

ANNUAL REPORT

2017

"We are glad to join with Delaware, New Jersey, New York and Pennsylvania in this bold venture. The task set for the Commission will not be easy to achieve, but we are confident that the cooperation that has brought forth this Compact will endure, and that working together real progress can be made for the people of the Basin."

President John F. Kennedy



Delaware River Basin Commission



2017 Annual Report

The Delaware River Basin Commission is a federal/interstate government agency formed by a compact in 1961 by the federal government, Delaware, New Jersey, New York and Pennsylvania. It is responsible for managing the water resources within the Delaware River Basin without regard to political boundaries. The five commission members are the governors of the four basin states and the commander of the U.S. Army Corps of Engineers' North Atlantic Division, who represents the federal government.



President John F. Kennedy signing the Delaware River Basin Compact on Nov. 2, 1961.



*Delaware River, Milford, Pa.
By Michelle Setta*

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Inset: Water Resource Scientist Elaine Panuccio looks for macroinvertebrates under the surface of the Delaware River. The presence and type of these little creatures are good indicators of water quality and the river’s health.

EXECUTIVE DIRECTOR'S

The Delaware River Basin Commission (DRBC) plays a unique role as the interstate and federal government agency charged since 1961 with managing the Basin's water resources. Through the DRBC, the states of Delaware, New Jersey, New York, Pennsylvania, and the federal government have built an exceptional record of results to improve water quality and to provide a sustainable water supply. This report highlights DRBC's 2017 contributions to the quality of life and prosperity of the approximately 15 million people regionally who are affected by the use, conservation, management and control of the Basin's water resources.

In the area of **water supply**, the Commission staff worked intensively through 2017 to provide the basin states and New York City with the technical support required to update and improve the "Flexible Flow Management Program" (FFMP) that governs flow objectives, reservoir releases and major diversions outside of the basin (see page 14.) The FFMP balances the diverse and sometimes competing demands on the basin's waters for public water supply, aquatic life, recreation, waste assimilation, agriculture, and industrial and commercial activities. And to ensure that these needs are balanced, the Commission provides the public with opportunities for input on how basin operations affect them. As a result of meetings of the DRBC Regulated Flow Advisory Committee (RFAC)(page 30), stakeholder recommendations and strategies were integrated into the 2017 FFMP.

The Commission's work in the area of **water quality** this year merits a spotlight. Central to the "origin story" of the DRBC is the recognition that coordinated action was required to address excessive pollution in the shared, industrialized portions of the Delaware River Estuary near Philadelphia, Camden and Wilmington. At the time DRBC was created, a 30-mile reach of the Estuary was so polluted that, for several months each summer, fish could not pass through it due to the complete lack of dissolved oxygen in this heavily used waterway.

Fast forward from 1961 to 2017... Transformative improvements in the water quality of the River, the Estuary and Delaware Bay are attracting notice. The DRBC has consistently taken a leading role in this transformation – combining water quality monitoring, scientific analysis, and modeling skills with the convening power and rulemaking authority required to: establish wasteload allocations (or pollution budgets) for discharges in three states, develop and establish interstate water quality standards in interstate waters, restore impaired water quality in the Estuary and Bay, and protect exceptional water quality in the non-tidal river.

In 2017, Delaware River fisheries surveys for American shad showed a healthy spawning run and a record-setting number of juveniles. Based upon these and other positive study results, the DRBC Commissioners in September formally recognized the substantial water quality and fisheries restoration achieved in the Estuary

MESSAGE

and Bay. The accomplishments of the past nearly six decades would not have been possible, they noted, without innovative DRBC initiatives in allocating carbonaceous oxygen demand, establishing water quality criteria for toxic contaminants, and requiring dischargers to develop and implement pollutant minimization plans for PCB's, the persistent and highly toxic chemicals that accumulate in fish tissue. To continue this record of leadership and achievement, the Commission also launched an ambitious effort to measure the feasibility of reducing *nitrogenous* oxygen demand and to determine the extent to which further elevating dissolved oxygen criteria would result in an even stronger recovery of Estuary fish populations. DRBC is leading this groundbreaking effort through a collaborative process informed by expert scientists and engineers, and in close consultation with its Water Quality Advisory Committee (page 31), a group representing state and federal co-regulators, NGO's, academic institutions, municipal and industrial dischargers, and water purveyors.

It is difficult to overstate the value of clean water to the economy of our region and the quality of life of its residents. A 2011 study by the University of Delaware's Dr. Gerald J. Kauffman estimated the economic value of the water resources of the Delaware River Basin at more than \$20 billion. Visit "Basin Information" on the DRBC website to read this study for yourself, or witness the resurgence of waterfront development activity in Camden, Philadelphia, and Wilmington; experience the abundant fishing, paddling, hiking, strolling, bird-watching, camping, dining and other river-focused recreational opportunities throughout the Basin; or watch the thousands of mature shad migrating upstream to spawn in the spring or their young swimming downstream in late summer.



Through the DRBC, the basin states and federal government continue to collectively manage this shared resource effectively together. Turn the pages of this annual report for more examples of the Delaware River Basin Commission's ongoing activities, results and leadership in ensuring the continued health and sustainability of our Basin's water resources.

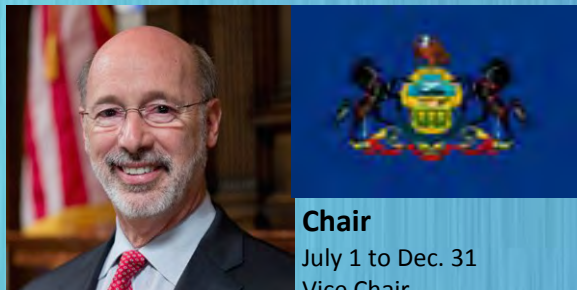
A handwritten signature in blue ink that reads "Steve Tambini". The signature is stylized and fluid.

Steve Tambini, P.E.

SIGNATORY MEMBERS

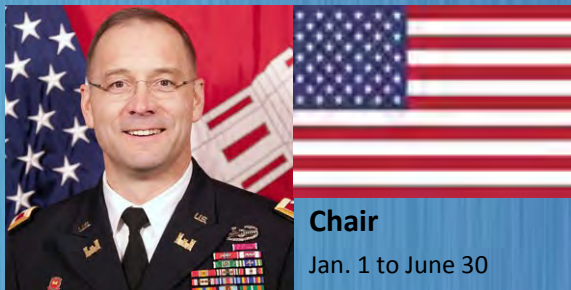
Commissioners

Pennsylvania Governor Tom Wolf



Chair
July 1 to Dec. 31
Vice Chair
Jan. 1 to June 30

Brigadier General William Graham



Chair
Jan. 1 to June 30

New Jersey Governor Chris Christie



Vice Chair
July 1 to Dec. 31
Second Vice Chair
Jan. 1 to June 30

Delaware Governor John Carney



New York Governor Andrew Cuomo



Second Vice Chair
July 1 to Dec. 31

The ex officio members of the Delaware River Basin Commission include the four basin state governors and the commander of the U.S. Army Corps of Engineers, North Atlantic Division, who serves as the federal representative.

The five members appoint alternative Commissioners, with the governors typically selecting high-ranking officials from the state environmental agencies. Each Commissioner has one vote of equal power with a majority vote needed to decide most issues. The Delaware River Basin Compact requires the annual election of a chair and vice chairs, which historically has been based upon rotation of the DRBC's five members.

Alternates/Advisors—2017



From left: Executive Director Steve Tambini, Jennifer Orr (Pa.), Jeff Hoffman (N.J.), Kenneth Kosinski (N.Y.), Bryan Ashby (Del.), LTC Kristen Dahle (Federal), and Henry Gruber (Federal).

FEDERAL GOVERNMENT

- 1st Alternate** LTC Michael Bliss, Commander, USACE Philadelphia District (Jan. 1 to July 7, 2017)
LTC Kristen Dahle, Commander, USACE Philadelphia District (July 7 to Dec. 31, 2017)
- 2nd Alternate** David Leach, USACE North Atlantic Division Programs Director
- 3rd Alternate** Henry Gruber, USACE North Atlantic Division Deputy Chief of Planning & Policy Division

PENNSYLVANIA

- 1st Alternate** Patrick McDonnell, DEP Secretary
Dana Aunkst, DEP Acting Deputy Secretary for Water Programs
- 2nd Alternate** Kelly Jean Heffner, DEP Executive Deputy Secretary for Programs
Lisa Daniels, DEP Acting Deputy Secretary for Water Programs
- 3rd Alternate** Jennifer Orr, Director, DEP Compacts and Commissions Office

NEW JERSEY

- 1st Alternate** Bob Martin, DEP Commissioner
- 2nd Alternate** Daniel Kennedy, DEP Assistant Commissioner for Water Resource Management
Ray Cantor, Chief Advisor to the DEP Commissioner
- 3rd Alternate** Michele Putnam, DEP Acting Assistant Commissioner for Water Resource Management
- 4th Alternate** Jeffrey Hoffman, State Geologist

NEW YORK

- 1st Alternate** Basil Seggos, DEC Commissioner
- 2nd Alternate** Mark Klotz, Director, DEC Division of Water
- 3rd Alternate** Angus Eaton, Director, DEC Bureau of Water Resource Management
- 4th Alternate** Kenneth Kosinski, Chief, DEC Watershed Implementation Section

Advisor Vincent Sapienza, New York City DEP Commissioner

DELAWARE

- 1st Alternate** David Small, DNREC Secretary (Jan. 1 to April 26, 2017)
Shawn Garvin, DNREC Secretary (April 26 to Dec. 31, 2017)
- 2nd Alternate** Kara Coats, DNREC Deputy Secretary
- 3rd Alternative** Virgil Holmes, Director, DNREC Division of Water: Management Section
- 4th Alternative** Bryan Ashby, Manager, DNREC Division of Water: Surface Water Discharges Section

THE BASIN

WHAT IS THE DELAWARE RIVER BASIN?

Lying in the densely populated corridor of the northeastern U.S., the 13,539 square mile Delaware River Basin stretches approximately 330 miles from its headwaters in New York State to its confluence with the Atlantic Ocean.

The Basin includes approximately 12,800 square miles of land area and nearly 800 square miles of the Delaware Bay.

The Delaware River is the longest un-dammed river in the U.S. east of the Mississippi River. If one stands on one side of the river, there is a different state on the other side. It is an interstate river its entire length.

It contains more than 200 tributaries, the largest of which are the Schuylkill and Lehigh rivers in Pennsylvania.



Aquatic Biologist Jake Bransky prepares a surface water sample for Perfluoroalkyl Substances (PFAS) testing from Oldmans Creek, N.J., a tidal Delaware River tributary.

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VALUE THROUGHOUT THE YEAR

FINANCIAL SUMMARY

The DRBC operates and maintains two funds for budgeting purposes: a General Operating Fund (GOF) and a Water Supply Storage Facilities Fund (WSSF).

The General Operating Fund

The General Operating Fund is the basic and routine operating budget for the DRBC. It includes all revenues and expenses required for the year-to-year operations and maintenance of the agency. Revenues are provided through several key sources, including signatory party contributions, project review fees, compliance-related actions, transfers from the WSSF and other sources.

The Water Supply Storage Facilities Fund

The WSSF was created to fund certain water supply storage facility projects in the basin. The WSSF is used to repay the obligations the DRBC assumed to purchase storage capacity at the federal government's Beltzville and Blue Marsh reservoirs. The WSSF also supports DRBC's pro rata share of the annual operations and maintenance costs of the two reservoirs, the water supply share of any future required improvements at these two facilities, a share of DRBC operating costs to support a sustainable water supply within the Basin (transfers to the GOF) and any future required storage in the Basin. Revenues for the WSSF are generated from charges for applicable surface water withdrawals in the Basin. The balance of the WSSF at the end of FY 2017 was \$19,250,411.

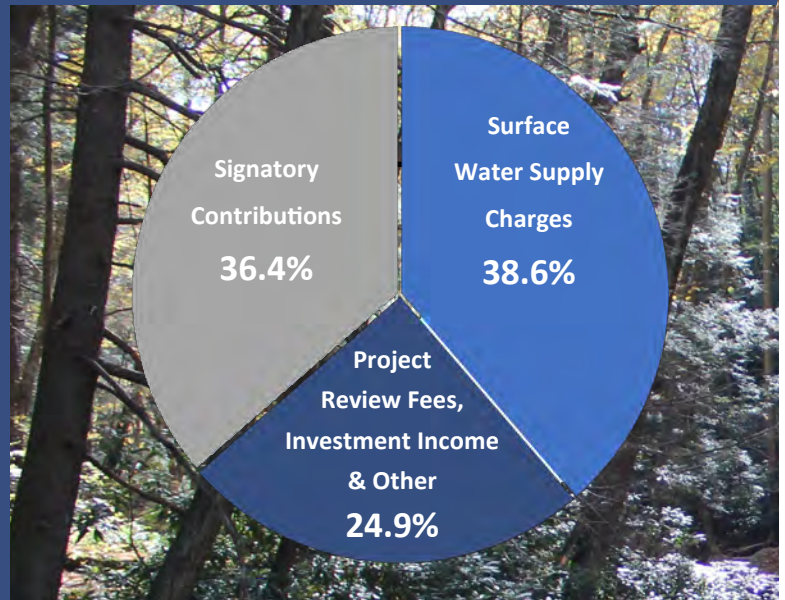
Independent Financial Audit

DRBC's financial records are audited annually as required by the Delaware River Basin Compact. The most recent annual independent audits are available at www.nj.gov/drbc/about/public/annual-audit.html

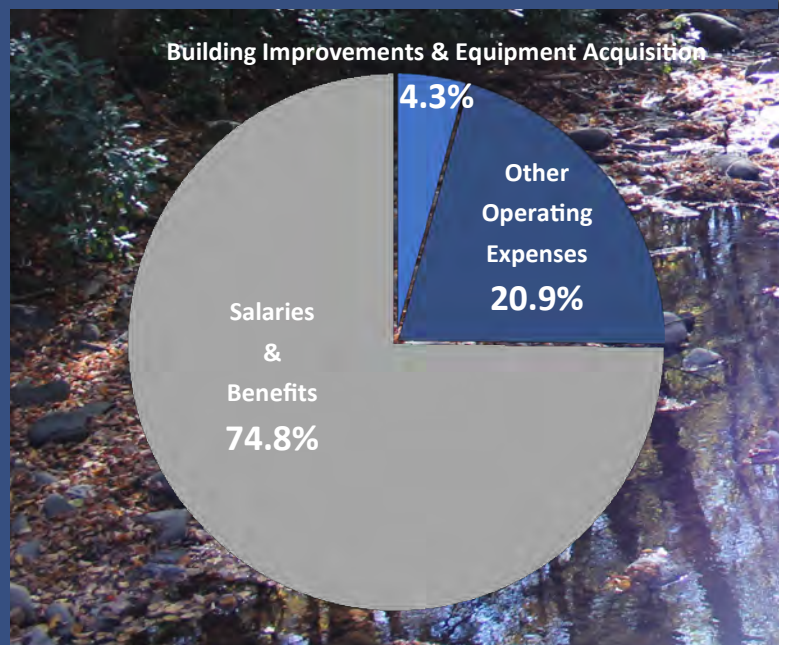
DRBC Fiscal Year 2017

General Fund

Revenues \$5,318,094



Expenses \$5,692,959



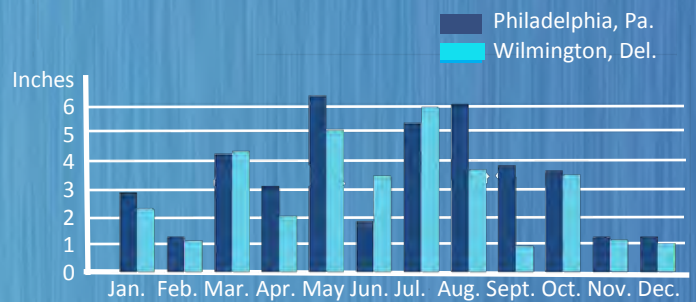
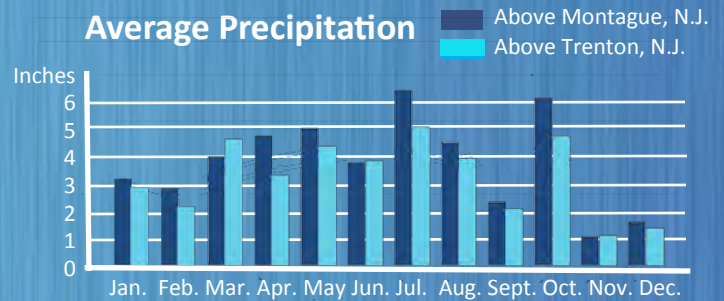
Autumn Light
By Scott Woodland

OUR WATER RESOURCES

Hydrologic Conditions

Precipitation

Annual precipitation totals were below normal for most of the Basin's counties during 2017. July was the wettest month with county precipitation totals averaging two inches above normal. November through December was the driest stretch of the year, with many counties experiencing combined precipitation deficits of four or more inches. These graphics show 2017 precipitation amounts for select locations in the Basin.



Streamflow

In 2017, observed monthly mean streamflows along the main stem of the Delaware River and its two-largest tributaries, the Lehigh and Schuylkill rivers, were generally normal to below normal during the first quarter of the year. A combination of rainfall and melting snow increased flows in early April, producing the highest daily mean flows of the year on the main stem Delaware River at Montague and Trenton. On April 7, the daily mean flow at Montague was 40,900 cubic feet per second (cfs). Similarly, at Trenton, the flow on April 8 was 65,400 cfs.

Flows in the Basin generally remained in the normal to above-normal range through September. Drier conditions during late fall and early winter resulted in below-normal flows throughout the Basin. The lowest average monthly flows of 2017 occurred in December, when many streams were less than 50% of their normal flow.



Groundwater

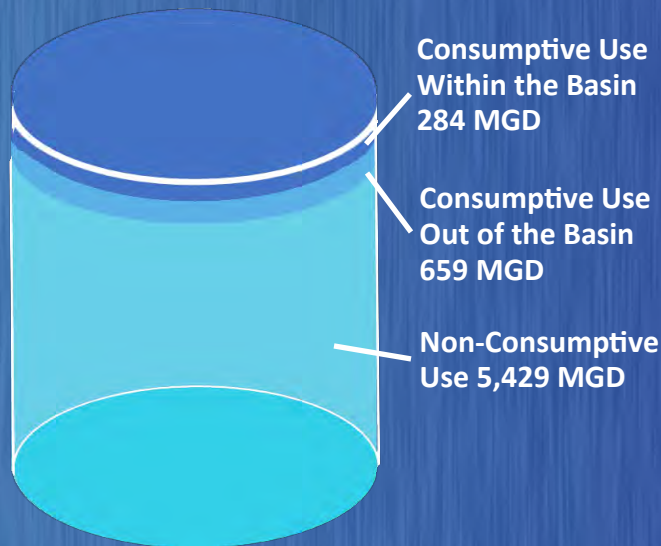
Groundwater levels in the Basin's observation wells were seasonally variable during 2017. Most wells recharged during the spring after receiving snowmelt and normal to above-normal precipitation and declined during the summer months when demand for water was high. Below-normal precipitation during November and December impeded the typical recovery period during the last quarter of the year. Many wells remained below the long-term median at the end of December.

Where Does the Water Go?

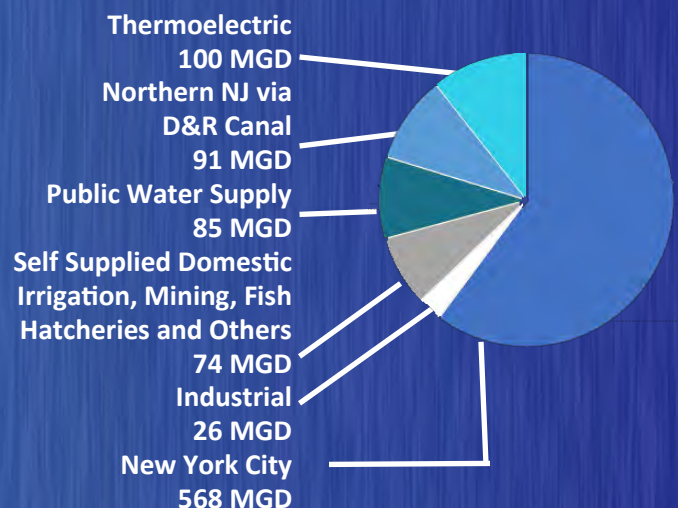
Water Withdrawals

Understanding water withdrawals, water use and supply is integral to the management of the Basin's water resources. In recent years, our understanding of the ways in which water is withdrawn and used has improved greatly, as have the underlying systems in place to manage the data, allowing for more timely and comprehensive assessments to be completed.

Total Withdrawals



Consumptive Use



6,372 million gallons per day (MGD)

Water System Audit Program & Water Loss Control

Water Loss Problem

Nationwide, an estimated six billion gallons per day of water is taken from water resources and never reaches the end user. This is enough water to supply the drinking water needs of the ten largest cities in the United States. In the Delaware River Basin, this number is estimated at 150 million gallons per day (MGD). Water suppliers are experiencing real water losses due to physical infrastructure failures and apparent losses resulting from inaccurate meter readings and erroneous billing practices. As demand for water increases, it is essential to ensure that water supplies and the infrastructure delivering water are dependable and efficiently move water from source to customer.



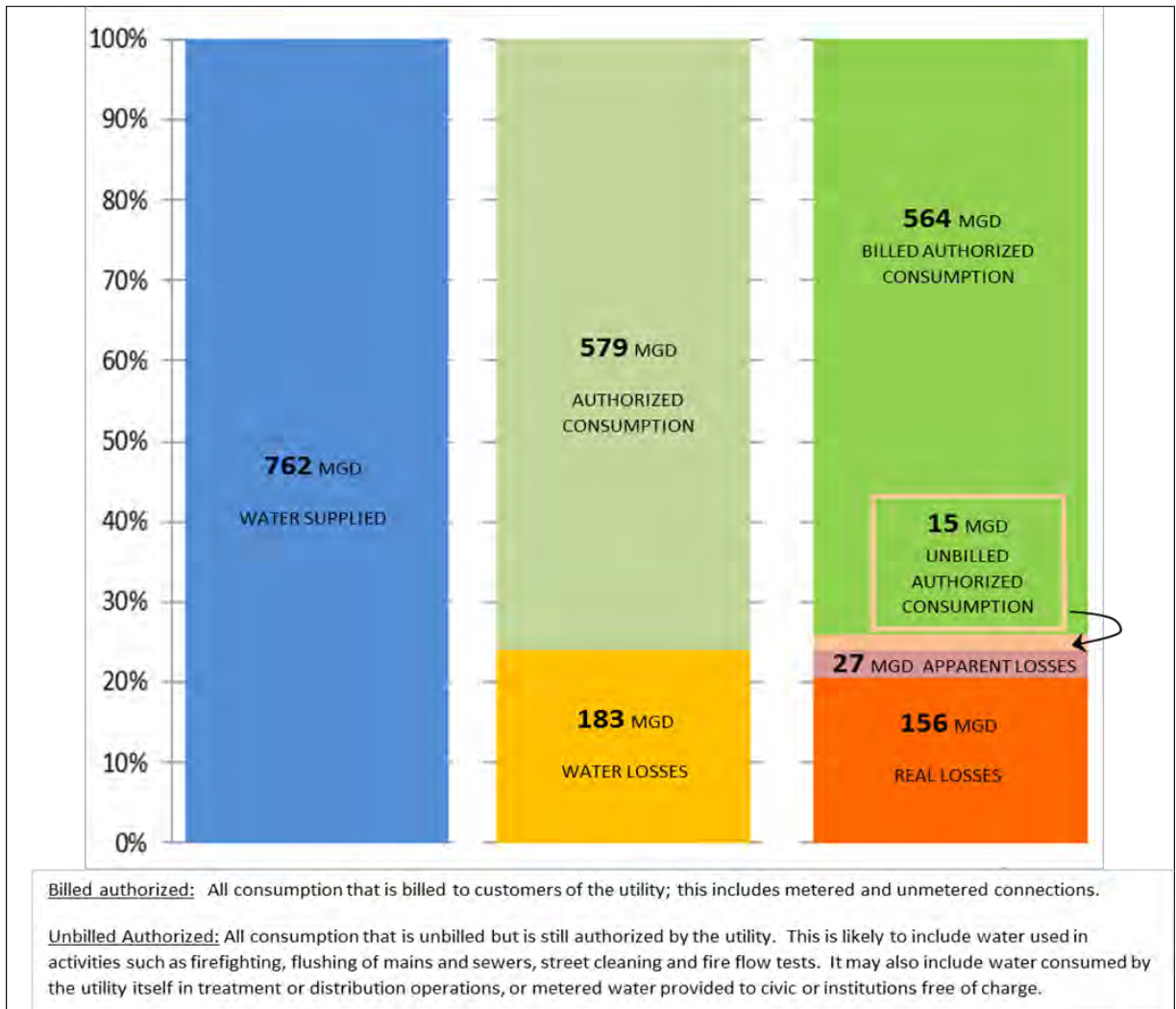
An estimated 700 to more than 800 water main breaks occur every day in the United States.

For several decades, the Commission has employed a comprehensive water efficiency program, which has formed an integral component of its broader strategy to manage water supplies throughout the Basin. In 2009, as part of DRBC's effort to ensure its regulations reflect the latest thinking in the field of water efficiency, the Commission amended its Comprehensive Plan and Water Code to implement an updated water audit approach to identify and manage water loss in the Basin. The purpose of the water audit is to track how effectively water is moved from its source to customers' taps and to ensure that public water supply systems quantify and address water losses.

DRBC anticipates that significant reductions in water losses can be realized through this program and that focus on this issue will allow system operators, utility managers and regulators to more effectively target their efforts to improve water supply efficiency, saving both water resources and money.

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VALUE THROUGHOUT THE YEAR



Aggregate Summary Graphic for 283 Systems Reporting Water Audit Data to DRBC for CY2016.

CY2016 Water Loss Summary

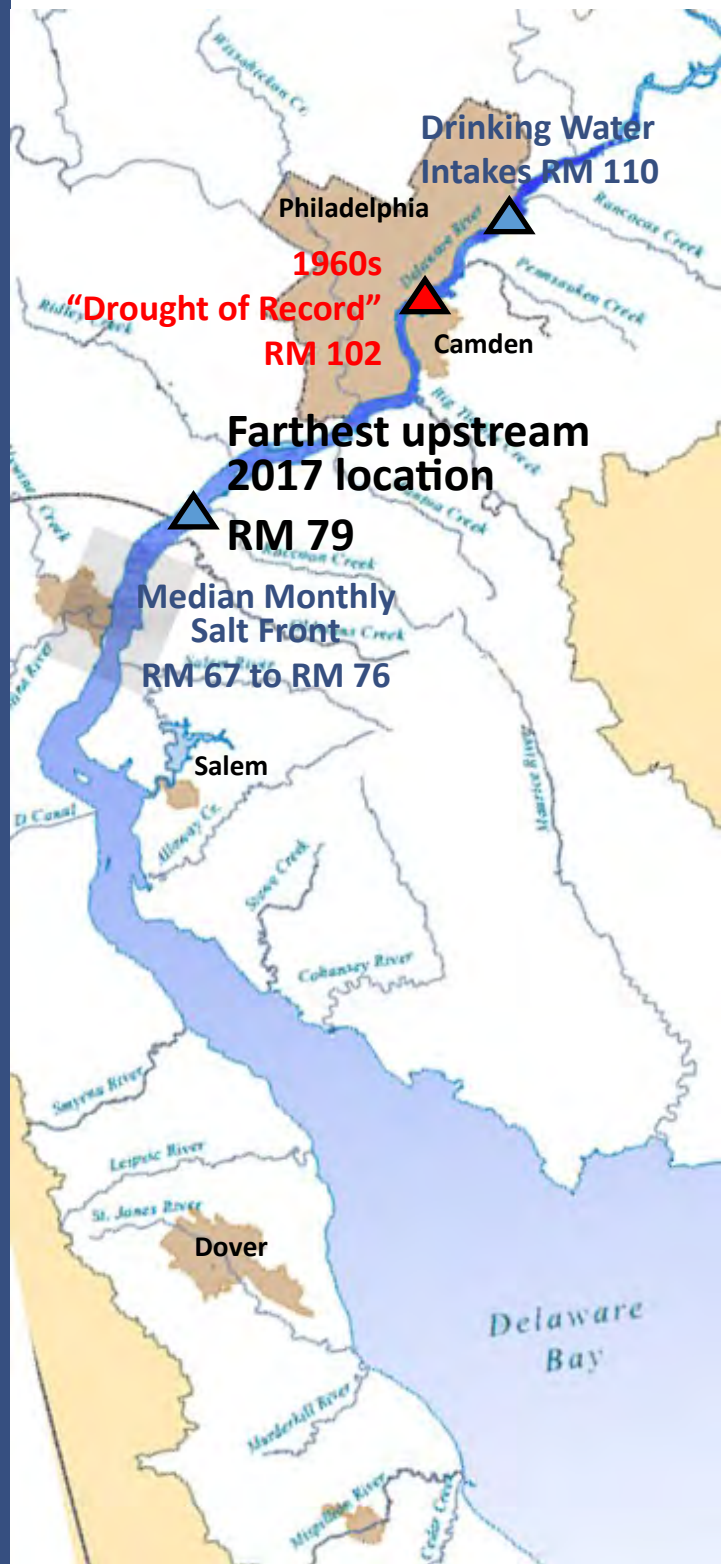
The figure above shows a high-level summary of the CY2016 water audit data for the DRB. This graphic represents the aggregate of 283 individual system audits and shows that an average of 762 million gallons of water was put into distribution systems in the Delaware River Basin every day. An estimated 156 MGD was reported as physically lost from distribution systems in the DRB along with an estimated 27 MGD reported as apparent losses. These water losses, in addition to 15 MGD of unbilled authorized consumption, comprise a total of 198 MGD of non-revenue water. This non-revenue water has an estimated value of \$132 million to water utilities in the Basin and represents a significant opportunity to improve the efficiency of public water supply.

Pushing Back the “Salt Front”

The purpose of the Trenton flow objective is to control the movement of the “salt line” or “salt front” in the tidal Delaware River. Adequate freshwater flowing downstream is needed to repel the upstream advancement of “salty” or “brackish” water from the Delaware Bay to protect drinking water intakes serving residents in Philadelphia and New Jersey as well as industrial intakes along the river from corrosion.

The salt front is defined as the 250 parts-per-million chloride concentration. The salt front’s location fluctuates along the main stem Delaware River as freshwater from upstream rivers increases or decreases in response to rainfall, snowmelt or managed releases from reservoirs. Long-term median mid-month locations range from river mile (RM) 67 in April (two miles downstream of the Delaware Memorial Bridge) to RM 76 in September (two miles downstream of the Pennsylvania-Delaware state line).

The farthest upstream location of the salt front during 2017 was RM 79 in late October. This location is one mile upstream of the Pennsylvania-Delaware state line and was seven miles upstream of the normal location for October. By comparison, the farthest recorded upstream location of the salt front measured during the 1960’s drought of record was RM 102.



Reservoir Storage

There are several reservoirs in the Delaware River Basin, all located on tributaries. They have many purposes, including water supply, hydro power generation, recreation and flood control.

The U.S. Army Corps of Engineers (USACE) owns and operates several of these reservoirs. These include: Francis E. Walter in White Haven, Pa., Blue Marsh in Leesport, Pa., Beltzville in Lehighton, Pa., and Prompton and General Edgar Jadwin Dam in Honesdale, Pa.



While DRBC does not own or operate any physical reservoir, it does own water supply storage in the Beltzville and Blue Marsh reservoirs. DRBC pays the USACE from its Water Supply Storage Facilities Fund for reservoir storage that the Commission directs for releases to augment stream flow during dry conditions.

The Francis E. Walter Dam was constructed by the U.S. Army Corps of Engineers in 1961 and has prevented more than \$212 million in flood damages. It also supports recreation in the Lehigh Valley with planned fishing and whitewater rafting water releases. Photo courtesy of U.S. Army Corps of Engineers, Philadelphia District

DRBC's basinwide drought operating plan allows the Commission to access up to 69 billion gallons of water for flow augmentation from Basin reservoirs in times of a DRBC-declared state of water supply emergency. The plan's primary drought management objective is to provide for conservation of regional reservoir storage for purposes of water supply and flow augmentation for the Delaware River, as well as salinity control in the Delaware Estuary.

Beltzville Reservoir refilled during the first two months of the year after being depleted to drought warning levels during the autumn 2016 drought. Other than this brief period of refill, Beltzville and Blue Marsh maintained normal storage during 2017. Consequently, DRBC's lower basin drought operating plan was not implemented. Additionally, sufficient natural flows were maintained in the Delaware River so that releases from the Lower Basin reservoirs were not necessary to meet the minimum streamflow objective at Trenton, N.J. (3,000 cubic feet per second).

Flows in the Upper Delaware

Flow management programs for the Upper Delaware River Basin, which use the three New York City (N.Y.C.) reservoirs in the Basin, are created upon unanimous agreement by the states of Delaware, New Jersey, New York, Pennsylvania and New York City.

Since 2011, the Flexible Flow Management Program (FFMP) has been renewed every year, with some minor modifications, to respond to changing flow needs and different purposes for use of water in the Basin. In May 2017, the parties were still negotiating a new agreement when the former agreement expired. An intermediate program, similar to the FFMP, was implemented until the parties unanimously approved a new agreement in October.

The new 10-year, two-part FFMP became effective on October 21, 2017, establishing water release rates from N.Y.C.'s Neversink, Pepacton and Cannonsville reservoirs, maintains the previous flow objectives for the main stem Delaware River and sets limitations on out-of-basin diversions by New York City and New Jersey. The new FFMP agreement attempts to balance the multiple uses for water in the Basin, including the water supply needs of the four basin states and N.Y.C. and support for the cold-water fisheries below each of the three reservoirs. It also provides for evaluating the evolving needs for aquatic life protection, new recreation opportunities, drought management and slowing the upstream migration of the "salt front." (page 12) during periods of low river flow.

The Commission provides technical support to the Decree Parties as the FFMP evolves. For the current agreement, DRBC furnished the Decree Parties with expert modeling and technical support, along with



Barryville, N.Y. by David B. Soete



the coordination services needed for informed decision-making. The Decree Parties used DRBC's Regulated Flow Advisory Committee (page 30) as a vehicle for the public to provide input, which resulted in many of the FFMP's modifications.

The "new" FFMP results in the continued release of cold water based on forecasts that are used to determine water that is not needed for water supply purposes. This is an innovative approach to water resource management that results in more efficient use of the water for multiple purposes including the cold-water trout fisheries, boating and other tourism activities along the river.



Fisherman Andy Boyar with a Rainbow trout caught in the Upper Delaware River at Hankins, N.Y. Photo by Dr. Peter J. Kolesar.

In the Upper Delaware River, around Callicoon, N.Y., the river changes from a warm water to a cold water fishery — prime trout habitat. Twenty-five miles further upstream from Callicoon, the Delaware splits into the West and East branches near Hancock, N.Y., both branches being reservoir fed. Throughout this area, from Callicoon to Hancock and up the branches, Brown and Rainbow trout thrive. The Upper Delaware River is recognized as being home to some of the best wild trout fishing in the country, as well as the best dry fly fishing on the East Coast.

Meeting Future Water Supply Needs

2060 Planning

Due to the many water demands in the Basin DRBC is looking to the future (Year 2060) to develop a strategy to ensure a sustainable future water supply for human and ecological uses. The purpose of the strategy is to assess potential changes to the basin system over the next 40 years and develop management strategies to increase resiliency and decrease risk to water supply. The emphasis is on development of a sustainable water supply based on assessment of need (human and ecological), optimization of existing supply systems and development of new supplies. Drivers of change may include population increases and redistribution, energy generation, re-distribution and use of a variety of fuels, natural gas development in the headwaters, ecological flow protection, landscape alteration, and climate change (e.g., sea level rise, increasing temperature, and change in precipitation patterns).

Impact of Climate Change

In 2017, DRBC began to evaluate the effects that future rainfall and temperature climate trends may have on flows in rivers and streams and reservoir storage. Knowing the potential for changes to flow in the river and into reservoirs will allow DRBC to assess the current drought operating plan and the goal of conserving regional reservoir storage for purposes of water supply, flow augmentation and salinity control in the Delaware Estuary.

DRBC used a rainfall-runoff model to get estimates of stream flow based on different



Beltzville Dam was designed and built by the U.S. Army Corps of Engineers (USACE) and completed in 1970. The 13 billion gallon reservoir provides flood damage reduction, water supply, water quality and recreation. Photo Courtesy of USACE, Philadelphia District.



predictions of future temperatures and rainfall in 2060. The predictions are based on the emission scenarios developed by the Intergovernmental Panel on Climate Change and global circulation models (the same or similar to those used to predict weather) from four research institutes.

Based upon preliminary analyses, streamflows in the winter are expected to increase because warmer temperatures will result in more rainfall draining to the rivers and streams instead of being stored as snow in the upper portion of the Basin. Spring and early summer flows will decrease because there is less snowpack to contribute water to streams and rivers. Summer flows will either increase or decrease depending on the balance between the increases to rainfall and the increases in evapotranspiration by plants, resulting from the temperature increase. The region is expected to see more precipitation, but in some areas the increase in evapotranspiration will be greater than the increase in precipitation. Overall, the annual average flows in rivers and streams are expected to be marginally larger in 2060 than they are now.

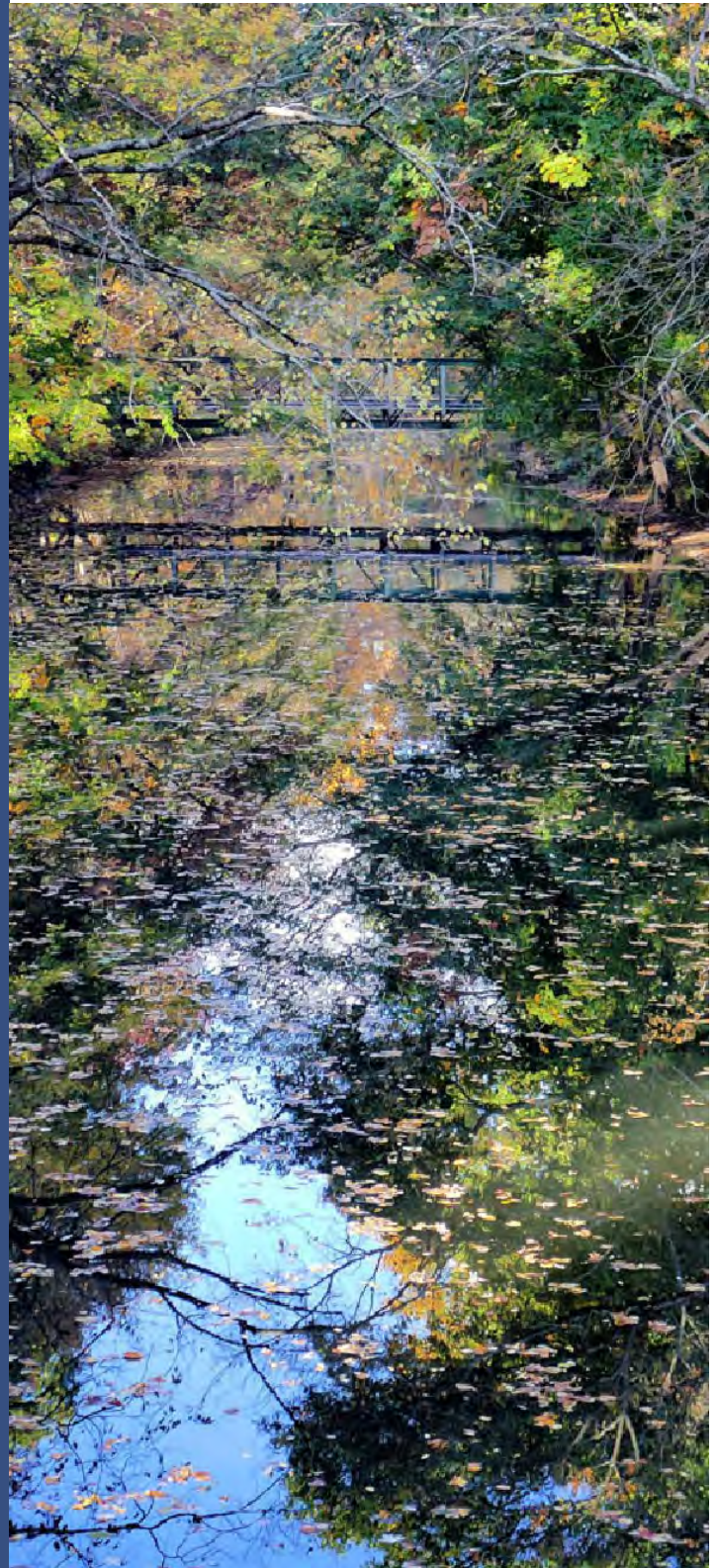
Using the predicted trends in streamflow, simulations with DRBC's reservoir operations model indicate that DRBC's drought management programs should be adequate to protect the Basin from future droughts; however, these preliminary analyses do not account for sea level rise. Droughts may be more difficult to manage considering future sea level rise increases and the need for additional freshwater flows to repel the salt front. To ensure sufficient freshwater flows into the estuary, additional storage may be needed to make reservoir releases to increase streamflows during periods of low flows.

DRBC continues to evaluate the effects of trends in rainfall and temperature on streamflow and ultimately on the location of the salt front. Although these analyses performed in 2017 provide insight as to what may happen in the future, much more work is needed to assess the full implications of predicted changes in climate.

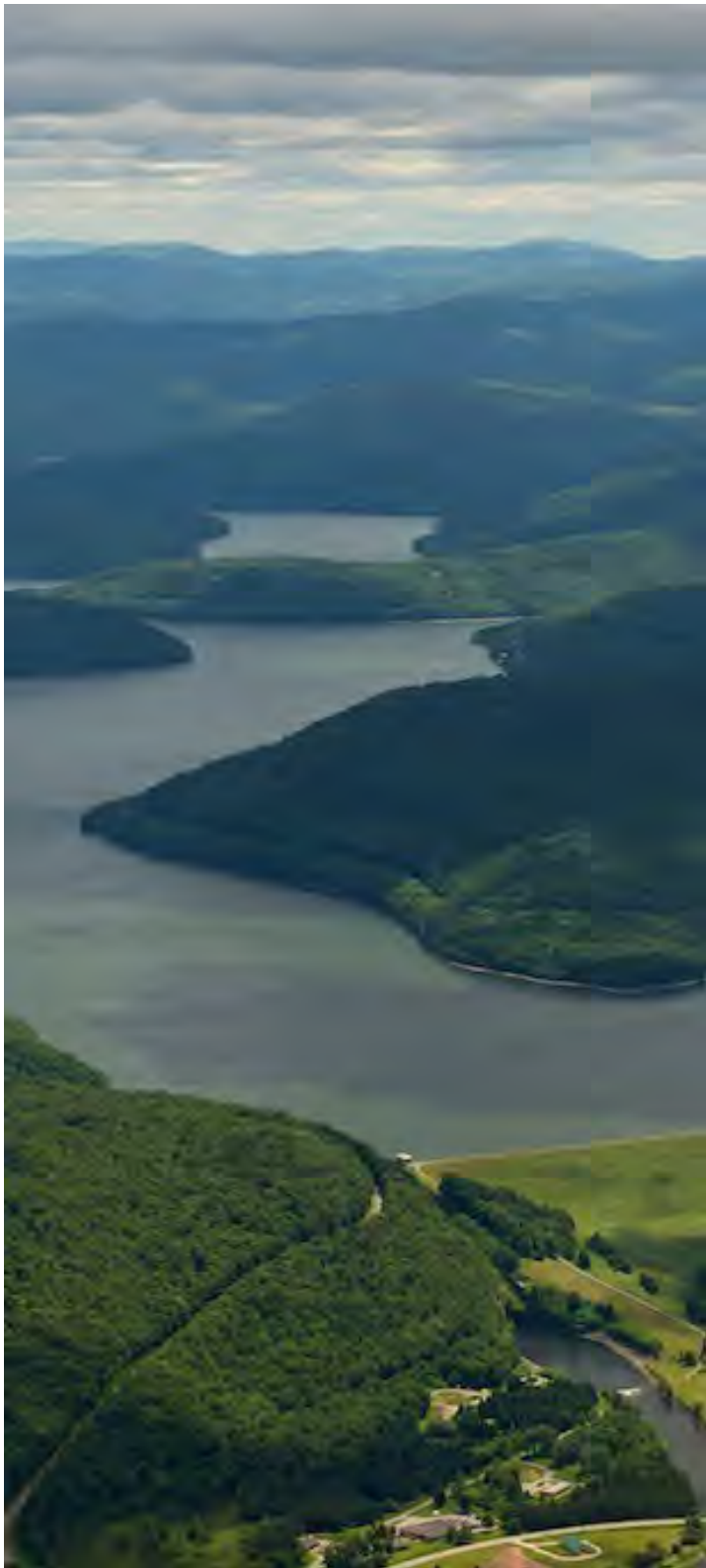
Exporting Water Out of the Basin

North/Central New Jersey

In the 1950s, New Jersey began diverting water from the Delaware River Basin through the Delaware and Raritan Canal. The water travels from Bull's Island, north of Stockton, N.J. for 22 miles along the river until it turns inland near Trenton, N.J., then crosses into the Raritan Basin near Princeton, N.J. The water is managed by the New Jersey Water Supply Authority for multiple drinking water suppliers that serve the residents of north and central New Jersey. In 2017, New Jersey diverted 31.2 billion gallons from the Basin.



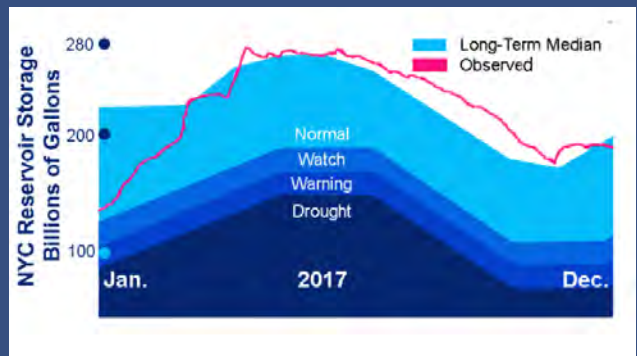
*Just Like Monet, The Delaware & Raritan Canal
By Samuel Vovsi*



The Basinwide Role of New York City’s Reservoirs

The combined storage in the three New York City reservoirs (Pepacton, Cannonsville and Neversink) in the Basin is managed to ensure the conservation of regional reservoir storage in times of drought through phased reductions in out-of-basin diversions, reservoir releases and flow objectives for purposes of water supply and flow augmentation in the Delaware River and salinity control in the Delaware River Estuary when necessary. Combined storage was even with or above the long-term median at the start of 2017.

However, after hovering at the long-term median through the summer, storage began dropping in early autumn.



Managing the N.Y.C. Reservoir Flows

Releases from the three New York City reservoirs is managed under a ten-year, two-part Flexible Flow Management Program (FFMP). See details on Page 14.

The Pepacton Reservoir, Colchester and Andes, N.Y. is one of three in the Basin that provides drinking water to New York City. Photo courtesy of NYCDEP.

Designated Use

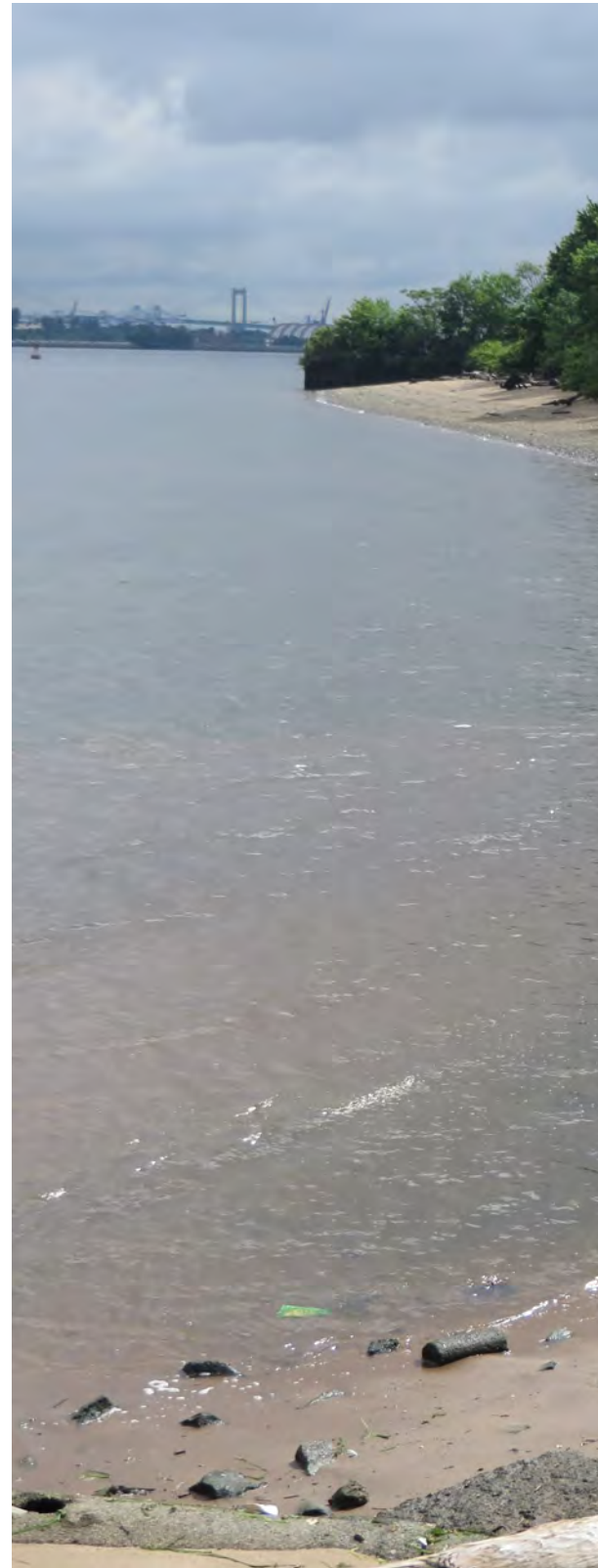
The Next Chapter In the Story of Clean Water

The DRBC approved a resolution in September 2017 recognizing the significant water quality improvements in the Delaware River Estuary and providing for a formal review of the designated aquatic life uses and water quality criteria necessary to support these uses.

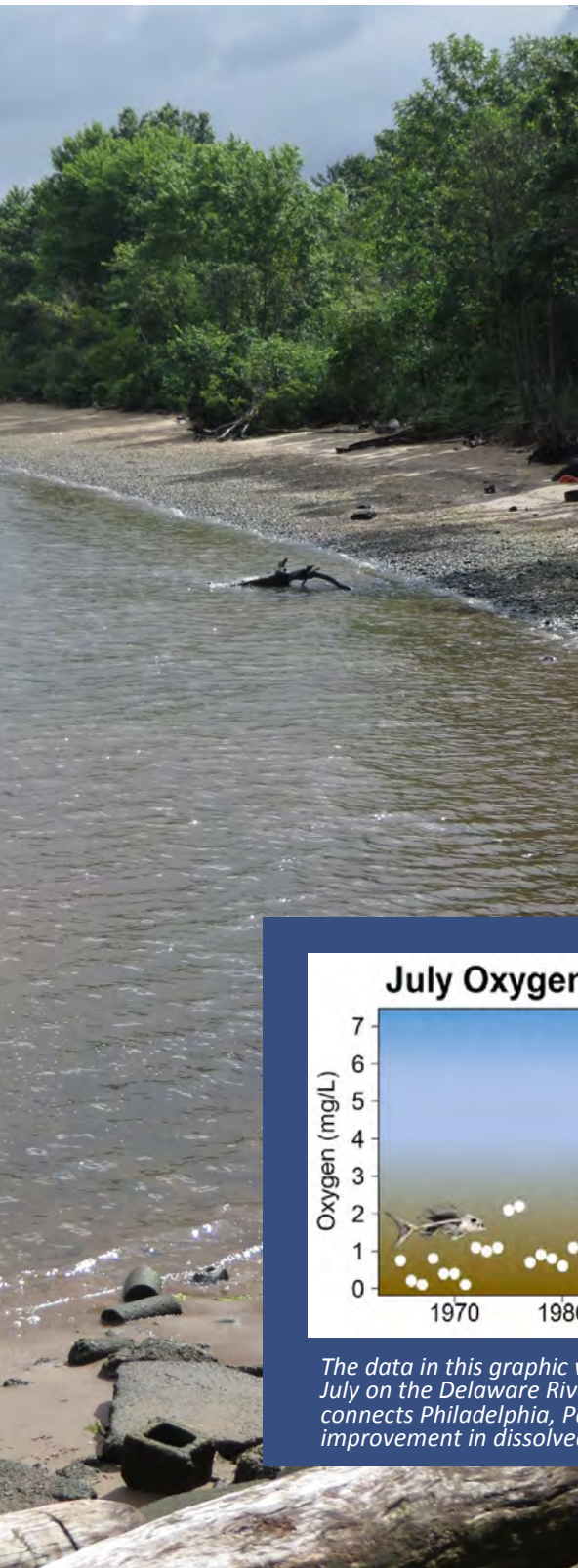
The resolution outlines a deliberative, scientific process to further study evidence on the reproduction of resident and migratory fish in a 38-mile section of the tidal Delaware River stretching from Wilmington, Del. to just above the Tacony-Palmyra Bridge connecting Philadelphia and New Jersey. This study will allow the Commission to determine the “designated use” of this reach of the river and provide data and information to establish revised water quality criteria to protect that use. It also affirms the important goal of continued water quality improvement.

The DRBC-approved resolution provides for scientific and technical studies to be performed over the next 3.5 years for the following purposes:

- To conduct additional field studies of the occurrence, spatial and temporal distribution of the life stages of important fish species that utilize the estuary;
- To determine the dissolved oxygen (DO) requirements of these fish species and the oxygen-depleting nutrient loadings from point (end-of-pipe) and nonpoint (runoff) sources that can be discharged into the tidal river while maintaining the DO levels in the water;
- To conduct an analysis to determine the attainability of DO requirements and water quality standards that would result in an upgrade in the designated aquatic life use in this 38-mile section of the river, including technical, social and economic factors; and
- To identify and evaluate opportunities for early action to reduce discharges of oxygen-depleting wastes to this stretch of river in the short term.



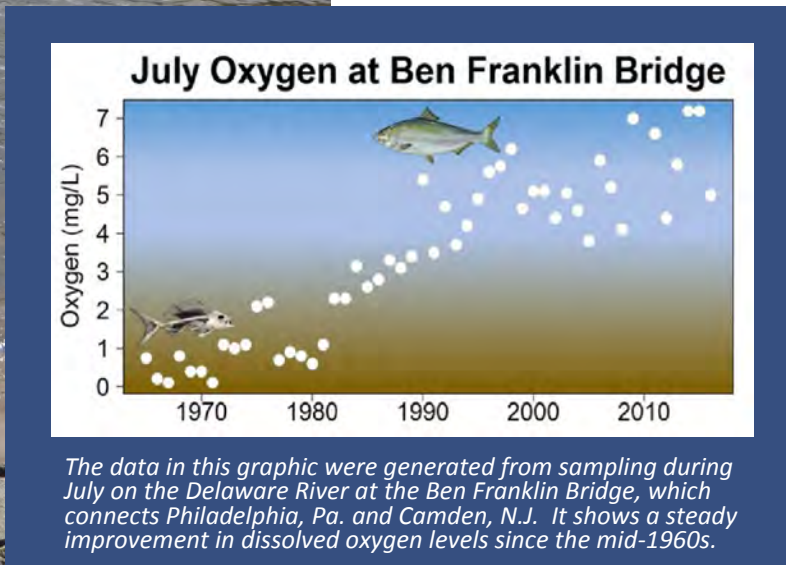
The Delaware Estuary with the Walt Whitman Bridge in the background.



The resolution directs the initiation of DRBC rulemaking to revise the designated aquatic life uses consistent with the results of these scientific and technical studies as well as the federal Clean Water Act. The Commission seeks to issue a final rule and an implementation strategy within six years, dependent on the availability of resources to fund the effort.

When the DRBC was created in 1961, little or no DO was present in the Delaware River from Wilmington to Philadelphia for periods of up to six months each year. To combat this serious challenge, DRBC in 1967 established designated aquatic life uses for the estuary and associated numerical water quality criteria necessary to protect those uses. The designated use in the 38-mile stretch of river between Wilmington and Philadelphia was “maintenance” (survival) of resident fish and movement of migratory fish through these waters to and from spawning areas.

Significant improvements in DO levels have occurred throughout this stretch of river since 1967. By the late 1980s, over one billion dollars had been spent on improving wastewater treatment facilities throughout the basin, which benefitted communities along the river and strengthened fish populations.



The scientific and technical studies to be undertaken as the result of the approved resolution will help to better inform decision makers on DO requirements of resident and migratory fish species since the early life stages of estuarine fish species are generally more sensitive to DO levels than are the adults living in the river stretches or just passing through these waters to reach spawning areas.

Reducing PCBs in the Estuary

The Development of Stage 2 TMDLs

More than a decade ago, the U.S. Environmental Protection Agency (EPA), on behalf of the states of New Jersey, Pennsylvania and Delaware, established acceptable loads (called Total Maximum Daily Loads or TMDLs) for polychlorinated biphenyls (PCBs) for the Delaware River Estuary. These TMDLs were developed by the Commission and are designed to protect human health from the carcinogenic effects of eating contaminated fish caught in these waters. These are referred to as Stage 1 TMDLs.

Implementation of these TMDLs led by the Commission has, to date, dramatically reduced PCB loading from point sources. Between 2005 and 2016, a 76-percent reduction in total PCBs was observed for the top ten dischargers.

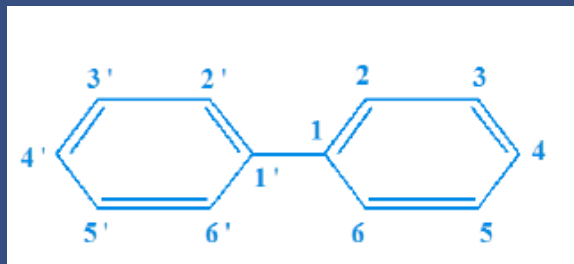
The Commission continues to work with EPA's Regions II and III to develop updated TMDLs. These are referred to as Stage 2 TMDLs, which will:

- Account for new water quality criteria for PCBs adopted by the Commission in 2013;
- Use a more equitable allocation procedure for wasteload allocations for point sources selected through a stakeholder process led by the Commission; and
- Enhance the implementation strategy to maintain the PCB reductions achieved by point sources, as well as continue the progress in the reduction of PCBs for all sources.

Despite the progress made by point source dischargers, PCB loading reductions from non-point sources, including contaminated sites, are needed to achieve the proposed Stage 2 TMDLs.

The establishment of these TMDLs sets forth a framework and specific goals to continue the long-term effort required to protect human health and restore the health of the Delaware Estuary and Bay. Due to the scope and complexity of the problem that has been defined through development of both the Stage 1 and 2 TMDLs, achieving the estuary water quality standards for PCBs will require continued efforts by the point source dischargers and focused efforts on the various non-point source categories, particularly contaminated sites.

What Are PCBs?



Polychlorinated biphenyls (PCBs) are man-made organic chemicals that were widely used in electrical equipment including capacitors, transformers and switches; paints, hydraulic fluids and plasticizers.

- *Hydrophobic and persistent, PCBs accumulate in sediments and fish tissues.*
- *PCBs have been identified as a possible human carcinogen.*
- *Manufacture of PCBs was banned in the U.S. in 1979. However, use continues in existing applications.*

Biomonitoring



DRBC assesses ecosystem health using biological water quality criteria in the non-tidal Delaware River during every odd numbered year. Between July and September 2017, DRBC staff sampled aquatic insects, algae, substrate and water chemistry at 25 sites ranging from Trenton, N.J. to Hancock, N.Y. After collection, the biological samples were sent to a lab, where they were sorted, and will be used to analyze water quality in the non-tidal river.

The composition of the aquatic insect and algal communities provides insight into the biological health of the river at each sampling location. DRBC will post the 2017 biomonitoring results to the website after the data is analyzed.



Right: A hellgrammite collected during biomonitoring. Hellgrammites are the larval form of the dobsonfly and are relatively intolerant to pollution making them good indicators of water quality.



*Left: A mayfly larva collected in a kick net sample during biomonitoring. This specific mayfly belongs to the genus *Attenella*, a group that is relatively intolerant to pollution, making it a good indicator of water quality.*



Top: Water Resource Scientist Doug Rowland (right) and Intern Andrew Garcia collect representative samples of benthic algae from the Delaware River.

Bottom: Water Resource Scientist Elaine Panuccio uses a dive mask and snorkel to ensure an adequate sampling effort and identify uncollected organisms, such as clams or mussels.

OUR REGULATED COMMUNITY

Proposed Regulations

High-Volume Hydraulic Fracturing Activities

On Sept. 13, the Commissioners adopted a resolution at the quarterly business meeting directing Executive Director Steve Tambini to prepare and publish a revised set of draft regulations for public comment to address natural gas development activities within the Delaware River Basin. The deadline for publication was Nov. 30.

The resolution -- which was approved by a vote of three Commissioners in favor (Delaware, New York and Pennsylvania) one opposed (federal government), and one abstaining (New Jersey) -- directed that the revised draft rules include prohibitions related to the production of natural gas utilizing horizontal drilling and high volume hydraulic fracturing within the Delaware River Basin. Further, the revised draft regulations were also to include provisions to ensure the safe and protective storage, treatment, disposal or discharge of hydraulic fracturing-related wastewater where permitted and provide for the regulation of inter-basin transfers of water and wastewater for purposes of natural gas development where permitted.

On Nov. 30, the Commission posted to its website the proposed draft amendments to its regulations and comprehensive plan to better provide for the planning, conservation, utilization, development, management and control of the Basin's water resources in connection with the hydraulic



A member of the public addresses the Commission during the open public comment portion of the Sept. 13 quarterly business meeting, which was held at the Bucks County Community College in Newtown, Pa.

fracturing of shale and other hydrocarbon bearing formations. In addition to the proposed regulations, the Commission also announced a series of four public hearings to take place in Jan. 2018.

The Commission also published instructions for submitting written comments along with any attachments through the Commission's online comments webpage.

No action on the revised draft rules will be taken by the Commission until the public comment process is completed. The Commissioners will consider changes to the revised draft regulations that may be appropriate based on the comments received.

New Fee Structure Implemented

After a public rulemaking process that included a public information session, public hearing and a written comment period, the DRBC approved a new fee structure in December 2016. The new fees took effect Jan. 1, 2017.

The new fee structure includes an annual monitoring and coordination fee for all water withdrawal and discharge projects regulated by the Commission or processed through the DRBC's One Process/One Permit (OPOP) program. The annual monitoring and coordination fee is determined by the monthly water allocation for withdrawals or the design capacity for wastewater dischargers.

Project review fees were also changed. The DRBC project review fees were eliminated for projects processed through the OPOP program. The docket application fee with respect to water withdrawal projects for which the DRBC continues to act as the lead agency is now based upon the applicant's requested monthly allocation.

The project review fee for most wastewater discharges for which DRBC issues a separate docket continues to be a flat fee depending upon whether it is a private project or a publicly sponsored project. Also, there was no change to fees for DRBC's review of projects that are neither water withdrawals nor wastewater discharges; the fees for these projects are based upon project costs.

However, the new fee structure does include an annual, indexed inflation adjustment that applies to most fees and water supply charges. The inflation adjustment is based on the Consumer Price Index for Philadelphia and takes effect each July 1, beginning July 1, 2017. If the applicable inflation index is flat or negative, no changes to the rates will occur.

In March 2017, the first round of invoicing for the annual monitoring and coordination fee commenced for water withdrawal projects in the Basin.



Senior Environmental Toxicologist Ronald MacGillivray, Ph.D. collecting surface water samples in Narrowsburg, N.Y.

Learn more at <http://www.nj.gov/drbc/about/regulations/fee-structure.html>.

Project Review

Withdrawals & Discharges

The Delaware River Basin Compact provides in Section 3.8 that no project having a substantial effect on the water resources of the Basin shall be undertaken unless it shall have been first submitted to and approved by the Commission.

These projects generally fall into one of two categories: water withdrawals (ground and/or surface water) or discharges (wastewater treatment). Occasionally, a project may be a combination of these, or a project falls under another category, such as pipelines.

DOCKET TYPES

WITHDRAWAL

- Groundwater
- Ground & Surface Water
- Surface Water

COMBINED DOCKETS

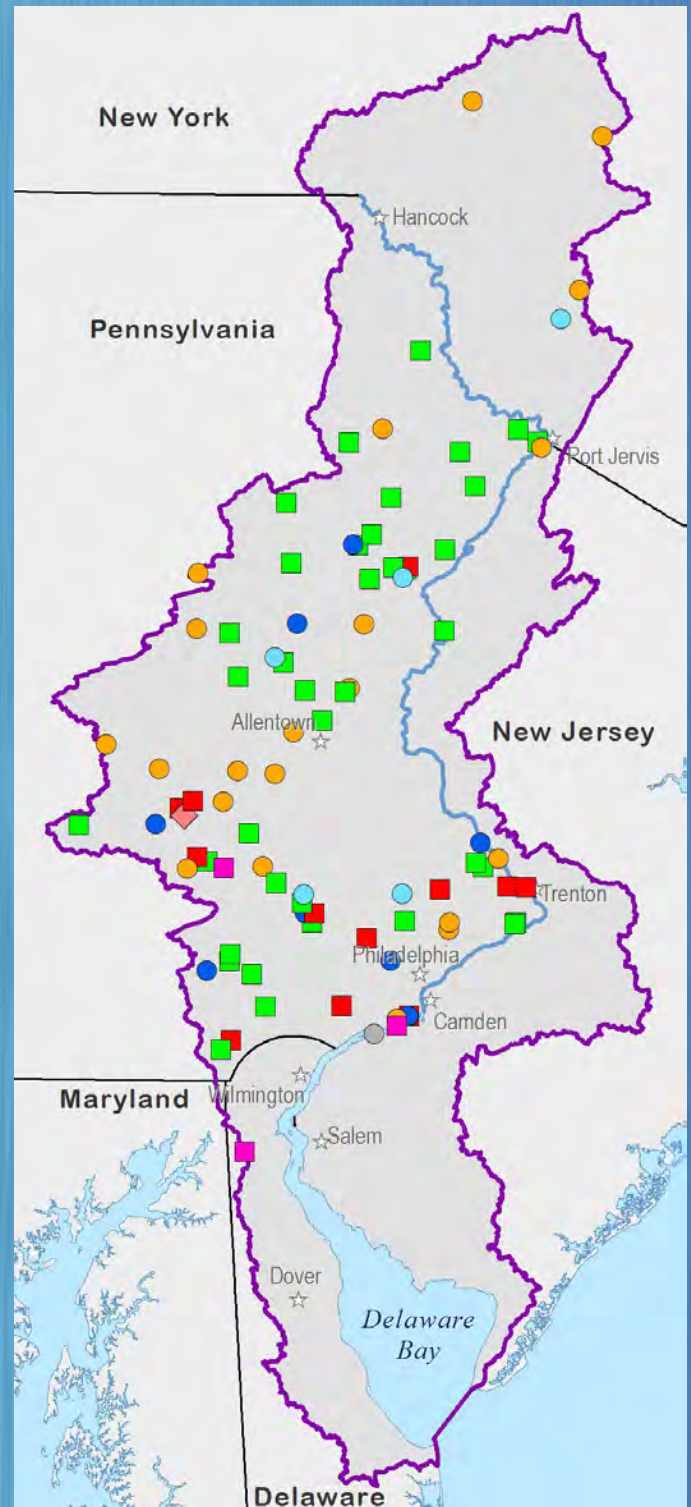
- ◆ IWTP and Groundwater Withdrawal

DISCHARGE

- Industrial Wastewater Treatment Plant (IWTP)
- Wastewater Treatment Plant

OTHER DOCKETS

- Other
- Pipeline



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VALUE THROUGHOUT THE YEAR

In 2017, DRBC approved **88** dockets.

Dockets Approved in 2017

Projects formally reviewed by the Commission are referred to as “dockets.” Following a public hearing, dockets are voted on by the Commissioners at their quarterly business meetings, which are open to the public. In 2017, the Commission approved 88 dockets.

DOCKETS APPROVED MARCH 15, 2017

1970-120-3 CAMBRIDGE-LEE INDUSTRIES, LLC
1973-209 CP-3 MIDDLE SMITHFIELD TWP
1974-176 CP-4 BOROUGH OF MYERSTOWN
1984-002-6 NESTLE PURINA PET CARE
1989-053-4 NGK METALS
1991-014 CP-4 PA AMERICAN WATER CO, BLUE MOUNTAIN LAKE
1991-020 CP-4 PLUM CREEK MUNICIPAL AUTHORITY
1993-062 CP-3 LAKE ADVENTURE COMMUNITY ASSOCIATION
2006-013-3 SKYTOP LODGE CORPORATION
2006-018-2 BLUE RIDGE COUNTRY CLUB
2006-026-CP-4 POCONO MANOR INVESTORS
2009-003 CP-2 NAVAL SURFACE WARFARE WATER WITHDRAWAL
2009-004 CP-2 NAVAL SURFACE WARFARE NON-CONTACT COOLING WATER DISCHARGE
2016-006 CP-1 UPPER MAKEFIELD TWP DUCHESS FARMS
2016-007-1 EASTERN SHORE NATURAL GAS
2016-011- 1 AQUA PA WASTEWATER, INC THORNHURST 16

DOCKETS APPROVED JUNE 14, 2017

1964-028 CP-3 PALMERTON WWTP
1967-080 CP-4 BOROUGH OF PHOENIXVILLE WWTP
1967-123 CP-3 BOROUGH OF PHOENIXVILLE SURFACE WATER WITHDRAWAL
1971-150 CP-2 WALLENPAUPACK LAKE ESTATES
1983-023 CP-4 KUTZTOWN GWD
1989-082-3 PIKE COUNTY ENVIRONMENTAL
1995-019 CP-2 BETHLEHEM SWWD
1996-036 CP-3 PHILADELPHIA DIVISION OF AVIATION GWD
1998-051 CP-4 MILFORD SENIOR CARE WWTP
1999-020 CP-4 PENN ESTATES UTILITIES WWTP
2001-045 CP-4 RIVERCREST WWTP
2001-052 CP-3 BEACH LAKE MA WWTP
2006-020-3 SC STREAM PA
2006-022-2 TEVA PHARMACUETICALS GWD
2007-022 CP-3 APPLECROSS



(From right) DRBC Project Review Manager David Kovach and Commission Secretary and Assistant General Counsel Pam Bush, J.D review a proposed project plan with Western Berks Water Authority Executive Director Chip Bilger.

2007-003-3 TO JO IWTP
2007-016 CP-2 BATH BOROUGH AUTHORITY
2007-018-4 WEDCO STERLING WWTP
2007-020-2 PAPERWORKS INDUSTRIES, INC SWWD
2007-028 CP-2 WOODBOURNE CORRECTIONAL FACILITY GWD
2007-039 CP-3 EAST STROUDSBURG WFP
2008-006 CP-3 MORRISVILLE WFP
2009-008 CP-2 FLEISCHMANN'S VILLAGE GWD
2010-010-2 FREISLAND CAMPINA-DOMO GWD
2016-009-1 PHILMONT COUNTRY CLUB GWD&SWWD 25

DOCKETS APPROVED SEPTEMBER 13, 2017

1977-058-5 MOUNT AIRY #1 WWTP
1979-026-3 ARCELOR MITTAL PLATE WWTP
1983-015 CP-5 POCOPSON HOME AND PRISON WWTP
1983-034 CP-4 ROBESON TWP MUA
1985-055 CP-4 AQUA PA INC HAMILTON GWD

- 1988-043-6 GIORGIO FOODS IWWTP
- 1988-051 CP-3 BATH BOROUGH WWTP
- 1990-028-3 PA AMERICAN WATER CO MARCEL LAKES
- 1991-001 CP-4 BRODHEAD CREEK REGIONAL AUTHORITY
- 1994-063 CP-3 FREELAND BOROUGH MUNICIPAL AUTHORITY
- 1995-058 CP-3 BOROUGH OF FLEETWOOD GWD
- 1997-001-CP-4 NORTH COVENTRY MUA WWTP
- 2001-054-3 AQUA PA LITTLE WASHINGTON WWTP
- 2006-016-2 SPRING FORD COUNTRY CLUB GWD SWD
- 2006-025 CP-2 PENNSYLVANIA AMERICAN WATER CO, MILFORD GWD
- 2007-010-2 VOGEL FARM AND BROAD MT SPRING WATER CO
- 2007-025 CP-3 UPPER MAKEFIELD WWTP
- 2008-002 CP-3 PA WATER CO LOWER MAKEFIELD
- 2008-007 CP-3 KEYSTONE MOBILE HOME PARK WWTP
- 2008-025 CP-3 AQUA PA RIDLEY CREEK
- 2008-033 CP-3 LONDON GROVE TWP MA
- 2012-001 CP-2 LOWER BUCKS COUNTY TULLYTOWN BOROUGH
- 2016-008-1 DTE MIDSTREAM APPALACHIA
- 2016-010-1 SUNOCO LOGISTICS 24

DOCKETS APPROVED DECEMBER 13, 2017

- 1969-055 CP-4 WBWA SWWD
- 1977-094 CP-2 AQUAPA – FLYING HILLS
- 1985-025-4 BLUE RIDGE BIG BOULDER WWTP
- 1990-068 CP-4 KIAMESHA
- 1993-076 CP-4 BCWSA UPPER DUBLIN
- 1996-016 CP-3 PAWC COATSVILLE
- 2006-038-3 RIVER ROAD UTILITIES WWTP
- 2007-024 CP-2 UPPER MAKEFIELD GWD
- 2007-044-2 POCONO MANOR INVESTORS GWD
- 2010-034-2 SQUIRES GOLF GW-SWWD
- 2010-038 CP-3 DEPT OF NAVY BRAC-GWTP
- 2015-017 CP-2 DCNR
- 2017-003-1 JOE JURGIELEWICZ & SON GWD
- 2017-004-1 LITTLE LEHIGH TREE AND TURF GWD
- 2017-009-1 DRP GIBBSTOWN LOGISTICS
- D-1986-032 CP-3 CATASAQUA BOROUGH WWTP
- D-1989-018 CP-7 DCSWA ROLLING HILLS WTS
- D-1990-107 CP-3 NESQUEHONING BORO WWTP
- D-1993-068 CP-3 LOWER BUCKS CO JMA WWTP
- D-1996-039 CP-3 NORTHSIDE HEIGHTS MHE
- D-2006-045 CP-3 ROYERSFORD BOROUGH WWTP
- D-2011-019-2 WG AMERICA DISCHARGE

Southeastern Pennsylvania Ground Water Protected Area



The Southeastern Pennsylvania Ground Water Protected Area (GWPA), where more stringent regulations apply to ground water withdrawals than they do in the rest of the Delaware River Basin, was established by DRBC at the request of the Commonwealth of Pennsylvania after it became evident that development was negatively impacting ground water levels in the Triassic lowland and adjacent area of southeastern Pennsylvania.

Water withdrawals from this area in excess of 10,000 gallons a day require DRBC permitting (a tenth of what is required in the rest of the basin).

The main goal of the GWPA is to prevent the depletion of ground water. Lowered water tables in the GWPA have reduced flows in some streams and dried up others. This reduction in baseflows affects downstream water uses, negatively impacts aquatic life and can reduce the capacity of waterways in the region to assimilate pollutants.

In 2017, DRBC issued five approvals for groundwater withdrawals from the Southeastern Pennsylvania Ground Water Protected Area.

OUR PUBLICS & STAKEHOLDERS

Advisory Committees

One of DRBC's strategic goals is to solicit diverse stakeholder participation and input on Basin water resource matters. DRBC's advisory committees provide such a forum for the exchange of information and viewpoints on a variety of issues, enhancing communication and coordination. The Commission recognizes the importance of engaging qualified representatives from federal/state/local government agencies, industry, municipalities, academia, public health and environmental/watershed organizations to inform its policy decisions. There are currently five standing committees, each with its own bylaws and regular meeting schedule. In 2017, these included:



Members of the public provide comments to the Regulated Flow Advisory Committee and the Decree Party representatives.

Flood Advisory Committee

Delaware Department of Natural Resources and Environmental Control

Michael Powell, CFM

New Jersey Department of Environmental Protection

Vincent Mazzei, P.E.
John H. Moyle, P.E.
Joseph Ruggeri, P.E., CFM
John Scordato

New York Department of Environmental Conservation

Mark Klotz, P.E.
William Nechamen, CFM

Pennsylvania Department of Environmental Protection

Hoss Liaghat, P.E.

New York City Department of Environmental Protection

Tina Johnstone
Thomas Murphy Jr., P.E.
Dana Olivio
John H. Vickers, P.E.

Delaware Emergency Management Agency

Arthur Paul
Edward Strouse

New Jersey Office of Emergency Management

Sgt. Michael K. Gallagher
Christopher Testa (Committee Chair)

New York State Division of Homeland Security and Emergency Services

Richard Lord
Gary L. Tuthill

Pennsylvania Emergency Management Agency

David Williams
Thomas S. Hughes, CEM

Federal Emergency Management Agency

Dave Bollinger, CFM
Scott Duell
Patricia Griggs
J. Andrew Martin, CFM
Alan Springett

U.S. Department of Agriculture - Natural Resources Conservation Service

Hosea Latshaw
David Lamm

U.S. Geological Survey

William F. Coon
Heidi L. Hoppe
Robert G. Reiser
Mark Roland, P.E.
Thomas Suro, P.H., CFM
Kirk White

National Weather Service

Peter Ahnert
Jim Brewster
Al Cope
Laurie Hogan
Raymond Krudzlo (Committee Vice Chair)
Al Matte
George McKillop
Patrick O'Hara
Ted Rodgers
Ben Schott

U.S. Army Corps of Engineers

Jason F. Miller, P.E.

National Park Service

Kristina Heister
Vince Pareago

Delaware River Joint Toll Bridge Commission

Sean M. Hill

Electric Generation Industry (Hydropower and Off-Stream Storage)

Meredith Strasser

County Water Resources Agencies

Gerald Kauffman, P.E.

Emergency Management Representatives

David K. Burd
Steve Hood

Monitoring Advisory and Coordination Committee

Academia

Dr. Jonathan Sharp

Agriculture/Forest Service

Richard Birdsey

Delaware

David Wolanski (Committee Chair)

Delaware River Basin Fish and Wildlife Cooperative

Sheila Eyler

Land Use Planning Community

Barry Seymour

National Oceanic and Atmospheric Administration

Dr. Jawed Hameedi

National Park Service

Don Hamilton
Jessica Newbern

New Jersey

Leslie McGeorge
Bruce Friedman

New York

Sarah Rickard

Pennsylvania

Michael Lookenbill

Regulated Community

Vacant

U.S. Army Corps of Engineers

Jerry Pasquale

U.S. Environmental Protection Agency

Deb Szaro
John S. Kushwara

U.S. Geological Survey

Tom Imbrigotta

Volunteer Monitoring

Maya K. van Rossum

Regulated Flow Advisory Committee

Delaware Department of Natural Resources and Environmental Control

William Cocke, P.G.

Delaware Geological Survey

Stefanie Baxter, P.G.

New Jersey Department of Environmental Protection

Joseph A. Miri, Ph.D.
Steve Domber

New York City Department of Environmental Protection

Jen Garigliano

New York State Department of Environmental Conservation

Brenan TARRIER (Chair)

Office of the Delaware River Master

Robert R. Mason, Jr.

Pennsylvania Department of Environmental Protection

Jennifer Orr

Philadelphia Water Department

Kelly Anderson

U.S. Army Corps of Engineers

Laura Bittner

Toxics Advisory Committee

Academic

David Velinsky, Ph.D.
Keith Cooper, Ph.D.
Randall Detra, Ph.D.

Agriculture

Brian F. Oram, P.G.
Paul W. Semmel

Delaware

Richard W. Greene, Ph.D.

Environmental/Watershed

Tracy Carluccio
Diana Oviedo-Vargas, Ph.D.

Environmental Protection Agency Region II

Brent Gaylord

Environmental Protection Agency Region III

Kuo-Liang Lai, P.E.

Federal Fish & Wildlife

Clay Stern

Industry

J. Bart Ruitter
Scott Northey

Municipal

Jason Cruz
Matthew Fritch

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VALUE THROUGHOUT THE YEAR

New Jersey

Biswarup (Roop) Guha
Sandra M. Goodrow, Ph.D., C.F.M.
Stephen Seeberger

New York

Scott J. Stoner
Jason R. Fagel

Pennsylvania

Vacant

Public Health

Eric Bind, M.P.P.

Water Management Advisory Committee

Delaware

Steven Smailer, P.G.

New Jersey

Carolyn Olynyk

New York

Erik Schmitt, P.E.

Pennsylvania

Hoss Liaghat, P.E.

U.S. Army Corps of Engineers

Laura Bittner

U.S. Environmental Protection Agency

Katie Lynch

U.S. Geological Survey

Daniel J. Goode, Ph.D.

City of New York

Dana Olivio

City of Philadelphia

Kelly Anderson

County Water Agency

Janet L. Bowers

Water Resources Association

Kathy Klein (Committee Vice-Chair)



The Water Quality Advisory Committee discussing studies in support of the Delaware Estuary Eutrophication Model, which will be used to define a new aquatic life use and dissolved oxygen criteria.

Industry

James Mershon (Committee Chair)

Water Utility

John Thaeber

Agriculture

Sandra Howland

League of Women Voters or other Civic Organization

Vacant

Environmental Organization

Mary Ellen Noble

Watershed Organization

Pete Golod

Academia

Gerald J. Kauffman, Ph.D.

Recreation

Ann M. Pilcher

Fisheries

Sheila Eyler, Ph.D.

Water Quality Advisory Committee

Academia/Science

John K. Jackson, Ph.D.

Delaware

David Wolanski (Committee Chair)
John Schneider

Environmental Professional

Maya K. van Rossum

Local Watershed Organization

Abigail M. Pattishall, Ph.D.

National Park Service Wild and Scenic Rivers Program

Richard Evans
Peter Sharpe, Ph.D.

New Jersey

Frank Klapinski
Biswarup (Roop) Guha

New York

Sarah Rickard

Pennsylvania

Thomas Barron
Matthew D. Kundrat, Ph.D.

Regulated Community - Industrial

J. Bart Ruitter
Christopher Conroy

Regulated Community - Municipal

Jason Cruz
Bryan P. Lennon

U.S. Environmental Protection Agency

Kuo-Liang Lai, P.E.
Brent Gaylord

Outreach

DRBC considers outreach to support the Commission's mission and the needs of interested user groups to be a strategic goal. To that end, DRBC took part in numerous outreach events throughout the Basin in 2017. In addition to those featured here, they also included:

- 17th Annual HydroMania—Allentown, Pa.
- Delaware Coast Day—Lewes, Del.
- 23rd Annual Delaware River Sojourn
- Shad "Young of Year" Seining—Phillipsburg, N.J.
- Biomonitoring demonstration with WFMZ, TV69 News
- Pa. Sen. Judy Schwank's Home Water Workshop—Reading, Pa.



Communications Specialist Kate Schmidt (right) explains aspects of the Basin to a member of the public at Pennsylvania Coast Day in Philadelphia.



Intern Taylor Krolik helps adults and children alike identify some of the macroinvertebrates found in the Delaware River at the 36th Annual Shad Festival in Lambertville, N.J.



Using a watershed model, Executive Assistant Donna Woolf teaches children about nonpoint source water pollution at Temple University Ambler's Earthfest.



Water Resource Scientist Elaine Panuccio demonstrates the makeup of a water monitoring probe to members of Congressman Brian Fitzpatrick's staff on the Calhoun St. Bridge between Trenton, N.J. and Morrisville, Pa.

Caring for Our Communities

While the Commission's work is focused on the water resource management throughout the Basin, DRBC staffers have embraced the concept of being good neighbors and contributing to their "work" community. In 2017, the DRBC team, which operates out of West Trenton, N.J., participated in many worthy causes. Whether it was preparing groceries for distribution at a local food bank, teaching Boy Scouts about protecting watersheds, or bringing in warm 'gently used' coats for those in need, or donating holiday gifts for local children, DRBC staffers were generous with their time.



Staff donated more than 50 winter coats through the national One Warm Coat program that were delivered by (from second to left) Executive Director Steve Tambini, Support Services Technician Pat Rago and Communications Specialist Kate Schmidt to the Rescue Mission of Trenton, N.J.



DRBC staff including Executive Assistant Donna Woolf (left) and Water Resource Management Director Ken Najjar volunteered time at Philadelphia Park and Recreation's Pennypack Park to water and refurbish 75 of the park's recently planted trees.





DRBC staff worked with the Mercer Street Friends Food Bank in Ewing, N.J., sorting and preparing donations of fresh produce for distribution to hunger relief programs in Mercer County, N.J.



DRBC staff donated enough school supplies to fill up 25 backpacks as part of the Salvation Army's Back-to-School Supply Drive. From left: Accounting Assistant Carol Adamovic, Support Services Technician Pat Rago, and Administrative Assistant Denise McHugh consolidate school materials for filling the backpacks.

OUR EMPLOYEES



DRBC Commissioner Alternates/Advisors pose with staff in the Dr. Ruth Patrick River Garden following a quarterly caucus meeting.

Despite the Delaware River Basin's area of 13,539 square miles over four states, the Commission's staff is a small group of individuals with educational training in fields such as biology, geology, toxicology, engineering and planning, many with advanced degrees and professional certifications. In 2017, the average DRBC staff member had about 24 years of experience in their respective technical field and about 13 years of service with the Commission.

Trusted Technical Expertise

Commission staff are routinely asked to speak on water resource management and technical issues. In 2017, these included:

**Commission Secretary and Assistant General Counsel
Pam Bush, J.D., M.R.P.**

- *DRBC's Special Protection Waters Program at 25* at the Water Resources Association of the Delaware River Basin Fall Conference.

Manager of Project Review David Kovach, P.G.

- *Groundwater Withdrawals in the Delaware River Basin* at Berks County Home Water Workshop.

**Director, Science & Water Quality Management
Thomas J. Fikslin, Ph.D.**

- *Water Quality Standards for Aquatic Life in Delaware River Estuary: Status of Revision Process* at N.J. Environment Association Annual Conference and Exposition.

- *Implementation of Antidegradation Policies and Practices in the Delaware River Special Protection Waters* at N.J. Environment Association Annual Conference and Exposition.
- *Research and Policy Decision: Aquatic Life Uses in the Delaware Estuary* at the Water Resources Association of the Delaware River Basin Fall Conference.
- *Modeling Eutrophication Processes in the Delaware Estuary to Link Watershed Efforts to Control Nutrient Impacts* at the Delaware Watershed Research Conference.

**Senior Environmental Toxicologist Ronald
MacGillivray, Ph.D.**

- *A Decade of Monitoring Emerging Contaminants in the Delaware River* at EMERGED: Contaminants of Emerging Concern in Delaware Waterways, DTCC Conference Center.
- *Biotic Ligand Model-Based Water Quality Assessment of Copper* at Hudson-Delaware Chapter of the Society of Environmental Toxicology and Chemistry's (HDC-SETAC) Spring Meeting, Seton Hall University.
- *Monitoring Water Quality to Ensure Sustainability* at Stevens Institute of Technology, Hoboken, N.J.

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VALUE THROUGHOUT THE YEAR

Director of Water Resource Management Kenneth F. Najjar, Ph.D., P.E.

- *Delaware River Basin Drought Status* at the Delaware Water Supply Coordinating Council.

Water Resource Scientist Elaine Panuccio

- *Lower Delaware River Special Protection Waters Assessment of Measurable Changes to Existing Water Quality, Round 1: Baseline EWQ (2000—2004) vs Post-EWQ (2009 – 2011)* at the Delaware Watershed Research Conference and at the Susquehanna River Symposium.

Information Specialist/GIS Karen Reavy

- *Progress in Water Resource Mapping in the Delaware Estuary* at the Partnership for the Delaware Estuary's Science Summit.

Manager of Communications Clarke Rupert

- *Overview of the DRB and DRBC* at the Rotary Club of Trenton, N.J.
- *The American Shad* at Pleasantville United Church of Christ.

Manager of Water Resource Operations Amy Shallcross, P.E.

- *Flow Management* at the Partnership for the Delaware Estuary's Science Summit.
- *DRBC Use of NWS Products for Water Resource Management* at the NOAA PA Roundtable for Congressional Legislators.
- *Modeling Hydrology and Reservoir Operations for Assessing the Big Picture Risks of Climate Trends* at the USGS Water Census Seminar.
- *History and Practice of Flow Management in the Delaware River Basin, Upstream* at the Water Resource Association of the Delaware River Basin's Fall Conference.
- *Water Resource Management* at the Coalition for the Delaware River Watershed's Watershed Forum.

Manager of Water Resource Modeling Namsu S. Suk, Ph.D.

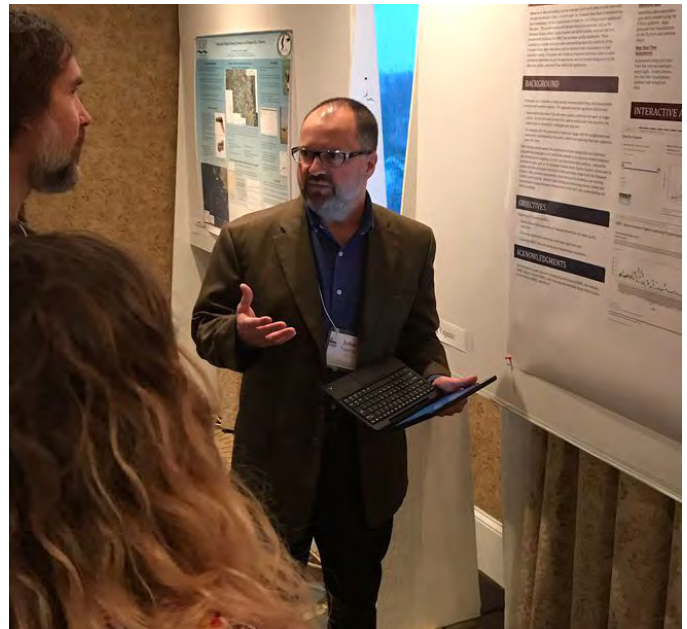
- *Updating TMDLs for PCBs for the Delaware Estuary* at the Partnership for the Delaware Estuary's Science Summit.

Executive Director Steve Tambini, P.E.

- *Analyzing Climate Change Impacts to Water Resources in the Delaware River Basin* at American Water Works Association, New Jersey Section.
- *Update of DRBC Activities* at Water Resources Association of the Delaware River Basin.

Manager of Water Quality Assessment John Yagecic, P.E.

- *Applications for Near Real-Time and Interactive Data Assessment in the Delaware River Basin* at the Partnership for the Delaware Estuary Science Summit.
- *Enhanced Understanding of Hydraulic Processes via Animated Graphing of Continuous Monitor Data in the Delaware Estuary and Barnegat Bay during Sandy* at the Super Storm Sandy: Five Years Later Conference.
- *Water Resources Management and the Delaware River Basin Commission* at Rider University
- *Water Quality and Monitoring Demonstration* at Boy Scouts of America, Troop 10 meeting in Yardley, Pa.



Manager of Water Quality Assessment John Yagecic, P.E., explains his poster on applications for near real-time and interactive data assessment to attendees at the Partnership for the Delaware Estuary's Science Summit.

Recognized Expertise



Chair of DANJ N.J. Documents Interest Group Deborah Mercer with Communications Specialist Kate Schmidt and Communications Manager Clarke Rupert as they accept the DANJ award for N.J. Website of the Year 2017.

The Documents Association of New Jersey (DANJ) presented DRBC with its annual award for the New Jersey Website of the Year, honoring websites published by a N.J. state agency, department, or commission. Communications Manager Clarke Rupert and Communications Specialist Kate Schmidt accepted the award on behalf of DRBC at DANJ's Fall Conference, held on October 27, 2017.

The award highlights government websites that utilize best practices in public information dissemination and that DANJ documents librarians feel is highly informative, understandable, easy to navigate and benefits N.J. citizens. According to DANJ, the DRBC website received several nominations and was chosen as the winner by a final selection committee.

Knowledge Sharing

DRBC frequently holds “brown bag lunch” knowledge sharing sessions. Sometimes they are led by internal staff detailing a current program they are working on. Occasionally, the Commission recognizes outside students, who are invited to present a school project to the staff.



13-year old Sonja Michaluk from Hopewell Valley Central High School presents her work on stream monitoring, which she has been doing since she was seven years old.



Students and faculty from Philadelphia's Mariana Bracetti Academy Charter School's STEM Club presented on an underwater drone, which the group built and used to observe aquatic life.

Retired and Missed

Richard C. Gore “Never had a bad day”



Richard C. Gore retired on April 1, 2017 after three decades of distinguished service to the Delaware River Basin Commission, spanning numerous commissioners and three executive directors.

He was appointed the Commission’s Chief Administrative Officer in 1988, having previously served 19 years with the County of Bucks (Pennsylvania), the City of Philadelphia and the Southeastern Pennsylvania Transportation Authority.

In 2016, he was named the Commission’s Director of Finance and Administration adding information technology management to his responsibilities. Rich left a legacy at the Commission and a positive impact on everyone who had the opportunity to work with him.

Robert Limbeck “My first and last job”



Robert Limbeck recording data after collecting surface water samples.

Robert Limbeck retired from DRBC on August 1, 2017 after 32 years of service. He started at the Commission in 1986 as a database specialist. It was his first job out of college. He stayed with the Commission, finishing more than three decades later as DRBC’s Senior Aquatic Biologist.

A Look Around the Basin

In the fall of 2017, the commission launched its first seasonal photo contest. The Fall Photo Contest garnered submissions from more than twenty professional and amateur photographers, who each captured some of the beauty of the Basin's resources. A judging panel of DRBC employees selected Rapids on the Mongaup River in the Fall by Andy Smith— the cover photo of this report— as the Fall winner. A selection of the fall entries are featured here.



Speck of Blue by Christopher Todd Kratzer. Taken at Horseshoe Bend Park in Kingwood, N.J.



River scene in Fall by Anna J. Blackman. Taken at Westfall Township, Pa. boat landing.



Buckingham by David B. Soete. Taken at Buckingham Access above Kilgour Spur, N.Y.



Morning on the Reservoir by Cheryl R. Decker. Taken at Cannonsville Reservoir at Deposit, N.Y.



View of the Delaware River by Linda Park. Taken at Bowman Hill Tower, New Hope, Pa.

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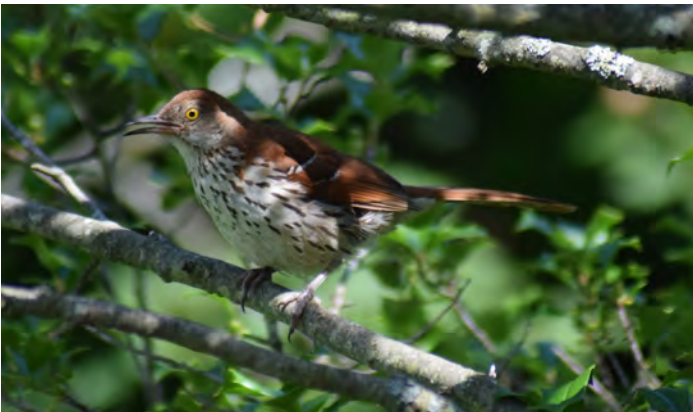
VALUE THROUGHOUT THE YEAR



Historic Delaware River by Alice Orrichio. Taken at Riegelsville Roebling Bridge, Riegelsville, Pa.



Fall Colors by Marion G. Waggoner. Taken at White Clay Creek near Landenberg, Pa.



Brown Thrasher by Carla Kelly-Mackey. Taken in Delaware Township, N.J.



Heavenly night by DRBC Administrative Assistant Denise McHugh. Taken at Falls Township, Pa. Community Park. (Winner, DRBC Staff Fall Photo Contest)

Front Cover:

"Rapids on the Mongaup River in the Fall" by Andy Smith, winner of the Commission's Fall Photo Contest.

Left:

DRBC Water Resource Modeler Li Zheng, Ph.D. calibrates a probe used in water quality monitoring.

Right:

DRBC Senior Environmental Toxicologist Ron MacGillivray, Ph.D. pilots the Commission's boat as Senior Geologist Greg Cavallo, P.G. examines a sediment sample he recovered from the estuary bottom.



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