 Mgal/d as a running average.

The USGS streamgage on the Delaware and Raritan Canal at Port Mercer, N.J. (USGS 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 average monthly diversion was 97 Mgal/d during November 2015 (table 8, in back of report) (USGS, 2019e). The maximum daily mean diversion was 111 Mgal/d on January 24, 2015 (table 8). Diversions by New Jersey did not exceed the limits stipulated by the FFMP.

Montague Flow Objective

The components of forecasted flow at the Montague site during low flow (forecasted releases from power reservoirs, estimated uncontrolled runoff including conservation releases from the Rio Reservoir, and forecasted increase in runoff from precipitation) and the sums of flows exclusive of releases from New York City's reservoirs are given in table 9 (in back of report). If the computed sum of the components is less than the flow objective at the Montague site, then the deficiency is made up by using 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 greater than the flow objective on all days from December 1, 2014, to May 12, 2015, and no releases were directed. The observed daily mean discharge at the Montague site was greater than the applicable flow objective (1,750 ft^3/s) on all days except for 1 day in May, 8 days in September, and 3 days in October (table 11, in back of report) (USGS, 2019d).

The forecasted flow at the Montague site, exclusive of water released from the New York City reservoirs, was less than the flow objective on 73 days between May 13, 2015, and October 30, 2015, and directed releases were required (table 9). For 11 days, from May 15, 2015, to October 24, 2015, the observed flow at the Montague site was less than the flow objective (table 11). Of those observed daily flows, 10 were within 10 percent of the flow objective, whereas the daily mean flow on September 12, 2015, was 1,546 ft^3/s, which is 88.3 percent of the flow objective (table 11).

The components of total flow observed at the Montague site from May 15 to 30, 2015, and from July 28 to October 27, 2015, are shown in figure 3. The flow is segregated into the portion derived from the New York City reservoirs, the portion contributed by the power reservoirs, and the uncontrolled runoff from the drainage area below the reservoirs. As described previously, the uncontrolled runoff was computed as the residual of observed flow minus releases and was subject to errors in observations, transit times, and routings of the 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.

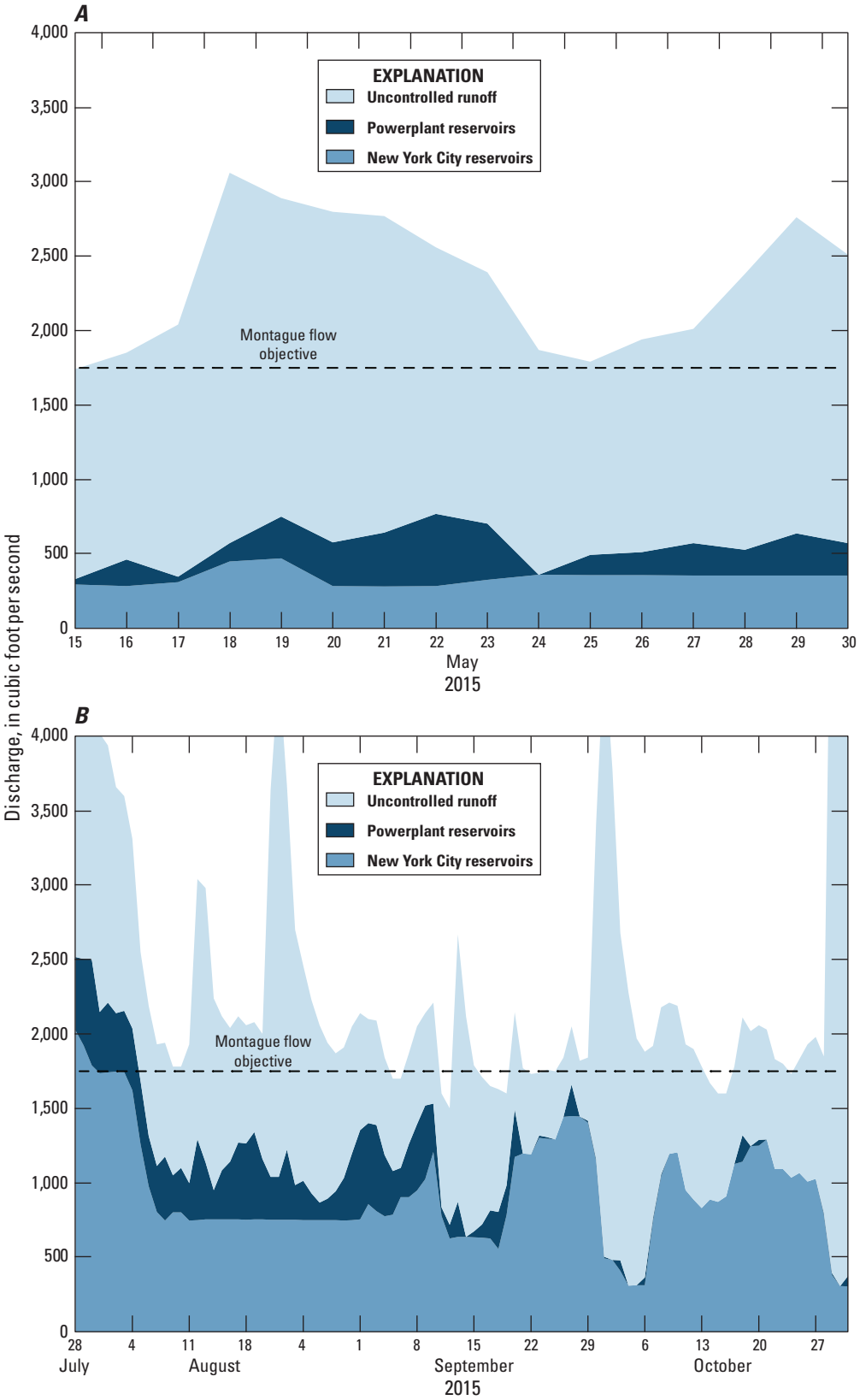


Figure 3. Graphs showing flow components—uncontrolled runoff, powerplant reservoirs, and New York City reservoirs—for the Delaware River at Montague, New Jersey (*A*) from May 15 to 30, 2015, and (*B*) from July 28 to October 31, 2015. The Montague flow objective is also shown.

Excess Release Quantity and Interim Excess Release Quantity

Per sections 4b and c of the 2015 FFMP (appendix 1), the Excess Release Quantity supports the Interim Excess Release Quantity (IERQ). The IERQ is 10.0 billion gallons (15,468 cubic feet per second accumulated daily ([ft³/s]-d).[1] The 2015 FFMP specifies that 3.91 billion gallons (6,045 [ft³/s]-d) of the IERQ is incorporated into the releases tables to enhance base releases from New York City's Delaware River Basin reservoirs. The remaining IERQ balance of 6.09 billion gallons (9,423 [ft³/s]-d) is reserved and may be used for additional releases to meet the Trenton equivalent flow objective or establish an Extraordinary Needs Bank as provided for in section 4d of the 2015 FFMP (appendix 1). Per section 4c of the 2015 FFMP, upon request by the "Lower Basin States" or the Delaware River Basin Commission (DRBC), New York City is required to release water in sufficient quantities from the remaining IERQ balance to maintain a flow in the Delaware River at Trenton, N.J. (USGS site number 01463500), of 3,000 ft³/s during basinwide normal conditions from June 15 through March 15 (known as the seasonal period). The maximum amount of water required for release from the remaining IERQ in any seasonal period is 70 billion gallons. New York City is required to make releases from the IERQ until May 31, 2016, or until the aggregate quantity of the IERQ is exhausted, whichever occurs first.

As described in section 4d of the 2015 FFMP (appendix 1), the DRBC and the ODRM may at any time review extraordinary water needs to support such research, aquatic life, or other water-use activity as may be approved by the DRBC. Upon unanimous agreement, the Decree Parties may bank all or a portion of the IERQ remaining in an IERQ Extraordinary Needs Bank that can provide for such extraordinary water needs. Banked quantities are deducted from the IERQ, and unused Extraordinary Needs Bank water is returned to the IERQ.

In 2015, 100 (ft³/s)-d of IERQ water was requested on September 17, to be released for September 20; and on September 18, to be released for September 21, to maintain flows at the Trenton site (table 10). The request for September 21was cancelled, and that water was not released. The unused portion of the IERQ Extraordinary Needs Bank was restored to the annual IERQ balance to maintain the flow target at the Trenton site.

[1]In this report, the descriptor "cubic feet per second accumulated daily" is used to explain the measure [(ft³/s)-d]. See the "Supplemental Information" section for clarification.

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, 2014, to November 30, 2015, 94.972 billion gallons was released from the New York City Delaware River Basin reservoirs under the Tailwaters Habitat Protection and Discharge Mitigation Program.

Comparison of River Master Operations Data With Other Records

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

Analysis of Forecasts

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

The forecasted flow of the Delaware River at Montague, N.J., exclusive of releases from the New York City reservoirs, was less than the flow objective on 7 days in the second half of May and on most days from late July through late October 2015 (table 9), as indicated by directed releases being made. Table 12 compares forecasted and actual flow from hydroelectric powerplant releases and uncontrolled runoff from May 13 to 31 and from July 28 to October 31, 2015.

Table 12. Cumulative forecasted and actual release volumes from Lake Wallenpaupack, Rio Reservoir, and uncontrolled runoff from May 13 to 31, 2015, and from July 28 to October 31, 2015.

[(ft³/s)-d, cubic foot per second for a day]

Releases and runoff	Forecasted volume ([ft³/s]-d)	Actual volume ([ft³/s]-d)
Lake Wallenpaupack	16,562	17,738
Rio Reservoir	3,403	5,592
Runoff from uncontrolled area	148,774	163,412

For the May 13–31, and July 28–October 31, 2015, periods shown in table 12, actual releases from Lake Wallenpaupack and Rio Reservoir averaged 7.1 and 64 percent more than the forecasted releases, respectively. Powerplant forecasted volumes were calculated using columns 1 and 2 in table 9; powerplant actual releases were calculated using columns 5 and 6 in table 10. Observed runoff (column 10 of table 10) from the uncontrolled area was about 10 percent more than forecasted runoff (columns 3 + 4 in table 9).

Forecasted and actual releases from Lake Wallenpaupack and Rio Reservoir can differ considerably on any given day. The differences between actual and forecasted daily releases from May 13 to 31, 2015, and July 28 to October 31, 2015, are as follows: daily releases at Lake Wallenpaupack varied by 230 ft^3/s less than forecasted releases to 292 ft^3/s greater than forecasted releases, and daily releases at Rio Reservoir varied by 124 ft^3/s less than forecasted releases to 230 ft^3/s greater than forecasted releases. Based on measured streamflow at the Montague site, total directed releases from the New York City reservoirs during the report year (column 9 of table 9) were about 6.0 percent more than required for exact forecasting (column 11 of table 9).

A comparison of forecasted and computed runoff hydrographs from the uncontrolled area (fig. 4) indicate 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 forecasting errors. However, because of traveltimes, the effects of the adjustments on flows at the Montague site were not evident until several days after the design date.

Releases From New York City Reservoirs

The ODRM operations data on controlled releases from the Pepacton, Cannonsville, and Neversink Reservoirs to the Delaware River were provided by the NYCDEP for the ODRM. These data were collected from calibrated instruments connected to Venturi meters installed in the outlet conduits of the reservoirs.

The USGS streamgage on the East Branch Delaware River at Downsville, N.Y. (USGS 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.

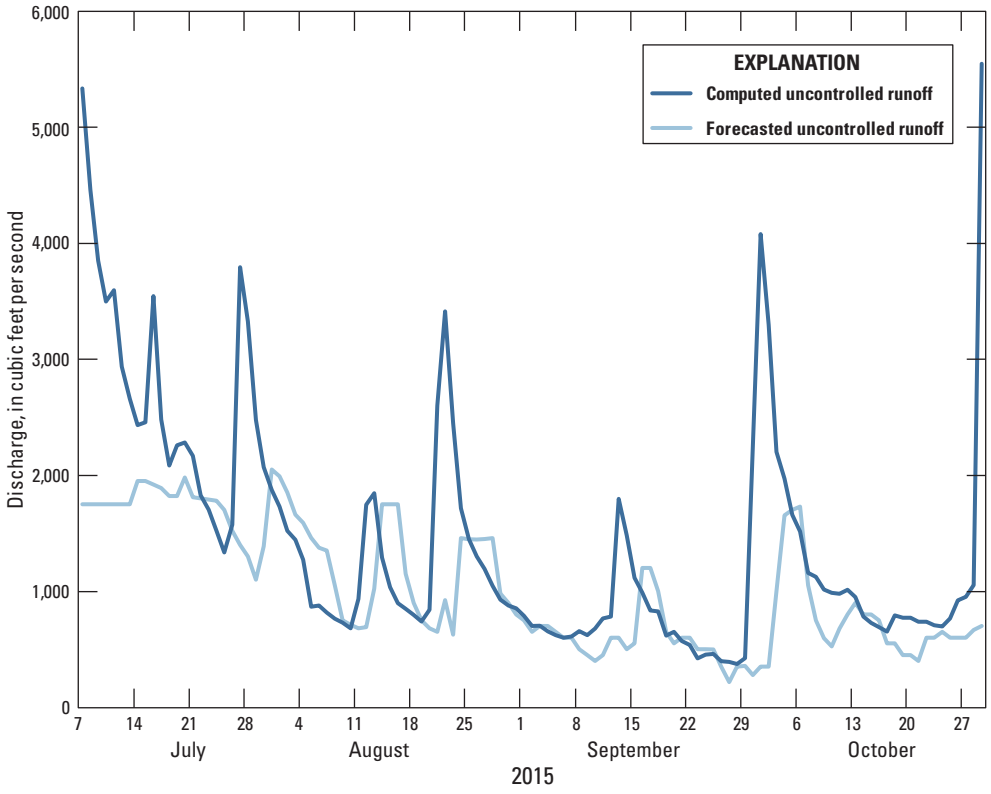


Figure 4. Hydrographs of computed and forecasted uncontrolled runoff components, Delaware River at Montague, New Jersey, from July 7 to October 31, 2015. Discharge is shown in cubic feet per second.

Figure 5*A* shows the measured flow from Pepacton Reservoir, including spillway, conservation, and directed releases, as reported by New York City, compared with the records for the USGS streamgage on East Branch Delaware River at Downsville, N.Y. (table 13, in back of report), from December 1, 2014, to November 30, 2015 (USGS, 2019a). The average difference is 5.9 percent, and 95 percent of the daily differences between the streamgage readings and New York City records are less than 14 percent. Greater 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. (USGS site number 01425000; fig. 1), is 1.4 mi downstream from the 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 releases from 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. (site number 01425000) (table 14, in back of report), from December 1, 2014, to November 30, 2015 (USGS, 2019b). The mean difference is 10.3 percent; 95 percent of the daily differences between the streamgage readings and New York City records are less than 31.4 percent. The greatest differences between the measured flows are primarily at lower flow rates.

The USGS streamgage on Neversink River at Neversink, N.Y. (site number 01436000), is 1,650 feet (ft) downstream from Neversink Dam (fig. 1). 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 Neversink Reservoir, including spillway, conservation, and directed releases, as 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), from December 1, 2014, to November 30, 2015 (USGS, 2019c). The mean difference between the released flow and measured flow is 2.9 percent, and 95 percent of the daily differences between the streamgage readings and New York City records are less than 7 percent.

Delaware River at Montague, New Jersey

The ODRM's operations record for the Delaware River at Montague, N.J., site (table 10) showed 2 percent more 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, 2014, to November 30, 2015, operations of the ODRM were conducted as stipulated by the Decree and the FFMP. Diversions from the Delaware River Basin to the New York City water supply system did not exceed those authorized by the Decree and the FFMP. New York City released water from its reservoirs at rates directed by the ODRM to meet the applicable Montague flow objective. During the report year, New York City complied fully with all directives and requests of the ODRM. Diversions from the Delaware River Basin by New Jersey were within the limits stipulated by the Decree. New Jersey complied fully with all directives and requests of the ODRM. The IERQ was used in accordance with the FFMP and agreements completed throughout the report year.

Quality of Water in the Delaware River Estuary

This section describes water-quality monitoring programs for the Delaware River estuary during the 2015 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).

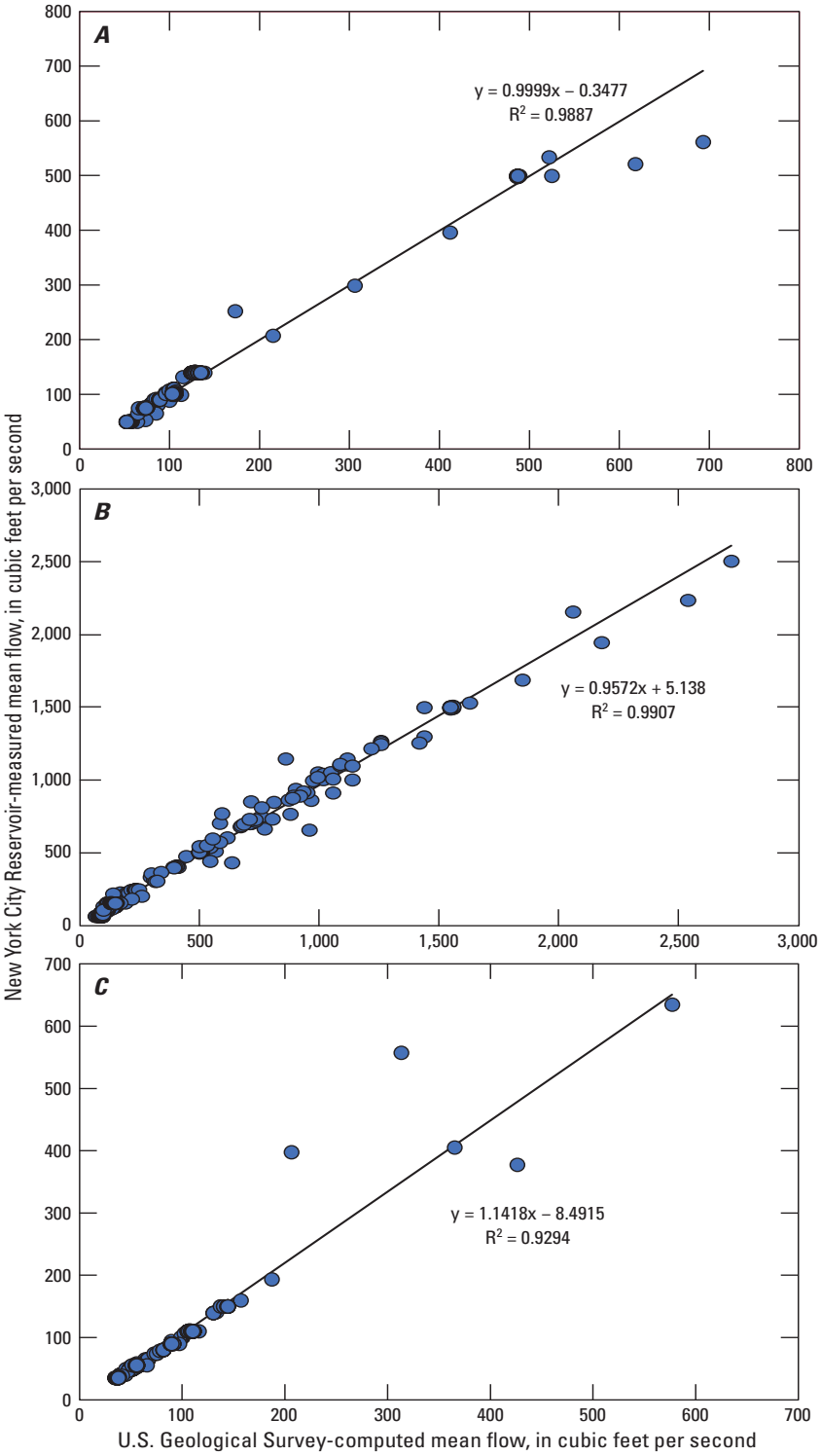


Figure 5. Graphs showing New York City-measured mean flow compared with computed mean flow records of U.S. Geological Survey (USGS) gaging stations downstream from their respective reservoirs: (*A*) East Branch Delaware River at Downsville, New York (N.Y.) (USGS site number 01417000), downstream from Pepacton Reservoir (data from USGS, 2019a); (*B*) West Branch Delaware River at Stilesville, N.Y. (USGS site number 01425000), downstream from Cannonsville Reservoir (data from USGS, 2019b); and (*C*) Neversink River at Neversink, N.Y. (USGS site number 01436000), downstream from Neversink Reservoir, December 1, 2014–November 30, 2015 (data from USGS, 2019c).

Continuous water temperature, specific conductance, dissolved oxygen, and pH data were collected at four sites: Delaware River at Trenton, N.J. (USGS site number 01463500); Delaware River at Benjamin Franklin Bridge at Philadelphia, Pennsylvania (Pa.) (USGS site number 01467200); Delaware River at Chester, Pa. (USGS site number 01477050); and Delaware River at Reedy Island Jetty, Del. (USGS site number 01482800). Continuous turbidity data were also collected at the Trenton and Reedy Island Jetty sites. The DRBC and others use these data to assess water-quality conditions and track the "salt front" movement in the Delaware River estuary. Continuous-monitor data are processed and stored in the USGS National Water Information System database (NWIS; https://waterdata.usgs.gov/nwis). Selected monitoring data from the 2015 report year are included in this section of the report.

For this report, USGS site number 01467200 is referred to as "Delaware River at Benjamin Franklin Bridge at Philadelphia, Pa.," because that was the gage name during the report period from December 1, 2014, to November 30, 2015. The gage was moved 150 ft upstream and renamed "Delaware River at Penns Landing, Philadelphia, Pa.," in January 2020. The updated name is used in the "References Cited" section to refer to the data as listed on NWIS web at the time of publication.

Delaware River Estuary Boat Run Monitoring Program

Each year, the DBRC contracts with the Delaware Department of Natural Resources and Environmental Control to collect water samples at 22 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 2015 Report Year

Streamflow

Streamflow has a major effect on the water quality of 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 help maintain 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 can result in excessive algae levels.

Streamflow from the Delaware River Basin upstream from the Trenton, N.J., site is the primary source of freshwater inflow to the Delaware River estuary. During the report year, monthly average streamflow measured at the Delaware River at Trenton, N.J., streamgage (USGS site number 01463500) was highest during April 2015 (19,563 ft^3/s) and lowest during September 2015 (4,152 ft^3/s; table 16, in back of report). Long-term monthly mean streamflow was computed for October 1912 through November 2014 (USGS, 2019f). Monthly mean streamflows were less than the long-term mean monthly streamflows from December 2014 through May 2015 and from August through November 2015. The greatest percentage of flow deficiency was in February 2015, when the monthly mean streamflow was 31 percent of the long-term mean monthly flow. The highest daily mean streamflow during the report year was 39,800 ft^3/s on July 2, 2015, and the lowest was 3,090 ft^3/s on October 25, 2015 (table 16).

Water Temperature

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

Water temperature monitoring data for the Benjamin Franklin Bridge, Philadelphia, Pa. (USGS site number 01467200), were collected almost continuously from April to November 2015. The procedures used to create figure 7 in this report were started with 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). In May, June, August, September, and November 2015, the monthly average temperatures were greater than the long-term mean monthly temperature (fig. 7). Monthly average temperatures were less than the respective long-term average in April, July, and October 2015 (fig. 7). The maximum daily mean water temperature of 27.3 degrees Celsius was recorded on July 31, and on August 1 and 2, 2015 (USGS, 2020d).

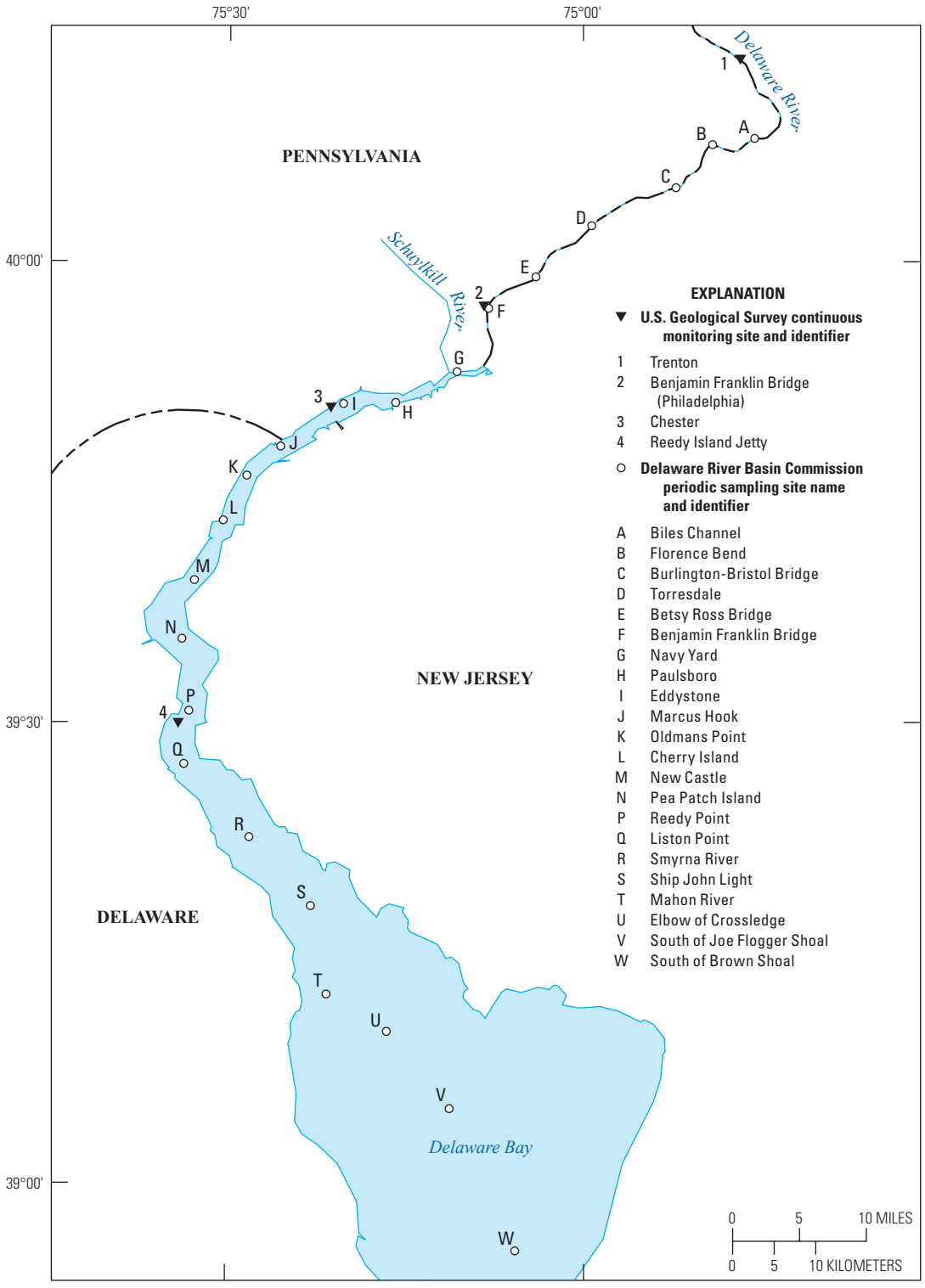


Figure 6. Map showing location of Delaware River Basin Commission (DRBC) water-quality monitoring sites on the Delaware River estuary. Modified from DRBC (2022). U.S. Geological Survey streamgaging sites (1–4) and DRBC sampling sites (A–N, P–W) are listed.

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. 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 are essential concerns 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. (USGS site number 01477050), were measured by Kimberly-Clark Chester Operations. The Delaware River Basin Commission provided those data, which are not derived from specific conductance data.

At the Reedy Island Jetty site, the greatest daily maximum specific conductance was 25,200 microsiemens per centimeter at 25 degrees Celsius (µS/cm at 25 °C) on February 18, 2015 (table 17, in back of report) (USGS, 2020h). The daily maximum specific conductance during the report year exceeded 3,780 µS/cm at 25 °C on approximately 99 percent of the 365 days with measured specific conductance values in the 2015 report year. The lowest daily minimum specific conductance was 721 µS/cm at 25 °C on April 24, 2015. The daily minimum specific conductance exceeded 3,780 µS/cm at 25 °C on 79 percent of the 365 days with measured specific conductance values in the 2015 report year.

The data measured by Kimberly-Clark Chester Operations at Chester, Pa., indicates the greatest daily maximum chloride concentration was 322 mg/L on October 28, 2015 (table 18, in back of report). During the report year, daily maximum concentrations exceeded 50 mg/L on about 79 percent of the 364 days on which measurements were taken. The lowest daily minimum chloride concentration was 36 mg/L on July 16 and 17, 2015. Daily minimum concentrations exceeded 50 mg/L on about 66 percent of the reported days, including from December 1 to 15, 2014, from mid-January to early April 2015, from mid-May to mid-June 2015, and from late August through the end of November 2015 (table 18).

Dissolved Oxygen

Dissolved oxygen in water is necessary for the respiratory processes of aquatic organisms and chemical reactions in aquatic environments (USGS, 2020a). The primary source of dissolved oxygen in the Delaware River estuary is diffusion from the atmosphere and, to a lesser extent, the photosynthetic activity of aquatic plants. The principal factors that affect dissolved-oxygen concentrations in the estuary are water temperature, biochemical oxygen demand, freshwater inflow, phytoplankton, turbidity, salinity, and tidal and wind-driven mixing.

Concentrations of dissolved oxygen at several sites on the Delaware River estuary have been measured since 1961 by the USGS. Two of these sites—the Delaware River at Benjamin Franklin Bridge at Philadelphia, Pa., and the Delaware River at Chester, Pa.—have nearly continuous records and are in the reach of the estuary most affected by effluent discharges, which can lead to reduced dissolved-oxygen concentrations because of increasing biological oxygen demand by aerobic bacteria in the water. For these sites, the daily mean and minimum daily mean dissolved-oxygen concentrations for the period of July–September during the 1965–2015 report years are shown in figure 8.

Although dissolved-oxygen concentrations increased considerably over this 51-year period, mean concentrations can vary from year to year. Due to technological changes and other factors, the process used to calculate mean dissolved-oxygen concentrations and the associated data values has changed 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 that 3-month period 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 4.5 mg/L on September 13, 2015 (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 June 1, 2015, and from October 1 through November 30, 2015. At the Chester site, the lowest recorded daily mean dissolved-oxygen concentration was 4.7 mg/L on July 22, 2015 (table 20, in back of report) (USGS, 2020f).

Histograms of quarter-hourly dissolved-oxygen concentrations during the critical summer period (from July 1 through September 30, 2015) at the Benjamin Franklin Bridge and Chester sites are presented in figure 9. During the 2015 critical summer period, quarter-hourly dissolved-oxygen

concentrations were as low as 4.0 mg/L on 3 days (3.0 percent of measured days) at the Benjamin Franklin Bridge site and on 0 days (0 percent) at the Chester 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 typically ranges from 6.5 to 8.5. Major factors affecting the pH of surface water include the geologic composition of the drainage basin and human inputs, including effluent discharges. In addition, photosynthetic activity and dissolved gases, including carbon dioxide, hydrogen sulfide, and ammonia, can 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, 6.7–7.6; Chester, 6.9–7.5; and Reedy Island Jetty, 7.2–7.8 (USGS, 2020d, f, h). The pH of water in the Delaware River estuary is usually lowest near the Trenton site and increases (water becomes more alkaline) in a downstream direction. The pH of water in the Delaware River estuary between the Benjamin Franklin Bridge site and the Reedy Island Jetty site was not a limiting factor for aquatic health or other beneficial water-uses during the report year.

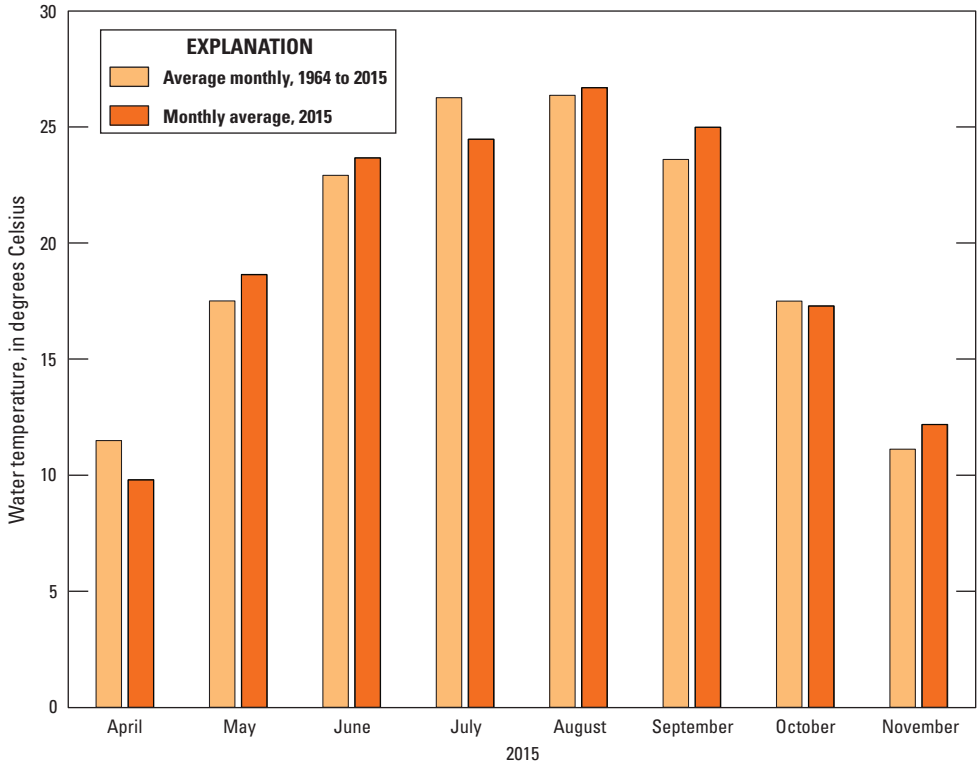


Figure 7. Bar chart showing monthly average water temperatures in 2015 and long-term mean monthly water temperatures from 1964 to 2015, for April through November, in the Delaware River at Benjamin Franklin Bridge at Philadelphia, Pennsylvania (U.S. Geological Survey [USGS] site number 01467200; data from USGS, 2020d). Water temperatures are given in degrees Celsius.

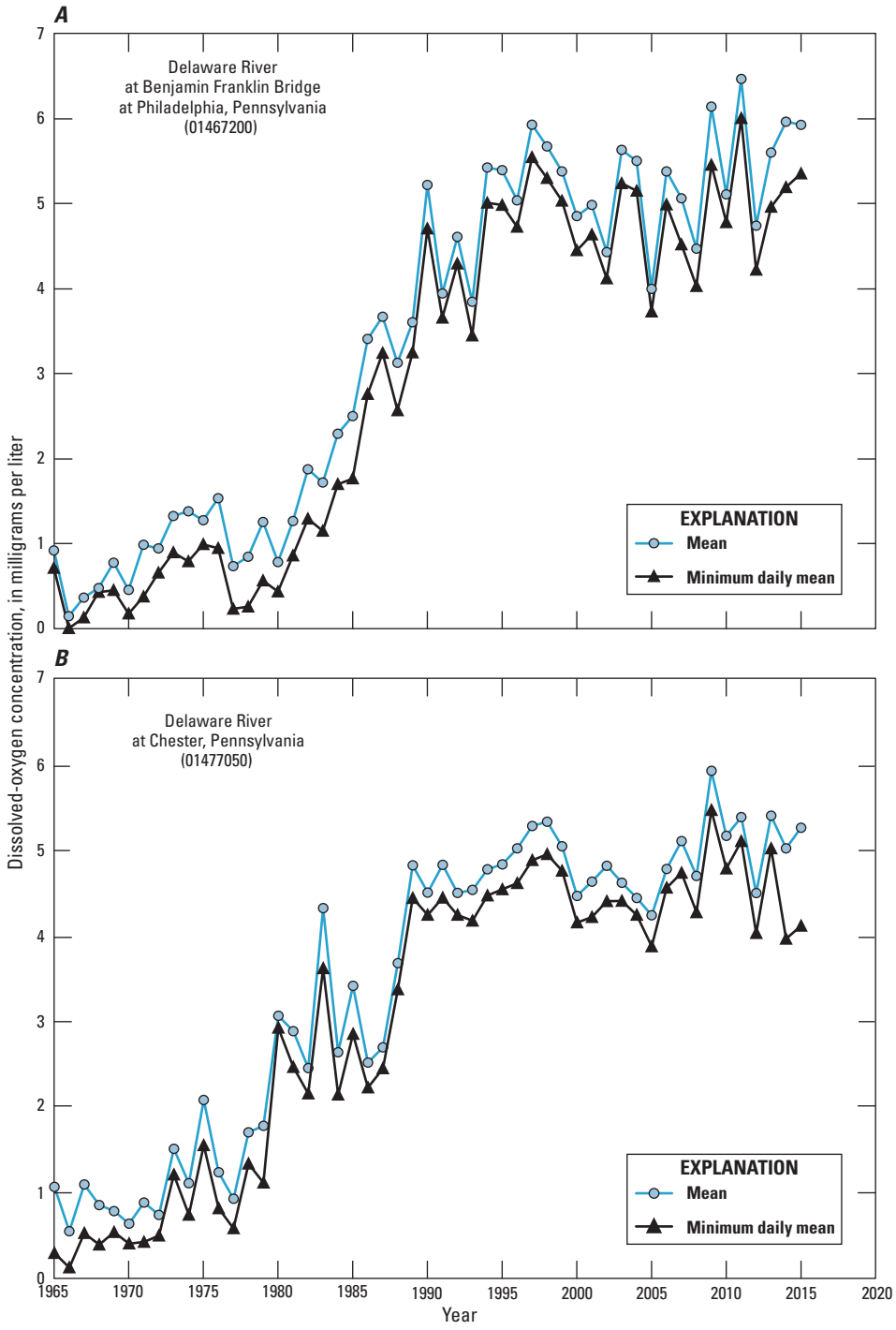


Figure 8. Graphs showing the daily mean and minimum daily mean dissolved-oxygen concentrations, in milligrams per liter, averaged for July–September, annually, at two sites on the Delaware River estuary, 1965–2015, at (*A*) Delaware River at Benjamin Franklin Bridge at Philadelphia, Pennsylvania (Pa.) (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).

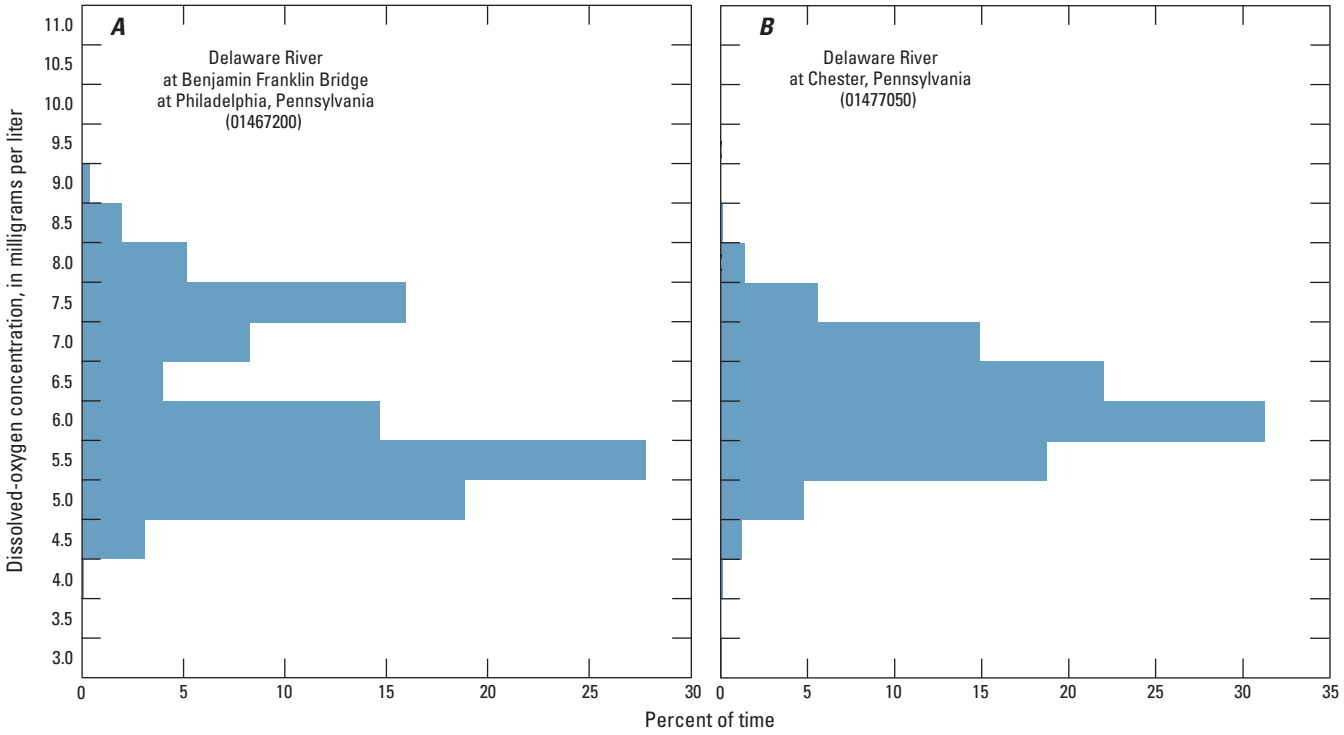


Figure 9. Graphs showing percent distribution of quarter-hourly dissolved-oxygen concentrations, in milligrams per liter, at two sites on the Delaware River estuary, from July to September 2015 at (*A*) Delaware River at Benjamin Franklin Bridge at Philadelphia, Pennsylvania (Pa.) (U.S. Geological Survey [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 2014 monthly average precipitation (in.)	December 2014–November 2015			
		Precipitation (in.)	Percent of average	Excess or deficit precipitation compared with long-term average (in.)	
				Month	Cumulative
December	3.50	2.79	80	–0.17	–0.17
January	3.02	2.21	73	–0.81	–1.52
February	2.64	1.59	60	–1.05	–2.57
March	3.39	2.21	65	–1.18	–3.75
April	3.76	3.37	90	–0.39	–4.14
May	4.20	2.06	49	–2.14	–6.28
June	4.22	7.76	184	3.54	–2.74
July	4.20	4.93	117	0.73	–2.01
August	4.05	3.89	96	–0.16	–2.17
September	4.08	4.77	117	0.69	–1.48
October	3.73	3.89	104	0.16	–1.32
November	3.70	2.75	74	–0.95	–2.27
Total	**44.49**	**42.22**	**95**	—	—

Table 3. Storage in Pepacton Reservoir, New York, for report year ending November 30, 2015.

[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. —, not applicable; Mgal/d, million gallons per day; ft^3/s, cubic foot per second]

Day	Dec. 2014	Jan. 2015	Feb. 2015	Mar. 2015	Apr. 2015	May 2015	June 2015	July 2015	Aug. 2015	Sept. 2015	Oct. 2015	Nov. 2015
1	86,737	96,506	100,884	94,725	96,234	135,928	133,186	140,209	132,629	118,208	105,478	99,213
2	86,637	96,992	101,070	94,725	96,598	136,181	133,329	140,394	132,434	117,669	105,589	99,167
3	86,523	97,404	100,915	94,351	97,450	136,490	133,132	140,301	132,200	117,182	105,462	99,044
4	86,551	97,938	100,823	94,036	99,490	136,672	132,916	140,190	131,719	116,713	105,257	98,890
5	86,508	98,844	100,730	93,662	101,961	136,836	132,611	140,098	131,238	116,211	105,002	98,629
6	86,451	99,428	100,606	93,288	103,594	137,018	132,255	139,859	130,688	115,742	104,717	98,399
7	86,680	99,583	100,466	92,917	105,225	137,181	131,933	139,564	130,209	115,227	104,320	98,184
8	86,751	99,753	100,528	92,531	107,124	137,401	131,541	139,271	129,642	114,761	103,893	97,908
9	86,923	99,939	100,636	92,531	109,965	137,528	131,844	138,903	129,077	114,246	103,452	97,664
10	87,281	100,125	100,528	92,175	112,794	137,730	132,255	138,811	128,549	113,881	103,152	97,282
11	87,509	100,466	100,342	91,777	116,009	137,820	132,434	138,553	128,146	113,453	102,775	97,206
12	87,710	100,823	100,001	91,570	118,731	137,857	132,344	138,058	127,794	112,975	102,383	97,359
13	87,811	100,978	99,706	91,394	120,633	137,839	132,379	137,565	127,337	112,613	101,976	97,359
14	88,129	101,024	99,397	91,555	122,190	137,893	132,416	137,036	126,883	112,152	101,507	97,359
15	88,474	101,055	99,060	91,762	123,670	137,784	133,258	136,763	126,359	111,677	101,133	97,343
16	88,489	101,086	98,659	91,968	124,794	137,657	134,678	136,617	125,870	111,186	100,823	97,282
17	88,518	101,086	98,352	92,234	125,905	137,547	135,258	136,417	125,331	110,713	100,544	97,146
18	88,778	101,273	98,014	92,576	126,848	137,401	135,711	136,055	124,777	110,241	100,544	96,962
19	88,907	101,554	97,694	92,858	127,565	137,218	136,091	135,982	124,291	109,770	100,528	96,810
20	89,009	101,773	97,343	93,155	128,357	136,908	136,399	135,819	123,739	109,299	100,450	97,084
21	89,374	101,758	96,992	93,422	129,288	136,617	136,836	135,493	123,566	108,813	100,109	97,359
22	89,723	101,695	96,856	93,662	130,280	136,272	137,875	135,185	123,273	108,347	99,784	97,389
23	89,826	101,648	96,871	93,841	131,256	135,946	138,737	134,678	122,791	107,798	99,413	97,786
24	90,103	101,586	96,567	94,051	132,076	135,602	139,124	134,192	122,241	107,412	99,106	97,923
25	90,790	101,695	96,144	94,231	132,862	135,239	139,400	133,743	121,848	106,916	98,813	97,816
26	92,234	101,804	95,735	94,516	133,527	134,877	139,436	133,473	121,334	106,404	98,537	97,832
27	93,303	101,570	95,342	94,980	134,120	134,498	139,363	133,509	120,838	105,956	98,214	97,786
28	94,276	101,367	94,980	95,222	134,678	134,372	139,363	133,455	120,310	105,446	97,786	97,740
29	95,161	101,133	—	95,463	135,058	134,048	139,564	133,293	119,784	105,002	98,214	97,664
30	95,856	100,900	—	95,659	135,493	133,671	139,785	133,060	119,257	104,970	98,983	97,556
31	96,234	100,853	—	95,917	—	133,419	—	132,934	118,731	—	99,182	—
Change[1]	+9,479	+4,347	–5,904	+1,192	+39,259	–2,509	+6,599	–7,275	–13,898	–13,238	–6,296	–1,657
Equivalent change[2] (Mgal/d)	+306.4	+140.2	–210.9	+38.5	+1,308.6	–80.9	+220.0	–234.7	–448.3	–441.3	–203.1	–55.2
Equivalent change[3] (ft^3/s)	+462	+217	–326	+60	+2,024	–125	+340	–363	–694	–683	–314	–85.0

[1]Change is calculated as the storage on the last day of each month minus the storage on the first day of each month. Net change for the year is +10,819.0 million gallons; minimum and maximum storage for December through May are 86,451 and 137,893 million gallons, respectively. Minimum and maximum storage for June through November are 96,810 and 140,394 million gallons, respectively.

[2]The net equivalent change for the year is +29.6 million gallons per day.

[3]The net equivalent change for the year is +45.8 cubic feet per second.

Table 4. Storage in Cannonsville Reservoir, New York, for report year ending November 30, 2015.

[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. —, not applicable; Mgal/d, million gallons per day; ft^3/s, cubic foot per second]

Day	Dec. 2014	Jan. 2015	Feb. 2015	Mar. 2015	Apr. 2015	May 2015	June 2015	July 2015	Aug 2015	Sept. 2015	Oct. 2015	Nov. 2015
1	44,255	58,412	59,120	56,116	57,276	96,044	89,925	95,706	72,602	64,912	53,681	48,570
2	44,622	58,668	58,986	56,129	57,460	95,867	89,925	97,605	71,238	64,644	53,914	49,037
3	44,867	58,900	58,778	55,970	58,278	95,660	89,940	97,943	70,576	64,377	54,042	49,469
4	45,145	59,242	58,546	55,799	61,231	95,417	89,910	97,492	70,099	64,096	54,159	49,819
5	45,356	60,158	58,351	55,579	64,899	95,143	89,849	97,106	69,768	63,713	54,206	50,111
6	45,556	60,671	58,131	55,372	67,165	94,854	89,788	96,623	69,530	63,332	53,891	50,367
7	46,112	60,976	57,899	55,274	69,265	94,565	89,499	96,173	69,278	62,899	53,436	50,589
8	46,591	61,142	57,679	55,262	71,795	94,413	89,180	95,508	69,013	62,416	52,957	50,776
9	46,980	61,218	57,496	55,250	75,086	94,261	89,226	94,930	68,722	61,893	52,432	50,951
10	47,580	61,333	57,301	55,079	78,871	94,063	89,271	94,733	68,470	61,677	52,129	51,103
11	48,092	61,396	57,069	55,018	83,013	93,881	89,058	94,763	68,430	61,575	51,896	51,884
12	48,470	61,473	56,837	55,176	85,889	93,653	88,784	94,504	68,338	61,396	51,627	53,541
13	48,726	61,613	56,886	55,237	87,695	93,409	88,572	94,276	68,192	61,256	51,289	54,556
14	48,915	61,613	56,800	55,225	89,149	93,196	88,359	93,790	68,007	61,091	50,974	55,445
15	49,084	61,562	56,861	55,140	90,397	92,923	88,906	93,166	67,768	60,964	50,589	56,177
16	49,235	61,536	56,922	55,115	91,264	92,694	90,062	92,040	67,543	60,793	50,087	56,788
17	49,410	61,498	56,812	55,066	91,918	92,573	90,777	90,838	67,397	60,622	49,562	57,313
18	49,959	61,384	56,886	55,152	92,466	92,299	91,203	89,591	67,190	60,256	48,981	57,777
19	50,391	61,307	56,934	55,201	92,847	92,147	91,553	88,389	66,961	59,633	48,414	58,168
20	50,683	61,243	56,825	55,201	93,105	91,903	91,614	87,334	66,732	59,083	47,803	58,803
21	50,928	61,154	56,703	55,237	93,516	91,690	91,659	86,178	66,656	58,473	47,336	59,462
22	51,126	60,976	56,751	55,274	94,322	91,477	92,223	84,993	66,643	57,814	46,869	59,999
23	51,313	60,829	56,800	55,274	94,900	91,248	92,679	83,721	66,528	57,166	46,390	60,439
24	51,639	60,671	56,690	55,286	95,402	91,005	92,999	82,463	66,337	56,483	45,912	60,854
25	52,747	60,512	56,532	55,274	95,754	90,762	93,196	81,105	66,159	55,713	45,501	61,218
26	54,101	60,366	56,544	55,298	96,012	90,503	93,303	79,908	66,134	54,932	45,078	61,562
27	55,140	60,170	56,361	55,713	96,173	90,458	93,379	78,747	66,006	54,171	44,956	61,855
28	56,031	59,950	56,141	56,300	96,253	90,458	93,516	77,545	65,828	53,447	44,956	62,123
29	56,971	59,731	—	56,580	96,237	90,442	93,850	76,260	65,650	53,074	45,512	62,377
30	57,618	59,535	—	56,825	96,173	90,229	94,155	74,975	65,421	53,167	47,080	62,606
31	58,094	59,352	—	57,069	—	89,986	—	73,821	65,179	—	47,914	—
Change[1]	+13,839	+940	–2,979	+953	+38,897	–6,058	+4,230	–21,885	–7,423	–11,745	–5,767	+14,036
Equivalent change[2] (Mgal/d)	+446.4	+30.3	–106.4	+30.7	+1,296.6	–195.4	+141.0	–706.0	–239.5	–391.5	–186.0	+467.9
Equivalent change[3] (ft^3/s)	+691	–47.0	–165	+47.5	+2,006	–302	+218	–1,092	–371	–606	–288	+724

[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 +18,351.0 million gallons; minimum and maximum storage for December–May are 44,255 and 96,253 million gallons, respectively. Minimum and maximum storage for June–November are 44,956 and 97,943, respectively.

[2]The net equivalent change for the year is +50.3 million gallons per day.

[3]The net equivalent change for the year is +77.8 cubic feet per second.

Table 5. Storage in Neversink Reservoir, New York, for report year ending November 30, 2015.

[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. —, not applicable; Mgal/d, million gallons per day; ft^3/s, cubic foot per second]

Day	Dec. 2014	Jan. 2015	Feb. 2015	Mar. 2015	Apr. 2015	May 2015	June 2015	July 2015	Aug. 2015	Sept. 2015	Oct. 2015	Nov. 2015
1	23,465	28,429	27,927	23,785	22,579	33,684	33,630	35,140	32,933	29,787	26,868	27,666
2	23,557	28,530	27,974	23,790	22,615	33,765	33,843	35,135	32,895	29,625	26,966	27,809
3	23,609	28,632	27,857	23,585	22,713	33,838	33,504	34,971	32,857	29,441	27,013	27,849
4	23,721	28,786	27,736	23,405	23,044	33,920	33,596	34,823	32,742	29,261	27,039	27,879
5	23,838	29,128	27,619	23,199	23,493	33,988	33,273	34,710	32,605	29,074	27,064	27,949
6	23,938	29,279	27,507	23,000	23,769	34,037	33,297	34,552	32,425	29,035	27,073	28,014
7	24,246	29,208	27,369	22,795	24,088	34,096	33,389	34,404	32,250	28,977	27,077	28,036
8	24,434	29,114	27,395	22,591	24,633	34,106	33,470	34,468	32,056	28,804	27,056	28,080
9	24,568	29,008	27,438	22,575	25,209	34,199	33,529	34,528	32,014	28,592	26,923	28,114
10	24,817	28,911	27,318	22,373	25,725	34,238	33,509	34,538	31,962	28,434	26,791	28,171
11	24,924	28,985	27,197	22,190	26,757	34,281	33,558	34,538	31,850	28,271	26,786	28,359
12	25,047	29,088	26,957	22,058	27,382	34,316	33,441	34,591	31,855	28,236	26,774	28,866
13	25,147	29,066	26,757	21,919	27,949	34,350	33,360	34,606	31,855	28,346	26,587	29,208
14	25,234	28,999	26,549	21,953	28,628	34,301	33,475	34,523	31,826	28,455	26,401	29,482
15	25,308	28,911	26,350	22,000	29,369	34,316	33,620	34,562	31,648	28,411	26,202	29,638
16	25,391	28,839	26,131	22,035	29,832	34,374	33,876	34,582	31,606	28,241	26,160	29,792
17	25,491	28,738	25,934	22,073	30,213	34,438	33,819	34,473	31,565	28,032	26,152	29,946
18	25,574	28,791	25,754	22,128	30,639	34,453	33,736	34,365	31,373	27,849	26,135	30,064
19	25,658	28,906	25,595	22,132	30,980	34,478	33,639	34,365	31,183	27,662	26,118	30,164
20	25,725	28,981	25,354	22,182	31,243	34,492	33,596	34,365	30,993	27,619	26,102	31,174
21	25,796	28,888	25,101	22,225	31,620	34,513	33,833	34,155	30,919	27,580	26,089	31,771
22	25,879	28,756	25,114	22,256	32,094	34,296	34,582	33,993	30,841	27,528	26,072	32,085
23	25,955	28,663	25,114	22,275	32,410	34,243	34,552	33,824	30,818	27,339	26,072	32,302
24	26,005	28,561	24,891	22,295	32,686	34,243	34,596	33,644	30,772	27,150	26,064	32,468
25	26,714	28,614	24,649	22,291	32,881	34,238	34,503	33,437	30,607	26,957	26,085	32,577
26	27,378	28,641	24,426	22,314	33,062	34,233	34,587	33,379	30,415	26,769	26,106	32,681
27	27,679	28,416	24,201	22,380	33,221	33,969	34,725	33,465	30,364	26,723	26,110	32,781
28	27,905	28,285	23,983	22,439	33,360	33,906	34,966	33,437	30,305	26,676	26,118	32,890
29	28,114	28,110	—	22,482	33,480	33,717	35,160	33,331	30,105	26,613	26,697	32,981
30	28,285	28,009	—	22,529	33,582	33,475	35,095	33,120	30,059	26,574	27,318	33,077
31	28,416	27,909	—	22,568	—	33,499	—	33,067	30,004	—	27,524	—
Change[1]	+4,951	–520	–3,944	–1,217	+11,003	–185.0	+1,465	–2,073	–2,929	–3,213	+656	+5,411
Equivalent change[2] (Mgal/d)	+159.7	–16.8	–140.9	–39.3	+366.8	–6.0	+48.8	–66.9	–94.5	–107.1	+21.2	+180.4
Equivalent change[3] (ft^3/s)	+247	–26.0	–218	–60.8	+567	–9.3	+75.5	–103	–146	–166	+32.8	+279

[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 more than +9,612.0 million gallons; minimum and maximum storage for December–May are 21,919 and 34,513 million gallons, respectively. Minimum and maximum storage for June–November is 26,064 and 35,160 million gallons, respectively.

[2]The net equivalent change for the year is +26.3 million gallons per day.

[3]The net equivalent change for the year is +40.7 cubic feet per second.

Table 6. Diversions to New York City water supply system for report year ending November 30, 2015.

[Delaware River Master daily operations record. Diversions in million gallons per day; data provided by New York City, Department of Environmental Protection, Bureau of Water Supply. —, not applicable. For December 1–May 31, the average is computed from June 1, 2013, to the given date. For June 1–November 30, the average is computed from June 1, 2014, to the given date. The diversion calculation is computed as authorized within the Decree]

Date	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average from June 1
12/1/2014	488	191	0	559
12/2/2014	489	299	0	560
12/3/2014	489	300	0	561
12/4/2014	489	301	0	563
12/5/2014	489	301	0	564
12/6/2014	489	301	0	565
12/7/2014	489	301	0	566
12/8/2014	342	243	0	566
12/9/2014	301	231	0	566
12/10/2014	302	231	0	566
12/11/2014	302	232	0	566
12/12/2014	301	261	0	566
12/13/2014	1	271	0	564
12/14/2014	3	271	0	563
12/15/2014	300	271	0	563
12/16/2014	300	271	0	563
12/17/2014	300	272	0	563
12/18/2014	300	296	0	563
12/19/2014	300	301	0	563
12/20/2014	1	301	0	562
12/21/2014	4	301	0	561
12/22/2014	216	300	0	561
12/23/2014	200	300	0	560
12/24/2014	0	300	0	559
12/25/2014	0	301	0	558
12/26/2014	0	300	0	557
12/27/2014	0	300	0	555
12/28/2014	0	300	0	554
12/29/2014	5	301	0	553
12/30/2014	200	301	0	553
12/31/2014	197	300	101	553
Total	**7,297**	**8,750**	**101**	—

Date	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average from June 1
1/1/2015	0	300	0	552
1/2/2015	0	300	0	551
1/3/2015	0	301	0	549
1/4/2015	0	301	0	548
1/5/2015	0	300	0	547
1/6/2015	205	299	203	548
1/7/2015	205	300	205	549
1/8/2015	205	300	204	549
1/9/2015	204	300	203	550
1/10/2015	0	300	0	549
1/11/2015	0	300	0	548
1/12/2015	205	300	152	548
1/13/2015	206	300	150	549
1/14/2015	205	300	152	549
1/15/2015	204	300	152	550
1/16/2015	205	300	153	550
1/17/2015	0	300	0	549
1/18/2015	0	300	0	548
1/19/2015	0	300	0	547
1/20/2015	208	300	151	547
1/21/2015	205	300	152	548
1/22/2015	205	300	152	548
1/23/2015	205	300	152	549
1/24/2015	0	300	0	548
1/25/2015	0	300	0	547
1/26/2015	389	300	289	549
1/27/2015	217	300	163	549
1/28/2015	201	300	152	550
1/29/2015	202	299	152	550
1/30/2015	201	299	149	550
1/31/2015	0	299	0	549
Total	**3,877**	**9,298**	**3,086**	—

Table 6. Diversions to New York City water-supply system for report year ending November 30, 2015.—Continued

[Delaware River Master daily operations record. Diversions in million gallons per day; data provided by New York City, Department of Environmental Protection, Bureau of Water Supply. —, not applicable. For December 1–May 31, the average is computed from June 1, 2013, to the given date. For June 1–November 30, the average is computed from June 1, 2014, to the given date. The diversion calculation is computed as authorized within the Decree]

Date	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average from June 1
2/1/2015	0	299	0	548
2/2/2015	207	299	161	549
2/3/2015	205	299	152	549
2/4/2015	205	299	134	550
2/5/2015	205	299	152	550
2/6/2015	205	299	153	550
2/7/2015	0	299	0	549
2/8/2015	0	299	0	548
2/9/2015	206	299	154	549
2/10/2015	229	299	154	549
2/11/2015	400	299	234	551
2/12/2015	400	14	227	551
2/13/2015	400	149	228	552
2/14/2015	400	0	223	552
2/15/2015	400	0	228	553
2/16/2015	400	149	226	554
2/17/2015	400	0	200	554
2/18/2015	400	0	202	554
2/19/2015	407	174	244	555
2/20/2015	406	164	278	556
2/21/2015	201	0	0	555
2/22/2015	0	0	3	553
2/23/2015	380	138	226	553
2/24/2015	400	124	227	554
2/25/2015	400	0	226	554
2/26/2015	400	193	227	555
2/27/2015	400	202	226	556
2/28/2015	216	11	196	556
Total	**7,872**	**4,607**	**4,681**	—

Date	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average from June 1
3/1/2015	5	0	0	554
3/2/2015	400	169	198	555
3/3/2015	400	201	198	556
3/4/2015	400	200	203	556
3/5/2015	400	200	201	557
3/6/2015	400	69	201	558
3/7/2015	383	0	203	558
3/8/2015	0	0	0	556
3/9/2015	400	192	200	557
3/10/2015	400	109	199	557
3/11/2015	400	0	201	557
3/12/2015	399	191	199	558
3/13/2015	0	382	0	558
3/14/2015	0	382	0	557
3/15/2015	0	383	0	556
3/16/2015	0	383	0	556
3/17/2015	0	383	0	555
3/18/2015	0	383	0	555
3/19/2015	0	383	0	554
3/20/2015	0	332	0	553
3/21/2015	0	332	0	552
3/22/2015	0	329	0	552
3/23/2015	0	259	0	551
3/24/2015	0	280	0	550
3/25/2015	0	280	0	549
3/26/2015	42	93	0	547
3/27/2015	9	244	8	546
3/28/2015	0	277	0	546
3/29/2015	0	277	0	545
3/30/2015	0	280	0	544
3/31/2015	0	280	0	543
Total	**4,038**	**7,273**	**2,011**	—

Table 6. Diversions to New York City water-supply system for report year ending November 30, 2015.—Continued

[Delaware River Master daily operations record. Diversions in million gallons per day; data provided by New York City, Department of Environmental Protection, Bureau of Water Supply. —, not applicable. For December 1–May 31, the average is computed from June 1, 2013, to the given date. For June 1–November 30, the average is computed from June 1, 2014, to the given date. The diversion calculation is computed as authorized within the Decree]

Date	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average from June 1
4/1/2015	0	280	0	542
4/2/2015	0	280	0	541
4/3/2015	0	281	0	540
4/4/2015	0	281	0	540
4/5/2015	0	281	0	539
4/6/2015	0	279	0	538
4/7/2015	0	279	0	537
4/8/2015	0	457	0	537
4/9/2015	0	474	0	537
4/10/2015	0	439	0	536
4/11/2015	0	478	0	536
4/12/2015	0	479	0	536
4/13/2015	0	480	0	536
4/14/2015	0	480	0	536
4/15/2015	0	481	0	535
4/16/2015	0	481	0	535
4/17/2015	0	481	0	535
4/18/2015	0	482	0	535
4/19/2015	0	482	0	535
4/20/2015	0	482	0	535
4/21/2015	0	482	0	534
4/22/2015	0	483	0	534
4/23/2015	0	483	0	534
4/24/2015	0	484	0	534
4/25/2015	0	484	0	534
4/26/2015	0	484	0	534
4/27/2015	0	484	0	534
4/28/2015	0	485	0	533
4/29/2015	0	485	0	533
4/30/2015	0	485	0	533
Total	**0**	**12,976**	**0**	—

Date	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average from June 1
5/1/2015	0	485	0	533
5/2/2015	0	485	0	533
5/3/2015	0	484	0	533
5/4/2015	0	484	0	532
5/5/2015	0	484	0	532
5/6/2015	0	484	0	532
5/7/2015	0	296	0	532
5/8/2015	0	298	0	531
5/9/2015	0	298	0	530
5/10/2015	0	298	0	529
5/11/2015	54	298	0	529
5/12/2015	96	298	0	529
5/13/2015	0	298	0	528
5/14/2015	255	298	0	528
5/15/2015	300	298	0	528
5/16/2015	300	298	0	528
5/17/2015	300	298	0	529
5/18/2015	300	298	0	529
5/19/2015	367	298	0	529
5/20/2015	400	298	0	530
5/21/2015	401	236	253	531
5/22/2015	400	229	50	531
5/23/2015	401	229	0	531
5/24/2015	400	229	0	532
5/25/2015	400	229	4	532
5/26/2015	400	29	300	532
5/27/2015	400	0	298	533
5/28/2015	399	0	298	533
5/29/2015	399	178	297	534
5/30/2015	399	227	0	535
5/31/2015	399	50	0	534
Total	**6,770**	**8,712**	**1,500**	—

Table 6. Diversions to New York City water-supply system for report year ending November 30, 2015.—Continued

[Delaware River Master daily operations record. Diversions in million gallons per day; data provided by New York City, Department of Environmental Protection, Bureau of Water Supply. —, not applicable. For December 1–May 31, the average is computed from June 1, 2013, to the given date. For June 1–November 30, the average is computed from June 1, 2014, to the given date. The diversion calculation is computed as authorized within the Decree]

Date	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average from June 1
6/1/2015	0	0	4	4
6/2/2015	154	0	495	327
6/3/2015	300	0	0	318
6/4/2015	302	0	417	418
6/5/2015	400	0	81	431
6/6/2015	400	224	0	463
6/7/2015	400	230	0	487
6/8/2015	149	114	189	482
6/9/2015	0	124	297	476
6/10/2015	141	298	4	472
6/11/2015	300	299	226	504
6/12/2015	301	298	202	529
6/13/2015	300	298	0	534
6/14/2015	300	298	0	539
6/15/2015	301	61	175	539
6/16/2015	301	0	226	538
6/17/2015	301	0	230	538
6/18/2015	301	0	227	537
6/19/2015	301	247	147	545
6/20/2015	301	299	0	548
6/21/2015	301	70	0	540
6/22/2015	49	0	317	532
6/23/2015	254	0	335	534
6/24/2015	372	0	298	540
6/25/2015	476	0	61	540
6/26/2015	500	0	0	538
6/27/2015	501	0	0	537
6/28/2015	501	0	0	536
6/29/2015	416	0	156	537
6/30/2015	103	0	54	524
Total	**8,726**	**2,860**	**4,141**	—

Date	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average from June 1
7/1/2015	230	0	0	515
7/2/2015	300	0	203	514
7/3/2015	300	0	248	515
7/4/2015	300	0	248	516
7/5/2015	300	0	247	517
7/6/2015	340	0	230	519
7/7/2015	350	272	19	522
7/8/2015	349	296	0	525
7/9/2015	99	53	147	519
7/10/2015	272	160	110	520
7/11/2015	399	197	0	522
7/12/2015	399	197	0	524
7/13/2015	399	329	114	531
7/14/2015	98	476	0	532
7/15/2015	0	475	0	531
7/16/2015	0	474	106	532
7/17/2015	114	473	97	535
7/18/2015	0	473	0	534
7/19/2015	0	472	0	532
7/20/2015	132	472	134	537
7/21/2015	132	471	131	540
7/22/2015	208	470	133	546
7/23/2015	208	469	135	551
7/24/2015	207	469	187	556
7/25/2015	206	465	0	559
7/26/2015	125	467	0	559
7/27/2015	35	467	43	559
7/28/2015	149	466	114	562
7/29/2015	186	465	189	567
7/30/2015	186	437	44	568
7/31/2015	281	464	119	573
Total	**6,304**	**9,929**	**2,998**	—

Table 6. Diversions to New York City water-supply system for report year ending November 30, 2015.—Continued

[Delaware River Master daily operations record. Diversions in million gallons per day; data provided by New York City, Department of Environmental Protection, Bureau of Water Supply. —, not applicable. For December 1–May 31, the average is computed from June 1, 2013, to the given date. For June 1–November 30, the average is computed from June 1, 2014, to the given date. The diversion calculation is computed as authorized within the Decree]

Date	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average from June 1
8/1/2015	198	463	0	575
8/2/2015	201	16	0	569
8/3/2015	475	0	114	569
8/4/2015	500	0	114	570
8/5/2015	500	0	114	571
8/6/2015	501	0	150	572
8/7/2015	500	0	159	573
8/8/2015	500	0	0	572
8/9/2015	501	0	0	571
8/10/2015	500	0	151	572
8/11/2015	500	0	151	573
8/12/2015	500	0	0	572
8/13/2015	464	0	0	571
8/14/2015	501	0	151	572
8/15/2015	501	0	0	571
8/16/2015	500	0	0	570
8/17/2015	500	0	152	571
8/18/2015	500	0	150	572
8/19/2015	500	0	152	573
8/20/2015	500	0	151	574
8/21/2015	500	0	151	575
8/22/2015	500	0	0	574
8/23/2015	501	0	0	573
8/24/2015	501	0	151	574
8/25/2015	500	0	151	575
8/26/2015	500	0	0	574
8/27/2015	501	0	0	573
8/28/2015	501	0	151	574
8/29/2015	500	0	0	573
8/30/2015	500	0	0	572
8/31/2015	500	0	172	574
Total	**14,846**	**479**	**2,485**	—

Date	East Delaware Tunnel	West Delaware Tunnel)	Neversink Tunnel	Average from June 1
9/1/2015	450	0	133	574
9/2/2015	450	0	151	574
9/3/2015	450	0	152	574
9/4/2015	450	0	151	575
9/5/2015	450	0	0	573
9/6/2015	450	0	0	572
9/7/2015	450	0	153	572
9/8/2015	450	0	154	573
9/9/2015	449	0	154	573
9/10/2015	450	0	154	573
9/11/2015	450	0	0	572
9/12/2015	450	0	0	571
9/13/2015	450	0	0	570
9/14/2015	450	4	32	569
9/15/2015	450	0	153	569
9/16/2015	450	0	156	570
9/17/2015	439	0	155	570
9/18/2015	450	13	153	570
9/19/2015	450	0	0	569
9/20/2015	450	0	0	568
9/21/2015	450	0	1	567
9/22/2015	450	0	155	567
9/23/2015	400	0	156	567
9/24/2015	450	14	157	568
9/25/2015	450	0	156	568
9/26/2015	450	0	0	567
9/27/2015	450	0	0	566
9/28/2015	450	0	0	565
9/29/2015	450	0	151	565
9/30/2015	114	0	151	563
Total	**13,102**	**31**	**2,778**	—

Table 6. Diversions to New York City water-supply system for report year ending November 30, 2015.—Continued

[Delaware River Master daily operations record. Diversions in million gallons per day; data provided by New York City, Department of Environmental Protection, Bureau of Water Supply. —, not applicable. For December 1–May 31, the average is computed from June 1, 2013, to the given date. For June 1–November 30, the average is computed from June 1, 2014, to the given date. The diversion calculation is computed as authorized within the Decree.]

Date	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average from June 1
10/1/2015	0	0	0	558
10/2/2015	219	0	0	556
10/3/2015	305	0	0	554
10/4/2015	305	0	0	552
10/5/2015	300	0	0	550
10/6/2015	451	0	0	549
10/7/2015	451	0	0	548
10/8/2015	451	0	134	548
10/9/2015	451	0	150	549
10/10/2015	451	0	0	548
10/11/2015	451	0	1	547
10/12/2015	451	0	201	548
10/13/2015	451	0	201	549
10/14/2015	451	0	201	550
10/15/2015	319	0	25	548
10/16/2015	300	0	0	546
10/17/2015	1	0	0	542
10/18/2015	0	0	0	539
10/19/2015	0	0	0	535
10/20/2015	348	0	0	533
10/21/2015	347	0	0	532
10/22/2015	350	0	0	531
10/23/2015	350	0	0	530
10/24/2015	351	0	0	528
10/25/2015	351	0	0	527
10/26/2015	350	0	0	526
10/27/2015	427	0	0	525
10/28/2015	451	0	0	525
10/29/2015	451	0	0	524
10/30/2015	451	0	0	524
10/31/2015	451	0	0	523
Total	**10,486**	**0**	**913**	—

Date	East Delaware Tunnel	West Delaware Tunnel	Neversink Tunnel	Average from June 1
11/1/2015	451	0	0	523
11/2/2015	451	0	0	522
11/3/2015	451	0	0	522
11/4/2015	451	0	0	522
11/5/2015	451	0	0	521
11/6/2015	450	0	0	521
11/7/2015	450	0	0	520
11/8/2015	451	0	0	520
11/9/2015	451	0	0	519
11/10/2015	451	0	0	519
11/11/2015	451	0	0	519
11/12/2015	451	0	0	518
11/13/2015	451	0	0	518
11/14/2015	451	0	0	517
11/15/2015	451	0	0	517
11/16/2015	451	0	0	517
11/17/2015	451	0	0	516
11/18/2015	451	0	0	516
11/19/2015	451	0	0	515
11/20/2015	451	0	0	515
11/21/2015	451	0	0	515
11/22/2015	0	0	0	512
11/23/2015	229	0	0	510
11/24/2015	301	0	5	509
11/25/2015	297	0	0	508
11/26/2015	293	0	0	507
11/27/2015	298	0	0	505
11/28/2015	301	0	0	504
11/29/2015	301	0	0	503
11/30/2015	301	0	0	502
Total	**11,790**	**0**	**5**	—

Table 7. Consumption of water by New York City from 1950 to 2015.

[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 2015.—Continued

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

Year	Average daily consumption			Annual consumption (in billions of gallons)
	City proper (Mgal/d)	Outside communities (Mgal/d)	Total (Mgal/d)	
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

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 the report year ending November 30, 2015.

[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. 2014	Jan. 2015	Feb. 2015	Mar. 2015	Apr. 2015	May 2015	June 2015	July 2015	Aug. 2015	Sept. 2015	Oct. 2015	Nov. 2015
1	92	94	93	100	94	91	90	81e	76	70	83	95
2	96	90	72	98	92	91	83	89e	77	69	83	96e
3	90	90	81	96	91	90	87	89	76	69	83	94e
4	89	73	94	90	88	90	85	87	76	69	85	94
5	89	84	96	78	92	90	87	88	76	69	86	92
6	75	89	95	93	92	92	85	88	78	69	83	94
7	70	89	96	101	92	90	84	81	77	68	79	94
8	90	87	94	96	90	90	87	80	77	67	76	94
9	49	96	93	94	93	91	84	85	76	66	79	92
10	72	95	92	87	92	90	82	87	75	75	83	94
11	85	96	94	55	91	89	78	87	79	73	78	94
12	83	93	96	69	94	89	80	87	79	71	82	92
13	79	92	93	92	94	90	83	85	77	70	83	97
14	74	94	88	65	93	91	86	89	76	71	85	99
15	69	90	91	73	93	92	82e	87	75	71	89	99
16	69	91	103	94	92	91	78e	87	74	70	91	99
17	66	92	100	94	91	87	79e	85	74	71	92	98
18	65	44	100	99	91	90	76e	85	74	73	93	98
19	64	48	99	100	90	89	76e	85	74	74	91	98
20	69	92	102	98	78	90	78e	83	73	74	90	96
21	77	74	103	94	77	91	80e	83	79	75	92	101
22	80	83	101e	94	85	90	76e	81	79	76	92	98
23	84	90	100	88	89	90	85	81	78	76	92	100
24	81	111	100	89	87	89	87	81	76	76	92	100
25	87	102	98	90	90	89	90	79	74	76	92	100
26	90	95	98	90	92	87	89	79	74	77	91	100
27	87	98	98	85	92	87	89	78	72	77	92	98
28	87	94	98	93	92	84	75	76	72	78	93	99
29	77	93	—	94	92	86	75e	78	72	79	93	100
30	84	94	—	92	91	87	78e	79	71	79	96	99
31	89	88	—	87	—	87	—	78	70	—	94	—
Total[1]	**2,458**	**2,741**	**2,668**	**2,768**	**2,710**	**2,770**	**2,474**	**2,588**	**2,336**	**2,178**	**2,713**	**2,904**
Mean[2]	79.3	88.4	95.3	89.3	90.3	89.4	82.5	83.5	75.4	72.6	87.5	96.8

[1]The year's total is 31,308 million gallons.

[2]The combined mean is 85.8 million gallons per day.

Table 9. New York City reservoir release design data from December 1, 2014, to October 31, 2015.

[Delaware River Master daily operations record. The Montague design rate was 1,750 cubic feet per second (ft³/s). Column (col.) 1 data provided by electric utilities PPL Corporation and Talen Energy; col. 2 data provided by Eagle Creek Renewable Energy, LLC; col. 3 computed from index stations; col. 4 computed increase in runoff based on quantitative precipitation forecasts; col. 5 = col. 1 + col. 2 + col. 3 + col. 4; col. 6 = design rate − col. 5, when positive, otherwise col. 6 = 0; col. 7 = col. 14 (4 days earlier); col. 8, directed release amount from the Office of 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, 2014, with these values being reset on June 1, 2015; (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															
Date of advance estimate	Powerplant release forecasts		Uncontrolled runoff		Montague date	Discharge (ft³/s)	Indicated deficiency	Balancing adjustment	Directed release (ft³/s)	Computation of balancing adjustment					
										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 12/1/2014 to 5/12/2015															
5/10/2015	93	0	1,726	92	5/13/2015	1,911	0	–20	0	0	80,113	0	79,912	201	–20
5/11/2015	93	0	1,655	56	5/14/2015	1,804	0	–20	0	0	80,113	240	80,152	–39	4
5/12/2015	0	0	1,435	3	5/15/2015	1,438	312	–20	292	294	80,407	304	80,456	–49	5
5/13/2015	0	177	1,540	35	5/16/2015	1,752	0	–20	0	0	80,407	183	80,639	–232	23
5/14/2015	0	0	1,350	74	5/17/2015	1,424	326	–20	306	310	80,717	20	80,659	58	–6
5/15/2015	0	0	1,240	66	5/18/2015	1,306	444	4	448	449	81,166	0	80,659	507	–50
5/16/2015	0	35	1,146	147	5/19/2015	1,328	422	5	427	468	81,634	0	80,659	975	–50
5/17/2015	0	89	2,027	87	5/20/2015	2,203	0	23	0	0	81,634	0	80,659	975	–50
5/18/2015	0	89	1,907	82	5/21/2015	2,078	0	–6	0	0	81,634	0	80,659	975	–50
5/19/2015	291	0	2,000	22	5/22/2015	2,313	0	–50	0	0	81,634	0	80,659	975	–50
5/20/2015	291	71	1,809	0	5/23/2015	2,171	0	–50	0	0	81,634	0	80,659	975	–50
5/21/2015	0	0	1,800	0	5/24/2015	1,800	0	–50	0	0	81,634	239	80,898	736	–50
5/22/2015	0	0	1,750	0	5/25/2015	1,750	0	–50	0	0	81,634	316	81,214	420	–42
5/23/2015	182	0	1,500	0	5/26/2015	1,682	68	–50	18	18	81,652	166	81,380	272	–27
5/24/2015	182	89	1,400	16	5/27/2015	1,687	63	–50	13	13	81,665	93	81,473	192	–19
5/25/2015	182	0	1,300	282	5/28/2015	1,764	0	–50	0	0	81,665	0	81,473	192	–19
5/26/2015	182	0	1,200	339	5/29/2015	1,721	29	–42	0	0	81,665	0	81,473	192	–19
5/27/2015	182	0	1,180	198	5/30/2015	1,560	190	–27	163	163	81,828	0	81,473	355	–36
5/28/2015	0	142	1,750	299	5/31/2015	2,191	0	–19	0	0	81,828	0	81,473	355	–36
The estimated Montague discharge was greater than the Montague design rate from 6/1/2015 to 7/27/2015															
7/25/2015	292	106	1,300	52	7/28/2015	1,750	0	0	0	0	0	0	7	–7	1
7/26/2015	292	0	1,100	68	7/29/2015	1,460	290	0	290	290	290	0	7	283	–28
7/27/2015	292	53	1,388	17	7/30/2015	1,750	0	0	0	0	290	0	7	283	–28

Table 9. New York City reservoir release design data from December 1, 2014, to October 31, 2015.—Continued

[Delaware River Master daily operations record. The Montague design rate was 1,750 cubic feet per second (ft^3/s). Column (col.) 1 data provided by electric utilities PPL Corporation and Talen Energy; col. 2 data provided by Eagle Creek Renewable Energy, LLC; col. 3 computed from index stations; col. 4 computed increase in runoff based on quantitative precipitation forecasts; col. 5 = col. 1 + col. 2 + col. 3 + col. 4; col. 6 = design rate − col. 5, when positive, otherwise col. 6 = 0; col. 7 = col. 14 (4 days earlier); col. 8, directed release amount from the Office of 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, 2014, with these values being reset on June 1, 2015; (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							Indicated deficiency	Balancing adjustment	Directed release (ft^3/s)	Computation of balancing adjustment					
Date of advance estimate	Powerplant release forecasts		Uncontrolled runoff		Montague date	Discharge (ft^3/s)				Adjusted directed release		Actual deficiency		Cumulative difference (ft^3/s-d)	Balancing adjustment (ft^3/s)
	Lake Wallenpaupack (ft^3/s)	Rio Reservoir (ft^3/s)	Current condition (ft^3/s)	Weather adjustment (ft^3/s)						Daily (ft^3/s)	Cumulative (ft^3/s-d)	Daily (ft^3/s)	Cumulative (ft^3/s-d)		
	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
7/28/2015	292	89	2,050	13	7/31/2015	2,444	0	0	0	0	290	0	7	283	–28
7/29/2015	365	124	1,990	35	8/1/2015	2,514	0	1	0	0	290	0	7	283	–28
7/30/2015	292	89	1,850	72	8/2/2015	2,303	0	–28	0	0	290	0	7	283	–28
7/31/2015	292	53	1,660	10	8/3/2015	2,015	0	–28	0	0	290	0	7	283	–28
8/1/2015	292	89	1,590	44	8/4/2015	2,015	0	–28	0	0	290	60	67	223	–22
8/2/2015	292	89	1,460	100	8/5/2015	1,941	0	–28	0	0	290	459	526	–236	24
8/3/2015	222	35	1,374	119	8/6/2015	1,750	0	–28	0	0	290	538	1,064	–774	50
8/4/2015	222	0	1,350	3	8/7/2015	1,575	175	–28	147	147	437	623	1,687	–1,250	50
8/5/2015	333	106	1,050	0	8/8/2015	1,489	261	–28	233	233	670	556	2,243	–1,573	50
8/6/2015	222	0	750	0	8/9/2015	972	778	24	802	801	1,471	771	3,014	–1,543	50
8/7/2015	222	71	710	0	8/10/2015	1,003	747	50	797	797	2,268	771	3,785	–1,517	50
8/8/2015	292	89	680	136	8/11/2015	1,197	553	50	603	603	2,871	566	4,351	–1,480	50
8/9/2015	292	89	690	679	8/12/2015	1,750	0	50	0	0	2,871	0	4,351	–1,480	50
8/10/2015	292	106	1,023	329	8/13/2015	1,750	0	50	0	0	2,871	0	4,351	–1,480	50
8/11/2015	292	106	1,750	87	8/14/2015	2,235	0	50	0	0	2,871	265	4,616	–1,745	50
8/12/2015	293	89	1,750	1	8/15/2015	2,133	0	50	0	0	2,871	383	4,999	–2,128	50
8/13/2015	292	18	1,750	8	8/16/2015	2,068	0	50	0	0	2,871	463	5,462	–2,591	50
8/14/2015	292	106	1,150	0	8/17/2015	1,548	202	50	252	252	3,123	383	5,845	–2,722	50
8/15/2015	293	106	900	0	8/18/2015	1,299	451	50	501	501	3,624	442	6,287	–2,663	50
8/16/2015	293	160	750	0	8/19/2015	1,203	547	50	597	597	4,221	424	6,711	–2,490	50
8/17/2015	345	230	680	2	8/20/2015	1,257	493	†50	493	493	4,764	504	7,215	–2,451	50
8/18/2015	293	106	650	29	8/21/2015	1,078	672	50	722	722	5,486	0	7,215	–1,729	50
8/19/2015	293	0	924	533	8/22/2015	1,750	0	50	0	0	5,486	0	7,215	–1,729	50
8/20/2015	293	177	625	655	8/23/2015	1,750	0	50	0	0	5,486	0	7,215	–1,729	50

Table 9. New York City reservoir release design data from December 1, 2014, to October 31, 2015.—Continued

[Delaware River Master daily operations record. The Montague design rate was 1,750 cubic feet per second (ft³/s). Column (col.) 1 data provided by electric utilities PPL Corporation and Talen Energy; col. 2 data provided by Eagle Creek Renewable Energy, LLC; col. 3 computed from index stations; col. 4 computed increase in runoff based on quantitative precipitation forecasts; col. 5 = col. 1 + col. 2 + col. 3 + col. 4; col. 6 = design rate − col. 5, when positive, otherwise col. 6 = 0; col. 7 = col. 14 (4 days earlier); col. 8, directed release amount from the Office of 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, 2014, with these values being reset on June 1, 2015; (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
8/21/2015	293	0	1,457	0	8/24/2015	1,750	0	50	0	0	5,486	0	7,215	–1,729	50
8/22/2015	293	0	1,448	9	8/25/2015	1,750	0	50	0	0	5,486	40	7,255	–1,769	50
8/23/2015	293	0	1,446	11	8/26/2015	1,750	0	50	0	0	5,486	270	7,525	–2,039	50
8/24/2015	293	0	1,449	8	8/27/2015	1,750	0	50	0	0	5,486	440	7,965	–2,479	50
8/25/2015	293	0	1,457	0	8/28/2015	1,750	0	50	0	0	5,486	560	8,525	–3,039	50
8/26/2015	293	0	980	0	8/29/2015	1,273	477	50	527	527	6,013	630	9,155	–3,142	50
8/27/2015	293	0	900	0	8/30/2015	1,193	557	50	607	607	6,620	587	9,742	–3,122	50
8/28/2015	293	0	800	1	8/31/2015	1,094	656	50	706	706	7,326	449	10,191	–2,865	50
8/29/2015	293	0	750	1	9/1/2015	1,044	706	50	756	753	7,961	363	10,554	–2,593	50
8/30/2015	293	0	650	2	9/2/2015	945	805	50	855	856	8,817	506	11,060	–2,243	50
8/31/2015	293	0	700	0	9/3/2015	993	757	50	807	809	9,626	469	11,529	–1,903	50
9/1/2015	293	35	700	2	9/4/2015	1,030	720	50	770	774	10,400	684	12,213	–1,813	50
9/2/2015	293	71	650	1	9/5/2015	1,015	735	50	785	786	11,186	836	13,049	–1,863	50
9/3/2015	293	0	600	8	9/6/2015	901	849	50	899	903	12,089	953	14,002	–1,913	50
9/4/2015	293	0	600	0	9/7/2015	893	857	50	907	903	12,992	783	14,785	–1,793	50
9/5/2015	324	0	500	0	9/8/2015	824	926	50	976	947	13,939	647	15,432	–1,493	50
9/6/2015	324	0	450	0	9/9/2015	774	976	50	1,026	1,024	14,963	634	16,066	–1,103	50
9/7/2015	185	0	400	17	9/10/2015	602	1,148	50	1,198	1,208	16,171	748	16,814	–643	50
9/8/2015	185	0	450	400	9/11/2015	1,035	715	50	765	778	16,949	928	17,742	–793	50
9/9/2015	185	0	600	601	9/12/2015	1,386	364	38	402	402	17,351	875	18,617	–1,266	50
9/10/2015	233	0	600	653	9/13/2015	1,486	264	29	293	293	17,644	0	18,617	–973	50
9/11/2015	0	0	500	615	9/14/2015	1,115	635	–47	588	588	18,232	267	18,884	–652	50
9/12/2015	0	0	550	1,878	9/15/2015	2,428	0	50	0	0	18,232	593	19,477	–1,245	50

Table 9. New York City reservoir release design data from December 1, 2014, to October 31, 2015.—Continued

[Delaware River Master daily operations record. The Montague design rate was 1,750 cubic feet per second (ft^3/s). Column (col.) 1 data provided by electric utilities PPL Corporation and Talen Energy; col. 2 data provided by Eagle Creek Renewable Energy, LLC; col. 3 computed from index stations; col. 4 computed increase in runoff based on quantitative precipitation forecasts; col. 5 = col. 1 + col. 2 + col. 3 + col. 4; col. 6 = design rate − col. 5, when positive, otherwise col. 6 = 0; col. 7 = col. 14 (4 days earlier); col. 8, directed release amount from the Office of 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, 2014, with these values being reset on June 1, 2015; (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
9/13/2015	268	0	1,200	1	9/16/2015	1,469	281	–7	274	274	18,506	670	20,147	–1,641	50
9/14/2015	268	0	1,200	0	9/17/2015	1,468	282	–50	232	232	18,738	725	20,872	–2,134	50
9/15/2015	268	0	1,000	0	9/18/2015	1,268	482	–50	432	432	19,170	674	21,546	–2,376	50
9/16/2015	268	0	650	0	9/19/2015	918	832	–50	782	783	19,953	933	22,479	–2,526	50
9/17/2015	71	177	550	0	9/20/2015	798	952	50	1,173	1,173	20,955	778	23,257	–2,302	50
9/18/2015	0	0	600	2	9/21/2015	602	1,148	50	1,198	1,198	22,153	1,178	24,435	–2,282	50
9/19/2015	0	0	600	10	9/22/2015	610	1,140	50	1,190	1,193	23,346	1,213	25,648	–2,302	50
9/20/2015	0	0	500	0	9/23/2015	500	1,250	50	1,300	1,303	24,649	1,313	26,961	–2,312	50
9/21/2015	0	0	500	0	9/24/2015	500	1,250	50	1,300	1,296	25,945	1,286	28,247	–2,302	50
9/22/2015	0	0	499	1	9/25/2015	500	1,250	50	1,300	1,291	27,236	1,291	29,538	–2,302	50
9/23/2015	0	0	350	0	9/26/2015	350	1,400	50	1,450	1,444	28,680	1,354	30,892	–2,212	50
9/24/2015	133	0	217	0	9/27/2015	350	1,400	50	1,450	1,449	30,129	1,149	32,041	–1,912	50
9/25/2015	0	0	350	0	9/28/2015	350	1,400	50	1,450	1,447	31,576	1,377	33,418	–1,842	50
9/26/2015	0	0	356	44	9/29/2015	400	1,350	50	1,400	1,404	32,980	1,314	34,732	–1,752	50
9/27/2015	0	0	278	122	9/30/2015	400	1,350	50	1,400	1,147	34,127	0	34,732	–605	50
9/28/2015	0	0	350	3,313	10/1/2015	3,663	0	50	0	0	34,127	0	34,732	–605	50
9/29/2015	0	0	350	7,131	10/2/2015	7,481	0	50	0	0	34,127	0	34,732	–605	50
9/30/2015	0	71	1,000	2,308	10/3/2015	3,379	0	50	0	0	34,127	0	34,732	–605	50
10/1/2015	0	0	1,654	96	10/4/2015	1,750	0	50	0	0	34,127	0	34,732	–605	50
10/2/2015	0	0	1,701	49	10/5/2015	1,750	0	50	0	0	34,127	92	34,824	–697	50
10/3/2015	0	0	1,730	20	10/6/2015	1,750	0	50	0	0	34,127	182	35,006	–879	50
10/4/2015	0	0	1,050	0	10/7/2015	1,050	700	50	750	745	34,872	575	35,581	–709	50
10/5/2015	0	0	750	0	10/8/2015	750	1,000	50	1,050	1,043	35,915	613	36,194	–279	28
10/6/2015	0	0	596	4	10/9/2015	600	1,150	50	1,200	1,195	37,110	735	36,929	181	–18

Table 9. New York City reservoir release design data from December 1, 2014, to October 31, 2015.—Continued

[Delaware River Master daily operations record. The Montague design rate was 1,750 cubic feet per second (ft^3/s). Column (col.) 1 data provided by electric utilities PPL Corporation and Talen Energy; col. 2 data provided by Eagle Creek Renewable Energy, LLC; col. 3 computed from index stations; col. 4 computed increase in runoff based on quantitative precipitation forecasts; col. 5 = col. 1 + col. 2 + col. 3 + col. 4; col. 6 = design rate − col. 5, when positive, otherwise col. 6 = 0; col. 7 = col. 14 (4 days earlier); col. 8, directed release amount from the Office of 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, 2014, with these values being reset on June 1, 2015; (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															
Date of advance estimate	Powerplant release forecasts		Uncontrolled runoff		Montague date	Discharge (ft^3/s)	Indicated deficiency	Balancing adjustment	Directed release (ft^3/s)	Computation of balancing adjustment					
										Adjusted directed release		Actual deficiency		Cumulative difference (ft^3/s-d)	Balancing adjustment (ft^3/s)
	Lake Wallenpaupack (ft^3/s)	Rio Reservoir (ft^3/s)	Current condition (ft^3/s)	Weather adjustment (ft^3/s)						Daily (ft^3/s)	Cumulative (ft^3/s-d)	Daily (ft^3/s)	Cumulative (ft^3/s-d)		
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12	Col. 13	Col. 14
10/7/2015	0	0	524	76	10/10/2015	600	1,150	50	1,200	1,204	38,314	764	37,693	621	–50
10/8/2015	0	0	678	172	10/11/2015	850	900	50	950	951	39,265	771	38,464	801	–50
10/9/2015	0	0	800	85	10/12/2015	885	865	28	893	887	40,152	737	39,201	951	–50
10/10/2015	0	0	900	0	10/13/2015	900	850	–18	832	831	40,983	801	40,002	981	–50
10/11/2015	0	0	800	12	10/14/2015	812	938	–50	888	889	41,872	969	40,971	901	–50
10/12/2015	0	0	800	30	10/15/2015	830	920	–50	870	872	42,744	1,022	41,993	751	–50
10/13/2015	0	0	750	42	10/16/2015	792	958	–50	908	909	43,653	1,059	43,052	601	–50
10/14/2015	0	0	550	23	10/17/2015	573	1,177	–50	1,127	1,127	44,780	1097	44,149	631	–50
10/15/2015	0	0	550	9	10/18/2015	559	1,191	–50	1,141	1,142	45,922	782	44,931	991	–50
10/16/2015	0	0	450	0	10/19/2015	450	1,300	–50	1,250	1,248	47,170	978	45,909	1,261	–50
10/17/2015	0	0	450	0	10/20/2015	450	1,300	–50	1,250	1,249	48,419	939	46,848	1,571	–50
10/18/2015	0	0	400	0	10/21/2015	400	1,350	–50	1,300	1,292	49,711	1,012	47,860	1,851	–50
10/19/2015	0	0	600	0	10/22/2015	600	1,150	–50	1,100	1,093	50,804	1,013	48,873	1,931	–50
10/20/2015	0	0	600	5	10/23/2015	605	1,145	–50	1,095	1,093	51,897	1,043	49,916	1,981	–50
10/21/2015	0	0	650	13	10/24/2015	663	1,087	–50	1,037	1,034	52,931	1,054	50,970	1,961	–50
10/22/2015	0	0	600	31	10/25/2015	631	1,119	–50	1,069	1,065	53,996	985	51,955	2,041	–50
10/23/2015	0	0	600	85	10/26/2015	685	1,065	–50	1,015	1,009	55,005	829	52,784	2,221	–50
10/24/2015	0	0	600	69	10/27/2015	669	1,081	–50	1,031	1,028	56,033	798	53,582	2,451	–50
10/25/2015	0	0	667	2	10/28/2015	669	1,081	–50	0	784	56,817	684	54,266	2,551	–50
10/26/2015	0	0	700	469	10/29/2015	1,169	581	–50	531	381	57,198	0	54,266	2,932	–50
10/27/2015	0	0	1,750	4,355	10/30/2015	6,105	0	–50	0	0	57,198	0	54,266	2,932	–50
10/28/2015	0	71	1,750	5,702	10/31/2015	7,523	0	–50	0	0	57,198	0	54,266	2,932	–50

[†]A miscalculation of balancing adjustment 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, 2015.

[Delaware River Master daily operations record. All provided measurements are the mean discharge in cubic foot 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 one day later; col. 4 = 24 hours beginning 1500 one day later; col. 5 = 24 hours beginning 0800 of date shown; col. 6 = 24 hours beginning 1600 of date shown; col. 7 = col. 2 + col. 3 + col. 4 in response to direction (col. 1); col. 8 = col. 2 + col. 3 + col. 4 − col. 7; col. 9 = col. 5 + col. 6; col. 10 = col. 11 − col. 7 − col. 8 − col. 9; col. 11 = 24 hours of calendar day shown; col. 12 = Interim Excess Release Quantity (IERQ) Bank releases; —, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow, Delaware River at Montague, New Jersey						
Directed								Controlled releases						
Date	Amount	Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	New York City reservoirs		Powerplants	Computed uncontrolled	Total	IERQ Bank releases
									Directed	Other				
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6		Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
11/28/2014	0	101	101	56	11/30/2014	0	0	12/1/2014	0	258	0	1,922	2,180	0
11/29/2014	0	101	101	56	12/1/2014	0	0	12/2/2014	0	258	0	1,992	2,250	0
11/30/2014	0	101	101	56	12/2/2014	0	0	12/3/2014	0	258	0	2,462	2,720	0
12/1/2014	0	101	101	56	12/3/2014	0	0	12/4/2014	0	258	0	2,702	2,960	0
12/2/2014	0	101	101	56	12/4/2014	0	0	12/5/2014	0	258	0	2,932	3,190	0
12/3/2014	0	101	101	50	12/5/2014	0	0	12/6/2014	0	252	0	3,058	3,310	0
12/4/2014	0	87	101	50	12/6/2014	0	0	12/7/2014	0	238	0	6,852	7,090	0
12/5/2014	0	80	101	50	12/7/2014	0	0	12/8/2014	0	231	0	7,129	7,360	0
12/6/2014	0	82	102	50	12/8/2014	0	0	12/9/2014	0	234	0	5,596	5,830	0
12/7/2014	0	82	101	50	12/9/2014	0	0	12/10/2014	0	233	0	8,487	8,720	0
12/8/2014	0	80	102	48	12/10/2014	0	0	12/11/2014	0	230	0	8,050	8,280	0
12/9/2014	0	80	102	50	12/11/2014	0	0	12/12/2014	0	232	0	6,158	6,390	0
12/10/2014	0	80	102	50	12/12/2014	0	0	12/13/2014	0	232	0	5,048	5,280	0
12/11/2014	0	80	102	50	12/13/2014	0	0	12/14/2014	0	232	0	4,338	4,570	0
12/12/2014	0	80	102	50	12/14/2014	0	0	12/15/2014	0	232	0	4,118	4,350	0
12/13/2014	0	80	102	50	12/15/2014	200	0	12/16/2014	0	232	200	3,828	4,260	0
12/14/2014	0	80	102	50	12/16/2014	264	0	12/17/2014	0	232	264	3,664	4,160	0
12/15/2014	0	80	102	50	12/17/2014	218	0	12/18/2014	0	232	218	4,100	4,550	0
12/16/2014	0	80	113	50	12/18/2014	257	0	12/19/2014	0	243	257	4,400	4,900	0
12/17/2014	0	80	130	50	12/19/2014	110	0	12/20/2014	0	260	110	3,930	4,300	0
12/18/2014	0	80	130	50	12/20/2014	0	0	12/21/2014	0	260	0	3,460	3,720	0
12/19/2014	0	80	125	50	12/21/2014	0	0	12/22/2014	0	255	0	3,175	3,430	0
12/20/2014	0	80	125	50	12/22/2014	0	0	12/23/2014	0	255	0	3,125	3,380	0
12/21/2014	0	80	125	50	12/23/2014	0	0	12/24/2014	0	255	0	3,535	3,790	0
12/22/2014	0	80	125	50	12/24/2014	0	0	12/25/2014	0	255	0	7,605	7,860	0
12/23/2014	0	80	125	50	12/25/2014	0	0	12/26/2014	0	255	0	11,245	11,500	0

Table 10. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey, for report year ending November 30, 2015.—Continued

[Delaware River Master daily operations record. All provided measurements are the mean discharge in cubic foot 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 one day later; col. 4 = 24 hours beginning 1500 one day later; col. 5 = 24 hours beginning 0800 of date shown; col. 6 = 24 hours beginning 1600 of date shown; col. 7 = col. 2 + col. 3 + col. 4 in response to direction (col. 1); col. 8 = col. 2 + col. 3 + col. 4 − col. 7; col. 9 = col. 5 + col. 6; col. 10 = col. 11 − col. 7 − col. 8 − col. 9; col. 11 = 24 hours of calendar day shown; col. 12 = Interim Excess Release Quantity (IERQ) Bank releases; —, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow, Delaware River at Montague, New Jersey					
Directed								Controlled releases					
Date	Amount	Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	New York City reservoirs		Powerplants	Computed uncontrolled	Total	IERQ Bank releases
									Directed	Other				
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6		Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
12/24/2014	0	80	127	50	12/26/2014	0	0	12/27/2014	0	257	0	8,413	8,670	0
12/25/2014	0	80	128	50	12/27/2014	0	0	12/28/2014	0	258	0	6,692	6,950	0
12/26/2014	0	80	127	50	12/28/2014	97	0	12/29/2014	0	257	97	6,246	6,600	0
12/27/2014	0	80	127	50	12/29/2014	344	0	12/30/2014	0	257	344	5,429	6,030	0
12/28/2014	0	80	127	50	12/30/2014	348	0	12/31/2014	0	257	348	4,645	5,250	0
12/29/2014	0	80	127	50	12/31/2014	300	0	1/1/2015	0	257	300	3,893	4,450	0
12/30/2014	0	80	128	50	1/1/2015	92	0	1/2/2015	0	258	92	3,730	4,080	0
12/31/2014	0	80	128	50	1/2/2015	304	0	1/3/2015	0	258	304	3,498	4,060	0
1/1/2015	0	80	128	50	1/3/2015	0	0	1/4/2015	0	258	0	3,552	3,810	0
1/2/2015	0	80	128	50	1/4/2015	15	0	1/5/2015	0	258	15	6,307	6,580	0
1/3/2015	0	80	128	50	1/5/2015	647	0	1/6/2015	0	258	647	6,485	7,390	0
1/4/2015	0	80	127	50	1/6/2015	577	0	1/7/2015	0	257	577	5,826	6,660	0
1/5/2015	0	80	128	50	1/7/2015	1,043	0	1/8/2015	0	258	1,043	4,019	5,320	0
1/6/2015	0	80	128	50	1/8/2015	860	0	1/9/2015	0	258	860	3,432	4,550	0
1/7/2015	0	80	128	50	1/9/2015	1,014	0	1/10/2015	0	258	1,014	3,958	5,230	0
1/8/2015	0	80	128	50	1/10/2015	747	0	1/11/2015	0	258	747	4,875	5,880	0
1/9/2015	0	80	128	50	1/11/2015	110	0	1/12/2015	0	258	110	4,092	4,460	0
1/10/2015	0	80	128	50	1/12/2015	433	0	1/13/2015	0	258	433	3,409	4,100	0
1/11/2015	0	80	128	50	1/13/2015	519	0	1/14/2015	0	258	519	3,523	4,300	0
1/12/2015	0	80	128	50	1/14/2015	512	0	1/15/2015	0	258	512	3,050	3,820	0
1/13/2015	0	80	128	50	1/15/2015	14	0	1/16/2015	0	258	14	2,528	2,800	0
1/14/2015	0	80	119	50	1/16/2015	0	0	1/17/2015	0	249	0	2,401	2,650	0
1/15/2015	0	70	110	50	1/17/2015	0	0	1/18/2015	0	230	0	2,410	2,640	0
1/16/2015	0	70	108	50	1/18/2015	47	0	1/19/2015	0	228	47	2,205	2,480	0
1/17/2015	0	70	108	50	1/19/2015	207	0	1/20/2015	0	228	207	2,395	2,830	0
1/18/2015	0	70	107	50	1/20/2015	212	0	1/21/2015	0	227	212	2,361	2,800	0

Table 10. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey, for report year ending November 30, 2015.—Continued

[Delaware River Master daily operations record. All provided measurements are the mean discharge in cubic foot 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 one day later; col. 4 = 24 hours beginning 1500 one day later; col. 5 = 24 hours beginning 0800 of date shown; col. 6 = 24 hours beginning 1600 of date shown; col. 7 = col. 2 + col. 3 + col. 4 in response to direction (col. 1); col. 8 = col. 2 + col. 3 + col. 4 − col. 7; col. 9 = col. 5 + col. 6; col. 10 = col. 11 − col. 7 − col. 8 − col. 9; col. 11 = 24 hours of calendar day shown; col. 12 = Interim Excess Release Quantity (IERQ) Bank releases; —, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow, Delaware River at Montague, New Jersey						
Directed								Controlled releases						
Date	Amount	Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	New York City reservoirs		Powerplants	Computed uncontrolled	Total	IERQ Bank releases
									Directed	Other				
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6		Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
1/19/2015	0	70	111	50	1/21/2015	262	0	1/22/2015	0	231	262	2,147	2,640	0
1/20/2015	0	70	113	50	1/22/2015	173	0	1/23/2015	0	233	173	1,824	2,230	0
1/21/2015	0	70	113	50	1/23/2015	130	0	1/24/2015	0	233	130	1,837	2,200	0
1/22/2015	0	70	113	50	1/24/2015	0	0	1/25/2015	0	233	0	1,717	1,950	0
1/23/2015	0	70	110	50	1/25/2015	70	0	1/26/2015	0	230	70	1,950	2,250	0
1/24/2015	0	70	110	50	1/26/2015	354	0	1/27/2015	0	230	354	1,666	2,250	0
1/25/2015	0	70	110	50	1/27/2015	401	0	1/28/2015	0	230	401	1,919	2,550	0
1/26/2015	0	70	110	50	1/28/2015	391	0	1/29/2015	0	230	391	1,679	2,300	0
1/27/2015	0	70	108	46	1/29/2015	419	0	1/30/2015	0	224	419	1,807	2,450	0
1/28/2015	0	68	96	40	1/30/2015	285	0	1/31/2015	0	204	285	2,111	2,600	0
1/29/2015	0	56	88	40	1/31/2015	0	0	2/1/2015	0	184	0	2,416	2,600	0
1/30/2015	0	56	88	40	2/1/2015	92	0	2/2/2015	0	184	92	2,274	2,550	0
1/31/2015	0	56	87	40	2/2/2015	469	0	2/3/2015	0	183	469	1,898	2,550	0
2/1/2015	0	56	87	40	2/3/2015	348	0	2/4/2015	0	183	348	1,969	2,500	0
2/2/2015	0	56	85	40	2/4/2015	475	0	2/5/2015	0	181	475	1,844	2,500	0
2/3/2015	0	56	84	40	2/5/2015	402	0	2/6/2015	0	180	402	2,168	2,750	0
2/4/2015	0	56	88	40	2/6/2015	351	0	2/7/2015	0	184	351	1,875	2,410	0
2/5/2015	0	56	90	40	2/7/2015	0	0	2/8/2015	0	186	0	2,254	2,440	0
2/6/2015	0	56	85	40	2/8/2015	74	0	2/9/2015	0	181	74	2,115	2,370	0
2/7/2015	0	56	87	40	2/9/2015	553	0	2/10/2015	0	183	553	1,444	2,180	0
2/8/2015	0	56	88	40	2/10/2015	440	0	2/11/2015	0	184	440	1,986	2,610	0
2/9/2015	0	56	88	40	2/11/2015	472	0	2/12/2015	0	184	472	2,034	2,690	0
2/10/2015	0	56	88	40	2/12/2015	516	0	2/13/2015	0	184	516	1,970	2,670	0
2/11/2015	0	56	88	40	2/13/2015	574	0	2/14/2015	0	184	574	1,972	2,730	0
2/12/2015	0	56	88	40	2/14/2015	543	0	2/15/2015	0	184	543	973	1,700	0
2/13/2015	0	56	88	40	2/15/2015	454	106	2/16/2015	0	184	560	1,056	1,800	0

Table 10. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey, for report year ending November 30, 2015.—Continued

[Delaware River Master daily operations record. All provided measurements are the mean discharge in cubic foot 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 one day later; col. 4 = 24 hours beginning 1500 one day later; col. 5 = 24 hours beginning 0800 of date shown; col. 6 = 24 hours beginning 1600 of date shown; col. 7 = col. 2 + col. 3 + col. 4 in response to direction (col. 1); col. 8 = col. 2 + col. 3 + col. 4 − col. 7; col. 9 = col. 5 + col. 6; col. 10 = col. 11 − col. 7 − col. 8 − col. 9; col. 11 = 24 hours of calendar day shown; col. 12 = Interim Excess Release Quantity (IERQ) Bank releases; —, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow, Delaware River at Montague, New Jersey					
Directed								Controlled releases					
Date	Amount	Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	New York City reservoirs		Powerplants	Computed uncontrolled	Total	IERQ Bank releases
									Directed	Other				
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6		Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
2/14/2015	0	56	88	40	2/16/2015	544	745	2/17/2015	0	184	1,289	327	1,800	0
2/15/2015	0	56	88	40	2/17/2015	478	851	2/18/2015	0	184	1,329	187	1,700	0
2/16/2015	0	56	87	40	2/18/2015	488	851	2/19/2015	0	183	1,339	178	1,700	0
2/17/2015	0	56	85	43	2/19/2015	456	514	2/20/2015	0	184	970	646	1,800	0
2/18/2015	0	59	87	50	2/20/2015	539	461	2/21/2015	0	196	1,000	504	1,700	0
2/19/2015	0	70	85	50	2/21/2015	381	443	2/22/2015	0	205	824	1,071	2,100	0
2/20/2015	0	70	87	50	2/22/2015	174	443	2/23/2015	0	207	617	1,616	2,440	0
2/21/2015	0	70	90	50	2/23/2015	483	762	2/24/2015	0	210	1,245	1,015	2,470	0
2/22/2015	0	70	111	56	2/24/2015	496	426	2/25/2015	0	237	922	1,441	2,600	0
2/23/2015	0	96	152	56	2/25/2015	506	248	2/26/2015	0	304	754	1,292	2,350	0
2/24/2015	0	99	153	56	2/26/2015	460	195	2/27/2015	0	308	655	1,237	2,200	0
2/25/2015	0	101	153	56	2/27/2015	469	142	2/28/2015	0	310	611	1,429	2,350	0
2/26/2015	0	101	150	56	2/28/2015	7	142	3/1/2015	0	307	149	1,694	2,150	0
2/27/2015	0	101	150	56	3/1/2015	0	142	3/2/2015	0	307	142	1,151	1,600	0
2/28/2015	0	99	152	56	3/2/2015	0	89	3/3/2015	0	307	89	1,154	1,550	0
3/1/2015	0	101	153	56	3/3/2015	13	230	3/4/2015	0	310	243	1,147	1,700	0
3/2/2015	0	101	152	56	3/4/2015	0	213	3/5/2015	0	309	213	1,228	1,750	0
3/3/2015	0	101	152	56	3/5/2015	112	106	3/6/2015	0	309	218	1,373	1,900	0
3/4/2015	0	101	153	56	3/6/2015	100	0	3/7/2015	0	310	100	1,440	1,850	0
3/5/2015	0	101	153	56	3/7/2015	0	0	3/8/2015	0	310	0	1,590	1,900	0
3/6/2015	0	101	153	56	3/8/2015	0	106	3/9/2015	0	310	106	1,384	1,800	0
3/7/2015	0	101	153	56	3/9/2015	0	160	3/10/2015	0	310	160	1,430	1,900	0
3/8/2015	0	101	139	50	3/10/2015	0	177	3/11/2015	0	290	177	1,833	2,300	0
3/9/2015	0	85	93	45	3/11/2015	0	124	3/12/2015	0	223	124	2,853	3,200	0
3/10/2015	0	62	71	36	3/12/2015	0	160	3/13/2015	0	169	160	3,971	4,300	0
3/11/2015	0	51	60	36	3/13/2015	0	53	3/14/2015	0	147	53	4,600	4,800	0

Table 10. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey, for report year ending November 30, 2015.—Continued

[Delaware River Master daily operations record. All provided measurements are the mean discharge in cubic foot 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 one day later; col. 4 = 24 hours beginning 1500 one day later; col. 5 = 24 hours beginning 0800 of date shown; col. 6 = 24 hours beginning 1600 of date shown; col. 7 = col. 2 + col. 3 + col. 4 in response to direction (col. 1); col. 8 = col. 2 + col. 3 + col. 4 − col. 7; col. 9 = col. 5 + col. 6; col. 10 = col. 11 − col. 7 − col. 8 − col. 9; col. 11 = 24 hours of calendar day shown; col. 12 = Interim Excess Release Quantity (IERQ) Bank releases; —, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow, Delaware River at Montague, New Jersey						
Directed								Controlled releases						
Date	Amount	Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	New York City reservoirs		Powerplants	Computed uncontrolled	Total	IERQ Bank releases
									Directed	Other				
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6		Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
3/12/2015	0	50	63	36	3/14/2015	0	0	3/15/2015	0	149	0	6,351	6,500	0
3/13/2015	0	50	62	36	3/15/2015	28	89	3/16/2015	0	148	117	6,985	7,250	0
3/14/2015	0	50	62	36	3/16/2015	0	89	3/17/2015	0	148	89	7,463	7,700	0
3/15/2015	0	50	62	36	3/17/2015	22	160	3/18/2015	0	148	182	7,970	8,300	0
3/16/2015	0	50	62	36	3/18/2015	0	213	3/19/2015	0	148	213	7,489	7,850	0
3/17/2015	0	50	62	36	3/19/2015	0	177	3/20/2015	0	148	177	6,575	6,900	0
3/18/2015	0	50	62	36	3/20/2015	0	18	3/21/2015	0	148	18	5,584	5,750	0
3/19/2015	0	50	62	36	3/21/2015	0	18	3/22/2015	0	148	18	4,524	4,690	0
3/20/2015	0	50	62	36	3/22/2015	0	160	3/23/2015	0	148	160	3,942	4,250	0
3/21/2015	0	50	60	36	3/23/2015	22	230	3/24/2015	0	146	252	3,632	4,030	0
3/22/2015	0	50	60	36	3/24/2015	0	177	3/25/2015	0	146	177	3,367	3,690	0
3/23/2015	0	50	62	36	3/25/2015	0	177	3/26/2015	0	148	177	3,345	3,670	0
3/24/2015	0	50	60	36	3/26/2015	98	142	3/27/2015	0	146	240	4,454	4,840	0
3/25/2015	0	50	59	36	3/27/2015	530	0	3/28/2015	0	145	530	5,315	5,990	0
3/26/2015	0	50	60	36	3/28/2015	371	0	3/29/2015	0	146	371	4,853	5,370	0
3/27/2015	0	50	60	36	3/29/2015	0	0	3/30/2015	0	146	0	4,684	4,830	0
3/28/2015	0	50	60	36	3/30/2015	0	0	3/31/2015	0	146	0	4,894	5,040	0
3/29/2015	0	50	60	36	3/31/2015	0	71	4/1/2015	0	146	71	4,913	5,130	0
3/30/2015	0	50	60	36	4/1/2015	0	71	4/2/2015	0	146	71	5,003	5,220	0
3/31/2015	0	50	60	36	4/2/2015	0	71	4/3/2015	0	146	71	8,683	8,900	0
4/1/2015	0	50	60	36	4/3/2015	0	0	4/4/2015	0	146	0	19,854	20,000	0
4/2/2015	0	50	60	36	4/4/2015	0	160	4/5/2015	0	146	160	23,394	23,700	0
4/3/2015	0	50	60	36	4/5/2015	841	408	4/6/2015	0	146	1,249	16,205	17,600	0
4/4/2015	0	50	60	36	4/6/2015	1,422	851	4/7/2015	0	146	2,273	13,781	16,200	0
4/5/2015	0	50	60	36	4/7/2015	1,174	851	4/8/2015	0	146	2,025	17,229	19,400	0
4/6/2015	0	50	62	36	4/8/2015	899	851	4/9/2015	0	148	1,750	21,602	23,500	0

Table 10. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey, for report year ending November 30, 2015.—Continued

[Delaware River Master daily operations record. All provided measurements are the mean discharge in cubic foot 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 one day later; col. 4 = 24 hours beginning 1500 one day later; col. 5 = 24 hours beginning 0800 of date shown; col. 6 = 24 hours beginning 1600 of date shown; col. 7 = col. 2 + col. 3 + col. 4 in response to direction (col. 1); col. 8 = col. 2 + col. 3 + col. 4 − col. 7; col. 9 = col. 5 + col. 6; col. 10 = col. 11 − col. 7 − col. 8 − col. 9; col. 11 = 24 hours of calendar day shown; col. 12 = Interim Excess Release Quantity (IERQ) Bank releases; —, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow, Delaware River at Montague, New Jersey					
Directed								Controlled releases					
Date	Amount	Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	New York City reservoirs		Powerplants	Computed uncontrolled	Total	IERQ Bank releases
									Directed	Other				
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6		Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
4/7/2015	0	50	62	36	4/9/2015	880	851	4/10/2015	0	148	1,731	21,021	22,900	0
4/8/2015	0	50	62	37	4/10/2015	658	851	4/11/2015	0	149	1,509	26,442	28,100	0
4/9/2015	0	50	60	36	4/11/2015	373	851	4/12/2015	0	146	1,224	18,830	20,200	0
4/10/2015	0	50	60	36	4/12/2015	475	851	4/13/2015	0	146	1,326	13,828	15,300	0
4/11/2015	0	50	60	36	4/13/2015	414	851	4/14/2015	0	146	1,265	12,089	13,500	0
4/12/2015	0	50	67	36	4/14/2015	416	851	4/15/2015	0	153	1,267	11,080	12,500	0
4/13/2015	0	50	74	36	4/15/2015	6	496	4/16/2015	0	160	502	9,018	9,680	0
4/14/2015	0	50	73	36	4/16/2015	0	496	4/17/2015	0	159	496	7,285	7,940	0
4/15/2015	0	50	74	36	4/17/2015	0	461	4/18/2015	0	160	461	6,649	7,270	0
4/16/2015	0	50	74	36	4/18/2015	0	319	4/19/2015	0	160	319	5,771	6,250	0
4/17/2015	0	50	74	36	4/19/2015	0	230	4/20/2015	0	160	230	5,190	5,580	0
4/18/2015	0	50	74	36	4/20/2015	2	355	4/21/2015	0	160	357	7,723	8,240	0
4/19/2015	0	50	74	36	4/21/2015	758	426	4/22/2015	0	160	1,184	12,556	13,900	0
4/20/2015	0	50	74	36	4/22/2015	540	461	4/23/2015	0	160	1,001	9,939	11,100	0
4/21/2015	0	54	74	36	4/23/2015	407	461	4/24/2015	0	164	868	8,348	9,380	0
4/22/2015	0	59	74	36	4/24/2015	167	461	4/25/2015	0	169	628	6,883	7,680	0
4/23/2015	0	50	74	36	4/25/2015	0	461	4/26/2015	0	160	461	6,049	6,670	0
4/24/2015	0	50	74	36	4/26/2015	65	337	4/27/2015	0	160	402	5,398	5,960	0
4/25/2015	0	50	74	36	4/27/2015	350	230	4/28/2015	0	160	580	4,890	5,630	0
4/26/2015	0	50	63	36	4/28/2015	401	284	4/29/2015	0	149	685	4,396	5,230	0
4/27/2015	0	50	74	36	4/29/2015	0	284	4/30/2015	0	160	284	4,046	4,490	0
4/28/2015	0	50	74	36	4/30/2015	0	390	5/1/2015	0	160	390	3,670	4,220	0
4/29/2015	0	50	74	42	5/1/2015	0	301	5/2/2015	0	166	301	3,343	3,810	0
4/30/2015	0	54	127	56	5/2/2015	0	266	5/3/2015	0	237	266	3,117	3,620	0
5/1/2015	0	74	153	56	5/3/2015	0	213	5/4/2015	0	283	213	2,844	3,340	0
5/2/2015	0	74	150	56	5/4/2015	0	248	5/5/2015	0	280	248	2,512	3,040	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, 2015.—Continued

[Delaware River Master daily operations record. All provided measurements are the mean discharge in cubic foot 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 one day later; col. 4 = 24 hours beginning 1500 one day later; col. 5 = 24 hours beginning 0800 of date shown; col. 6 = 24 hours beginning 1600 of date shown; col. 7 = col. 2 + col. 3 + col. 4 in response to direction (col. 1); col. 8 = col. 2 + col. 3 + col. 4 − col. 7; col. 9 = col. 5 + col. 6; col. 10 = col. 11 − col. 7 − col. 8 − col. 9; col. 11 = 24 hours of calendar day shown; col. 12 = Interim Excess Release Quantity (IERQ) Bank releases; —, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow, Delaware River at Montague, New Jersey					
Directed								Controlled releases					
Date	Amount	Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	New York City reservoirs		Powerplants	Computed uncontrolled	Total	IERQ Bank releases
									Directed	Other				
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6		Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
5/3/2015	0	74	150	56	5/5/2015	31	89	5/6/2015	0	280	120	2,330	2,730	0
5/4/2015	0	74	150	56	5/6/2015	0	0	5/7/2015	0	280	0	2,330	2,610	0
5/5/2015	0	74	150	56	5/7/2015	17	89	5/8/2015	0	280	106	2,204	2,590	0
5/6/2015	0	76	150	56	5/8/2015	58	89	5/9/2015	0	282	147	2,061	2,490	0
5/7/2015	0	76	150	56	5/9/2015	12	0	5/10/2015	0	282	12	1,896	2,190	0
5/8/2015	0	74	150	56	5/10/2015	101	0	5/11/2015	0	280	101	1,869	2,250	0
5/9/2015	0	74	150	56	5/11/2015	214	124	5/12/2015	0	280	338	1,782	2,400	0
5/10/2015	0	74	150	56	5/12/2015	156	89	5/13/2015	0	280	245	1,595	2,120	0
5/11/2015	0	74	150	56	5/13/2015	0	0	5/14/2015	0	280	0	1,510	1,790	0
5/12/2015	292	76	162	56	5/14/2015	0	35	5/15/2015	294	0	35	1,411	1,740	0
5/13/2015	0	74	153	56	5/15/2015	0	177	5/16/2015	0	283	177	1,390	1,850	0
5/14/2015	306	73	181	56	5/16/2015	0	35	5/17/2015	310	0	35	1,695	2,040	0
5/15/2015	448	74	319	56	5/17/2015	70	53	5/18/2015	449	0	123	2,488	3,060	0
5/16/2015	427	76	336	56	5/18/2015	263	18	5/19/2015	468	0	281	2,141	2,890	0
5/17/2015	0	76	193	56	5/19/2015	292	0	5/20/2015	0	325	292	2,223	2,840	0
5/18/2015	0	74	149	56	5/20/2015	275	89	5/21/2015	0	279	364	2,127	2,770	0
5/19/2015	0	74	149	59	5/21/2015	398	89	5/22/2015	0	282	487	1,791	2,560	0
5/20/2015	0	77	184	65	5/22/2015	288	89	5/23/2015	0	326	377	1,687	2,390	0
5/21/2015	0	91	203	65	5/23/2015	0	0	5/24/2015	0	359	0	1,511	1,870	0
5/22/2015	0	91	200	65	5/24/2015	137	0	5/25/2015	0	356	137	1,297	1,790	0
5/23/2015	18	91	200	65	5/25/2015	156	0	5/26/2015	18	338	156	1,428	1,940	0
5/24/2015	13	90	198	65	5/26/2015	219	0	5/27/2015	13	340	219	1,438	2,010	0
5/25/2015	0	90	198	65	5/27/2015	139	35	5/28/2015	0	353	174	1,853	2,380	0
5/26/2015	0	90	198	65	5/28/2015	177	106	5/29/2015	0	353	283	2,124	2,760	0
5/27/2015	163	91	198	65	5/29/2015	172	46	5/30/2015	163	191	218	1,938	2,510	0
5/28/2015	0	90	198	65	5/30/2015	232	71	5/31/2015	0	353	303	1,654	2,310	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, 2015.—Continued

[Delaware River Master daily operations record. All provided measurements are the mean discharge in cubic foot 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 one day later; col. 4 = 24 hours beginning 1500 one day later; col. 5 = 24 hours beginning 0800 of date shown; col. 6 = 24 hours beginning 1600 of date shown; col. 7 = col. 2 + col. 3 + col. 4 in response to direction (col. 1); col. 8 = col. 2 + col. 3 + col. 4 − col. 7; col. 9 = col. 5 + col. 6; col. 10 = col. 11 − col. 7 − col. 8 − col. 9; col. 11 = 24 hours of calendar day shown; col. 12 = Interim Excess Release Quantity (IERQ) Bank releases; —, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow, Delaware River at Montague, New Jersey					
Directed								Controlled releases					
Date	Amount	Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	New York City reservoirs		Powerplants	Computed uncontrolled	Total	IERQ Bank releases
									Directed	Other				
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6		Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
5/29/2015	0	90	196	65	5/31/2015	148	0	6/1/2015	0	351	148	2,531	3,030	0
5/30/2015	0	90	198	68	6/1/2015	0	0	6/2/2015	0	356	0	3,474	3,830	0
5/31/2015	0	91	217	74	6/2/2015	12	71	6/3/2015	0	382	83	3,735	4,200	0
6/1/2015	0	102	223	74	6/3/2015	64	89	6/4/2015	0	399	153	2,918	3,470	0
6/2/2015	0	101	223	74	6/4/2015	661	89	6/5/2015	0	398	750	2,312	3,460	0
6/3/2015	0	101	232	80	6/5/2015	269	71	6/6/2015	0	413	340	1,987	2,740	0
6/4/2015	0	108	244	80	6/6/2015	19	71	6/7/2015	0	432	90	1,828	2,350	0
6/5/2015	0	110	244	80	6/7/2015	189	89	6/8/2015	0	434	278	1,628	2,340	0
6/6/2015	0	110	244	80	6/8/2015	651	53	6/9/2015	0	434	704	2,462	3,600	0
6/7/2015	0	110	244	80	6/9/2015	642	142	6/10/2015	0	434	784	3,412	4,630	0
6/8/2015	0	110	244	80	6/10/2015	381	124	6/11/2015	0	434	505	3,341	4,280	0
6/9/2015	0	110	244	80	6/11/2015	498	160	6/12/2015	0	434	658	2,468	3,560	0
6/10/2015	0	110	244	80	6/12/2015	393	319	6/13/2015	0	434	712	2,114	3,260	0
6/11/2015	0	110	244	80	6/13/2015	480	0	6/14/2015	0	434	480	2,146	3,060	0
6/12/2015	0	110	244	80	6/14/2015	370	0	6/15/2015	0	434	370	2,226	3,030	0
6/13/2015	0	110	244	80	6/15/2015	435	35	6/16/2015	0	434	470	5,376	6,280	0
6/14/2015	0	110	243	80	6/16/2015	448	71	6/17/2015	0	433	519	5,288	6,240	0
6/15/2015	0	110	302	101	6/17/2015	315	89	6/18/2015	0	513	404	4,153	5,070	0
6/16/2015	0	138	398	101	6/18/2015	181	89	6/19/2015	0	637	270	3,283	4,190	0
6/17/2015	0	141	399	101	6/19/2015	173	89	6/20/2015	0	641	262	2,967	3,870	0
6/18/2015	0	141	398	101	6/20/2015	168	35	6/21/2015	0	640	203	3,797	4,640	0
6/19/2015	0	139	399	101	6/21/2015	474	106	6/22/2015	0	639	580	8,131	9,350	0
6/20/2015	0	139	399	101	6/22/2015	978	230	6/23/2015	0	639	1,208	7,023	8,870	0
6/21/2015	0	139	438	110	6/23/2015	1,133	142	6/24/2015	0	687	1,275	4,948	6,910	0
6/22/2015	0	139	500	110	6/24/2015	563	266	6/25/2015	0	749	829	4,172	5,750	0
6/23/2015	0	139	501	110	6/25/2015	456	372	6/26/2015	0	750	828	3,342	4,920	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, 2015.—Continued

[Delaware River Master daily operations record. All provided measurements are the mean discharge in cubic foot 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 one day later; col. 4 = 24 hours beginning 1500 one day later; col. 5 = 24 hours beginning 0800 of date shown; col. 6 = 24 hours beginning 1600 of date shown; col. 7 = col. 2 + col. 3 + col. 4 in response to direction (col. 1); col. 8 = col. 2 + col. 3 + col. 4 − col. 7; col. 9 = col. 5 + col. 6; col. 10 = col. 11 − col. 7 − col. 8 − col. 9; col. 11 = 24 hours of calendar day shown; col. 12 = Interim Excess Release Quantity (IERQ) Bank releases; —, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow, Delaware River at Montague, New Jersey					
Directed								Controlled releases					
Date	Amount	Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	New York City reservoirs		Powerplants	Computed uncontrolled	Total	IERQ Bank releases
									Directed	Other				
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6		Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
6/24/2015	0	139	500	110	6/26/2015	292	124	6/27/2015	0	749	416	3,115	4,280	0
6/25/2015	0	139	500	110	6/27/2015	1,047	106	6/28/2015	0	749	1,153	4,748	6,650	0
6/26/2015	0	139	500	110	6/28/2015	1,072	89	6/29/2015	0	749	1,161	7,340	9,250	0
6/27/2015	0	139	501	110	6/29/2015	1,081	160	6/30/2015	0	750	1,241	6,509	8,500	0
6/28/2015	0	139	501	114	6/30/2015	944	337	7/1/2015	0	754	1,281	12,465	14,500	0
6/29/2015	0	139	501	145	7/1/2015	929	390	7/2/2015	0	785	1,319	15,996	18,100	0
6/30/2015	0	271	608	190	7/2/2015	1,017	355	7/3/2015	0	1,069	1,372	11,759	14,200	0
7/1/2015	0	500	851	190	7/3/2015	1,064	248	7/4/2015	0	1,541	1,312	9,147	12,000	0
7/2/2015	0	501	1,299	187	7/4/2015	1,013	195	7/5/2015	0	1,987	1,208	8,905	12,100	0
7/3/2015	0	501	1,502	150	7/5/2015	1,055	248	7/6/2015	0	2,153	1,303	6,744	10,200	0
7/4/2015	0	500	1,499	149	7/6/2015	1,087	301	7/7/2015	0	2,148	1,388	5,334	8,870	0
7/5/2015	0	500	1,497	139	7/7/2015	945	319	7/8/2015	0	2,136	1,264	4,460	7,860	0
7/6/2015	0	500	1,494	139	7/8/2015	319	248	7/9/2015	0	2,133	567	3,850	6,550	0
7/7/2015	0	500	1,395	139	7/9/2015	292	248	7/10/2015	0	2,034	540	3,496	6,070	0
7/8/2015	0	500	1,095	139	7/10/2015	434	319	7/11/2015	0	1,734	753	3,593	6,080	0
7/9/2015	0	500	828	142	7/11/2015	415	89	7/12/2015	0	1,470	504	2,936	4,910	0
7/10/2015	0	500	699	150	7/12/2015	353	0	7/13/2015	0	1,349	353	2,658	4,360	0
7/11/2015	0	500	699	150	7/13/2015	456	53	7/14/2015	0	1,349	509	2,432	4,290	0
7/12/2015	0	498	698	150	7/14/2015	350	177	7/15/2015	0	1,346	527	2,457	4,330	0
7/13/2015	0	498	698	150	7/15/2015	242	89	7/16/2015	0	1,346	331	3,543	5,220	0
7/14/2015	0	498	1,378	150	7/16/2015	234	89	7/17/2015	0	2,026	323	2,481	4,830	0
7/15/2015	0	498	1,493	150	7/17/2015	426	89	7/18/2015	0	2,141	515	2,084	4,740	0
7/16/2015	0	500	1,491	150	7/18/2015	386	35	7/19/2015	0	2,141	421	2,258	4,820	0
7/17/2015	0	500	1,493	150	7/19/2015	348	106	7/20/2015	0	2,143	454	2,283	4,880	0
7/18/2015	0	500	1,493	150	7/20/2015	427	124	7/21/2015	0	2,143	551	2,166	4,860	0
7/19/2015	0	500	1,491	150	7/21/2015	254	89	7/22/2015	0	2,141	343	1,826	4,310	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, 2015.—Continued

[Delaware River Master daily operations record. All provided measurements are the mean discharge in cubic foot 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 one day later; col. 4 = 24 hours beginning 1500 one day later; col. 5 = 24 hours beginning 0800 of date shown; col. 6 = 24 hours beginning 1600 of date shown; col. 7 = col. 2 + col. 3 + col. 4 in response to direction (col. 1); col. 8 = col. 2 + col. 3 + col. 4 − col. 7; col. 9 = col. 5 + col. 6; col. 10 = col. 11 − col. 7 − col. 8 − col. 9; col. 11 = 24 hours of calendar day shown; col. 12 = Interim Excess Release Quantity (IERQ) Bank releases; —, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow, Delaware River at Montague, New Jersey					
Directed								Controlled releases					
Date	Amount	Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	New York City reservoirs		Powerplants	Computed uncontrolled	Total	IERQ Bank releases
									Directed	Other				
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6		Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
7/20/2015	0	500	1,502	150	7/22/2015	187	89	7/23/2015	0	2,152	276	1,702	4,130	0
7/21/2015	0	500	1,502	150	7/23/2015	228	89	7/24/2015	0	2,152	317	1,521	3,990	0
7/22/2015	0	500	1,497	150	7/24/2015	374	35	7/25/2015	0	2,147	409	1,334	3,890	0
7/23/2015	0	500	1,499	150	7/25/2015	256	71	7/26/2015	0	2,149	327	1,574	4,050	0
7/24/2015	0	483	1,497	150	7/26/2015	303	124	7/27/2015	0	2,130	427	3,793	6,350	0
7/25/2015	0	381	1,493	150	7/27/2015	244	248	7/28/2015	0	2,024	492	3,324	5,840	0
7/26/2015	290	291	1,493	138	7/28/2015	351	230	7/29/2015	290	1,632	581	2,477	4,980	0
7/27/2015	0	189	1,490	110	7/29/2015	481	230	7/30/2015	0	1,789	711	2,070	4,570	0
7/28/2015	0	139	1,488	110	7/30/2015	268	142	7/31/2015	0	1,737	410	1,873	4,020	0
7/29/2015	0	139	1,494	110	7/31/2015	378	89	8/1/2015	0	1,743	467	1,730	3,940	0
7/30/2015	0	139	1,497	110	8/1/2015	359	35	8/2/2015	0	1,746	394	1,520	3,660	0
7/31/2015	0	139	1,496	110	8/2/2015	358	53	8/3/2015	0	1,745	411	1,444	3,600	0
8/1/2015	0	139	1,371	110	8/3/2015	330	89	8/4/2015	0	1,620	419	1,271	3,310	0
8/2/2015	0	139	1,010	110	8/4/2015	336	89	8/5/2015	0	1,259	425	866	2,550	0
8/3/2015	0	139	729	110	8/5/2015	230	106	8/6/2015	0	978	336	876	2,190	0
8/4/2015	147	139	554	110	8/6/2015	205	106	8/7/2015	147	656	311	816	1,930	0
8/5/2015	233	139	497	110	8/7/2015	324	106	8/8/2015	233	513	430	764	1,940	0
8/6/2015	802	139	552	110	8/8/2015	250	0	8/9/2015	801	0	250	729	1,780	0
8/7/2015	797	139	552	110	8/9/2015	227	71	8/10/2015	797	4	298	681	1,780	0
8/8/2015	603	139	497	110	8/10/2015	162	89	8/11/2015	603	143	251	933	1,930	0
8/9/2015	0	139	501	110	8/11/2015	438	106	8/12/2015	0	750	544	1,746	3,040	0
8/10/2015	0	139	504	110	8/12/2015	277	106	8/13/2015	0	753	383	1,844	2,980	0
8/11/2015	0	139	506	110	8/13/2015	90	106	8/14/2015	0	755	196	1,289	2,240	0
8/12/2015	0	139	504	110	8/14/2015	243	89	8/15/2015	0	753	332	1,035	2,120	0
8/13/2015	0	139	504	110	8/15/2015	318	71	8/16/2015	0	753	389	898	2,040	0
8/14/2015	252	139	504	110	8/16/2015	412	106	8/17/2015	252	501	518	849	2,120	0

Table 10. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey, for report year ending November 30, 2015.—Continued

[Delaware River Master daily operations record. All provided measurements are the mean discharge in cubic foot 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 one day later; col. 4 = 24 hours beginning 1500 one day later; col. 5 = 24 hours beginning 0800 of date shown; col. 6 = 24 hours beginning 1600 of date shown; col. 7 = col. 2 + col. 3 + col. 4 in response to direction (col. 1); col. 8 = col. 2 + col. 3 + col. 4 − col. 7; col. 9 = col. 5 + col. 6; col. 10 = col. 11 − col. 7 − col. 8 − col. 9; col. 11 = 24 hours of calendar day shown; col. 12 = Interim Excess Release Quantity (IERQ) Bank releases; —, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow, Delaware River at Montague, New Jersey					
Directed								Controlled releases					
Date	Amount	Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	New York City reservoirs		Powerplants	Computed uncontrolled	Total	IERQ Bank releases
									Directed	Other				
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6		Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
8/15/2015	501	139	503	110	8/17/2015	423	89	8/18/2015	501	251	512	796	2,060	0
8/16/2015	597	141	503	110	8/18/2015	392	195	8/19/2015	597	157	587	739	2,080	0
8/17/2015	493	141	503	110	8/19/2015	300	106	8/20/2015	493	261	406	840	2,000	0
8/18/2015	722	139	503	110	8/20/2015	288	0	8/21/2015	722	30	288	2,600	3,640	0
8/19/2015	0	139	503	110	8/21/2015	287	0	8/22/2015	0	752	287	3,411	4,450	0
8/20/2015	0	139	503	110	8/22/2015	293	177	8/23/2015	0	752	470	2,448	3,670	0
8/21/2015	0	139	503	110	8/23/2015	232	0	8/24/2015	0	752	232	1,716	2,700	0
8/22/2015	0	139	501	110	8/24/2015	228	35	8/25/2015	0	750	263	1,447	2,460	0
8/23/2015	0	139	501	110	8/25/2015	179	0	8/26/2015	0	750	179	1,301	2,230	0
8/24/2015	0	139	501	110	8/26/2015	118	0	8/27/2015	0	750	118	1,192	2,060	0
8/25/2015	0	139	501	110	8/27/2015	144	0	8/28/2015	0	750	144	1,046	1,940	0
8/26/2015	527	139	501	110	8/28/2015	192	0	8/29/2015	527	223	192	928	1,870	0
8/27/2015	607	139	498	110	8/29/2015	286	0	8/30/2015	607	140	286	877	1,910	0
8/28/2015	706	139	500	110	8/30/2015	377	71	8/31/2015	706	43	448	853	2,050	0
8/29/2015	756	139	504	110	8/31/2015	476	124	9/1/2015	753	0	600	787	2,140	0
8/30/2015	855	139	613	104	9/1/2015	438	106	9/2/2015	856	0	544	700	2,100	0
8/31/2015	807	139	580	90	9/2/2015	455	124	9/3/2015	809	0	579	702	2,090	0
9/1/2015	770	139	545	90	9/3/2015	341	71	9/4/2015	774	0	412	654	1,840	0
9/2/2015	785	139	557	90	9/4/2015	222	71	9/5/2015	786	0	293	621	1,700	0
9/3/2015	899	139	674	90	9/5/2015	197	0	9/6/2015	903	0	197	600	1,700	0
9/4/2015	907	139	674	90	9/6/2015	286	71	9/7/2015	903	0	357	610	1,870	0
9/5/2015	976	139	718	90	9/7/2015	305	142	9/8/2015	947	0	447	656	2,050	0
9/6/2015	1,026	139	795	90	9/8/2015	352	142	9/9/2015	1,024	0	494	622	2,140	0
9/7/2015	1,198	139	979	90	9/9/2015	253	71	9/10/2015	1,208	0	324	678	2,210	0
9/8/2015	765	139	549	90	9/10/2015	39	18	9/11/2015	778	0	57	765	1,600	0
9/9/2015	402	139	396	90	9/11/2015	93	0	9/12/2015	402	223	93	782	1,500	0

Table 10. Controlled releases from reservoirs in the upper Delaware River Basin and segregation of flow of Delaware River at Montague, New Jersey, for report year ending November 30, 2015.—Continued

[Delaware River Master daily operations record. All provided measurements are the mean discharge in cubic foot 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 one day later; col. 4 = 24 hours beginning 1500 one day later; col. 5 = 24 hours beginning 0800 of date shown; col. 6 = 24 hours beginning 1600 of date shown; col. 7 = col. 2 + col. 3 + col. 4 in response to direction (col. 1); col. 8 = col. 2 + col. 3 + col. 4 − col. 7; col. 9 = col. 5 + col. 6; col. 10 = col. 11 − col. 7 − col. 8 − col. 9; col. 11 = 24 hours of calendar day shown; col. 12 = Interim Excess Release Quantity (IERQ) Bank releases; —, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow, Delaware River at Montague, New Jersey					
Directed								Controlled releases					
Date	Amount	Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	New York City reservoirs		Powerplants	Computed uncontrolled	Total	IERQ Bank releases
									Directed	Other				
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6		Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
9/10/2015	293	139	408	90	9/12/2015	236	0	9/13/2015	293	344	236	1,797	2,670	0
9/11/2015	588	139	408	90	9/13/2015	0	0	9/14/2015	588	49	0	1,483	2,120	0
9/12/2015	0	139	404	90	9/14/2015	41	0	9/15/2015	0	633	41	1,116	1,790	0
9/13/2015	274	139	401	90	9/15/2015	91	0	9/16/2015	274	356	91	989	1,710	0
9/14/2015	232	139	396	90	9/16/2015	119	71	9/17/2015	232	393	190	835	1,650	0
9/15/2015	432	133	331	90	9/17/2015	161	89	9/18/2015	432	122	250	826	1,630	0
9/16/2015	782	99	594	90	9/18/2015	128	71	9/19/2015	783	0	199	618	1,600	0
9/17/2015	1,173	99	979	90	9/19/2015	144	177	9/20/2015	1,002	166	321	651	2,140	100
9/18/2015	1,198	101	1,007	90	9/20/2015	0	0	9/21/2015	1,198	0	0	572	1,770	0
9/19/2015	1,190	101	1,002	90	9/21/2015	0	0	9/22/2015	1,193	0	0	537	1,730	0
9/20/2015	1,300	101	1,112	90	9/22/2015	15	0	9/23/2015	1,303	0	15	422	1,740	0
9/21/2015	1,300	101	1,105	90	9/23/2015	11	0	9/24/2015	1,296	0	11	453	1,760	0
9/22/2015	1,300	101	1,100	90	9/24/2015	0	0	9/25/2015	1,291	0	0	459	1,750	0
9/23/2015	1,450	101	1,253	90	9/25/2015	0	0	9/26/2015	1,444	0	0	396	1,840	0
9/24/2015	1,450	101	1,258	90	9/26/2015	211	0	9/27/2015	1,449	0	211	390	2,050	0
9/25/2015	1,450	101	1,256	90	9/27/2015	0	0	9/28/2015	1,447	0	0	373	1,820	0
9/26/2015	1,400	101	1,213	90	9/28/2015	13	0	9/29/2015	1,404	0	13	423	1,840	0
9/27/2015	1,400	101	956	90	9/29/2015	13	0	9/30/2015	1,147	0	13	2,250	3,410	0
9/28/2015	0	101	302	90	9/30/2015	9	0	10/1/2015	0	493	9	4,078	4,580	0
9/29/2015	0	101	302	80	10/1/2015	0	0	10/2/2015	0	483	0	3,297	3,780	0
9/30/2015	0	101	252	56	10/2/2015	0	71	10/3/2015	0	409	71	2,200	2,730	0
10/1/2015	0	101	152	56	10/3/2015	0	0	10/4/2015	0	309	0	1,971	2,280	0
10/2/2015	0	101	155	56	10/4/2015	0	0	10/5/2015	0	312	0	1,658	1,970	0
10/3/2015	0	101	155	56	10/5/2015	0	53	10/6/2015	0	312	53	1,515	1,880	0
10/4/2015	750	101	588	56	10/6/2015	16	0	10/7/2015	745	0	16	1,159	1,920	0
10/5/2015	1,050	101	886	56	10/7/2015	13	0	10/8/2015	1,043	0	13	1,124	2,180	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, 2015.—Continued

[Delaware River Master daily operations record. All provided measurements are the mean discharge in cubic foot 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 one day later; col. 4 = 24 hours beginning 1500 one day later; col. 5 = 24 hours beginning 0800 of date shown; col. 6 = 24 hours beginning 1600 of date shown; col. 7 = col. 2 + col. 3 + col. 4 in response to direction (col. 1); col. 8 = col. 2 + col. 3 + col. 4 − col. 7; col. 9 = col. 5 + col. 6; col. 10 = col. 11 − col. 7 − col. 8 − col. 9; col. 11 = 24 hours of calendar day shown; col. 12 = Interim Excess Release Quantity (IERQ) Bank releases; —, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow, Delaware River at Montague, New Jersey					
Directed								Controlled releases					
Date	Amount	Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	New York City reservoirs		Powerplants	Computed uncontrolled	Total	IERQ Bank releases
									Directed	Other				
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6		Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
10/6/2015	1,200	101	1,038	56	10/8/2015	0	0	10/9/2015	1,195	0	0	1,015	2,210	0
10/7/2015	1,200	101	1,047	56	10/9/2015	0	0	10/10/2015	1,204	0	0	986	2,190	0
10/8/2015	950	101	794	56	10/10/2015	0	0	10/11/2015	951	0	0	979	1,930	0
10/9/2015	893	99	732	56	10/11/2015	0	0	10/12/2015	887	0	0	1,013	1,900	0
10/10/2015	832	101	674	56	10/12/2015	0	0	10/13/2015	831	0	0	949	1,780	0
10/11/2015	888	101	732	56	10/13/2015	0	0	10/14/2015	889	0	0	781	1,670	0
10/12/2015	870	101	715	56	10/14/2015	0	0	10/15/2015	872	0	0	728	1,600	0
10/13/2015	908	101	752	56	10/15/2015	0	0	10/16/2015	909	0	0	691	1,600	0
10/14/2015	1,127	101	970	56	10/16/2015	0	0	10/17/2015	1,127	0	0	653	1,780	0
10/15/2015	1,141	101	985	56	10/17/2015	0	177	10/18/2015	1,142	0	177	791	2,110	0
10/16/2015	1,250	101	1,091	56	10/18/2015	0	0	10/19/2015	1,248	0	0	772	2,020	0
10/17/2015	1,250	101	1,092	56	10/19/2015	40	0	10/20/2015	1,249	0	40	771	2,060	0
10/18/2015	1,300	101	1,135	56	10/20/2015	0	0	10/21/2015	1,292	0	0	738	2,030	0
10/19/2015	1,100	101	936	56	10/21/2015	0	0	10/22/2015	1,093	0	0	737	1,830	0
10/20/2015	1,095	101	936	56	10/22/2015	0	0	10/23/2015	1,093	0	0	707	1,800	0
10/21/2015	1,037	101	877	56	10/23/2015	0	0	10/24/2015	1,034	0	0	696	1,730	0
10/22/2015	1,069	101	908	56	10/24/2015	0	0	10/25/2015	1,065	0	0	765	1,830	0
10/23/2015	1,015	101	852	56	10/25/2015	0	0	10/26/2015	1,009	0	0	921	1,930	0
10/24/2015	1,031	101	871	56	10/26/2015	0	0	10/27/2015	1,028	0	0	952	1,980	0
10/25/2015	0	101	627	56	10/27/2015	13	0	10/28/2015	784	0	13	1,053	1,850	0
10/26/2015	531	101	224	56	10/28/2015	13	0	10/29/2015	381	0	13	5,546	5,940	0
10/27/2015	0	101	149	56	10/29/2015	0	0	10/30/2015	0	306	0	12,094	12,400	0
10/28/2015	0	99	149	56	10/30/2015	0	71	10/31/2015	0	304	71	6,775	7,150	0
10/29/2015	0	102	150	59	10/31/2015	0	0	11/1/2015	0	311	0	4,729	5,040	0
10/30/2015	0	102	150	56	11/1/2015	0	18	11/2/2015	0	308	18	3,764	4,090	0
10/31/2015	0	102	150	56	11/2/2015	0	53	11/3/2015	0	308	53	3,173	3,540	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, 2015.—Continued

[Delaware River Master daily operations record. All provided measurements are the mean discharge in cubic foot 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 one day later; col. 4 = 24 hours beginning 1500 one day later; col. 5 = 24 hours beginning 0800 of date shown; col. 6 = 24 hours beginning 1600 of date shown; col. 7 = col. 2 + col. 3 + col. 4 in response to direction (col. 1); col. 8 = col. 2 + col. 3 + col. 4 − col. 7; col. 9 = col. 5 + col. 6; col. 10 = col. 11 − col. 7 − col. 8 − col. 9; col. 11 = 24 hours of calendar day shown; col. 12 = Interim Excess Release Quantity (IERQ) Bank releases; —, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow, Delaware River at Montague, New Jersey					
Directed								Controlled releases					
Date	Amount	Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	New York City reservoirs		Powerplants	Computed uncontrolled	Total	IERQ Bank releases
									Directed	Other				
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6		Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
11/1/2015	0	102	150	56	11/3/2015	0	89	11/4/2015	0	308	89	2,743	3,140	0
11/2/2015	0	101	150	56	11/4/2015	0	89	11/5/2015	0	307	89	2,464	2,860	0
11/3/2015	0	99	150	56	11/5/2015	0	89	11/6/2015	0	305	89	2,266	2,660	0
11/4/2015	0	101	152	56	11/6/2015	0	53	11/7/2015	0	309	53	2,088	2,450	0
11/5/2015	0	101	152	56	11/7/2015	0	53	11/8/2015	0	309	53	1,898	2,260	0
11/6/2015	0	101	152	56	11/8/2015	0	53	11/9/2015	0	309	53	1,778	2,140	0
11/7/2015	0	101	152	56	11/9/2015	0	195	11/10/2015	0	309	195	1,666	2,170	0
11/8/2015	0	101	153	56	11/10/2015	0	106	11/11/2015	0	310	106	3,094	3,510	0
11/9/2015	0	101	152	56	11/11/2015	0	89	11/12/2015	0	309	89	10,702	11,100	0
11/10/2015	0	101	152	56	11/12/2015	7	89	11/13/2015	0	309	96	7,855	8,260	0
11/11/2015	0	101	153	56	11/13/2015	0	89	11/14/2015	0	310	89	6,501	6,900	0
11/12/2015	0	101	152	56	11/14/2015	0	89	11/15/2015	0	309	89	5,072	5,470	0
11/13/2015	0	102	152	56	11/15/2015	11	0	11/16/2015	0	310	11	4,329	4,650	0
11/14/2015	0	101	153	56	11/16/2015	190	0	11/17/2015	0	310	190	3,750	4,250	0
11/15/2015	0	99	150	56	11/17/2015	277	0	11/18/2015	0	305	277	3,348	3,930	0
11/16/2015	0	101	150	56	11/18/2015	229	89	11/19/2015	0	307	318	3,175	3,800	0
11/17/2015	0	101	150	56	11/19/2015	241	160	11/20/2015	0	307	401	4,372	5,080	0
11/18/2015	0	101	152	56	11/20/2015	494	0	11/21/2015	0	309	494	7,447	8,250	0
11/19/2015	0	101	152	56	11/21/2015	7	0	11/22/2015	0	309	7	5,594	5,910	0
11/20/2015	0	101	152	56	11/22/2015	72	0	11/23/2015	0	309	72	4,729	5,110	0
11/21/2015	0	101	152	56	11/23/2015	437	160	11/24/2015	0	309	597	4,034	4,940	0
11/22/2015	0	101	152	56	11/24/2015	337	106	11/25/2015	0	309	443	3,518	4,270	0
11/23/2015	0	101	153	56	11/25/2015	330	0	11/26/2015	0	310	330	3,200	3,840	0
11/24/2015	0	101	153	54	11/26/2015	0	0	11/27/2015	0	308	0	2,962	3,270	0
11/25/2015	0	101	150	57	11/27/2015	0	0	11/28/2015	0	308	0	2,772	3,080	0
11/26/2015	0	101	152	56	11/28/2015	0	0	11/29/2015	0	309	0	2,631	2,940	0
11/27/2015	0	101	152	56	11/29/2015	99	0	11/30/2015	0	309	99	2,482	2,890	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, 2015.—Continued

[Delaware River Master daily operations record. All provided measurements are the mean discharge in cubic foot 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 one day later; col. 4 = 24 hours beginning 1500 one day later; col. 5 = 24 hours beginning 0800 of date shown; col. 6 = 24 hours beginning 1600 of date shown; col. 7 = col. 2 + col. 3 + col. 4 in response to direction (col. 1); col. 8 = col. 2 + col. 3 + col. 4 − col. 7; col. 9 = col. 5 + col. 6; col. 10 = col. 11 − col. 7 − col. 8 − col. 9; col. 11 = 24 hours of calendar day shown; col. 12 = Interim Excess Release Quantity (IERQ) Bank releases; —, not applicable]

Controlled releases from New York City reservoirs					Controlled releases from power reservoirs			Segregation of flow, Delaware River at Montague, New Jersey						
Directed								Controlled releases						
Date	Amount	Pepacton	Cannonsville	Neversink	Date	Lake Wallenpaupack	Rio Reservoir	Date	New York City reservoirs		Powerplants	Computed uncontrolled	Total	IERQ Bank releases
									Directed	Other				
	Col. 1	Col. 2	Col. 3	Col. 4		Col. 5	Col. 6		Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12
						Monthly totals								
Dec. 2014	0	2,617	3,461	1,578	Dec. 2014	1,838	0	Dec. 2014	0	7,656	1,838	154,336	163,830	0
Jan. 2015	0	2,338	3,692	1,536	Jan. 2015	10,138	0	Jan. 2015	0	7,566	10,138	96,606	114,310	0
Feb. 2015	0	1,755	2,663	1,227	Feb. 2015	11,237	6,187	Feb. 2015	0	5,645	17,424	41,191	64,260	0
Mar. 2015	0	2,157	2,924	1,339	Mar. 2015	1,303	3,352	Mar. 2015	0	6,420	4,655	118,275	129,350	0
Apr. 2015	0	1,513	2,011	1,081	Apr. 2015	10,248	14,202	Apr. 2015	0	4,605	24,450	338,095	367,150	0
May 2015	1,667	2,370	5,306	1,786	May 2015	3,407	2,741	May 2015	1,715	7,747	6,148	63,259	78,910	0
June 2015	0	3,564	9,707	2,691	June 2015	13,593	3,281	June 2015	0	15,962	16,874	112,774	145,610	0
July 2015	290	13,526	38,164	4,581	July 2015	15,682	5,406	July 2015	290	55,981	21,088	132,541	209,900	0
Aug. 2015	6,987	4,313	20,296	3,410	Aug. 2015	8,676	2,090	Aug. 2015	6,986	21,033	10,766	39,485	78,270	0
Sept. 2015	27,358	3,704	22,767	2,734	Sept. 2015	4,640	1,348	Sept. 2015	26,924	2,286	5,988	22,767	57,960	100
Oct. 2015	22,487	3,127	21,078	1,794	Oct. 2015	104	372	Oct. 2015	23,071	2,928	476	58,115	84,640	0
Nov. 2015	0	3,031	4,545	1,682	Nov. 2015	2,731	1,669	Nov. 2015	0	9,258	4,400	118,136	131,800	0

Table 11. Daily mean discharge, Delaware River at Montague, New Jersey (U.S. Geological Survey site number 01438500), for report year ending November 30, 2015.

[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. 2014	Jan. 2015	Feb. 2015	Mar. 2015	Apr. 2015	May 2015	June 2015	July 2015	Aug. 2015	Sept. 2015	Oct. 2015	Nov. 2015
1	2,100	4,390	1,680e	1,630e	5,130	4,220	3,030	14,400	3,670	2,180	4,720	5,040
2	2,170	4,030	1,610e	1,480e	5,220	3,810	3,830	18,000	3,380	2,130	3,910	4,090
3	2,630	4,010	1,720e	1,420e	8,900	3,620	4,200	14,100	3,300	2,120	2,850	3,540
4	2,870	3,770	1,940e	1,640e	20,000	3,340	3,470	11,800	3,060	1,870	2,400	3,140
5	3,100	6,470	2,040e	1,680e	23,700	3,040	3,460	12,000	2,690	1,730	2,070	2,860
6	3,220	7,260	1,950e	1,800e	17,600	2,730	2,740	9,950	2,300	1,740	1,880	2,660
7	6,910	5,100e	2,060e	1,820e	16,200	2,610	2,350	8,660	2,030	1,910	1,940	2,450
8	7,170	3,800e	2,100e	1,840e	19,400	2,590	2,340	7,670	2,030	2,080	2,220	2,260
9	5,680	3,600e	1,780e	1,750e	23,500	2,490	3,600	6,370	1,870	2,180	2,270	2,140
10	8,490	3,400e	1,870e	1,800e	22,900	2,190	4,630	5,890	1,870	2,250	2,260	2,170
11	8,060	3,300e	2,230e	2,200e	28,100	2,250	4,280	5,910	2,000	1,630	2,010	3,510
12	6,230	3,700e	2,050e	3,000e	20,200	2,400	3,560	4,760	3,130	1,540	2,000	11,100
13	5,140	3,550e	1,850e	3,700e	15,300	2,120	3,260	4,220	3,070	2,700	1,880	8,260
14	4,450	3,400e	1,750e	4,600e	13,500	1,790	3,060	4,140	2,300	2,160	1,790	6,900
15	4,240	3,400e	1,700e	5,800e	12,500	1,740	3,030	4,190	2,170	1,830	1,740	5,470
16	4,150	2,950e	1,750e	6,000e	9,680	1,850	6,280	5,060	2,090	1,740	1,750	4,650
17	4,050	2,600e	1,950e	6,700e	7,940	2,040	6,220	4,670	2,160	1,680	1,960	4,250
18	4,430	2,750e	2,150e	7,610e	7,270	3,060	5,050	4,580	2,090	1,660	2,110	3,930
19	4,770	3,150e	2,040e	7,950e	6,250	2,890	4,170	4,660	2,110	1,630	2,020	3,800
20	4,190	3,050e	2,110e	6,930e	5,580	2,840	3,850	4,720	2,020	2,170	2,060	5,080
21	3,610	2,900e	2,310e	5,750e	8,240	2,770	4,590	4,700	3,680	1,810	2,030	8,250
22	3,330	2,750e	2,070e	4,690	13,900	2,560	9,280	4,170	4,480	1,760	1,830	5,910
23	3,280	2,650e	1,570e	4,250	11,000	2,390	8,800	3,980	3,700	1,770	1,800	5,110
24	3,680	2,550e	1,580e	4,030	9,380	1,870	6,830	3,820	2,710	1,800	1,730	4,940
25	7,660	2,400e	1,980e	3,690	7,680	1,790	5,670	3,730	2,460	1,770	1,830	4,270
26	11,200	2,250e	2,080e	3,670	6,670	1,940	4,850	3,890	2,230	1,860	1,930	3,840
27	8,460	2,100e	1,850e	4,840	5,960	2,010	4,210	6,180	2,060	2,070	1,980	3,270
28	6,770	2,050e	1,950e	5,990	5,630	2,380	6,530	5,660	1,940	1,840	1,850	3,080
29	6,500	2,100e	—	5,370	5,230	2,760	9,110	4,770	1,870	1,860	5,940	2,940
30	5,950	2,150e	—	4,830	4,490	2,510	8,360	4,340	1,910	3,500	12,400	2,890
31	5,170	1,850e	—	5,040	—	2,310	—	3,770	2,050	—	7,150	—
Total[1]	**159,660**	**103,430**	**53,720**	**123,500**	**367,050**	**78,910**	**144,640**	**204,760**	**78,430**	**58,970**	**86,310**	**131,800**
Mean[2]	5,150	3,336	1,919	3,984	12,235	2,545	4,821	6,605	2,530	1,966	2,784	4,393

[1]The year's total is 1,591,180 cubic feet per second accumulated daily.

[2]The combined mean is 4,356 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, 2015.

[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. 2014	Jan. 2015	Feb. 2015	Mar. 2015	Apr. 2015	May 2015	June 2015	July 2015	Aug. 2015	Sept. 2015	Oct. 2015	Nov. 2015
1	98	84	64	101	54	66	96	522	124	132	103	107
2	98	84	64	101	54	72	97	693	124	132	103	107
3	98	85	65	101	55	72	96	618	125	132	103	105
4	94	85	65	101	54	72	100	525	125	132	103	105
5	79	84	65	101	53	72	105	489	126	135	103	105
6	79	83	65	102	53	72	105	487	125	135	103	105
7	80	83	65	103	54	72	104	487	125	135	104	105
8	79	83	65	103	54	73	104	486	125	135	104	105
9	79	84	65	100	55	72	105	486	125	136	104	105
10	79	84	65	85	55	72	105	486	125	135	104	105
11	81	84	65	74	54	72	105	487	126	135	104	105
12	81	87	65	64	52	74	105	487	126	136	104	105
13	81	87	65	56	52	74	105	486	127	135	104	106
14	81	87	64	57	52	73	105	487	127	135	104	106
15	81	81	63	58	52	74	105	487	127	135	105	105
16	81	75	63	58	52	75	115	487	128	113	105	105
17	81	75	63	58	53	75	128	487	129	103	106	105
18	80	75	63	58	53	75	128	487	132	104	106	105
19	80	75	71	56	54	74	127	487	132	105	106	105
20	80	75	75	56	53	74	127	487	132	105	105	105
21	79	75	77	56	54	85	127	487	133	105	106	105
22	81	75	77	56	65	89	127	487	132	103	106	105
23	81	76	83	56	52	89	127	487	132	103	106	104
24	82	77	100	56	52	88	127	487	132	103	106	104
25	82	77	101	54	52	88	127	412	132	103	106	104
26	82	77	101	54	52	89	127	306	129	103	106	104
27	82	77	100	55	52	90	128	215	132	103	107	104
28	82	77	100	54	52	89	127	139	132	103	106	103
29	83	69	—	54	52	88	126	124	132	103	106	103
30	83	63	—	55	52	89	173	124	131	104	107	103
31	83	63	—	54	—	89	—	124	132	—	107	—
Total[1]	**2,569**	**2,447**	**2,039**	**2,194**	**1,608**	**2,424**	**3,482**	**13,540**	**3,984**	**3,578**	**3,252**	**3,145**
Mean[2]	82.9	78.9	72.8	70.8	53.6	78.2	116	437	128	119	105	105

[1]The year's total is 44,262 cubic feet per second accumulated daily.

[2]The combined mean is 120.6 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, 2015.

[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. 2014	Jan. 2015	Feb. 2015	Mar. 2015	Apr. 2015	May 2015	June 2015	July 2015	Aug. 2015	Sept. 2015	Oct. 2015	Nov. 2015
1	102	147	104	126	88	161	201	863	1,550	588	262	135
2	103	145	104	125	88	157	208	2,060	1,420	534	139	136
3	103	147	103	124	92	152	209	2,720	1,060	558	141	138
4	104	148	103	124	97	151	219	2,540	774	675	143	138
5	106	147	102	123	96	150	232	2,180	570	679	597	138
6	109	148	102	123	94	150	235	1,850	510	759	905	139
7	109	146	102	123	95	151	232	1,630	555	813	1,050	141
8	110	145	98	122	98	151	239	1,440	547	969	1,060	146
9	111	145	92	117	98	151	240	1,140	503	547	807	148
10	113	145	93	95	99	152	237	882	503	394	735	151
11	113	145	94	86	96	152	235	720	513	407	687	172
12	116	145	96	75	94	152	236	713	508	409	735	157
13	117	144	96	70	94	159	235	712	505	407	711	152
14	119	143	96	71	97	154	240	718	502	401	762	149
15	120	137	96	78	98	172	250	1,440	502	396	976	151
16	121	120	96	82	98	299	302	1,550	502	342	996	149
17	144	119	96	86	98	313	407	1,550	502	587	1,090	148
18	155	118	96	89	98	194	407	1,560	504	997	1,090	148
19	153	118	96	89	98	152	407	1,560	503	1,020	1,140	151
20	146	118	96	89	98	151	408	1,550	505	1,020	952	151
21	144	120	96	89	102	174	415	1,560	505	1,120	936	152
22	149	120	96	89	100	188	447	1,550	502	1,120	895	150
23	150	120	102	87	100	188	506	1,550	502	1,120	923	150
24	152	120	116	88	100	188	504	1,550	502	1,260	874	151
25	147	120	119	88	102	188	502	1,550	502	1,260	891	151
26	148	119	120	88	130	188	502	1,550	502	1,260	639	150
27	148	118	120	88	158	188	505	1,550	502	1,220	220	150
28	148	118	126	88	180	187	510	1,550	502	961	133	151
29	148	112	—	87	173	186	510	1,550	502	319	140	151
30	148	104	—	88	154	186	514	1,560	503	326	133	151
31	148	104	—	88	—	187	—	1,550	619	—	134	—
Total[1]	**4,004**	**4,045**	**2,860**	**2,986**	**3,212**	**5,472**	**10,294**	**46,448**	**18,681**	**22,468**	**20,896**	**4,445**
Mean[2]	129	130	102	96.3	107	176	343	1,498	603	749	674	148

[1]The year's total is 145,811 cubic feet per second accumulated daily.

[2]The combined mean is 396.4 cubic feet per second.

Table 15. Daily mean discharge, Neversink River at Neversink, New York (USGS site number 01436000) for report year ending November 30, 2012.

[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. 2014	Jan. 2015	Feb. 2015	Mar. 2015	Apr. 2015	May 2015	June 2015	July 2015	Aug. 2015	Sept. 2015	Oct. 2015	Nov. 2015
1	57	50	41	55	37	51	72	577	106	97	65	55
2	57	50	41	54	37	57	75	426	106	91	56	55
3	57	50	40	55	38	57	75	187	106	91	55	55
4	55	50	40	55	36	58	78	157	105	91	55	55
5	51	48	40	54	37	59	82	137	105	91	56	55
6	52	49	40	55	38	59	81	133	105	89	56	55
7	51	49	40	55	38	58	82	130	105	89	56	55
8	50	49	40	54	38	57	82	130	106	89	56	55
9	50	49	41	53	38	58	81	130	108	89	56	55
10	50	49	40	47	38	58	81	130	108	89	55	55
11	51	49	40	41	37	57	81	137	110	89	56	56
12	50	50	40	34	37	57	82	140	109	89	56	55
13	50	49	40	35	37	57	81	140	110	88	56	55
14	51	49	41	36	37	57	82	143	110	88	55	54
15	52	50	39	34	37	57	82	144	110	89	55	55
16	52	48	39	35	37	57	89	144	110	89	55	55
17	51	49	40	35	37	57	100	144	110	89	54	55
18	50	50	40	35	37	57	100	144	111	89	54	55
19	50	51	45	35	37	57	100	144	110	89	54	56
20	50	51	48	35	37	58	99	144	111	88	55	55
21	51	51	49	36	37	64	98	144	111	89	55	55
22	51	51	49	35	38	66	102	144	111	89	55	55
23	51	52	50	35	37	66	107	144	111	89	54	55
24	52	51	55	35	36	66	106	144	111	89	55	55
25	51	51	54	35	37	66	107	144	110	89	55	55
26	51	52	55	36	37	66	108	144	111	89	55	55
27	52	51	55	36	36	66	107	144	110	89	55	55
28	51	50	55	36	37	66	206	116	110	89	56	55
29	50	44	—	37	37	66	365	105	111	89	55	55
30	50	40	—	37	37	66	313	105	111	89	55	55
31	50	40	—	37	—	66	—	105	110	—	55	—
Total[1]	**1,597**	**1,521**	**1,235**	**1,286**	**1,116**	**1,869**	**3,303**	**5,000**	**3,378**	**2,679**	**1,721**	**1,656**
Mean[2]	51.5	49.1	44.1	41.5	37.2	60.3	110	161	109	89.3	55.5	55.2

[1]The year's total is 26,361 cubic feet per second accumulated daily.

[2]The combined mean is 72.0 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, 2015.

[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. 2014	Jan. 2015	Feb. 2015	Mar. 2015	Apr. 2015	May 2015	June 2015	July 2015	Aug. 2015	Sept. 2015	Oct. 2015	Nov. 2015
1	4,650	9,810	4,000e	3,680e	12,900	9,570	6,120	28,400	7,480	3,980	8,020	13,300
2	4,900	8,580	3,800e	3,440e	12,800	8,890	10,500	39,800	6,880	3,760	8,790	10,400
3	5,880	7,620	3,700e	3,120e	12,500	8,400	11,900	34,600	6,480	3,750	8,440	8,920
4	6,990	9,930	3,600e	3,360e	16,900	7,800	12,300	26,800	6,170	3,720	7,540	8,200
5	6,970	10,100	3,800e	3,980e	31,500	7,290	10,200	22,900	5,980	3,640	6,700	7,110
6	7,750	11,500	3,600e	4,050e	31,700	7,000	8,400	21,300	5,320	3,450	5,560	6,330
7	11,300	11,800	3,600e	4,000e	26,400	6,720	7,470	18,800	4,810	3,650	4,900	6,000
8	12,400	10,100	3,700e	4,240e	25,100	6,250	6,180	16,500	4,330	3,420	4,430	5,710
9	16,900	8,000e	3,600e	4,250e	28,100	6,090	7,010	15,200	4,070	3,180	4,480	5,140
10	16,600	8,500e	3,400e	4,560e	30,800	5,990	8,740	15,300	4,160	3,780	5,080	4,770
11	16,200	8,000e	3,500e	6,430e	31,500	5,720	9,020	14,700	4,340	5,600	6,080	4,890
12	15,100	7,800e	3,600e	11,300e	33,100	5,270	8,450	12,800	6,000	5,600	6,020	5,730
13	12,400	7,500e	3,630e	13,400e	25,400	5,090	7,480	11,200	6,260	5,600	5,110	12,800
14	10,600	8,200e	3,500e	16,800	21,000	4,940	6,690	9,930	6,110	7,630	4,230	11,900
15	9,460	8,000e	3,620e	23,400	19,100	4,480	8,080	10,600	5,220	6,460	3,920	10,600
16	8,710	7,500e	3,620e	19,100	17,600	4,180	11,400	11,500	4,520	5,250	3,520	9,100
17	8,500	6,200e	3,830e	18,500	14,800	4,200	11,700	10,100	4,420	4,670	3,360	8,050
18	8,220	5,500e	4,340e	20,200	13,200	4,980	12,400	9,580	4,330	4,280	3,280	7,280
19	8,150	6,000e	4,600e	18,900	12,100	5,040	10,800	9,460	4,040	3,870	3,380	6,930
20	8,650	6,500e	4,720e	17,500	13,400	5,820	8,980	9,040	4,140	3,620	3,500	9,250
21	8,070	6,500e	5,430e	15,600	15,600	5,240	9,050	8,520	5,470	3,490	3,450	10,800
22	7,230	6,000e	5,590e	14,500	19,200	5,160	11,600	8,520	6,780	3,810	3,460	12,900
23	6,740	5,800e	4,300e	14,000	23,800	4,840	15,000	7,690	8,210	3,500	3,380	10,800
24	7,510	5,200e	3,460e	12,400	20,300	4,550	15,400	7,030	7,340	3,360	3,160	9,440
25	11,400	4,800e	3,960e	11,500	17,100	4,340	12,600	6,680	6,140	3,310	3,090	8,990
26	13,900	4,600e	4,250e	11,000	14,400	3,940	10,600	6,580	5,350	3,290	3,110	8,410
27	17,100	4,200e	3,960e	16,400	12,800	3,650	[1]9,650	7,030	4,770	3,190e	3,250	7,560
28	14,300	4,500e	3,680e	16,200	11,900	3,710	11,800e	11,300	4,340	3,270	3,550e	6,740
29	12,500	4,200e	—	15,200	11,300	4,060	17,100	10,700	3,980	3,480	6,240e	6,400
30	11,500	4,000e	—	13,800	10,600	4,460	18,000	9,070	3,960	4,950	16,300	6,070
31	11,100	4,300e	—	12,700	—	4,530	—	8,530	4,160	—	20,000	—
Total[1]	**321,680**	**221,240**	**110,390**	**357,510**	**586,900**	**172,200**	**314,620**	**440,160**	**165,560**	**124,560**	**175,330**	**250,420**
Mean[2]	10,377	7,137	3,942	11,533	19,563	5,555	10,487	14,199	5,341	4,152	5,656	8,351

[1]The year's total is 3,240,670 cubic feet per second accumulated daily.

[2]The combined mean is 8,857.7 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, 2015.

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

Day	Dec. 2014		Jan. 2015		Feb. 2015		Mar. 2015		Apr. 2015		May 2015		June 2015		July 2015		Aug. 2015		Sept. 2015		Oct. 2015		Nov. 2015	
	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	9,800	12,900	6,050	18,100	7,450	21,100	12,500	13,600	4,520	12,600	5,340	13,300	5,200	10,900	3,240	14,000	4,550	19,600	9,090	19,600	11,600	16,900	11,000
2	19,000	10,400	11,100	4,850	17,900	8,730	22,900	13,300	14,300	4,470	13,500	5,130	11,700	5,120	10,200	2,230	13,400	4,700	19,800	8,860	21,500	12,900	16,700	10,800
3	20,500	10,900	12,800	4,790	15,400	6,740	21,200	12,500	12,400	4,180	13,300	5,440	13,300	5,560	9,270	1,870	13,500	5,100	16,800	8,910	22,300	15,100	16,100	10,100
4	17,800	10,000	14,000	5,020	17,000	7,170	21,200	11,800	10,900	3,470	12,300	5,190	12,000	5,130	8,580	1,640	12,800	5,160	17,500	8,880	23,300	14,800	16,400	9,720
5	17,600	9,750	10,100	3,570	13,600	6,750	19,300	11,600	11,600	3,440	12,100	4,950	11,300	5,120	7,970	1,450	12,600	5,140	18,600	10,100	22,000	13,900	16,100	9,760
6	19,000	10,500	9,320	2,850	17,100	6,880	19,000	10,600	9,240	2,700	10,500	4,780	11,300	4,900	6,800	1,380	13,000	5,210	17,200	10,000	20,000	12,700	16,600	9,580
7	18,100	9,860	9,950	3,220	17,100	7,530	19,300	9,320	8,830	2,280	11,800	4,870	10,900	5,070	5,620	1,320	14,900	5,640	17,500	10,100	20,000	12,500	15,700	9,750
8	20,800	10,900	10,700	2,440	16,800	7,340	17,700	10,100	7,740	2,220	11,600	5,120	11,000	5,040	4,580	1,220	16,200	6,780	16,700	9,990	20,800	11,900	17,200	9,200
9	22,400	10,800	12,100	2,430	17,200	9,780	18,700	9,480	9,360	2,200	11,100	5,130	8,090	4,820	6,680	1,250	16,500	6,870	17,700	9,470	19,900	12,200	17,200	9,730
10	19,900	8,810	9,860	1,780	19,900	10,200	17,900	9,270	8,680	2,030	11,100	5,090	8,930	4,330	7,190	1,190	16,100	7,750	16,600	9,530	19,200	12,100	19,300	10,600
11	17,500	8,380	11,100	2,660	22,200	11,700	17,500	8,940	6,200	1,730	10,300	5,370	9,090	4,360	7,880	1,280	13,300	7,100	16,800	9,150	19,500	12,200	18,600	10,900
12	16,600	8,060	12,800	4,110	21,500	12,400	15,000	6,680	4,710	1,390	10,400	5,200	10,500	4,190	8,420	1,340	13,800	5,910	17,400	9,520	20,100	12,800	19,800	11,300
13	18,200	7,750	14,200	4,680	19,100	11,800	13,800	6,180	5,070	1,320	10,500	4,750	8,920	3,960	8,610	1,440	14,900	6,100	16,200	9,450	21,100	13,100	17,800	11,000
14	18,200	7,190	16,000	6,820	21,500	11,400	13,900	5,080	5,270	1,080	13,500	4,750	11,000	3,990	8,680	1,650	15,000	6,300	15,300	8,860	19,800	13,000	13,800	8,660
15	19,300	7,820	18,300	8,730	17,400	8,870	12,800	4,160	5,280	1,060	13,800	5,660	11,600	4,290	9,300	1,770	15,000	6,410	15,000	8,460	19,900	12,700	16,100	8,920
16	19,100	9,240	17,900	8,240	22,300	9,960	12,000	3,130	5,920	1,000	13,000	5,980	11,000	4,320	9,130	1,730	14,900	6,360	15,900	8,300	19,100	12,500	16,600	8,490
17	19,300	9,200	17,900	8,110	24,600	12,900	14,500	3,140	6,040	1,000	12,200	5,500	9,150	4,170	10,300	1,840	14,200	6,330	16,600	8,490	19,700	12,400	19,000	8,490
18	17,100	7,810	19,000	8,600	25,200	13,300	11,400	2,940	5,760	937	13,400	5,740	11,800	4,500	8,900	2,040	13,900	6,340	16,900	8,820	20,600	12,400	17,100	9,570
19	16,900	7,400	16,600	6,820	24,700	13,500	10,500	2,530	5,600	1,080	14,300	6,220	10,800	4,330	7,640	1,910	13,700	6,700	16,600	9,140	21,700	12,600	17,000	9,530
20	19,600	7,950	15,100	6,330	20,000	12,300	10,500	2,510	5,390	1,190	14,000	6,470	10,400	4,230	7,610	1,910	14,100	7,710	16,400	9,200	19,700	13,500	15,600	9,000
21	19,800	8,920	14,600	6,150	22,000	12,700	11,400	2,370	5,190	1,080	13,200	6,120	10,400	4,190	8,840	2,010	13,200	7,210	19,200	9,370	19,300	11,500	17,600	8,640
22	18,700	9,650	15,100	6,220	22,100	12,200	11,000	2,490	4,130	1,080	13,100	6,640	8,790	3,740	9,940	2,170	15,000	6,750	19,100	11,100	20,700	11,500	16,100	8,730
23	20,400	9,490	14,700	6,490	22,500	12,500	9,450	2,310	2,080	942	12,300	6,420	9,290	3,920	11,000	2,350	15,100	7,180	19,500	11,400	20,500	12,000	15,500	8,280
24	19,300	9,610	14,700	6,870	22,300	12,300	5,790	2,080	2,750	721	14,400	6,270	9,660	3,500	13,000	3,010	17,600	7,790	19,900	10,800	21,100	13,000	17,100	7,840
25	16,500	9,070	13,500	6,170	22,800	13,400	7,770	2,170	5,560	742	11,800	6,050	11,100	3,730	13,800	3,750	17,400	7,900	20,400	11,900	20,400	13,400	15,700	7,850
26	14,000	7,850	12,700	6,070	22,000	13,400	8,190	2,150	5,360	885	12,700	5,780	11,500	4,400	15,900	5,630	18,600	7,850	20,300	12,500	20,000	12,900	15,900	7,640
27	14,200	7,460	16,700	7,660	21,900	13,300	6,760	2,060	7,560	1,600	12,400	4,760	13,300	5,180	15,500	4,230	19,600	8,340	20,400	12,300	20,300	13,400	15,600	7,600
28	13,500	6,770	16,000	7,950	21,200	12,100	8,500	2,070	9,620	1,730	11,700	4,400	11,000	4,960	14,700	4,240	19,600	8,960	19,300	12,000	21,800	14,300	15,600	7,710
29	13,300	6,680	17,200	7,680	—	—	12,100	2,090	11,300	3,480	12,600	4,590	10,000	4,030	14,900	4,880	19,900	9,360	19,300	12,100	20,100	13,100	15,900	7,960
30	14,300	6,410	16,900	8,040	—	—	13,600	4,050	12,400	4,220	13,600	5,260	10,200	4,040	15,000	4,360	20,500	9,680	19,100	11,500	17,500	12,000	16,800	8,640
31	14,300	6,510	13,900	7,030	—	—	13,200	4,740	—	—	13,600	5,280	—	—	13,300	4,110	20,000	9,140	—	—	18,100	11,700	—	—
Mean	17,823	8,740	14,120	5,756	20,193	10,664	14,128	5,946	7,595	1,993	12,274	5,427	10,711	4,477	10,005	2,401	15,558	6,849	17,920	9,976	20,310	12,765	16,713	9,233
Max	22,400	10,900	19,000	8,730	25,200	13,500	22,900	13,300	14,300	4,520	14,400	6,640	13,300	5,560	15,900	5,630	20,500	9,680	20,400	12,500	23,300	15,100	19,800	11,300
Min	13,300	6,410	9,320	1,780	13,600	6,740	5,790	2,060	2,080	721	10,300	4,400	8,090	3,500	4,580	1,190	12,600	4,550	15,000	8,300	17,500	11,500	13,800	7,600

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, 2015.

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

Day	Dec. 2014		Jan. 2015		Feb. 2015		Mar. 2015		Apr. 2015		May 2015		June 2015		July 2015		Aug. 2015		Sept. 2015		Oct. 2015		Nov. 2015	
	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	115	115	49	42	92	87	205	161	87	71	64	50	74	57	50	50	50	50	93	65	161	124	161	92
2	139	87	49	49	92	87	221	189	87	71	65	50	74	57	50	50	50	50	103	59	148	102	102	92
3	125	87	49	49	92	87	205	174	87	71	65	50	65	57	50	50	50	50	114	65	161	102	102	83
4	105	87	49	49	104	92	221	161	87	78	65	59	74	57	50	50	50	50	103	42	161	74	102	83
5	105	87	50	43	124	102	205	148	78	71	67	50	74	50	50	43	57	50	135	92	124	102	102	83
6	105	87	50	50	113	92	189	161	78	63	57	50	74	65	50	43	57	50	148	92	113	92	92	74
7	118	87	50	50	102	92	161	148	78	63	57	50	74	57	50	43	50	50	102	92	113	83	92	65
8	97	78	50	50	113	102	148	148	78	63	57	50	74	65	43	43	50	50	124	92	116	92	83	65
9	87	87	50	50	113	113	221	161	71	63	57	50	74	65	57	43	57	50	148	92	116	90	83	65
10	97	69	50	50	102	92	174	161	73	61	57	50	65	57	43	43	57	50	124	92	98	82	92	74
11	87	69	50	50	113	111	161	148	71	50	50	50	65	57	43	36	57	50	102	83	96	90	83	65
12	87	69	50	50	124	102	161	148	63	50	57	50	74	57	50	43	50	50	113	83	98	90	124	65
13	78	69	71	50	113	92	161	148	50	50	57	50	65	57	43	43	50	50	102	90	136	98	90	82
14	78	61	63	50	136	102	154	124	56	50	57	50	74	57	43	43	57	50	107	92	116	90	90	74
15	78	61	63	50	136	121	148	102	57	50	57	50	65	57	43	43	57	50	116	90	126	90	82	67
16	61	53	63	50	136	124	102	92	50	50	57	50	65	65	43	36	57	50	107	98	147	90	82	67
17	71	50	63	60	148	124	92	92	50	50	57	57	74	57	50	36	57	57	107	82	170	90	90	67
18	56	50	63	60	189	148	92	65	50	50	64	57	75	57	50	43	57	50	107	82	136	98	82	67
19	56	50	63	56	135	118	92	83	83	50	65	57	65	50	50	43	57	50	116	90	196	90	82	67
20	56	50	71	63	136	124	92	57	51	50	74	57	65	57	43	43	57	50	126	90	136	98	74	67
21	56	50	56	50	135	124	92	83	50	50	74	57	57	50	50	43	65	57	126	98	158	90	74	67
22	56	50	71	63	174	148	92	83	50	50	65	57	57	50	50	43	57	57	170	98	243	107	67	59
23	56	49	63	63	205	174	78	78	57	50	65	57	57	50	50	43	57	57	158	98	243	147	74	52
24	56	49	71	63	205	174	78	78	65	50	74	57	57	57	50	50	57	57	158	98	243	116	67	52
25	56	49	87	50	205	174	78	71	50	50	83	65	57	50	50	43	65	57	158	95	196	116	67	52
26	49	49	87	78	205	174	78	71	57	50	74	65	57	50	50	43	57	57	148	74	196	136	67	52
27	49	49	87	78	205	161	78	71	57	50	83	65	57	57	50	50	57	50	148	102	211	196	59	52
28	49	49	92	87	174	161	*	*	50	50	83	74	50	50	50	43	74	57	135	124	322	126	67	59
29	49	49	92	87	—	—	78	78	50	50	83	65	50	50	50	43	65	57	148	102	300	183	59	52
30	57	49	92	87	—	—	78	78	50	50	83	74	57	50	50	50	75	57	205	92	211	126	67	59
31	57	49	92	87	—	—	78	71	—	—	83	65	—	—	57	50	74	57	—	—	174	83	—	—
Mean	77	64	65	59	140	122	134	114	64	56	66	56	66	56	49	44	58	52	128	88	167	106	85	68
Max	139	115	92	87	205	174	221	189	87	78	83	74	75	65	57	50	75	57	205	124	322	196	161	92
Min	49	49	49	42	92	87	78	57	50	50	50	50	50	50	43	36	50	50	93	42	96	74	59	52

Table 19. Daily mean dissolved-oxygen concentrations, Delaware River at Benjamin Franklin Bridge at Philadelphia, Pennsylvania (U.S. Geological Survey site number 01467200), from April 1 to November 30, 2015.

[Data from U.S. Geological Survey [USGS], 2020d. Concentrations are in milligrams per liter. As of January 20, 2020, USGS site number 01467200 is located at the Delaware River at Penn's Landing, Philadelphia, Pennsylvania. —, not applicable]

Day	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
1	12.1	9.1	6.0	7.1	5.6	5.3	6.0	8.5
2	11.9	9.0	5.8	7.3	5.5	5.1	6.3	8.5
3	11.9	9.0	5.6	7.4	5.5	5.0	7.0	8.4
4	11.9	8.9	5.7	7.3	5.5	5.0	7.3	8.4
5	11.9	8.8	5.9	7.2	5.4	5.2	7.6	8.2
6	11.9	8.7	5.8	7.2	5.3	5.3	7.6	8.1
7	11.6	8.5	5.9	7.2	5.4	5.2	7.5	8.0
8	11.5	8.4	6.2	7.2	5.4	5.3	7.3	8.1
9	11.5	8.3	6.5	7.1	5.3	5.4	7.2	8.0
10	11.5	8.2	6.9	6.8	5.2	5.3	7.1	7.9
11	11.4	8.2	7.4	7.0	5.1	4.9	7.0	7.9
12	11.5	8.1	7.7	7.1	4.8	4.6	6.9	7.7
13	11.5	8.1	7.8	7.2	4.8	4.5	6.8	8.0
14	11.5	8.1	7.6	7.3	4.9	4.8	6.8	8.6
15	11.3	8.0	7.2	7.1	5.0	5.0	6.9	8.7
16	11.0	7.8	6.9	7.0	5.1	5.0	6.9	8.8
17	10.7	7.5	6.7	7.0	5.2	5.0	7.0	8.8
18	10.4	7.2	6.3	7.1	5.2	5.0	7.1	8.8
19	10.2	6.9	5.8	7.2	5.1	5.0	7.2	8.8
20	9.8	6.7	5.6	7.3	5.1	5.0	7.4	8.9
21	9.1	6.5	5.3	7.4	5.0	5.2	7.6	9.0
22	8.9	6.1	5.4	7.6	5.1	5.3	7.5	9.2
23	8.7	6.1	5.7	7.9	5.2	5.4	7.6	9.6
24	8.5	6.1	6.2	8.0	5.2	5.5	7.6	9.8
25	8.5	6.2	6.6	8.1	5.3	5.7	7.6	9.9
26	8.5	6.3	6.7	7.9	5.4	6.0	7.7	9.8
27	8.6	6.3	6.6	7.6	5.4	6.2	7.7	9.8
28	8.8	6.2	6.6	7.3	5.4	6.2	7.7	9.8
29	8.9	6.0	6.9	6.9	5.3	6.1	7.6	9.7
30	9.1	6.0	7.1	6.5	5.4	5.8	7.9	9.8
31	—	6.1	—	5.9	5.4	—	8.3	—
Mean	10.5	7.5	6.4	7.2	5.2	5.3	7.2	8.8
Maximum	12.1	9.1	7.8	8.1	5.6	6.2	7.9	9.9
Minimum	8.5	6.0	5.3	5.9	4.8	4.5	6.0	7.7

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, 2015.

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

Day	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
1	11.8	9.3	6.2	6.2	5.6	5.7	6.4	7.8
2	11.9	8.9	6.6	6.0	5.5	5.4	7.0	7.7
3	11.5	8.8	6.7	6.0	5.7	5.2	8.0	7.6
4	11.6	8.9	6.9	6.3	5.8	5.2	8.0	7.5
5	11.6	9.0	6.1	6.5	5.7	5.8	8.1	7.4
6	11.3	9.0	5.9	6.7	5.8	5.8	8.0	7.3
7	11.1	8.7	6.0	6.7	5.9	5.8	7.5	7.3
8	11.3	8.6	6.7	6.6	6.0	5.7	7.3	7.4
9	11.1	8.1	7.1	6.5	5.8	5.7	7.2	7.5
10	10.6	7.8	7.2	6.6	5.6	5.6	7.2	7.7
11	10.6	7.7	7.1	6.6	5.8	5.3	7.3	7.7
12	10.6	7.6	7.1	6.4	5.5	5.2	7.3	7.7
13	*	8.0	7.1	6.2	5.4	5.3	7.2	7.9
14	10.9	8.0	7.1	6.3	5.5	5.6	7.2	8.3
15	10.9	8.1	6.4	6.2	5.7	5.7	7.3	8.6
16	11.1	8.0	6.7	6.6	5.8	5.8	7.5	8.7
17	11.0	7.4	6.1	6.7	5.9	5.8	7.5	8.9
18	11.0	7.3	5.8	6.6	5.9	5.8	7.7	9.0
19	10.8	6.9	5.1	6.5	5.9	5.7	8.0	8.9
20	10.3	6.7	5.2	6.6	5.8	5.6	8.4	8.8
21	9.6	6.7	4.9	6.5	5.4	5.9	8.3	8.6
22	9.6	6.8	4.7	6.7	5.5	6.2	8.3	8.6
23	9.5	7.1	5.1	6.8	5.6	6.3	8.3	8.8
24	9.5	7.2	4.9	6.9	5.5	6.2	8.3	8.8
25	9.5	7.5	5.2	6.8	5.6	6.5	8.3	8.7
26	9.5	7.7	5.2	6.7	5.7	6.8	8.2	8.6
27	9.4	7.2	5.7	6.4	5.8	7.0	8.3	8.6
28	9.4	6.6	6.3	6.0	5.9	6.8	8.6	8.4
29	9.4	6.6	6.0	5.9	5.8	6.7	8.5	8.4
30	9.3	6.2	6.2	5.7	5.9	6.6	8.2	8.8
31	—	5.8	—	5.7	5.8	—	7.9	—
Mean	10.5	7.7	6.1	6.4	5.7	5.9	7.8	8.2
Maximum	11.9	9.3	7.2	6.9	6.0	7.0	8.6	9.0
Minimum	9.3	5.8	4.7	5.7	5.4	5.2	6.4	7.3

References Cited

Delaware River Basin Commission [DRBC], 2022, Delaware Estuary Water Quality Monitoring Program: DRBC web page, accessed July 5, 2022, at https://www.nj.gov/drbc/programs/quality/boat-run.html.

DiFrenna, V.J., Andrews, W.J., Russell, K.L., Norris, J.M., and Mason, R.R., Jr., 2020, Report of the River Master of the Delaware River for the period December 1, 2010–November 30, 2011: U.S. Geological Survey Open-File Report 2020–1020, 127 p., accessed April 15, 2021, at https://doi.org/10.3133/ofr20201020.

Kauffman, G., Belden, A., and Homsey, A., 2009, Technical summary—State of the Delaware Basin report—A report on the health of the 13,539-square-mile Delaware River Basin in Delaware, New Jersey, New York, and Pennsylvania: West Trenton, N.J., and Wilmington, Del., Delaware River Basin Commission and Partnership for the Delaware Estuary, prepared by University of Delaware, 195 p., accessed March 11, 2019, at https://www.wrc.udel.edu/wp-content/uploads/2020/10/State-of-the-Delaware-Basin-Report-2008.pdf.

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

U.S. Environmental Protection Agency [EPA], 2016, Indicators—Conductivity: EPA web page, accessed August 7, 2018, at https://www.epa.gov/national-aquatic-resource-surveys/indicators-conductivity.

U.S. Geological Survey [USGS], 2019a, USGS 01417000 East Branch Delaware River at Downsville NY: USGS National Water Information System database, accessed January 23, 2019, at https://waterdata.usgs.gov/nwis/dv?cb_00060=on&format=html&site_no=01417000&referred_module=sw&period=&begin_date=2014-12-01&end_date=2015-11-30.

U.S. Geological Survey [USGS], 2019b, USGS 01425000 West Branch Delaware River at Stilesville NY: USGS National Water Information System database, accessed January 23, 2019, at https://nwis.waterdata.usgs.gov/nwis/dv?cb_00060=on&format=html&site_no=01425000&referred_module=sw&period=&begin_date=2014-12-01&end_date=2015-11-30.

U.S. Geological Survey [USGS], 2019c, USGS 01436000 Neversink River at Neversink NY: USGS National Water Information System database, accessed January 23, 2019, at https://nwis.waterdata.usgs.gov/nwis/dv?cb_00060=on&format=html&site_no=01436000&referred_module=sw&period=&begin_date=2014-12-01&end_date=2015-11-30.

U.S. Geological Survey [USGS], 2019d, USGS 01438500 Delaware River at Montague NJ: USGS National Water Information System database, accessed January 23, 2019, at https://nwis.waterdata.usgs.gov/nwis/dv?cb_00060=on&format=html&site_no=01438500&referred_%20module=sw&period=&begin_%20date=2014-12-01&end_date=2015-11-30.

U.S. Geological Survey [USGS], 2019e, USGS 01460440 Delaware and Raritan Canal at Port Mercer NJ: USGS National Water Information System database, accessed January 23, 2019, at https://nwis.waterdata.usgs.gov/nwis/dv?cb_00060=on&format=html&site_no=01460440&referred_%20module=sw&period=&begin_%20date=2014-12-01&end_%20date=2015-11-30.

U.S. Geological Survey [USGS], 2019f, USGS 01463500 Delaware River at Trenton NJ: USGS National Water Information System database, accessed January 23, 2019, at https://waterdata.usgs.gov/nwis/dv?referred_module=sw&cb_00060=on&format=html&site_no=01463500&referred_%20module=sw&period=&begin_%20date=2014-12-01&end_%20date=2015-11-30.

U.S. Geological Survey [USGS], 2020a, Dissolved oxygen and water: USGS web page, accessed April 10, 2020, at https://usgs.gov/special-topic/water-science-school/science/dissolved-oxygen-and-water?qt-science_center_objects=0.

U.S. Geological Survey [USGS], 2020b, pH and water: USGS web page, accessed April 10, 2020, at https://usgs.gov/special-topic/water-science-school/science/ph-and-water?qt-science_center_objects=0.

U.S. Geological Survey [USGS], 2020c, Temperature and water: USGS web page, accessed April 10, 2020, at https://www.usgs.gov/special-topics/water-science-school/science/temperature-and-water?qt_science_center_objects=0.

U.S. Geological Survey [USGS], 2020d, USGS 01467200 Delaware River at Penn's Landing, Philadelphia, PA: USGS National Water Information System database, accessed April 10, 2020, at https://nwis.waterdata.usgs.gov/pa/nwis/dv?cb_00010=on&cb_00010=on&cb_00095=on&cb_00095=on&cb_00300=on&cb_00300=on&cb_00400=on&cb_00400=on&format=html&site_no=01467200&legacy=&referred_module=qw&period=&begin_date=2015-04-01&end_date=2015-11-30.

U.S. Geological Survey [USGS], 2020e, USGS 01467200 Delaware River at Penn's Landing, Philadelphia, PA: USGS National Water Information System database, accessed March 16, 2023, at https://waterdata.usgs.gov/monitoring-location/01467200/#parameterCode=00300&timeSeriesId=121396&startDT=2014-12-01&endDT=2015-11-30.

U.S. Geological Survey [USGS], 2020f, USGS 01477050 Delaware River at Chester PA: USGS National Water Information System database, accessed April 10, 2020, at https://waterdata.usgs.gov/nwis/dv?cb_00095=on&cb_00400=on&format=html&site_no=01477050&legacy=&referred_module=sw&period=&begin_date=2014-12-01&end_date=2015-11-30.

U.S. Geological Survey [USGS], 2020g, USGS 01477050 Delaware River at Chester PA: USGS National Water Information System database, accessed March 16, 2023, at https://waterdata.usgs.gov/monitoring-location/01477050/#parameterCode=00300&startDT=2014-12-01&endDT=2015-11-30.

U.S. Geological Survey [USGS], 2020h, USGS 01482800 Delaware River at Reedy Island Jetty, DE: USGS National Water Information System database, accessed April 10, 2020, at https://waterdata.usgs.gov/nwis/dv?cb_00095=on&cb_00400=on&format=html&site_no=01482800&legacy=&referred_module=sw&period=&begin_date=2014-12-01&end_date=2015-11-30.

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. This adjustment calls for less water to be released when previous directed releases were higher than required to meet the Montague flow objective. The balancing adjustment, based on provisional data, is computed as 10 percent of the difference between the cumulative adjusted directed release and the cumulative directed release required for exact forecasting. The balancing adjustment is applied to the following day's release design. The maximum daily balancing adjustment is intentionally limited to preclude unacceptably large variations in the 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, 2015, Flexible Flow Management Program (appendix 1):

- **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 2015 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. This includes the out-of-basin transfer of water by New Jersey from the Delaware River through the Delaware and Raritan Canals.

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

Flexible Flow Management Program (FFMP) A set of rules for the management of storage, diversions, releases, and flow targets relating to the apportioning of water from the Delaware River Basin under the 1954 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). Refer to appendix 1.

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

Interim Excess Release Quantity An Interim Excess Release Quantity (IERQ) was defined in the Flexible Flow Management Program (appendix 1) and made available for interim periods from June 1, 2014, to May 31, 2015, and from June 1, 2015, to May 31, 2016. The IERQ is computed as 83 percent of the difference between the highest year's consumption of the New York City water supply system during the period 2002–2006 (1,257 million gallons per day) and New York City's current estimate of continuous safe yield of the New York City water supply system of 1,290 million gallons per day, obtainable without pumping. During the 2015 report year, the IERQ available for release was 15,468 cubic feet per second accumulated daily. 6,045 cubic feet per second accumulated daily of the IERQ is incorporated into the releases tables to enhance base releases from the New York City Delaware River Basin reservoirs.

Interim Excess Release Quantity Extraordinary Needs Bank From the 2015 Flexible Flow Management Program (appendix 1)—"In addition to the hydrologic criteria described in Section 2.5.6.A. [sic] of the Water Code and subject to other provisional uses of the IERQ as provided herein, the Decree Parties [Delaware, New Jersey, New York State, New York City, and Pennsylvania], the DRBC and the River Master may at any time review extraordinary water needs to support such research, aquatic-life, or other water-use activity as may be approved by the DRBC. Upon unanimous agreement, the Decree Parties may bank all or a portion of the IERQ remaining at such time, and such portion shall be placed in an IERQ Extraordinary Needs Bank and used to provide for such extraordinary water needs. Such quantity as may be so banked shall be deducted from the IERQ. Any unused Extraordinary Needs Bank water shall be returned to IERQ."

Key gaging stations Specific sites on the East Branch Delaware River, West Branch Delaware River, Neversink River, Delaware and Raritan Canal, and mainstem Delaware River where continuous, systematic observations of gage height and discharge are made. These stations 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 delivery of quantities of water for all purposes for which the reservoir was designed. This is also referred to as the minimum full-operating level.

Montague flow objective In section 3a of the June 1, 2015, Flexible Flow Management Program (appendix 1), "Except with respect to limitations provided herein in Section 5, releases from the City Delaware Basin Reservoirs shall be in quantities designed to maintain, during Normal storage conditions, a minimum basic rate of flow at the gaging station of the U.S. Geological Survey at Montague, N. J. of 1,750 cubic feet per second (cfs), as directed by the River Master in accordance with Section VII. [sic] of the Decree. During Basinwide Drought Watch, Drought Warning, and Drought Emergency, in accordance with Section 5 of this Agreement and Section 2.5.3.B. [sic] and Tables 1 and 2 of the Delaware River Basin Water Code, the Montague flow objective shall vary based upon the time of year and location of the salt front, and minimum compensating releases shall be made by the City of New York from its reservoirs in the upper Delaware Basin."

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.

Reservoir-controlled releases Controlled releases from reservoirs passed through outlet valves in the dams or 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 based on 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, 2015, 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 regulations are 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, 2015

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, 2015. A copy of the agreement, which is in effect through May 31, 2015, 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/FFMP_2015_Agreement1.pdf).

Agreement of the Parties to the 1954 U.S. Supreme Court Decree Effective June 1, 2015

10. LAKE WALLENPAUPACK
11. RECREATIONAL BOATING
12. ESTUARY AND BAY ECOLOGICAL HEALTH
13. WARM WATER AND MIGRATORY FISH
14. MONITORING AND REPORTING
    a. Temperature
    b. IERQ
15. REASSESSMENT STUDY
16. PERIODIC EVALUATION AND REVISION
17. TEMPORARY SUSPENSION OR MODIFICATION
18. RESERVATIONS
19. EFFECTIVE DATE
20. RENEWAL AND REVISION
21. REVERSION

An Agreement, consented to by the Parties (the State of Delaware (Del.), the State of New Jersey (N.J.), the State of New York (N.Y.), the Commonwealth of Pennsylvania (Pa.), and the City of New York (NYC or City); hereafter Decree Parties) to the Amended Decree of the U.S. Supreme Court in New Jersey v. New York, 347 U.S. 995 (1954), (hereafter Decree) that succeeds for a one-year period the Flexible Flow Management Program (FFMP) that terminated on May 31, 2015, 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 and 2014 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 three extensions of the 2011 Agreement with no additional program modifications other than dates. This Agreement, the 2015 FFMP, shall be effective from June 1, 2015 to May 31, 2016.

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, 2015 through March 15, 2016; 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, 2011Agreement 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.

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, 2015 shall the aggregate total quantity of water diverted by the City, divided by the number of days elapsed since May 31, 2015 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, 2015 and continuing through March 15, 2016 (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, 2016 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, 2015 and May 21 to May 31, 2016 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, 2015 shall releases from the Diversion Offset Bank exceed the unused balance of the bank. The Diversion Offset Bank shall terminate automatically on June 1, 2016; 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)

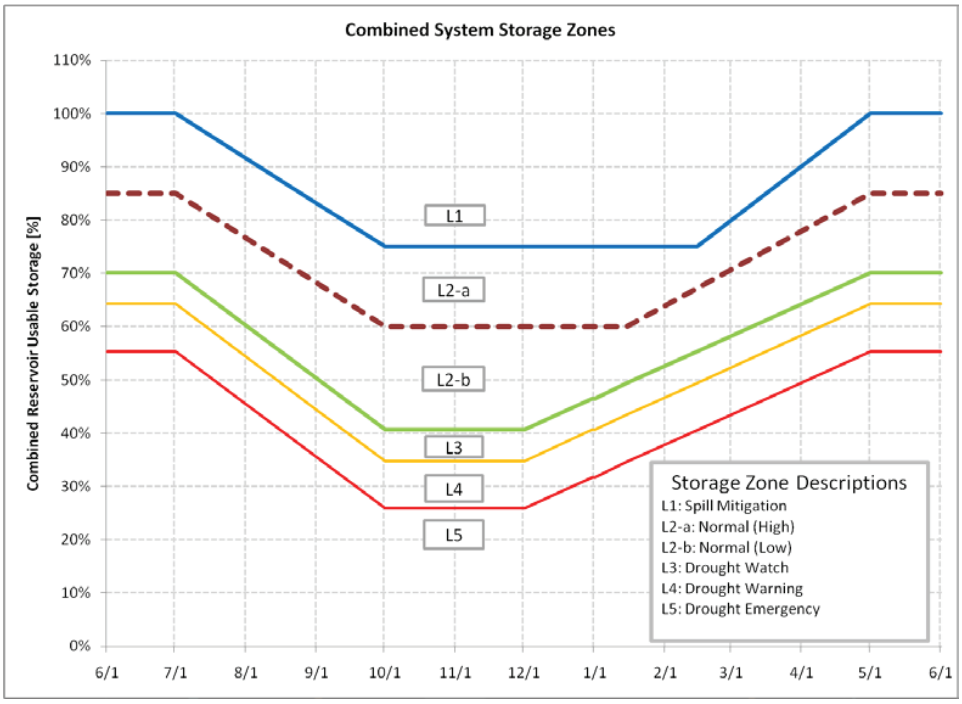


Table 1
Interstate Operation Formula for Diversions and Flow Objectives

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.

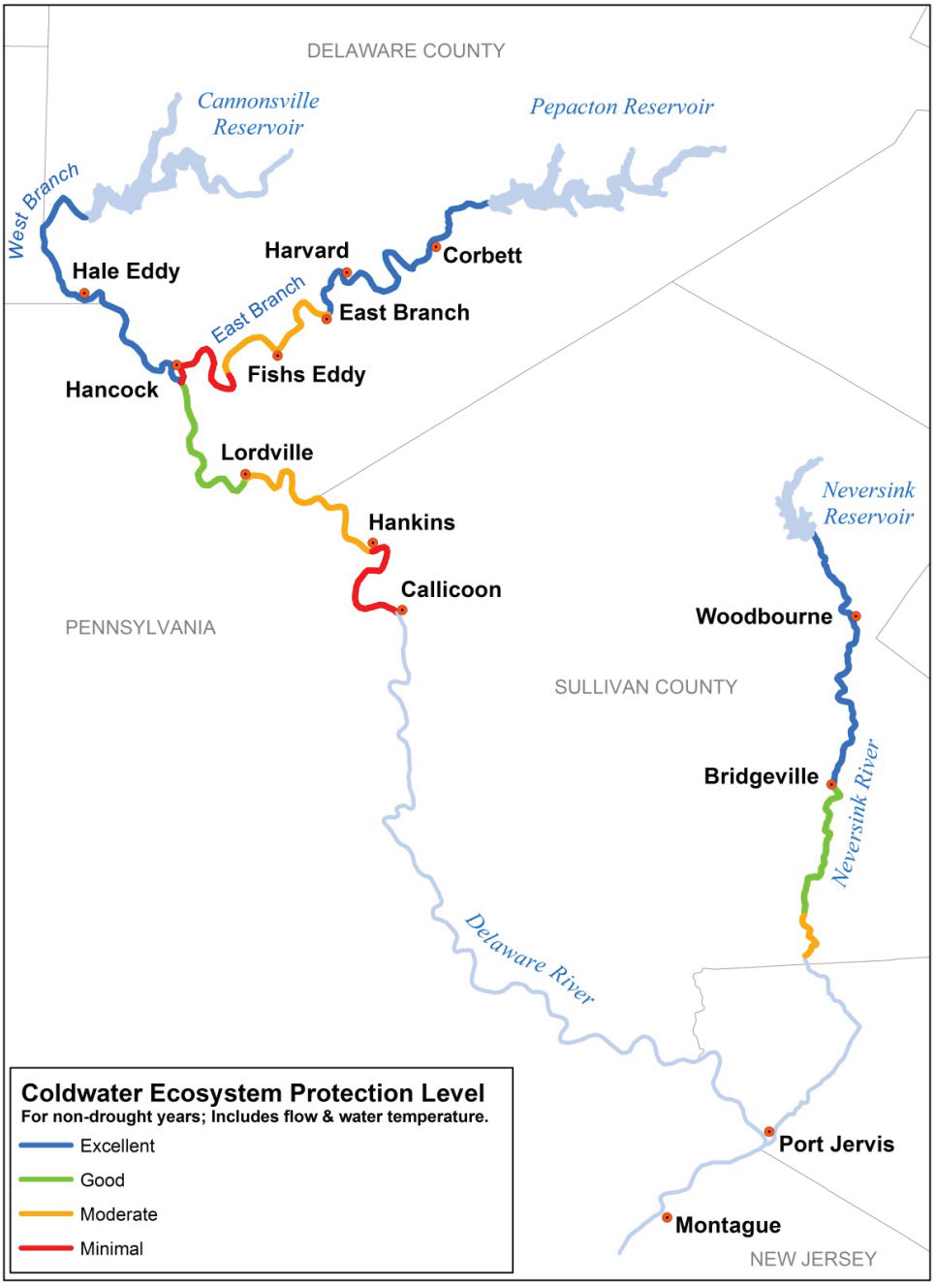
Elevated temperatures will occasionally be an issue. Good protection level applies to the Delaware River main stem from the junction of the West and East Branches to Lordville, N.Y. and the Neversink River from Bridgeville, N.Y. to the mouth of Eden Brook near Oakland Valley, N.Y.

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)

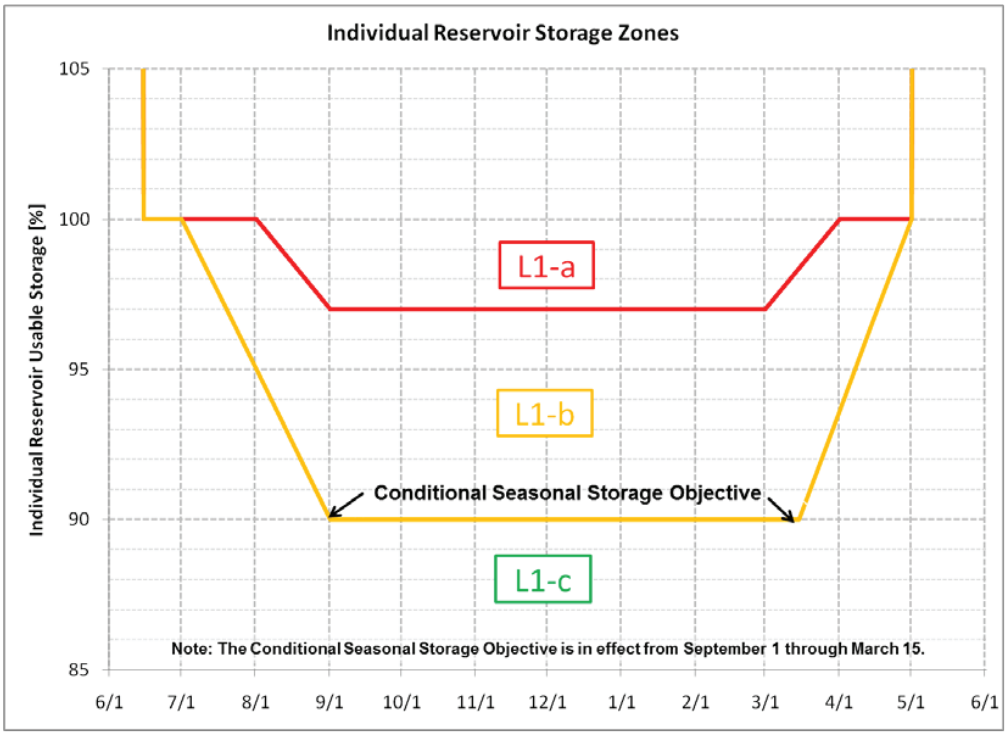


Table 4a
Schedule of Releases (cfs) during Normal Conditions
Base Releases with no Forecast-based Available Water (FAW)

	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, 2015 through March 15, 2016 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, 2016, 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, 2016, 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, 2016 by unanimous written agreement of the Decree Parties. If this Agreement is not renewed for an additional one-year period, prior to May 31, 2016, 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).

Appendix 2. Temporary Modification to the Drought Entry Criteria Under the Flexible Flow Management Program

An agreement for a temporary modification to the 2014 Flexible Flow Management Program (available at https://webapps.usgs.gov/odrm/documents/ffmp/FFMP_2014_Agreement.pdf) 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 revised the method for reservoir storage calculations and was in effect March 13–April 15, 2015. 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/2015_Temporary_Modification.pdf).

Temporary Modification to the Drought Entry Criteria under the Flexible Flow Management Program

In order to best account for the current hydrological state of the Delaware basin and prevent the adverse impacts associated with entry and then rapidly exiting a Delaware Basin Drought Watch, one half of the snow-water-equivalent (SWE) shall be added to the actual combined storage in the NYC Delaware Basin reservoirs in determining when storage conditions enter zone L3 (equivalent to the DRBC Drought Watch line). This modified calculation will be in effect for the period beginning March 13, 2015 and ending April 15, 2015:

The drought entry criteria in Section 5.e of the FFMP shall temporarily be modified to include fifty (50) percent of the SWE in the watersheds above the three New York City Reservoirs in the determination of combined and individual reservoir usable storage in relation to Figures 1 and 2. The City will periodically verify and adjust the quantity of SWE using data from the National Weather Service's National Operational Hydrologic Remote Sensing Center and from snow pack surveys performed by DEP staff.

Approvals

_____
City of New York Date

_____
State of New York Date

_____
State of Delaware Date

_____
State of New Jersey Date

_____
Commonwealth of Pennsylvania 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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