



# 2021 Annual Report

60 Years of Managing, Protecting, and Improving





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.

The DRBC has been managing, protecting and improving the water resources of the Delaware River Basin for 60 years and counting. In support of its mission, DRBC convenes and collaborates with its signatory parties—the four Basin states and the federal government—to protect and improve water quality; manage river flows; mitigate droughts and flood loss; provide for the reasonable and sustainable development and use of surface and ground water; and promote water conservation and efficiency.

*The commission shall make and publish an annual report to the legislative bodies of the signatory parties and to the public reporting on its programs, operations and finances.*

*Delaware River Basin Compact, Section 14.12*

*All photos by DRBC with all rights reserved unless otherwise noted.*

*On the cover, second image from the left: American Oystercatcher at Cape Henlopen. Credit, BrianHenderson (CC BY-NC 2.0 via Flickr).*

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# Executive Director's Message

The Delaware River is one of our nation's great waterways. Traveling 330 miles through New York, New Jersey, Pennsylvania, and Delaware, it sustains one of the most densely populated landscapes in the country, providing drinking water for over 13 million people. Sixty years ago, a model was developed to protect the River and watersheds of the four Basin states that has contributed to one of the greatest comeback stories in history, and it remains relevant today. As we celebrated the 60th anniversary of the Delaware River Basin Commission in 2021, we also resolved to use this model of federal and interstate cooperation to continue to meet our greatest water security needs and to address climate and water equity challenges ahead.

During the post-WWII era, the urban Delaware River around Philadelphia and Camden was so polluted that at times, the River was starved of the dissolved oxygen needed to support aquatic life, resulting in a functionally dead River. There was no coordinated plan or authority to address weather and flow extremes that impacted the River Basin. Persistent and horrific floods caused loss of life and property.

After crisis, conflict, and study, a new concept emerged in which the states and the federal government came together to form the Delaware River Basin Commission.

The Delaware River Basin Compact, adopted and signed into law by President John F. Kennedy in 1961, provides for "the planning, conservation, utilization, development, management and control of the water resources of the Basin." The Commission is uniquely vested with the authority of both state and federal law to uphold a nature-based governance system.

Using science, planning and leadership, the most polluted portions of the River have improved. Urban planners in the Philadelphia area who once turned their backs to a dead River now compete to provide opportunities to live, work and play near the River. Fish once again can migrate and reproduce.

The Basin's residents and businesses have benefited from the DRBC's nation-leading programs in areas like water efficiency, tracking and reduction of legacy pollutants, and strict water quality standards to ensure that exceptionally clean waters stay that way.

Water security is bolstered by the DRBC's regulatory drought management plans for the Basin and by modeling and operations



Steve Tambini, P.E.  
Executive Director





programs that ensure freshwaters are released from upstream reservoirs to control the location of salt in the Delaware River Estuary.

Through these measures and throughout the decades, the four Basin states and the federal government have shown that by following the shape of a river’s basin above political boundaries, they could achieve more together than any one government could achieve individually.

But the challenges brought by a changing climate are the biggest test for the Delaware yet. The climate continues to impact our changing water cycle with potentially significant impacts. Rising seas want to push salt further upstream threatening drinking water intakes, groundwater recharge areas, and tidally-influenced ecosystems. More frequent and severe extreme weather means more drought and flood potential throughout our diverse Basin. Stormwater runoff continues to impact water quality and challenges us to better harness nature-based infrastructure.

Despite significant improvements, in water quality since DRBC was formed, all the “fishable and swimmable” goals of the Clean Water Act have not been fully achieved, especially in and near the urban Delaware River Estuary. Water security needs persist, especially in environmental justice communities, which face water quality needs, flooding impacts, aging infrastructure,

and affordability challenges. With more federal investment resources aimed at water infrastructure improvements, the DRBC and the entire Basin community has an opportunity to plan for and implement investment translating into greater water equity in our Basin’s historically overburdened communities.

What President Kennedy once called a “bold venture” —government in the shape of water— works, and we must continue to support it. With about four percent of the U.S. population reliant on the water resources of the Delaware River Basin, too much is at stake for once-in-a-generation investments to pass by. The DRBC is well-positioned to coordinate this effort, ensuring equity and water quality increase in the Delaware River Basin.

Through regulatory authority gained 60 years ago and a mission of planning and science, collaboration and cooperation with members and our Basin community, the DRBC holds the key to water security for our region into the future.

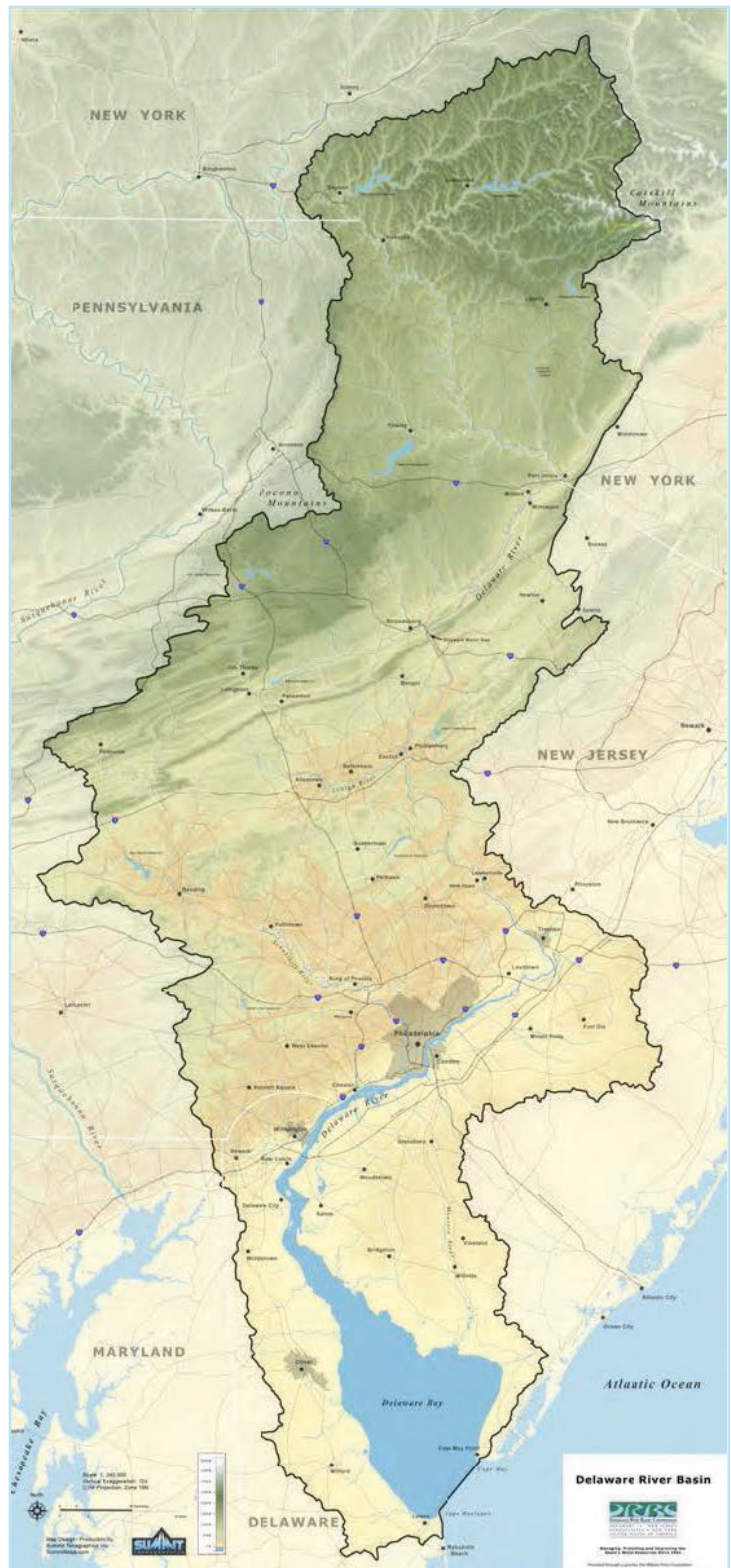
Steve Tambini, P.E.  
Executive Director

# The Delaware River Basin

Lying in the densely populated corridor of the northeastern U.S., the Delaware River stretches approximately 330 miles from its headwaters in New York State to its confluence with the Atlantic Ocean. The Basin totals 13,539 square miles, including approximately 12,800 square miles of land area, nearly 800 square miles of the Delaware Bay and more than 2,000 tributaries, including many that are rivers in their own right.

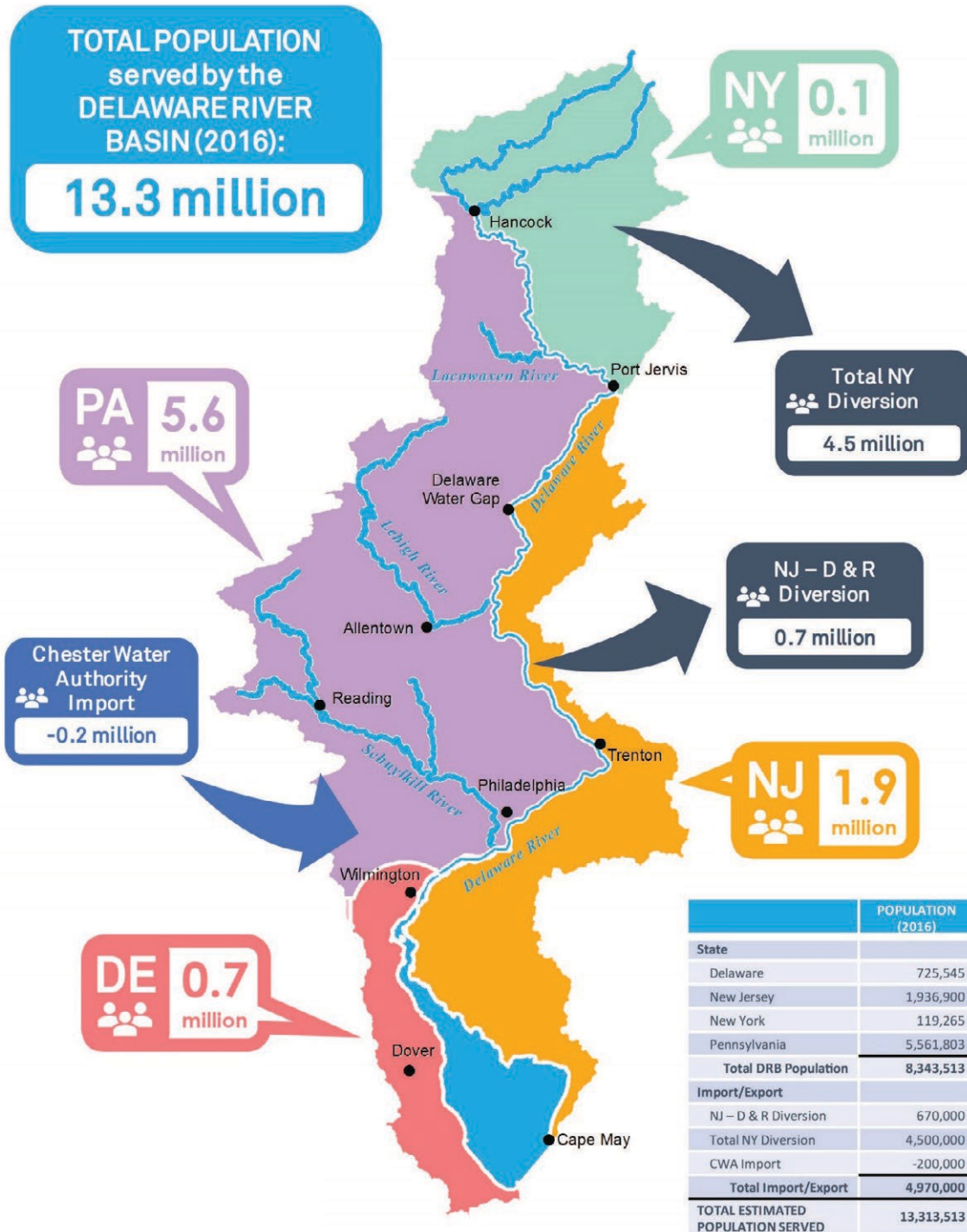
The northernmost tributaries to the Delaware River originate in the forested western slopes of the Catskill Mountains, which reach elevations of up to 4,000 feet. The East and West Branches meet at Hancock, N.Y., from where the Delaware River descends about 800 feet on its journey to the Atlantic Ocean.

The Delaware River is the longest undammed 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.





# Population Served



Total NY diversion includes NYC diversion and upstate NY communities


# 60th Anniversary Timeline


In celebration of our 60 years, the DRBC created a timeline for our website: [timeline.drbc.gov](https://www.drbc.gov/timeline)


We wanted to reflect on the Commission's work and accomplishments throughout the Basin, set against the rich backdrop of historic actions, environmental milestones and major hydrologic events. Our work continues with opportunities and challenges ahead, and we invite you to join us in a shared journey through the next 60 years.


**60th Anniversary Timeline**


The Delaware River Basin Commission has been managing, protecting and improving our shared waters for 60 years and counting. As we celebrate this anniversary, we wanted to reflect on the Commission's work and accomplishments throughout the Basin, set against the rich backdrop of historic actions, environmental milestones and major hydrologic events. Our work continues with opportunities and challenges ahead, and we invite you to join us in a shared journey through the next 60 years.


**1961** — DRBC Milestone: President Kennedy signs the Delaware River Basin Compact, creating the Delaware River Basin Commission. The ceremonial signing takes place at the White House on November 2, 1961. 


**1962** — DRBC Milestone: The DRBC approves its first Comprehensive Plan, including Tocks Island and 11 other dams. 


**1962** — DRBC Milestone: James F. Wright is appointed DRBC's first executive director. 

**1963** — Hydrologic Milestone: Record-setting drought tightens its grip on the Basin, causing low water levels. The drought lasts from 1961 - 1967. 

**1965** — DRBC Milestone: The DRBC declares a water supply emergency and plays a pivotal role in negotiating emergency water allocations out of court. New York City's Cannonsville Reservoir becomes operational.   
Credit: Joe Mabel, CC BY-SA 2.0

**1966** — DRBC Milestone: The DRBC publishes its first Delaware River recreation maps, which are updated in 1979, 1991, and 2007. 

**1967** — DRBC Milestone: The Delaware Estuary Water Quality Monitoring Program (AKA the Boat Run) is established, a collaboration with the Delaware Department of Natural Resources and Environmental Control. Today, this program is one of the longest, continuously running in the world.   
Credit: Del. Dept. Natural Resources & Environmental Control

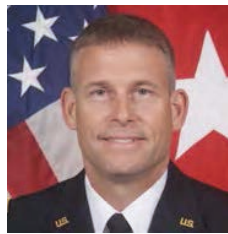
**1968** — DRBC Milestone: The DRBC adopts broad regulations to implement water quality standards for the Delaware Estuary that include an innovative wasteload allocation component. Former Interior Department head Stewart Udall remarks, "Only the Delaware among the nation's river basins is moving into high gear in its program to combat water pollution." 



## Commissioners

The ex officio members of the Delaware River Basin Commission are the four Basin state governors and the Division Engineer of the U.S. Army Corps of Engineers, North Atlantic Division, who serves as the federal representative. The five members appoint alternate commissioners, with the governors typically selecting high-ranking officials from their state environmental agencies.

Each commissioner has one vote of equal power, with a majority vote needed to decide most issues. Exceptions are votes on the commission's annual budget and drought declarations, which require unanimity.



**Chair**  
**Federal Representative**  
 Major General  
 Thomas J. Tickner



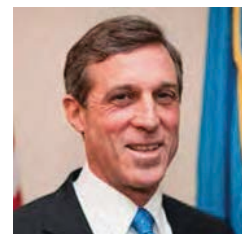
**Vice Chair**  
**Pennsylvania Governor**  
 Tom Wolf



**Second Vice Chair**  
**New Jersey Governor**  
 Philip D. Murphy



**Member**  
**New York Governor**  
 Kathy Hochul



**Member**  
**Delaware Governor**  
 John Carney



2021 saw several notable commission changes. First, Kathy Hochul was sworn in as the 57th and first female Governor of New York State and became the state's new DRBC Commissioner. According to her official biography, Governor Hochul began her career in public service on her local Town Board before serving as Erie County Clerk and then as a member of Congress for New York's 26th Congressional District. She more recently served in statewide office as Lieutenant Governor and now as the first female Governor of the State of New York.

Shawn LaTourette was named Commissioner of the New Jersey Department of Environmental Protection (NJDEP) in June 2021. He succeeds Catherine R. McCabe in leading the agency. Commissioner LaTourette first joined NJDEP as chief legal and regulatory policy adviser to the Commissioner in 2018. He was elevated to Chief of Staff in 2019 and Deputy Commissioner in 2020.

Additionally, Federal Representative Major General Thomas J. Tickner appointed a new alternate, Lieutenant Colonel Ramon Brigantti in July 2021. LTC Brigantti also serves as the Chair of the Commission for FY 2022.

# Alternates / Advisors for 2021

## Federal Government

**1st Alternate:** Lieutenant Colonel Ramon Brigantti, Commander, USACE Philadelphia District

**2nd Alternate:** Valerie Cappola

**3rd Alternate:** Henry Gruber, USACE North Atlantic Division Deputy Chief of Planning & Policy Division

## Delaware

**1st Alternate:** Shawn M. Garvin, DNREC Secretary

**2nd Alternate:** Alternate Pending

**3rd Alternate:** Virgil R. Holmes, Director, DNREC Division of Water Management Section

**4th Alternate:** Bryan A. Ashby, Manager, DNREC Division of Water Resources Surface Water Section

## Pennsylvania

**1st Alternate:** Patrick McDonnell, PADEP Secretary

**2nd Alternate:** Aneca Y. Atkinson, Acting Deputy Secretary, Office of Water Programs

**3rd Alternate:** Summer L. Kunkel, Acting Director, Compacts and Commissions Office

## New Jersey

**1st Alternate:** Shawn LaTourette, NJDEP Commissioner

**2nd Alternate:** Pat Gardner, Director of Water Supply and Geoscience

**3rd Alternate:** Jeffrey L. Hoffman, State Geologist

## New York

**1st Alternate:** Basil Seggos, NYSDEC Commissioner

**2nd Alternate:** Mark Klotz, Director, NYSDEC Division of Water,

**3rd Alternate:** Kenneth Kosinski, Chief, NYSDEC Watershed Implementation Section

**Advisor:** Vincent Sapienza

# Commendations for Our 60th Anniversary

In recognition of the DRBC's 60th anniversary, Commissioners, Members of Congress and other dignitaries reached out with letters and commendations. Several are reprinted on the following pages.



Pennsylvania – Proclamation from Governor Tom Wolf



New Jersey – Proclamation from Governor Philip D. Murphy





KATHY HOCHUL  
GOVERNOR

December 7, 2021

Mr. Steven J. Tambini, P.E.  
Executive Director  
Delaware River Basin Commission  
P.O. Box 7360  
West Trenton, NJ 08628-0360

Dear Mr. Tambini,

I want to offer my heartfelt congratulations to the Delaware River Basin Commission on 60 years of pro-active conservation in one of our region's essential watersheds. Since President Kennedy first signed this interstate compact into law in 1961, the Commission has been a vital environmental resource to our state.

Over the last six decades, the Delaware River Basin Commission has brought stability to the region's water management. From conservation initiatives, to water quality protection, to flood management, the Commission has played an integral role in safeguarding a water supply millions of New Yorkers rely on. The Commission's stewardship of the Basin during a turbulent time for our global climate is commendable.

On behalf of all New Yorkers, I wish you continued success in your mission and thank you for your future service to our state and nation.

Sincerely,

Kathy Hochul  
Governor

PRINTED ON RECYCLED PAPER

### New York – Letter from Governor Kathy Hochul



STATE OF DELAWARE  
OFFICE OF THE GOVERNOR  
TATNALL BUILDING, SECOND FLOOR  
MARTIN LUTHER KING, JR. BOULEVARD SOUTH  
DOVER, DELAWARE 19901  
PHONE: 302-744-4101  
FAX: 302-739-2775

December 1, 2021

Dear DRBC Community,

As Governor of the State of Delaware, I want to extend my sincere congratulations to the DRBC during this 60<sup>th</sup> anniversary celebration. Your decades of hard work and commitment have revitalized the Delaware River Basin, one of our most important natural resources.

On behalf of the nearly one million Delawareans who have benefitted from the DRBC's stewardship, I thank you for providing trusted leadership on the many issues that affect the river basin region. It takes extraordinary dedication to manage the 13,539 square miles of this watershed, but your efforts help support the 600,000 jobs and \$22 billion in economic activity that the river basin generates.

Our river and bay now support year-round fish and wildlife populations, extensive recreation opportunities, parks, and greenways for residents to enjoy.

The DRBC's legacy, however, will be the environmental cleanup and restoration of the Delaware River and Delaware Bay. Your work has helped lead the way for federal environmental regulation, including the Clean Water Act and the establishment of the Environmental Protection Agency.

I salute DRBC's historic success and ongoing efforts in Delaware, the region, and the nation to make this important waterway environmentally and economically sustainable. I look forward to continuing to work together to ensure that the Delaware River and Bay remains a vibrant resource for all to enjoy.

Sincerely,

John C. Carney  
Governor, State of Delaware

### Delaware – Letter from Governor John C. Carney



DEPARTMENT OF THE ARMY  
U.S. ARMY CORPS OF ENGINEERS, NORTH ATLANTIC DIVISION  
FORT HAMILTON MILITARY COMMUNITY  
300 GENERAL LEE AVENUE  
BROOKLYN, NY 11252-6700

October 28, 2021

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

Dear Executive Director Tambini:

As the Chair and Federal Representative of the Delaware River Basin Commission, it gives me great pleasure, on behalf of the U.S. Army Corps of Engineers North Atlantic Division, to extend our congratulations on the DRBC's 60th anniversary. This significant milestone is a testament to the Commission's critical work in providing protection and security to the Delaware River Basin.

The history of this Commission is storied and impressive. From its beginnings, the DRBC became a model in water quality control, soon reversing decades of pollution suffered throughout the lower Delaware River. In the years that followed, the Commission continued to innovate and is now recognized as a leader in water policy and regulatory practice. For the millions of Americans who rely on the Delaware River to provide clean drinking water, agricultural and commercial use, recreation, river fishing and more, the DRBC is an essential partner in their every day lives.

USACE and DRBC have successfully partnered on watershed and environmental studies, floodplain management initiatives, and education and outreach programs. We've also maintained long-standing water supply agreements with DRBC at our Blue Marsh Lake and Belzville Lake reservoirs. Many of my team members, from regulators to hydrologists and dam operators, routinely work cooperatively with DRBC staff.

I am proud to work collaboratively with DRBC alongside my alternate counterparts at the Philadelphia District Lt. Col. Ramon Bigazzi, District Commander; and at the Division, Valerie Cappola, Program Manager, and Hank Gruber, Deputy Chief of Planning and Policy. We look forward to our continued relationship with the DRBC, as we work together to ensure the responsible management of the Delaware River's water resources.

To our partners on the Commission and the staff members of all parties, past and present, who have made this mission possible, again, congratulations, and thank you for all you do.

Sincerely,

THOMAS J. TICKNER  
Brigadier General, USA  
Commanding

*I HAVE A SPECIAL BOARD WITH THE DRBC. CONGRATS ON THIS SPECIAL MILESTONE.*



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460

DEC - 3 2021

THE ADMINISTRATOR

Mr. Steven J. Tambini  
Executive Director  
Delaware River Basin Commission  
25 Cosey Road  
P.O. Box 7360  
West Trenton, New Jersey 08628

Dear Mr. Tambini:

On behalf of the U.S. Environmental Protection Agency, I would like to congratulate the Delaware River Basin Commission for achieving 60 years of success and commitment in managing, improving and protecting the cherished water resources of the Delaware River Basin, on which 13.3 million people rely for drinking water.

The 1961 signing of the Delaware River Basin Commission compact by President John F. Kennedy and the governors of the four basin states marked the first time that the federal government and a group of states joined together as equal partners to oversee a unified approach to managing a river system without regard to political boundaries. While predating the passage of the Clean Water Act in 1972, the commission has continued to serve as an effective forum for adaptively managing the basin's interstate water resources.

The commission has accomplished much through partnerships, including with the EPA. The Clean Water Act brought with it a statutory framework to help address the pollution and long-standing water-quality issues facing the estuary, river and major tributaries. The Delaware River Basin Commission's regulations have helped to dramatically improve dissolved oxygen levels in the estuary, allowing resident and migratory fish populations to thrive again. With the passage of Resolution 2017-4, the Delaware River Basin Commission has laid out a comprehensive strategy for upgrading the aquatic-life designated use and associated water-quality criteria for dissolved oxygen and nutrients in the urban zones of the Delaware Estuary. Once finalized, the new use will acknowledge – and the new criteria will protect – the resurgence in fish propagation that has occurred in the estuary during the past two decades. The EPA looks forward to continued collaboration and is fully committed to helping the commission achieve its objectives.

The EPA appreciates the commission's ongoing collaboration and support for the development of polychlorinated biphenyl total maximum daily loads for the Delaware Estuary. The implementation of 'Stage 1' TMDLs, established in 2003 and 2006, has resulted in significant load reductions of PCBs to the estuary, particularly among top-tier dischargers. Thanks to the commission's technical support, a new set of TMDLs is currently under development that are designed to achieve more recent upgrades to the commission's water-quality criteria for PCBs. These 'Stage 2' TMDLs will build upon the successes that have already been realized through an adaptive, iterative approach to TMDL implementation that is geared towards continuous water-quality improvement.

While there has been much success during the past 60 years, the Delaware River Basin Commission's policies and programs will need to continue to adapt and evolve to meet the challenges of tomorrow. From climate change impacts, microplastic pollution and ongoing efforts to fully meet the "fishable/swimmable" goals of the Clean Water Act to emerging contaminants such as perfluoroalkyl and polyfluoroalkyl substances, the EPA looks forward to tackling these challenges together.

I wish you, your colleagues and the commission continued success for many more years to come and look forward to our ongoing collaboration as we strive to protect and improve the water resources throughout the Delaware River Basin.

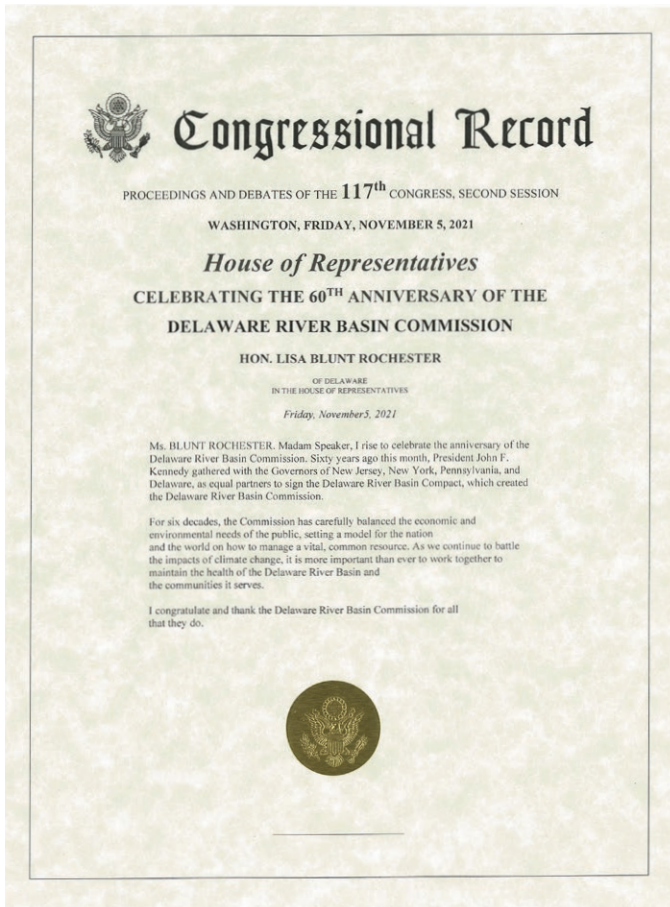
Sincerely yours,

Michael S. Regan

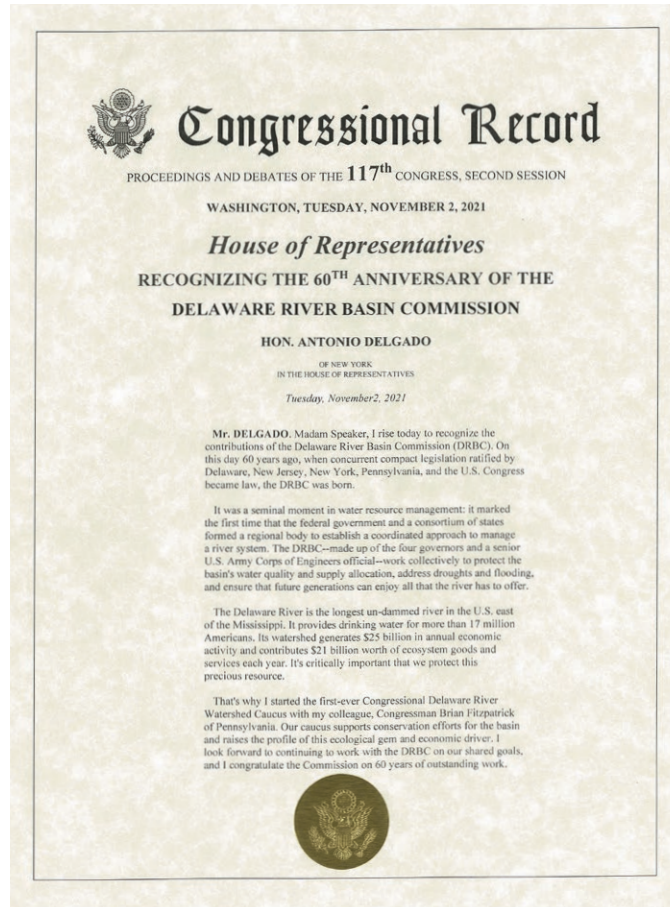
### Federal – Letter from U.S. Army Corps of Engineers, North Atlantic Division Commander Major General Thomas J. Tickner

### Federal – Letter from EPA Administrator Michael S. Regan

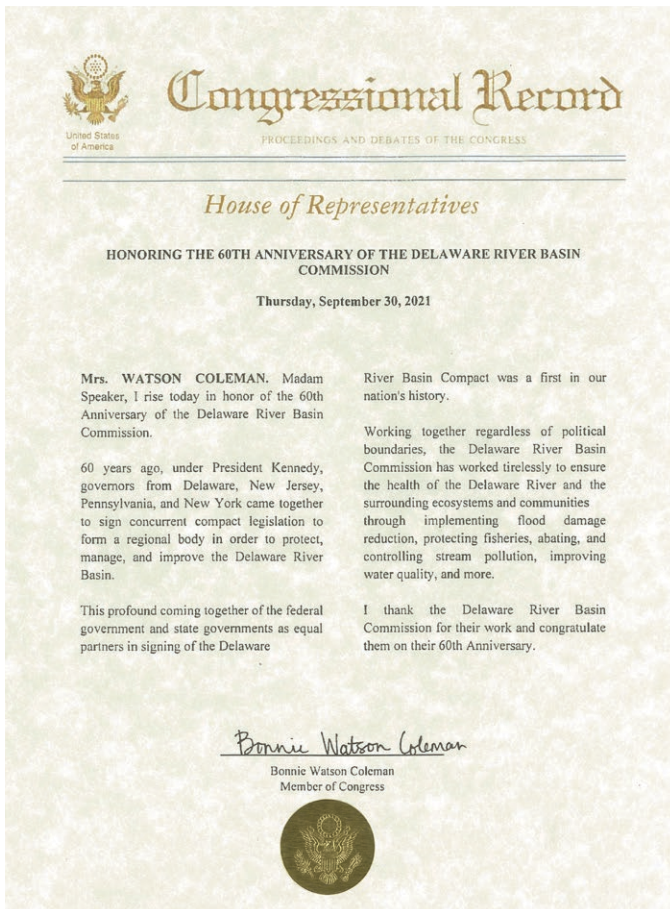




Congressional Record – Remarks from Rep. Lisa Blunt Rochester (DE)



Congressional Record – Remarks from Rep. Antonio Delgado (NY-19)

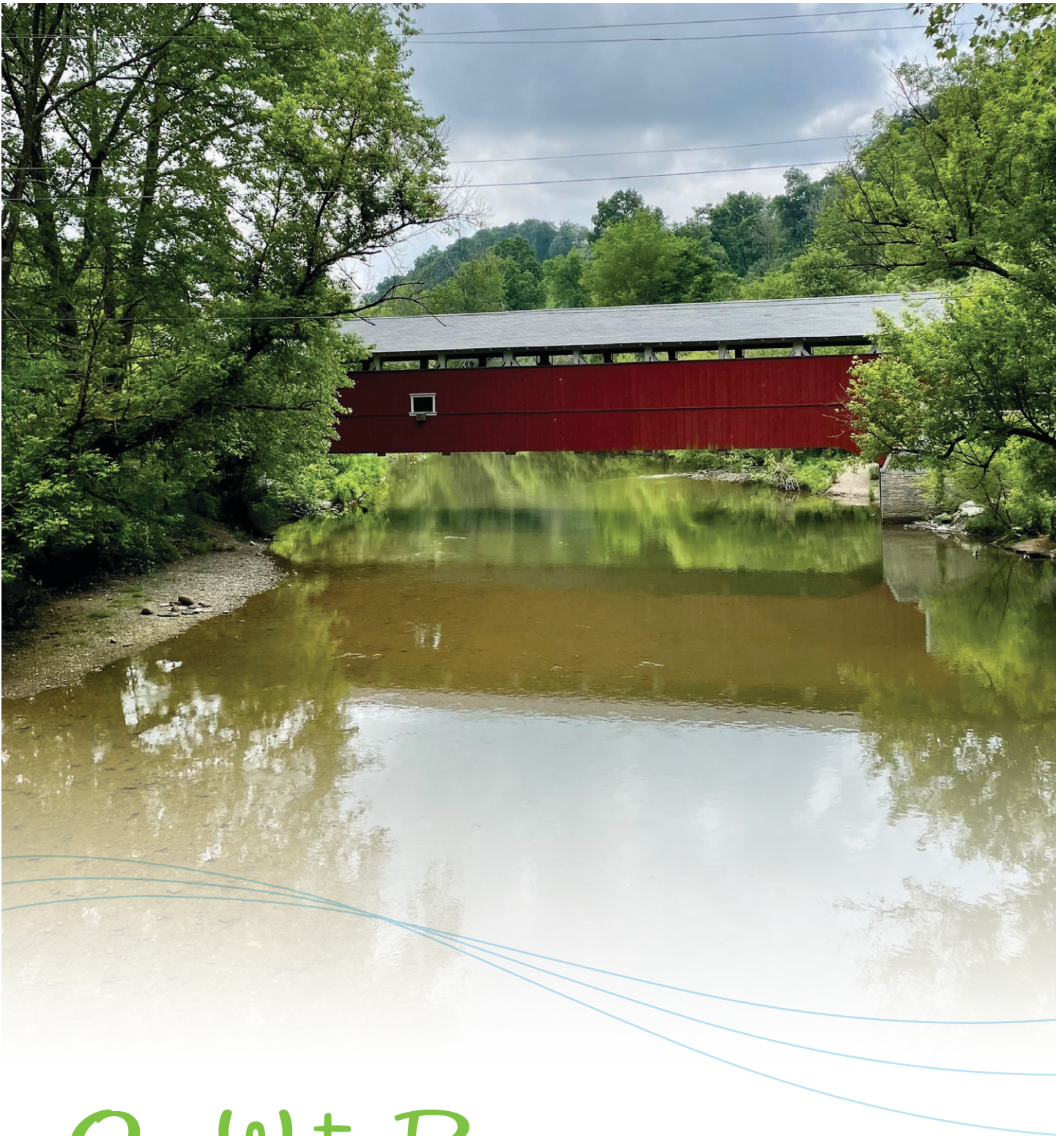


Congressional Record – Remarks from Rep. Bonnie Watson Coleman (NJ-12)



Congressional Record – Remarks from Rep. Brian K. Fitzpatrick (PA-1)





# *Our Water Resources*

Basin Water Use

Water Quality

Hydrology

Climate Change



# Basin Water Use

DRBC's Water Supply and Planning Program focuses on water security—ensuring that there is a sustainable supply of suitable, quality water in the Delaware River Basin (DRB).

To support this water resource management goal, the DRBC studies water use and plans for future water availability in the DRB.



## Water Withdrawal and Consumptive Use Study

In October 2021, the DRBC published a new report titled *Water Withdrawal and Consumptive Use Estimates for the Delaware River Basin (1990–2017) with Projections through 2060*. The report analyzes 30 years of historic withdrawal data and projects withdrawal demands to the year 2060. The report aimed to analyze existing water withdrawal and consumptive use data for the DRB from 1990–2017 and to project water withdrawals through 2060. The focus was on Major Water Withdrawal Sectors: Public Water Supply, Power Generation, Industry, Irrigation, Mining, Self-Supplied Domestic, Out-of-Basin Diversions.

Key conclusions include that most water withdrawals are coming from surface water (~95%), with the remainder from groundwater; Peak water withdrawal in the DRB has likely already occurred; Total water withdrawals are projected to decrease by about 1 billion gallons per day by 2060; The overall consumptive use of water has remained the same and is projected to remain constant (~12% of total water withdrawn). One reason is a change in technology for generating power; newer recirculating technology withdraws less

water overall but results in higher rates of evaporation. Overall population in the Basin has gone up, but the amount of water we use has not. This is indicative of good water conservation practices in the DRB, a trend projected to continue—increase in population, but not overall water use. Most people living in the Basin are serviced by public water providers, with only a small percentage relying on private wells (self-supplied domestic). The results of this study will be incorporated into future withdrawal/availability assessments of the Delaware River Basin, considering scenarios such as reservoir operations, a repeated drought of record and climate change impacts.

### 1. Water Supply Planning: Why are we projecting withdrawal data?



#### Is there enough water to meet future demands?

- What are the current/future demands? ←
- How does it compare against current allocations?
- What about a repeat of the Drought of Record?
- What about climate change?



#### DELAWARE RIVER BASIN COMPACT (1961)

##### 3.6 General Powers.

- Conduct and sponsor research on water resources
- Collect, compile, correlate, analyze, report and interpret data on water resources and uses in the basin



# Water Quality

## Aquatic Life Designated Use Study Update

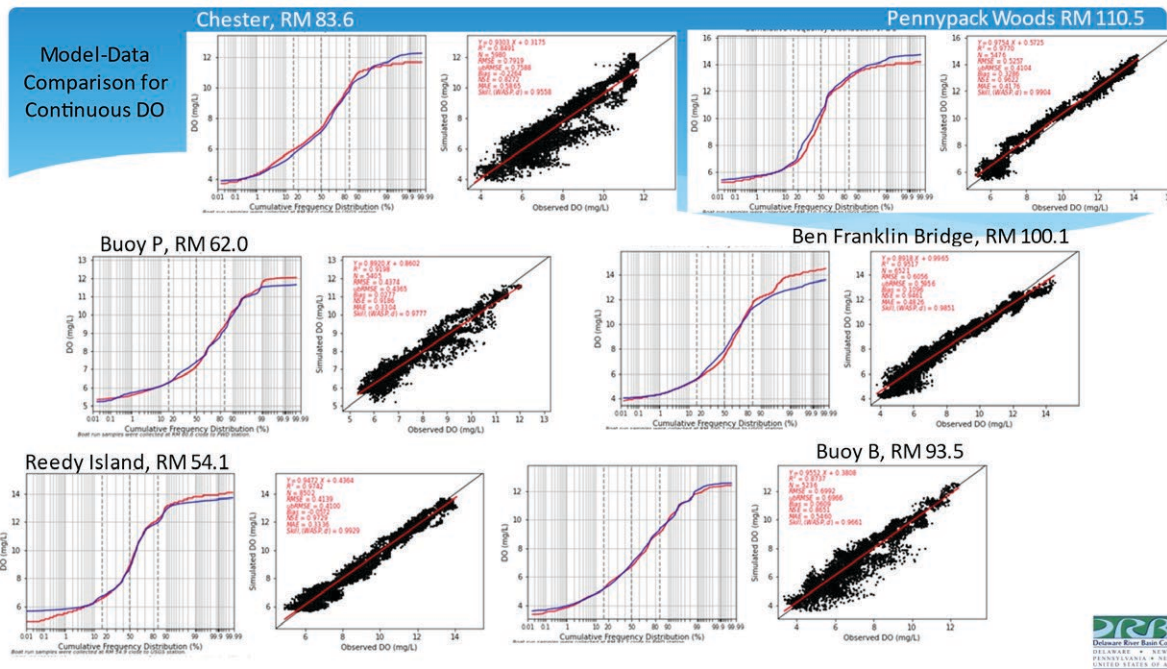
Dissolved oxygen (DO) is among the most critical environmental parameters directly affecting fish communities. When the Delaware River Basin Commission was created in 1961, little or no DO was present in the Delaware River Estuary from Wilmington to Philadelphia for periods of up to six months each year, preventing the survival of resident fish and the passage of anadromous fish through these waters. The water quality and aquatic life uses of the Delaware River Estuary have substantially improved since DRBC adopted designated uses and water quality criteria for these reaches in 1967, specifically due to wastewater treatment plant upgrades to meet organic wastewater discharge criteria. Nonetheless, significant DO sags still occur in Zones 3 and 4, especially during summer periods, limiting the degree of propagation amongst resident fish populations. DRBC staff developed a coupled hydrodynamic and water quality model to quantify the impact of nutrient loads on dissolved oxygen dynamics in the Delaware Estuary.

The DRBC's Commissioners unanimously approved a resolution in September 2017 recognizing the significant water quality improvements in the Delaware River Estuary and the vital importance of determining the

appropriate designated aquatic life uses and water quality criteria necessary to support these uses in a 38-mile section of the tidal Delaware River stretching from Wilmington to Philadelphia. In accordance with DRBC Resolution 2017-04, which affirms the important goal of continued water quality improvement, the DRBC is conducting a comprehensive scientific and engineering evaluation of water quality to determine the "highest attainable use" of this reach of the River and to provide data and information to establish revised water quality criteria to protect that use. DRBC is leading this groundbreaking effort through a collaborative process informed by an Expert Panel comprised of nationally recognized water resource scientists and engineers, and in close consultation with its Water Quality Advisory Committee, a stakeholder advisory group representing state and federal co-regulators, nongovernmental organizations, academic institutions, and municipal and industrial dischargers. DRBC will perform an "analysis of attainability" to determine the highest aquatic life use, based on DO condition, that can be achieved.

In support of the overall evaluation of highest attainable use as described above, the goal of





this modeling project is to develop a technically sound eutrophication model for the Delaware Estuary and Bay, from the head of the tide at Trenton, NJ, to the ocean, utilizing an appropriate level of complexity within the current state of the science and within the timeframe established by the Commission. The eutrophication model being developed by the DRBC will enhance our understanding of the impact of nitrogenous and carbonaceous oxygen-demanding loads on dissolved oxygen conditions in the tidal Delaware River and Bay, as well as reaeration, sediment oxygen demand, and phytoplankton photosynthesis and respiration. Given the complexity of tidal dynamics and pollutant sources, the spatial extent of the model includes the entire tidal Delaware River and Bay. The model is designed to estimate ambient dissolved oxygen levels that can be expected for various levels of pollutant reductions using a dynamic (time-varying), long-term simulation of diurnal dissolved oxygen patterns.

Modeling eutrophication in the Delaware Estuary requires an understanding of the complex interactions among many processes: the circulation of water, distribution of temperature

and salinity, cycling and transformation of nutrients, algal dynamics, and solute exchange across the sediment-water interface. The DRBC's overall modeling approach is as follows:

- Develop a linked hydrodynamic and water quality model of the system using Environmental Fluid Dynamics Code and Water Quality Analysis Simulation Program.



Shad monitoring, October 2021

- Assess available data and conduct additional monitoring of both pollutant sources and ambient water to fill gaps as needed.
- Calibrate linked hydrodynamic and water quality model to our intensive monitoring period (2018–2019), and corroborate against historical periods, primarily 2012. Together these periods represent a wide range of hydrologic conditions.
- Conduct forecast simulations with the calibrated model to determine the pollutant reductions needed to achieve varying levels of ambient dissolved oxygen conditions in the tidal River and Estuary, and ultimately to determine the highest attainable dissolved oxygen condition.
- Prepared complete external loading inputs for the 2018–2019 calibration years and the 2012 hindsight used for corroboration.
- Developed fully operational 2D (horizontal) and 3D (10-layer) water quality models of the Delaware Estuary; performed more than 300 2D and 230 3D runs in order to achieve preliminary calibration of global kinetics for the water quality model.

DRBC is preparing its draft Analysis of Attainability, expected in September 2022. Additional study information can be found at [www.nj.gov/drbc/programs/quality/designated-use.html](http://www.nj.gov/drbc/programs/quality/designated-use.html).

Key modeling tasks performed by DRBC in 2021:

- Documented calibration of a three-dimensional hydrodynamic model, the objective of which was to simulate transport information e.g., water depth, current velocity, salinity, water temperature, and mixing coefficient, over a range of hydrologic and loading conditions with the degree of accuracy and confidence necessary to drive the water quality model calibration and application. Hydrodynamic model performance was evaluated by comparing observations of water surface elevation, current velocity, water temperature and salinity in the estuary with model predictions. DRBC published the draft hydrodynamics modeling report in December 2021.
- Developed significant model improvements to better represent processes relating to light attenuation in the water column and reaeration at the water surface. The modified algorithms for calculating light extinction and reaeration were based on both empirical data analysis and mechanistic approaches, and represent significant advancements of the state-of-the-art.



Shad monitoring, October 2021



# Recreational Use Study Update

The Commission first adopted Water Quality regulations in March 1967 and has updated and revised the regulations periodically. DRBC's regulations protect Basin waters and communities by establishing criteria for individual parameters, as appropriate to protect the River's designated uses across the mainstem Delaware's water quality zones and for the Basin. Current designated uses include aquatic life, drinking water, fish consumption and recreation, and criteria have been established as necessary to protect both human health and aquatic life.

In the Delaware River, primary contact recreation is a designated use for all water quality zones except within a 27-mile stretch around Philadelphia and Camden. Here, elevated bacteria levels mean the designated use is set at secondary contact recreation. However, primary contact recreation like tubing and jet skiing has been observed. To see if bacteria levels meet the criteria for this type of recreation, DRBC is conducting focused monitoring at sites where close-contact recreational activities were observed or anticipated beginning in 2019.

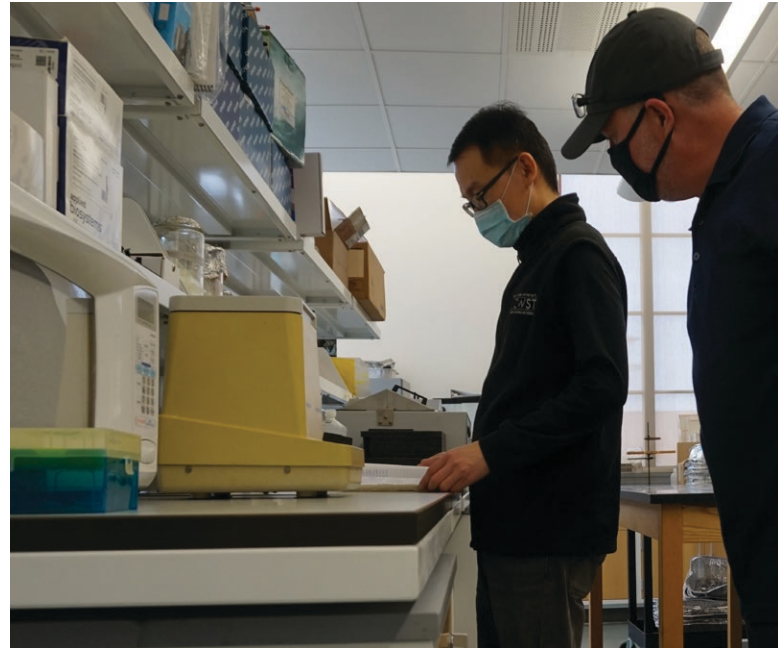
Additionally, in 2021, microbial source tracking efforts were launched to differentiate bacteria derived from humans, cattle, horses, Canada geese, deer and dogs.

**Boat-Based, Center-Channel:** via the Delaware Estuary Water Quality Monitoring Program

**Shore-Based:** collected weekly May–September:

— **In New Jersey:** Pyne Point Park, National Park, Pennsauken Access, Palmyra Cove and Riverton Yacht Club

— **In Pennsylvania:** Penn Treaty Park, Washington Ave. Green, Penn's Landing and Frankford Arsenal Access



DRBC staff collaborates with Dr. David Hsu of Montclair State on Microbial Source Tracking

**Boat-Based, Transect:** Five transects, five samples each: Chester, Red Bank, Penn's Landing, Pyne Poynt Park and Frankford Arsenal

**Remote sensing:** New Jersey's Pyne Poynt Park. In 2021, DRBC in partnership with the U.S. Geological Survey, began seasonally collecting near real-time data on bacterial indicators using an advanced water-quality instrument.

For additional information on recreational use, see DRBC's website: [www.nj.gov/drbc/programs/quality](http://www.nj.gov/drbc/programs/quality)

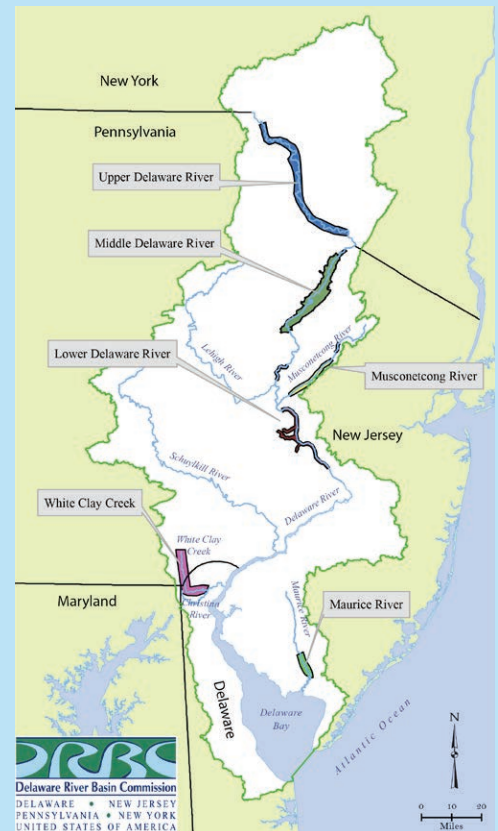
# Chloride and Total Dissolved Solids Monitoring in Special Protection Waters

DRBC initiated a Chloride Monitoring effort within the Lower Delaware reach of the Special Protection Waters (SPW) area as results of the 2016 [DRBC Lower Delaware Assessment of Measurable Changes](#) indicate weak to moderate evidence of degradation at 83% of the sites for chloride and specific conductance. In 2021, staff deployed and maintained continuous conductivity HOBOTM loggers in seven tributaries and monitored throughout the year once per month at a total of 27 locations for chloride, total dissolved solids (TDS), and conductivity. Preliminary results from the study thus far indicate a moderate to strong relationship between chloride and specific conductance at nearly 60% of the 27 sites. Starting in 2022, DRBC will expand upon the monitoring list of chloride, TDS, and conductivity to include alkalinity and the common ions that comprise the TDS and electrical conductivity in water: sodium, potassium, bicarbonate, silica, nitrate, sulfate, calcium, and magnesium. This expanded list of ions will be collected in order to characterize ionic compositions for each site and to aid in potential source tracking. The entire data collection effort will support a site-specific assessment of modeled expected vs. observed chloride and specific conductance to identify sites as “degrading,” “improving,” or “no change.” This project is funded by the U.S. Environmental Protection Agency’s (EPA) 106 grant, and more information about this initiative may be found on the DRBC’s website, along with an [interactive map](#).

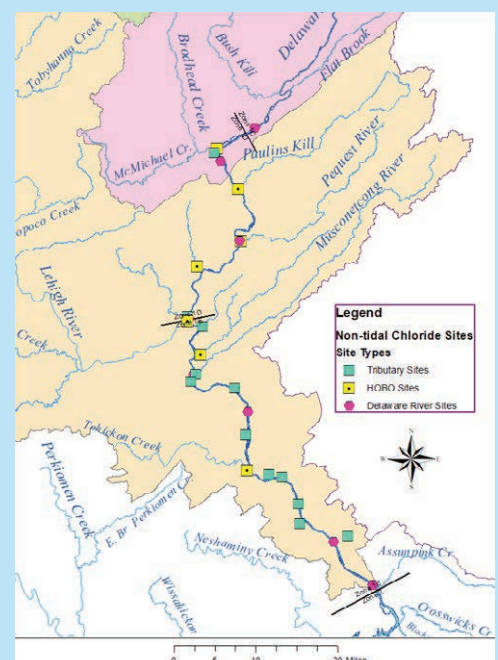


Chloride monitoring

## Stretches of the Delaware River and its Tributaries Included in the National Wild and Scenic Rivers System



## Non-tidal Chloride Monitoring Sites





# Contaminants of Emerging Concern

## Microplastics

Plastic is perhaps the most prevalent and persistent type of debris found in our oceans, rivers and large lakes. Plastic pollution is found in all shapes and sizes, but plastic debris less than five millimeters in length (or about the size of a sesame seed) is known as “microplastics.” These tiny particles easily pass through water filtration systems and end up in receiving waters. Over time, larger plastics degrade into microplastics, but microplastics also include originally manufactured products such as microbeads and microfibers. Preliminary studies have shown that microplastics may have harmful effects on aquatic life.



Microplastics study sites

In 2018, the DRBC received a grant from the Delaware Watershed Conservation Fund to monitor for microplastics and model loadings of microplastics in the upper Delaware River Estuary from Trenton, N.J. to Wilmington, Del. This reach of River is largely urbanized and is likely a major contributor to microplastics found in the estuary and bay. Samples were collected in spring and fall 2019, with additional

samples collected in 2020 and 2021. Samples were collected via net, grab sample or Niskin sampler. A total of 15 sites were sampled: four Delaware River Estuary sites (by boat), the Delaware River at Trenton, N.J. (by bridge) and 10 tidal Delaware River tributaries. All samples were analyzed by Temple University for microplastic concentration, size, color, shape, and composition. Samples were filtered and sediment and organic matter was removed. Microplastics were then analyzed using Fourier transform infrared spectroscopy, which allows researchers to identify the individual composition of plastic (polythelia, polypropylene, etc.).

Microplastic particles were found in each sample that was collected in the estuary. A large discrepancy was seen in plastic concentrations depending on the collection method. Grab samples showed higher concentrations of plastics than net samples. Microplastic concentrations were also used to model the dynamics of the plastic transport in the estuary.



Microplastics filter

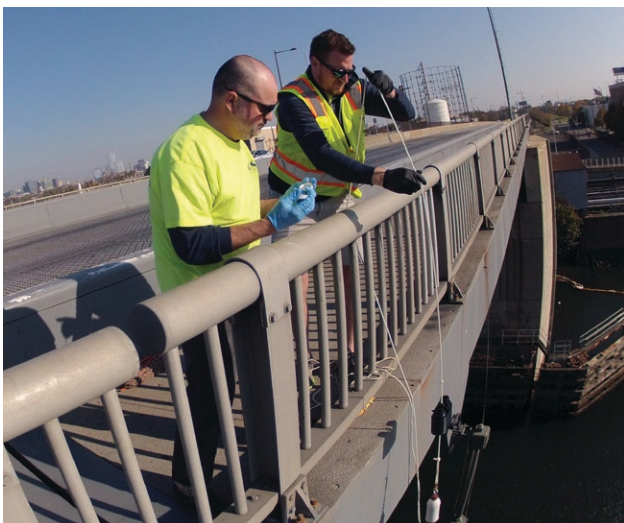
## 1,4-Dioxane

1,4-Dioxane is a synthetic industrial chemical used as a solvent in certain products; as a stabilizer for chlorinated organic solvents; in the manufacture of pharmaceuticals, some plastics and rubber; and it appears as a byproduct of surfactants used in personal care products, detergents and cosmetics. Since scientific studies indicate that 1,4-Dioxane may pose a threat to human health if ingested in sufficient amounts, the chemical is a contaminant of emerging concern for drinking water supplies.



Monitoring, April 2021

DRBC is part of a working group that includes representatives from the New Jersey Department of Environmental Protection (NJDEP), the Pennsylvania Department of Environmental Protection (PADEP) and water/wastewater utilities.



Monitoring, November, 2021

In 2021 the working group conducted enhanced sampling and assessment to identify potential source(s) of the contaminant in the Basin and recommend a course of action to address potential risks to the environment or public health. In-stream water quality results for 1,4 Dioxane from monitoring conducted by DRBC under the most recent working group efforts have been shared on DRBC's website. DRBC has engaged its Toxics Advisory Committee, and, in addition to the above-mentioned monitoring efforts, will continue monitoring for 1,4-Dioxane via its Delaware Estuary Water Quality Monitoring and Special Tributary Monitoring programs.

## PFAS

Perfluoroalkyl and polyfluoroalkyl substances (PFAS) are a diverse group of compounds that have varying degrees of persistence, toxicity, and bioaccumulation in the environment. They are found in a variety of industrial and household products such as stain repellent textiles, fire-fighting foams, and paper coatings. They have unique properties to repel both water and oil. While there is still much to be learned about the effects of PFAS on human and ecological health, exposure from drinking water and fish consumption are a concern. These substances have been detected in drinking water wells in Basin states. Health advisories and standards have been developed by federal and Basin state agencies for some PFAS. Basin New Jersey, New York, Pennsylvania and Delaware also have initiatives to manage PFAS exposure. Available data for surface water show PFAS levels are below current EPA and Basin state human health advisory levels in segments of the Delaware River designated as drinking water sources. However, PFAS levels observed in fish indicate that further evaluation of risk to human health and wildlife is warranted in the Delaware River. PFOS has also been detected in fish tissue in the Basin at levels causing fish consumption advisories in some locations. In





Monitoring, October, 2021

2021, DRBC staff shared information on PFAS in a publication and by presentations to interested parties within the Basin and outside the Basin including a Northeast Waste Management Officials' Association webinar on April 13, 2021. The DRBC continued to collect PFAS data from water, sediment, and fish tissue in the mainstem Delaware River and tributaries. The samples were analyzed for an extended list of 40 PFAS analytes. Data collected will be used by DRBC and other state and government agencies as the scientific basis for the development of future PFAS reduction strategies and will inform fish consumption advisories. This work is being supported with grant funding from the Delaware Watershed Conservation Fund, Pennsylvania Coastal Zone Management and the EPA. DRBC staff and its Toxics Advisory Committee continue to review and assess PFAS in the Delaware River.

For additional information, see Contaminants of Emerging Concern on DRBC's website: [www.nj.gov/drbc/programs/quality/cecs.html](http://www.nj.gov/drbc/programs/quality/cecs.html)

## Boatrun Monitoring

The DRBC has been measuring water quality for over 50 years. The Delaware Estuary Water Quality Monitoring Program that we affectionately call the "Boat Run" is our long-running program that performs monthly sampling in the Estuary at 22 locations.

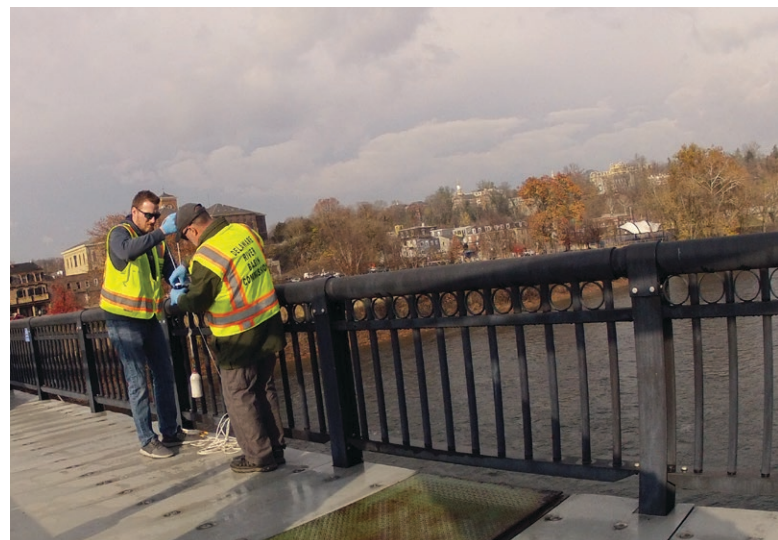
Each year, DRBC contracts with the Delaware Dept. of Natural Resources and Environmental Control to collect surface water samples in the Delaware Estuary, from the head of tide at Trenton, N.J. to the mouth of the Delaware Bay.

Samples are evaluated and assist DRBC in managing water quality and ensuring criteria are being met.

This monitoring program provides accurate, precise and defensible estimates of the surface water quality of the Delaware Estuary and allows assessment of water quality criteria compliance.

Sample analysis includes routine and bacterial parameters, nutrients, dissolved oxygen, heavy metals, chlorophyll-a, dissolved silica, volatile organics, and 1,4-Dioxane.

Data are available via the EPA's [Water Quality Portal](#).



Monitoring, December, 2021

# Hydrology

## Hydrologic Conditions Report

Many notable events occurred during 2021, including four tropical systems during the summer and early fall, leading to record breaking flooding in southeastern Pennsylvania. The mainstem Delaware River also experienced minor flooding due to Hurricane Ida. November and December were drier than normal. Highlights of the year are summarized below. A detailed report about the hydrologic conditions in 2021 can be found on DRBC's website: [www.nj.gov/drbc/library/documents/2021Hydrologic-Conditions-Rpt.pdf](http://www.nj.gov/drbc/library/documents/2021Hydrologic-Conditions-Rpt.pdf)

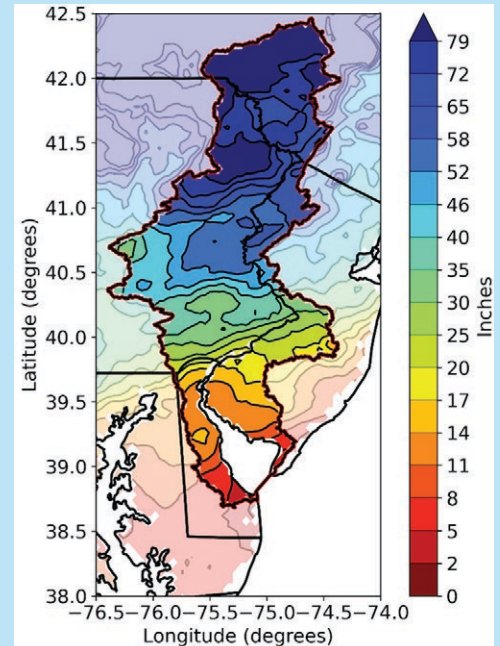


Ida flooding, September 2021

In May, the three New York City (NYC) reservoirs (Pepacton, Cannonsville, and Neversink) were full, with a combined storage of 267.4 billion gallons. The reservoirs are normally full in spring. In the summer, predicted high water temperatures at Lordville, N.Y., triggered releases from the thermal mitigation bank, a volume of water in the NYC reservoirs reserved to protect the upper Basin cold water fishery. Thermal releases were made on five days in June and three days in August. As a result, the temperature at Lordville did not exceed 75 degrees Fahrenheit, the goal of the thermal release program.

On July 8–9, Tropical Storm Elsa produced between half an inch and four inches of precipitation over the Basin, but no flooding

## Snowfall in the DRB Winter 2020-2021



Over the winter, areas in New York and the Poconos received more than approximately 70 inches of snow, while areas below Philadelphia received less than 20 inches. The figure above shows the recorded snowfall for the 2020–2021 season.



Ice Accumulation at the Trenton Makes Bridge



occurred on major tributaries or rivers. On July 12, an intense storm event of between six to ten inches of precipitation in less than four hours led to flash flooding along Pennypack Creek, near towns such as Croydon, Pa. Locations in the Schuylkill River and Neshaminy Creek Basins also experienced moderate flooding.

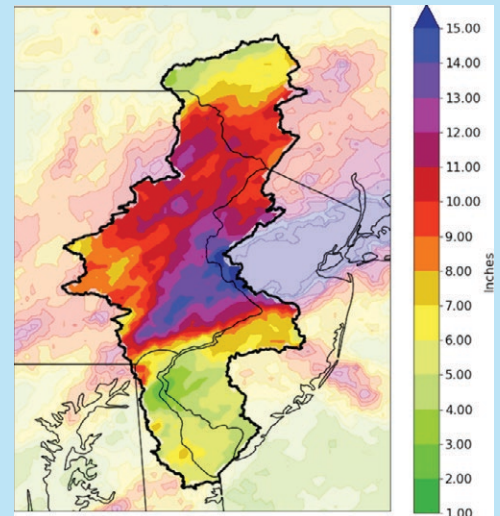
In August and early September, the Basin was impacted by three tropical storm systems. On August 18–19, Tropical Storm Fred brought three to five inches of precipitation to a widespread area and minor to moderate flooding occurred in the Lower Basin. Minor tidal flooding also occurred in the tidal portion of the Delaware, Christina, and Schuylkill rivers. However, the mainstem did not experience flooding.

Hurricane Henri occurred from August 21–23. A corridor from Scranton, Pa. to Callicoon, N.Y. and over the Lehigh Valley received from three to five inches of precipitation. Flooding occurred in the middle-upper Basin and lower Basin. Along the mainstem, the River near Riegelsville reached bankfull water levels and minor tidal flooding also occurred.

Hurricane Ida, on September 1–2, was the most impactful tropical system to hit the Basin in 2021. Record-breaking flooding occurred due to the high amounts of precipitation and wet conditions after Tropical Storms Fred and Henri, which occurred less than two weeks earlier. Locations in eastern Pennsylvania from Chester to Montgomery and Bucks counties, and Hunterdon and Mercer Counties in New Jersey received approximately eight to ten inches of precipitation from the storm. Record high water levels were experienced at seven locations on the Schuylkill River, Perkiomen Creek (a tributary to the Schuylkill River), Neshaminy Creek, and Brandywine Creek. High tide records were set at two locations along the tidal River.

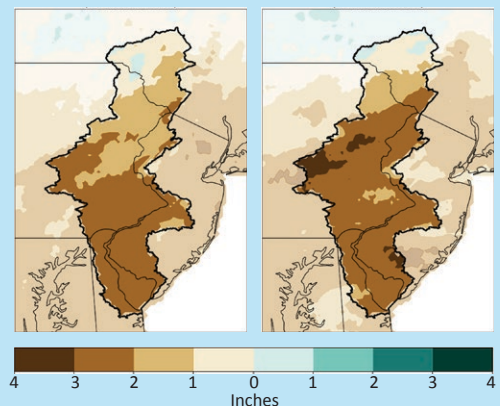
At the end of October, a strong Nor’Easter impacted the Basin. The northern half of the Basin received between 2.5 and 5 inches of rain over two days. Flooding occurred in many upper Basin tributaries. Three mainstem River locations also reached bankfull levels.

### Total Tropical Precipitation Accumulation Elsa, Fred, Henri and Ida



The figure above presents a map of the total precipitation from all four tropical systems. A detailed summary for each tropical system is in the Annual Hydrologic Conditions Report on the DRBC website.

### Departure from Normal Precipitation (November 2021) (December 2021)



Monthly precipitation amounts for November and December were both two to three inches below normal. The departure from average for each month is shown in the figure above. According to the US Drought Monitor released on December 28, areas in the southern portion of the Basin were classified as abnormally dry.



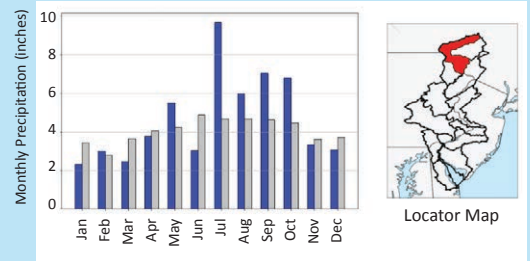
# Precipitation

Annual precipitation varied by location within the Basin. The largest amounts, of more than 60 inches, occurred in portions of the upper Basin and localized areas in southeastern Pennsylvania near Levittown, in Bucks County. The least amount of precipitation occurred in the western part of the Basin, where some areas only received 36 inches for the year.

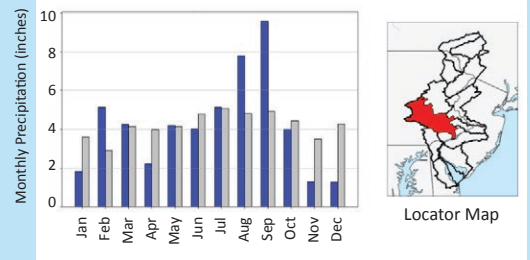
# Streamflow

Streamflows were approximately 50 percent of normal in April at the four locations displayed. Streamflows in March were 100 to 150 percent of normal. During late August into early September, streamflows were higher than normal due to large amounts of precipitation from three tropical storms. Monthly average streamflows were highest during September, with values approximately 400 to 500 percent of normal. Flooding occurred in many areas of the Basin as the result of tropical storms in August and September and the Nor'Easter at the end of October.

## Monthly Normal Precipitation Upper Delaware Basin



## Schuylkill Basin

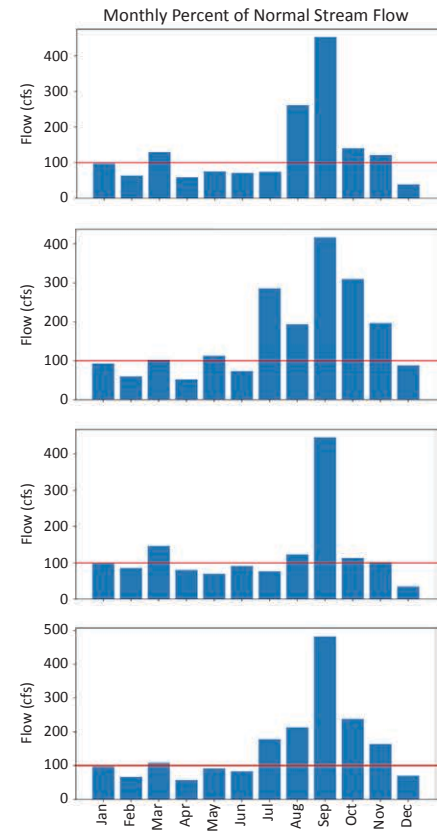
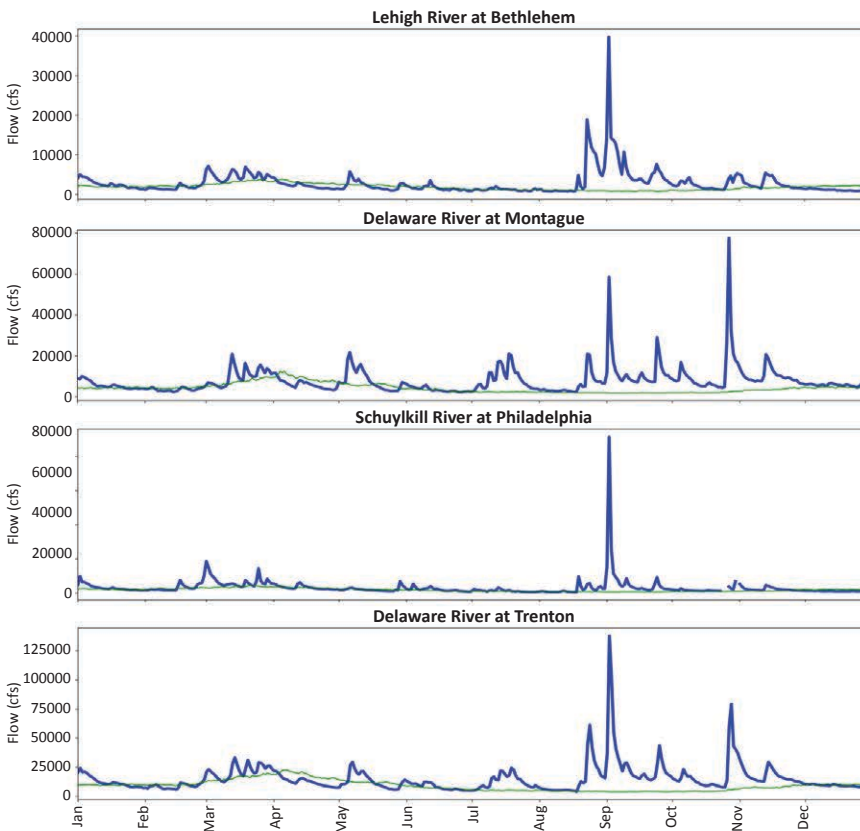


■ Monthly Observed Precip. 2021    ■ Monthly Normal (1991–2020)

The monthly precipitation compared to normal is presented for the upper and lower Basin in the figures above. For both regions, precipitation was above normal during July through September, and below normal for March, November, and December.

— Observed Flow    — Daily Median Flow

## Streamflow Monthly Percentages 2021



# Reservoir Storage and Releases

## Lower Basin

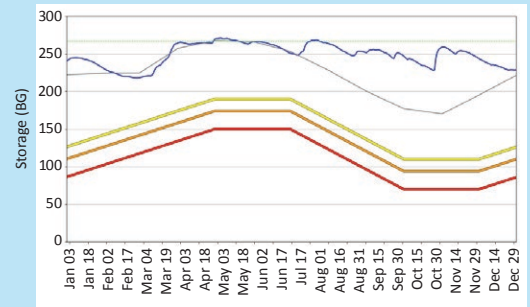
Both Beltzville Reservoir (located on the Pohopoco Creek, a tributary of the Lehigh River) and Blue Marsh Reservoir (located on the Tulpehocken Creek, a tributary of the Schuylkill River) remained near or above their normal pool elevations for most of the year. The elevation of Blue Marsh reservoir is increased from mid-March through mid-October to create a seasonal recreation pool.

The Lower Basin drought operating plan was not implemented because the requirements (low reservoir elevations) were not met. No water was needed to support the Trenton Flow Objective.

## Upper Basin

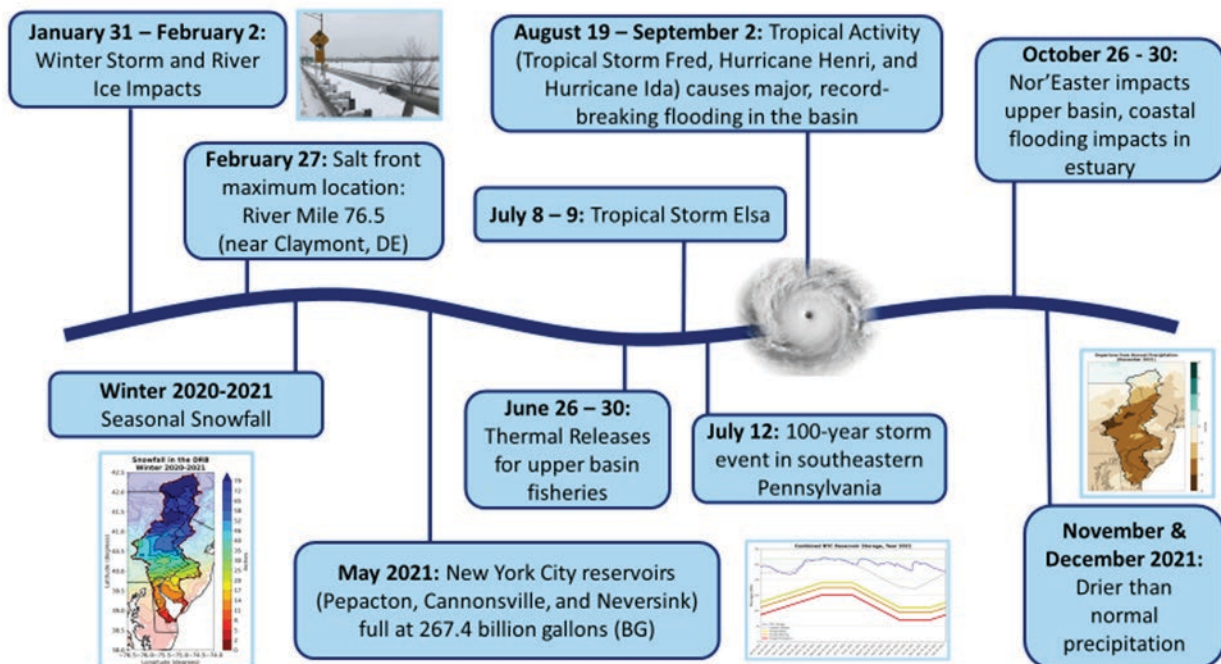
Releases from the three NYC Delaware River Basin (DRB) Reservoirs were made in accordance with the 2017 Flexible Flow Management Program. The River Master directed releases from the NYC reservoirs to meet the Montague flow objective and to support cold water fisheries in the upper Basin. A release was needed on one day in February and all others were made in June, July, and August 2021. One release was made to support the Montague flow objective on February 11 of approximately 141 million gallons (MG). Thermal mitigation releases were made for three multi-day events (10 days total) in June, July, and August.

## Combined NYC Reservoir Storage 2021



— 2021 Storage      — Longterm Median  
 — Drought Warning      — Drought Emergency  
 — Drought Watch

The combined storage in the New York City reservoirs is used to determine drought status in accordance with the Water Code. The figure above presents the upper Basin combined storage in 2021. On January 1, the combined storage was approximately 240 BG (90.0 percent). The minimum storage approximately 217.9 BG (81.5 percent) occurred on February 27. The reservoirs were full by May 20 and near full again in July and October as the result of precipitation from Elsa and the October Nor’Easter, respectively.



## Groundwater

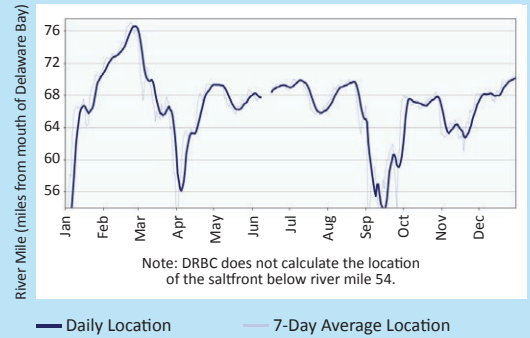
Groundwater levels vary based on the amount of precipitation that infiltrates and the amount of water pumped. Groundwater levels were normal or above normal in the winter throughout the Basin. During spring in the lower Basin, levels were normal, but below normal and much below normal in the upper Basin. As a result of the higher amounts of precipitation over the summer, groundwater in all but a few areas was in the normal range. The drier fall conditions resulted in below normal and much below normal groundwater levels.

## Salt Front

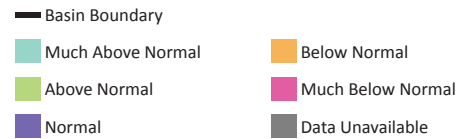
The salt front is defined as the approximate location in the estuary where the concentration of chloride is 250 parts-per-million. The seven-day average location of the salt front is used as an indicator of salinity intrusion in the Delaware Estuary for reservoir operations. The salt front moves upstream and downstream based on the tide and amounts of freshwater entering the Estuary.

In 2021, the salt front began the year below Reedy Island, RM 54. The most upstream location of the salt front in 2021 occurred on February 27, approximately at RM 76.5 (near Claymont, Del.). The salt front was in the normal range for much of the year, except during high flow periods in March and September.

## Salt Front Location 2021



When significant amounts of precipitation are stored in the snowpack, only a limited amount of water becomes available to run off into the River. As a result of less water coming downstream, the salt front, a measure of salinity in the River, moved farther upstream than normal for February. On February 27, the salt front reached its most upstream location for the year, RM 76.5 (as measured along the channel beginning at the mouth of the bay), which is near Claymont, Del.



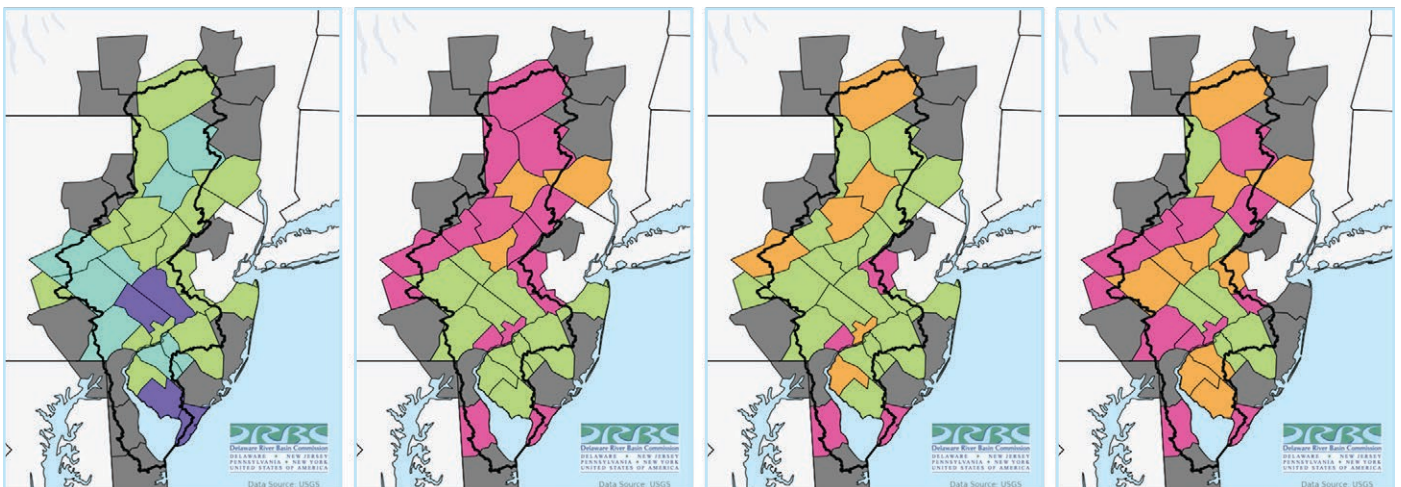
## Groundwater Ranking

March 31, 2021

June 28, 2021

September 20, 2021

December 31, 2021





# Climate Change

## First Annual Climate Change Forum

In March 2021, the Partnership for the Delaware Estuary's *Science and Environmental Summit* featured the first *Forum on Climate Change and the Delaware River Basin*, hosted by the Delaware River Basin Commission's (DRBC) Advisory Committee on Climate Change. DRBC's Advisory Committee on Climate Change (ACCC) is comprised of individuals with relevant climate expertise, representing various government, watershed, academic, business and water user perspectives. The Climate Forum was kicked off by welcome remarks from New Jersey Governor Phil Murphy.

The keynote presentation followed, given by NASA Jet Propulsion Laboratory scientist Dr. Ben Hamlington on how NASA uses satellites to measure and understand sea level change. Hamlington said, "Sea level rise is global, but its impacts are local," and that was a great start to a day of talks on how climate change is impacting the Delaware River Basin and our communities.

The next session focused on Climate Change and the Delaware Estuary. Topics discussed included salinity impacts on Delaware Bay wetlands and marshes and best management practices, as well as how salinity impacts mussel and oyster populations. During this session, DRBC Senior Water Resource Engineer Dr. Fanghui Chen, P.E., presented *Sea Level Rise Impacts on Delaware*

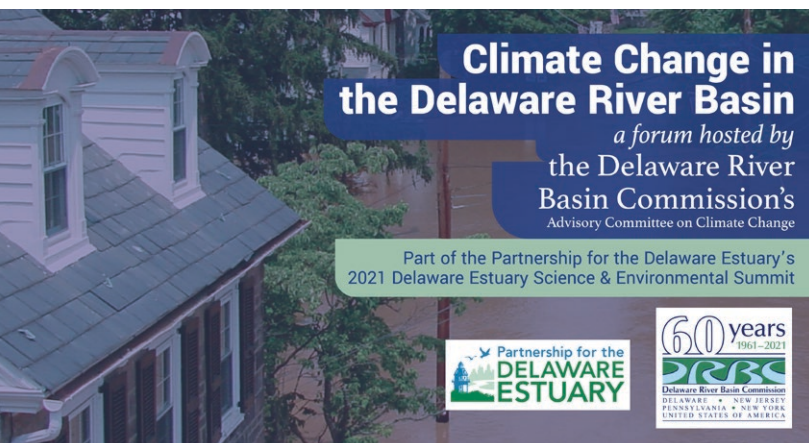
*Estuary Wetlands*, highlighting a model DRBC is developing to study this.



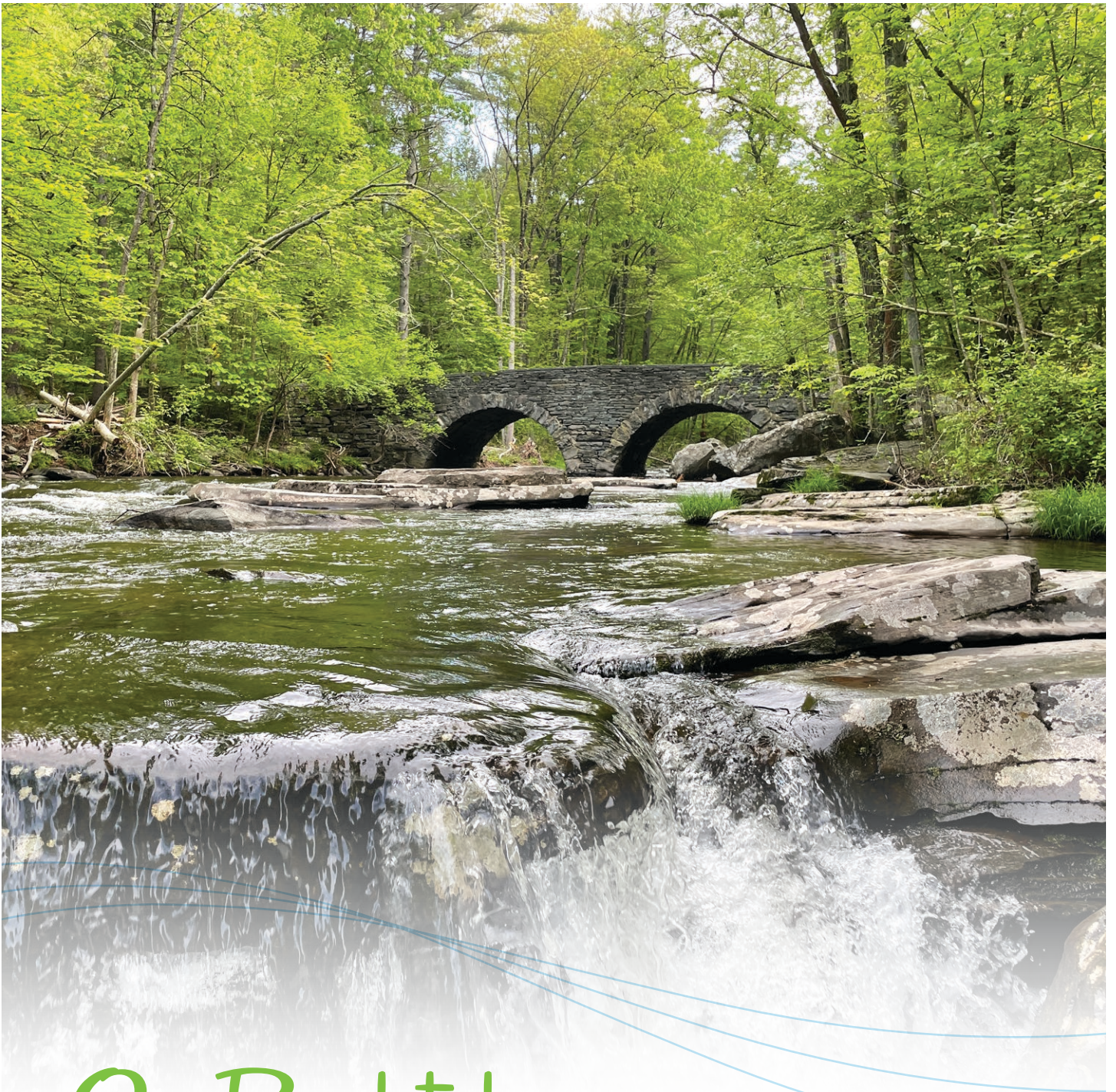
Meteorologist Glenn "Hurricane" Schwartz delivers remarks at DRBC Climate Forum

The next keynote speaker of the day was NBC10 Philadelphia's Glenn "Hurricane" Schwartz who spoke about how climate change, in particular arctic ice melt, is impacting rain, snow and flooding in the Basin, as well as the ability to make long-range winter forecasts. One of his responsibilities as a meteorologist is to warn the public about extreme events, and there will simply be many more of them, and an increased risk of flooding, in our future because of climate change. Besides helping plan the day and moderate sessions, ACCC members were featured in a panel discussion about climate challenges.

Many had similar responses regarding the challenge of relaying climate science in a way everyone can understand and the importance of thinking about equity and environmental justice when planning for climate impacts. The Climate Forum also featured presentations on topics such as monitoring and assessment and restoring and revitalizing urban waters. The final keynote speaker of the day was Dr. Kelsey Leonard.







# *Our Regulated Community and Stakeholders*

2021 Dockets

Rulemaking

Our Basin Stakeholders

Sharing Trusted, Technical Experience



# 2021 Dockets

The DRBC’s authority to review projects comes from the Delaware River Basin Compact, Section 3.8. It states that “no project having a substantial effect on the water resources of the Basin shall hereafter be undertaken by any person, corporation or governmental authority unless it shall have been first submitted to and approved by the Commission.” In accordance with Section 3.8, the Commission is required to approve a project whenever it finds and determines that the project would not substantially impair or conflict with the Comprehensive Plan. The following projects were reviewed and approved by the Commission in 2021.

The majority of the projects subject to Commission review under the Compact are water withdrawal and wastewater discharge projects over certain thresholds.

Dockets Approved in Quarter 1, 2021	
Docket #	Docket Name
D-1964-074-3	Vicinity Energy
D-1975-028 CP-5	Pen Argyl Municipal
D-1978-041 CP-4	Lower Frederick Township
D-1979-088-6	SPS Technologies
D-1980-007 CP-5	Pennsylvania Department of Conservation and Natural Resources
D-1987-026-5	GenOn REMA, LLC.
D-1988-054-8	Waste Management Disposal Services of Pennsylvania, Inc.
D-1988-089 CP-3	Pennsylvania American Water Co.
D-1996-045 CP-4	Lansdale Borough
D-1998-016 CP-4	Pennsylvania American Water Co.
D-2000-011 CP-3	Dublin Borough
D-2000-059 CP-3	Reading Area Water Authority
D-2004-015 CP-4	Buckingham Township
D-2008-005 CP-3	Pleasant Valley School District
D-2010-040 CP-2	Vicinity Energy
D-2010-042 CP-2	Aqua Pennsylvania, Inc.
D-2011-003 CP-2	Covanta Delaware Valley, LP
D-2014-014 CP-2	Tinicum Township
D-1988-014 CP-4	Roamingwood Sewer and Water Association

Dockets Approved in Quarter 1, 2021 Cont.	
Docket #	Docket Name
D-2016-011-3	Aqua Pennsylvania Wastewater, Inc.
D-2019-006 CP-1	Aqua Pennsylvania, Inc.

Dockets Approved in Quarter 2, 2021	
Docket #	Docket Name
D-1973-199 CP-5	Boyertown Borough
D-1974-061 CP-6	Spring City Borough
D-1983-009 -4	Occidental Chemical Corp.
D-1987-015 CP-4	East Stroudsburg Borough
D-1996-026 CP-3	West Grove Borough
D-1998-048 CP-4	Upper Moreland – Hatboro Joint Sewer Authority
D-2000-028 CP-4	Maidencreek Township Authority
D-2001-041 CP-3	Topton Borough
D-2001-061 CP-5	Upper Hanover Authority
D-2002-032 CP-3	Waymart Area Authority
D-2002-042 -5	Aqua Pennsylvania Wastewater, Inc.
D-2002-047 CP-3	North Coventry Water Authority

**Dockets Approved in Quarter 2, 2021 Cont.**

Docket #	Docket Name
D-2006-005 CP-4	Alsace Township
D-2006-019 -5	Brookdale Enterprises, LLC
D-2006-026 CP-5	Pocono Manor Investors, L.P.
D-2009-024 -3	Camp Lohikan
D-2009-026 CP-4	Wallenpaupack Area School District
D-2010-013 -2	Butter Valley Golf Port
D-2010-026 -2	Tuthill Corporation & Aquashicola-Little Gap, Inc.
D-2010-040 CP-2	Vicinity Energy
D-2010-043 -2	Bethany Childrens Home
D-2012-011 CP-3	City of Lewes Board of Public Works
D-2012-018 -3	Union Lake Hotel, Inc.
D-2015-015 CP-2	Pennsylvania American Water Co.
D-1994-078 CP-2	New York City Department of Environmental Protection
D-2007-030 -2	Venice Island Developer
D-2009-039 -2	Cleveland Cliffs Plate, LLC
D-1991-065 CP-4	Hazleton City Authority

**Dockets Approved in Quarter 3, 2021**

Docket #	Docket Name
D-1977-094 CP-3	Aqua Pennsylvania, Inc.
D-1988-017 CP-4	Horsham Water & Sewer Authority
D-1990-006 CP-4	North Wales Water Authority
D-1993-062 CP-4	Lake Adventure Comm. Assoc.
D-1993-074 CP-6	Shoemakersville Municipal Authority
D-1996-013 -3	Superior Tube Company, Inc.
D-1997-040 CP-3	Newmanstown Water Authority
D-2000-040 CP-3	Parkhouse Providence Pointe
D-2000-065 -3	MC Resource Development Co.
D-2001-057 -3	The Ace Center
D-2002-045 -3	BlueTriton Brands, Inc.

**Dockets Approved in Quarter 3, 2021 Cont.**

Docket #	Docket Name
D-2006-036 CP-3	Pennsylvania American Water Co.
D-2007-025 CP-4	Upper Makefield Township
D-2010-024 -2	Blackwood Golf Course
D-2010-041 -2	Altuglas LLC
D-1987-010 CP-3	Easton Area Joint Sewer Authority
D-1988-077 CP-5	Spring Township
D-2020-002-1	PSEG Power LLC

**Dockets Approved in Quarter 4, 2021**

Docket #	Docket Name
D-1973-209 CP-4	Middle Smithfield Township
D-1975-016 CP-5	Ambler Borough
D-1975-093 CP-6	Community Utilities of Pennsylvania, Inc.
D-1981-020 CP-3	Calpine Corporation
D-1990-019 CP-4	North Wales Water Authority
D-1991-014 CP-5	Pennsylvania American Water Co.
D-1995-053 CP-2	Pennsylvania American Water Co.
D-1998-055 -6	BlueTriton Brands, Inc.
D-2001-002 CP-5	Upper Bern Township
D-2002-029 CP-4	Towamencin Municipal Authority
D-2006-020 -4 SC	Stream PA LLC
D-2008-023 -5	BM Resort Management, LLC
D-2011-007 CP-2	Lost Lake Management Corp.
D-2012-005 -2	American Household, Inc. – C/O Newell Co.
D-2015-008 -3	Indian Head Camp
D-2017-005 -2	Camp Starlight, With You, LLC
D-1970-120 -4	Cambridge-Lee Industries, LLC
D-1998-035 -2	Sunoco Pipeline L.P.
D-2005-022 CP-4	Chadds Ford Township Sewer Authority
D-2010-044 CP-2	South Jersey Port Corp.
D-2021-001 -1	Prysmian Cables and Systems USA, LLC



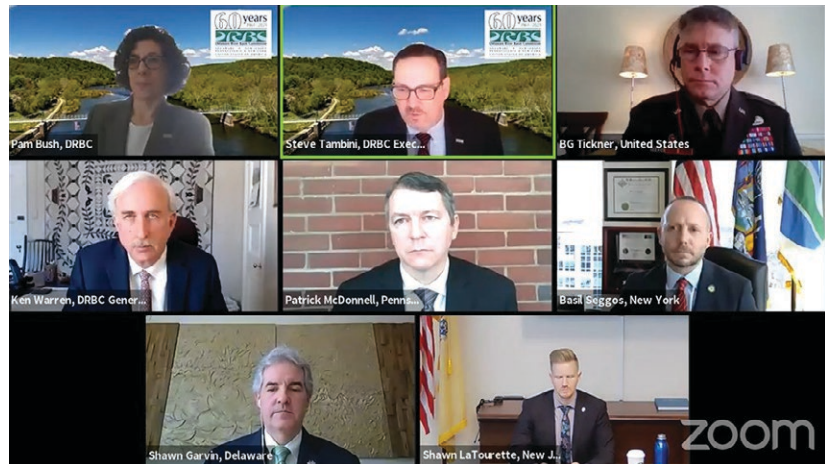
# Rulemaking

## HVHF Final Rule

The decision to prohibit High Volume Hydraulic Fracturing in the Delaware River Basin made by the DRBC in February 2021 came after a deliberate and extensive rulemaking process.

At the direction of the Commissioners, DRBC staff had published for public comment in 2017 a set of draft regulations to address high volume hydraulic fracturing in the Basin and held six public hearings to gather input on the proposed rules. DRBC received tens of thousands of comments, letters and petitions from a diverse cross section of the public from within the Basin and beyond. These comments, along with additional scientific and technical literature and reports, studies, findings and conclusions of other government agencies on the impacts of HVHF on water resources, were reviewed and evaluated by the DRBC staff and the Commissioners.

The Notice of Final Rule was adopted at a special meeting of the Commission held on February 25, 2021. In a separate action, the Commissioners directed the executive director to propose amendments to update the Commission's rules concerning the importation of wastewater from outside the Basin and exportation of Basin waters.



HVHF Special Meeting, February 25, 2021

## Import Export Rule Proposed

On October 28, 2021, the Commission published proposed amendments to its regulations regarding the importation and exportation of water and wastewater into and from the Delaware River Basin and the discharge of wastewater from high volume hydraulic fracturing, along with a schedule of public hearings and a written comment period. The comment period opened October 28, 2021, and closed February 28, 2022, during which time the Commission received a total of 2,461 comment submissions.

The proposed amendments to DRBC's Special Regulations include a determination that the discharge of wastewater from HVHF and HVHF-related activities poses significant, immediate and long-term risks to the Basin's water resources and that controlling future pollution by prohibiting such discharges within the Basin is required to effectuate the Commission's Comprehensive Plan. This determination is accompanied by related definitions and a prohibition on the discharge of wastewater from HVHF and HVHF-related activities to waters or land within the Basin.

The draft amendments establish the circumstances under which proposed exportations that meet the Commission's existing threshold for review may be considered for approval. They also clarify the factors the Commission will use in evaluating proposed importations of water or wastewater that meet the Commission's existing thresholds for review.

# Our Basin Stakeholders

## Diversity, Equity, Inclusion and Justice (DEIJ)

At DRBC, we are committed to the following core values:

**Service:** to the public, the regulated community, and our DRBC colleagues.

**Respect:** for each other, the public and the Basin’s water resources.

**Professionalism:** defined by high ethical standards, integrity, continuous improvement and accountability.

And, we are committed to applying these core values to meet the vital goals of Diversity, Equity, Inclusion and Justice (DEIJ). Our commitment to DEIJ is essential to our mission of managing, protecting and improving the Basin’s shared water resources. Just as we all can do our part to keep our waters clean, we all must do our part to ensure that our Basin community is one of respect, inclusion and equality.

In 2021, DRBC’s internal workgroup began developing a DEIJ strategic plan for the Commission that will translate to policy and practices to support DEIJ goals across our four key work areas: our water resources, our public and regulated community, our employees and our workplace.

The team made progress in defining the scope of the plan, conducting a stakeholder survey, and identifying best practices from organizations and thought leaders.

A key milestone in the group’s work came in September 2021 with the completion of a stakeholder survey. This effort yielded valuable insights and feedback on several dimensions of our work.

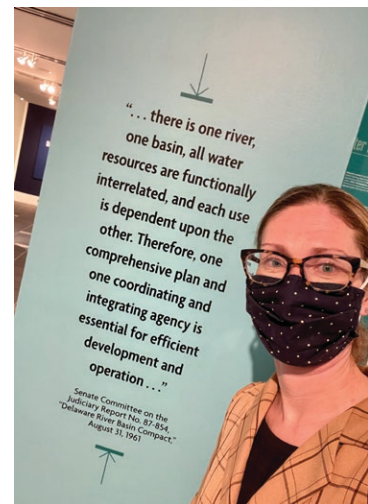
## Outreach and Communications

In 2021, we grew the *Our Shared Waters* community to nearly 40 partners; continued to amplify partner content, events and toolkits on the *Our Shared Waters* Facebook page, which now has over 3,600 likes; provided fresh content to partners; donated historic objects to the Science History Institute’s *Downstream* exhibit and sponsored PDE’s Science and Environmental Summit.

Through the *Our Shared Waters* Blog we published six posts in 2021. Rep. Mary Isaacson (PA-175), staff of The Discovery Center, Audubon Mid-Atlantic and Friends of the Upper Delaware contributed content in addition to DRBC staff.

### Virtual Outreach

Staff made a series of informational and educational videos reflecting the continued impact of the COVID-19 pandemic keeping many of our events online or canceled. A highlight was the video featuring former Philadelphia Phillies baseball pitcher Cole Irvin demonstrating how to “mud” a baseball with mud from the Delaware River. This and other videos are available on the DRBC YouTube channel.





## Sojourn Scholars

The Delaware River Basin Commission works to educate people about the importance of the Delaware River Basin's water resources. Events like river sojourns, where people get real-life exposure to our region's waterways, are great ways to learn and connect with others. The goal is that these experiences will create new stewards of our waters, helping protect these resources we all depend on. Nearly a dozen Sojourn Scholars paddled down the Delaware, Lehigh and Schuylkill Rivers this summer, supported by Our Shared Waters. Here are some of their reflections:

"My favorite part was interactions with other participants, views from the River, and lunch break with DRBC presentation."

—Hana E. (2021 Schuylkill River Sojourn Scholar)

"It was an amazing experience ... my first river paddle, I felt safe and welcomed by all ... very informative, [I learned] so many things I did not know about the Delaware."

—Alice P. (2021 Delaware River Sojourn Scholar)

"The Sojourn paddle was transformative for me. I had amazing conversations with other paddlers who were more experienced and I learned a lot about being on the water and the possibilities of paddling."

—Janine S. (2021 Delaware River Sojourn Scholar)

"I learned so much about our waterways from the Delaware River Basin Commission and the Schuylkill River Greenways on the importance of keeping them clean and how current and rainfall affects them. I was enlightened with facts that I just never thought about until this journey and it has impacted my personal goal to reduce my own carbon footprint and educate others around me."

—Fran N. (2021 Schuylkill River Sojourn Scholar)

We heard from multiple people that they gained confidence in their abilities and their own strength as a result of the sojourns, in addition to their newfound appreciation for the rivers.





## Events

**The Kalmar Nyckel:** Delaware's official Tall Ship was featured this summer in two experiential learning events hosted by DRBC's *Our Shared Waters*. Local legislators and community members were invited to get aboard the Kalmar, meet the crew and learn from DRBC staff and local businesses about why a sustainable, clean water supply is vital for people, businesses and wildlife.

In August, Delaware and Pennsylvania officials met in New Castle, Delaware. Unfortunately, extreme heat and humidity prevented a sail on the Delaware Bay, but attendees were able to tour the ship and meet the crew and then headed to a local restaurant for a "lunch and learn." On the ship, a press conference was held featuring U.S. Sen. Tom Carper (DE), Rep. Lisa Blunt Rochester (DE-At Large), Rep. Chrissy Houlahan (PA-6), State Sen. Stephanie Hansen (DE-10), State Sen. Marie Pinkney (DE-13), DNREC Secretary Shawn M. Garvin and DRBC Executive Director Steve Tambini. Each gave remarks on the Delaware River Basin management and protection, highlighting climate change, increased water demand and water quality. Sen. Carper presented Kalmar Nyckel Captain Lauren Morgens with a flag flown over the U.S. Capitol. At the local Boothhouse Tavern, folks heard from W. Ryan Anthes, owner of Hammergod Brewing, and Chris Anderson, Watershed Partnerships Legislative Lead for the Philadelphia Water Department, about the importance of clean water to the brewing and drinking water industries, respectively. DRBC Manager of Water Quality Assessment John Yagecic, P.E., and Senior Toxicologist Dr. Ron MacGillivray discussed several water quality issues affecting the Delaware River and Bay, for example, contaminants of emerging concern and improving oxygen levels for endangered fish species. DRBC Senior Water Resource Engineer Dr. Fanghui Chen talked about sea level rise and how it is impacting the Delaware Bay.





In September, Pennsylvania legislators and community members joined DRBC staff and local business leaders aboard the Kalmar Nyckel for a sail out of Bristol, Pa. Prior, a press conference was held at the Bristol Wharf pavilion featuring Bristol Borough Councilman Michael Gorman and Pennsylvania Senator Robert “Tommy” Tomlinson (PA-6). Councilman Gorman welcomed everyone to Historic Bristol Borough and discussed how important their Delaware waterfront is to the people of Bristol Borough. Sen. Tomlinson presented Kalmar Nyckel Captain Lauren Morgens with a flag flown over the Capitol in Harrisburg. In addition to Sen. Tomlinson, the legislators in attendance included Sen. Art Haywood (PA-4), Rep. KC Tomlinson (PA-18), Rep. Mary Isaacson (PA-175), Rep. Greg Vitali (PA-166), Rep. Joe Webster (PA-150), Rep. Perry Warren (PA-31) and Rep. Meghan Schroeder (PA-29). Staff representing other elected officials were also present. Once on board the Kalmar, folks heard from the crew about the boat’s history, from DRBC Executive Director Steve Tambini about the DRBC, and got to experience hauling the sails. Next folks rotated around four stations to hear about why clean water is so important. Hannah Gohde, lead brewer at Naked Brewing, talked about the beer making process and how water is a vital ingredient. Matt Csik of New Jersey American Water discussed how water from the Delaware is treated before it comes out your taps as drinking water; the cleaner the source water is, the better it is for us to drink. Beth Brown, then of Audubon Mid-Atlantic, partnered with DRBC Water Resource Scientist Elaine Panuccio to talk about the ecological connection between clean water, bugs and birds. And DRBC Deputy Executive Director Kristen Bowman Kavanagh discussed flow management in the Delaware River Basin.





**Birding with Audubon Mid-Atlantic:** A series of birdwalks with Audubon Mid-Atlantic provided the chance for DRBC staff, along with Audubon staff, to talk about the important role the Delaware River—and the Basin as a whole—plays in the daily lives of humans and wildlife. Walks were held at Ridley Creek State Park with staff of State Rep. Chris Quinn (PA-168) and Pa. Department of Conservation and Natural Resources staff, at Stateline Woods Preserve with Rep. Craig Williams (PA-160) and Land Conservancy for Southern Chester County staff, and at Honey Hollow environmental Center with Rep. Shelby Labs (PA-143), Rep. Meghan Schroeder (PA-29), and Bucks County Audubon staff.

**Trenton River Days with SPLASH:** DRBC had a great time participating in the 3rd Annual Trenton River Days Fair, held in September at South Riverwalk Park, along the Delaware River in Trenton, N.J. Exhibiting along with DRBC was SPLASH. SPLASH is a partner with DRBC in *Our Shared Waters*. While SPLASH taught about how pollution on our lands negatively affects our waters using their Enviroscape watershed model, DRBC’s activity focused on macroinvertebrates. Staff collected bugs from the Delaware River and displayed them in trays of water for attendees to check out, identify, and learn what they can tell us about water quality.

**Trenton Fishing Derby:** Hooked on Fishing, Not on Drugs was the theme of the Trenton Youth Fishing Derby, which was held at Stacy Park along the banks of the Delaware River in July. DRBC was proud to again participate in this great event that gives Trenton’s youth an opportunity to experience fishing and learn about clean water, something that fish and humans need to survive.





### **Tookany/Tacony-Frankford and Palmyra**

**Cove Cleanups:** While DRBC staff are normally focused on managing and protecting the shared interstate waters of the Delaware River Basin, they also care about helping out in our local communities. In October 2021, staff volunteered to clean up Philadelphia’s Tacony Creek Park and the Palmyra Cove Nature Center in Palmyra, N.J. Both places are hotspots for plastic pollution. Staff always appreciate being able to get out and help clean up our watershed. Removing trash from our lands helps keep it out of our waters.

### **Additional Outreach**

In 2021, DRBC developed a “souvenir map” of the Basin as a whimsical way to share information about the Basin. These were shared with multiple partners and at events.

*Rate your Waters* launched in 2021 as part of our outreach program. The site allows visitors to explore and contribute to the crowd-sourced water quality monitoring map for the Delaware River Basin.

DRBC also provided 15 middle and high school teachers with scholarships to attend the PDE Science Summit and DRBC Climate Forum.





## Sharing Trusted, Technical Experience

DRBC staff shared their expertise at several conferences and events this year. Presentations highlighted Commission programs, ongoing studies and a new DRBC publication. Outreach and education are important strategic goals of DRBC. Whether sharing information about the Basin and Commission programs at conferences, community events, in the classroom, online or otherwise with partners and peers, staff recognizes that connecting with our communities is vital to help foster understanding.

### CDRW Watershed Forum

The Coalition for the Delaware River Watershed (CDRW) held its 9th Annual *Del-AWARE River Watershed Forum* virtually in September 2021. Themed as *Building Inclusive Partnerships to Defend, Protect, and Restore a Great Water*, the three-day event featured dozens of presentations on a variety of topics, as well as in-person field trips. As part of the Forum, DRBC led a session focused on the evolution of water quality in the mainstem Delaware River Estuary. Entitled *Restoring Water Quality in the Main Stem Delaware River: Programs, Policies and Strategies*, this data-driven session explored how the DRBC is addressing the River's largest polluting sources, e.g., nutrient pollution, bacteria, salts, toxins, climate change and other emerging contaminants. This session also took a deep dive into the plans, programs and policies that have, over the years, driven measurable

changes in water quality improvements and what future strategies are needed to provide a sustainable, more equitably-minded path in these efforts. Staff featured were DRBC Executive Director Steve Tambini, P.E., DRBC Water Resource Scientist Dr. Sarah Beganskas, DRBC Aquatic Biologist Jake Bransky and DRBC Manager of Water Quality Assessment John Yagecic, P.E.

### Stroud Water Research Center

Executive Director Steve Tambini, P.E., participated in a webinar hosted by the Stroud Water Research Center entitled *The Journey From River To Faucet: How Collaboration Between States Ensures Adequate Drinking-Water Supply Across the Delaware River Basin*. This webinar was part three in a four-part series to celebrate the Delaware River being named American Rivers' 2020 River of the Year. It featured a panel discussion facilitated by Stroud Water Research Center President and Executive Director Dr. Dave Arscott. Panelists included DRBC Executive Director Steve Tambini, Friends of the Upper Delaware River's Jeff Skelding, Moonshot Mission's Andy Kricun and American Rivers' Gary Belan. Tambini reviewed major flow and water quality management initiatives that have occurred since the creation of the DRBC in 1961. Other topics of discussion included recreation, drinking water protection and environmental justice.



## Science and Environmental Summit

The Partnership for the Delaware Estuary's (PDE) biennial Science and Environmental Summit was held March 1-3. Over 400 people participated in this event to learn more about the issues facing the Delaware Estuary, the tidal portion of the Delaware River and Bay, and what is being done about them. The DRBC regularly participates in the Science Summit, as presenters, panel moderators and/or attendees. DRBC Aquatic Biologist Jake Bransky presented on DRBC's 2020 Water Quality Assessment Report during the Water Quality & Water Quantity session. Bransky and DRBC Manager of Water Resource Modeling Thomas Amidon then presented during the Water Quality & Water Quantity II Session on DRBC's Aquatic Life Designated Use Study. Day two featured the Forum on Climate Change and the Delaware River Basin, as noted above. The final day of the Science Summit featured a panel discussion of *25 Years in the Delaware Estuary: Reflecting on Past Accomplishments and Addressing Future Challenges*. The panel was comprised of members of PDE's Steering Committee, including DRBC Executive Director Steve Tambini. The theme woven throughout the Climate Change Forum, and the entire Science Summit, was the importance of collaboration and partnership among all sectors. It is and will continue to be key as we work toward a cleaner, healthier and resilient Delaware River Estuary for all.

## Earth Week Presentations

State Senator Amanda Cappelletti (PA-17) hosted a Facebook Live event on April 21, 2021: *Conservation and Connectivity*. DRBC's Kate Schmidt joined Schuylkill River Greenway's Tim Fenchel to talk about things we can do to help conserve water and keep it clean, as well as about connecting with nature and recreational opportunities along the Schuylkill River. The Schuylkill River is the Delaware River's largest tributary and a major waterway in Sen. Cappelletti's district.

The Philadelphia Geographical Society hosted a webinar on April 22, 2021: *Philadelphia's Water—Preservation and Exploration*. DRBC's Kate Schmidt joined the Academy of Natural Science's Carol Collier and the EPA's Garth Connor to talk about the relationship between human activity and the health of river ecology. Panelists discussed the history of water quality improvements and recreational opportunities in the Delaware River Basin, as well as how government regulation and on-the-ground watershed improvement projects complement one another and work together to make our water resources healthier and sustainable.

## Water Works Operators' Assoc. of Pennsylvania

The Water Works Operators' Association of Pennsylvania hosted its annual conference in early October. Themed *Expect the Unexpected*, the conference brought together operators, engineers, vendors and government officials to highlight the importance of always being prepared for any situation when managing a public water supply system. DRBC Deputy Executive Director Kristen Bowman Kavanagh, P.E., presented *Climate Change Considerations in Water Resource Management*.

## Interstate Council on Water Policy

The Interstate Council on Water Policy held its annual meeting over two days in mid-October. DRBC Manager of Water Resource Operations Amy Shallcross, P.E., serves as the Chair of their Water Data and Science Committee; she helped organize the meeting and moderated three sessions. DRBC Executive Director Steve Tambini, P.E., provided opening remarks on the meeting's first day. DRBC Director of Science and Water Quality Management Dr. Namsoo Suk presented on DRBC's Aquatic Life Designated Use Study. DRBC Water Resource Engineer Michael Thompson, P.E., discussed Water Withdrawal and Consumptive Use Estimates for the Delaware River Basin (1990-2017) With Projections Through 2060.

## American Water Resources Association: Mid-Atlantic

The 2021, American Water Resources Association (AWRA) Mid-Atlantic Conference was held in late September. DRBC Manager of Water Resource Modeling Thomas Amidon is the immediate past president of the New Jersey Section-AWRA and helped organize this informative conference. He and three other colleagues were a part of the conference, either giving presentations or participating in a panel discussion. DRBC Water Resource Engineer Michael Thompson's, P.E., presentation *Have We Seen Peak Water Use in the Delaware River Basin?* discussed work completed on a 30-year trend analysis of water use in the Basin. This analysis helped the Commission make projections of how much water will be needed in the future for a variety of water use sectors. Amidon and DRBC Manager of Water Quality Assessment John Yagecic, P.E., also presented at the conference. Amidon's presentation *Application of Eutrophication Modeling to Understand the Potential to expand designated aquatic life uses in the Delaware River Estuary* discussed the Commission's Aquatic Life Designated Use Study, focusing on the models being developed and used for this multi-year study and regulatory effort. Yagecic's presentation *Using Data for Water Resource Management at the Delaware River Basin Commission* discussed various dashboards and models staff developed and use to assess and communicate a variety of water quality and flow data.

## Audubon's Birds and Brews Speaker Series

The National Audubon Society's Delaware River Watershed program and Brewers for the Delaware River hosted a speaker series at The Discovery Center in Philadelphia, focusing on clean water and habitat in the Delaware River Basin. DRBC's former Director of External Affairs Peter Eschbach talked about DRBC's work and its role in *Our Shared Waters* in August, and in October the role was assumed by DRBC's new Director of External Affairs, Beth Brown. Eschbach and Brown were joined by panelists from the Academy of Natural Sciences of Drexel University, Tannery Run Brew Works, 2SP Brewing Company, Philadelphia Water Department and LandHealth Institute, along with community partners including Harriett's Bookshop and Philly Health Department.

## Friends of the Upper Delaware River

The Friends of the Upper Delaware River held their annual *Water Water Everywhere* conference in October. This conference focused on water resource management issues that affect the upper Delaware River, the portion of River that borders Pennsylvania and New York. DRBC Deputy Executive Director Kristen Bowman Kavanagh, P.E., presented on DRBC's Storage Feasibility Study. DRBC Manager of Water Resource Operations Amy Shallcross, P.E., and NYCDEP Bureau of Water Supply Chief of Staff Jennifer Garigliano presented jointly at the conference. They discussed water releases from the New York City Delaware River Basin reservoirs and how they impact and are used in salinity management downstream in the Delaware River Estuary.



Audubon Birds and Brews Panel, August 2021



## NJDEP Water Supply Advisory Council

The New Jersey Water Supply Advisory Council was established by NJDEP. The Council advises the Department concerning water supply resource issues affecting New Jersey. The Council holds monthly meetings. DRBC Water Resource Engineer Michael Thompson, P.E., presented *Water Withdrawal and Consumptive Use Estimates for the Delaware River Basin (1990–2017) with Projections Through 2060* at their October meeting.

## New Jersey Assembly Special Committee on Infrastructure and Natural Resources

DRBC Manager of Water Resource Operations Amy Shallcross, P.E., provided testimony before the New Jersey Assembly Special Committee on Infrastructure and Natural Resources. The focus of the hearing was on how climate change impacts New Jersey infrastructure and its water resources. Shallcross's testimony focused on the impacts of climate change and sea level rise on flooding, water supply and droughts. Warmer temperatures could mean more droughts, but also more intense storms, as warmer air holds more water. Managing water supplies to ensure there is enough water during dry periods but also not too much water during floods is vital. Additionally, because the Delaware is undammed, water in the Delaware River Basin is managed to ensure there is ample freshwater flow to keep salty water from the ocean in the Delaware Bay and away from industry and drinking water intakes. Shallcross explained that sea level rise, coupled with less flow due to changes in precipitation patterns, poses risks to this important infrastructure. These are all issues that the DRBC is looking at with respect to climate change. The New Jersey Assembly Special Committee on Infrastructure and Natural Resources includes several who represent legislative districts in the Basin: Asm. Robert D. Clifton (NJ-12), Asw. Carol Murphy (NJ-7) and Anthony Verrelli (NJ-15).

## Pennsylvania House Democratic Policy Committee

DRBC Deputy Executive Director Kristen Bowman Kavanagh, P.E., and Senior Environmental Toxicologist Dr. Ron MacGillivray provided testimony before the Pennsylvania House Democratic Policy Committee. The hearing was entitled "Protecting the Delaware River Basin" and was hosted by State Representative Mary Isaacson (PA-175). The hearing was held to highlight the value of the Delaware River Basin and Pennsylvania's role in its preservation. Kavanagh's remarks provided background about the DRBC and our important role in managing, protecting and improving the water resources of the Delaware River Basin. She focused on the Commission's main programs and emphasized that we work with Pennsylvania in a non-duplicative and complementary manner. Dr. MacGillivray discussed some of DRBC's key water quality programs, for example, PCB reduction and contaminants of emerging concern, such as PFAS. Other speakers included Audubon's Beth Brown; Yardley Borough Council President David Bria; Driftwood Water Adventures' Patrick Mulhern; Tannery Run Brew Works' Timothy Brown; and 2SP Brewing Company's Mike Contreras.

## Schuylkill Action Network Annual Meeting

In 2021, the Delaware River Basin Commission published a report entitled *Water Withdrawal and Consumptive Use Estimates for the Delaware River Basin (1990–2017) with Projections through 2060*. DRBC Water Resource Engineer Michael Thompson’s presentation *Have We Seen Peak Water Use in the Delaware River Basin?* to the Schuylkill Action Network discussed the 30-year trend analysis of water use in the Basin. This analysis helped the Commission make projections of how much water will be needed in the future for a variety of water use sectors.

## Pennsylvania Emergency Management Agency

DRBC and the Pennsylvania Emergency Management Agency (PEMA) co-hosted a series of hybrid Hazard Mitigation Plan Implementation and Grant Development workshops in September and October 2021 to help municipalities connect the dots between planning and Federal Emergency Management Agency (FEMA) funding and access other funding streams for possible cost share. These resources will assist municipalities and eligible authorities by providing the tools to advance mitigation, recovery, and resilience priorities. The DRBC’s goal is for PEMA to advance more project applications from the Upper Delaware/Lackawaxen Watershed for FEMA funding approval. PEMA and DRBC assisted municipalities in developing, selecting, and prioritizing complete grant application proposals for existing local project priorities and other potential funding and cost-share opportunities, as well as getting the process started in FEMA’s web portal.



PEMA Workshop Wayne County, October 2021

## Publications

Technical Report No. 2021-1, [Nitrogen Reduction Cost Estimation Study: Final Summary Report](#), prepared for the Commission by Kleinfelder, January 2021.

Technical Report No. 2021-2, [2020 Hydrologic Conditions Report](#), By Anthony Preucil, Feb. 2021.

Technical Report No. 2021-3, [Water Resources Program FY2022-2024](#), June 2021.

Technical Report No. 2021-4, [Water Withdrawal and Consumptive Use Estimates for the Delaware River Basin \(1990-2017\) With Projections through 2060](#), By Michael Y. Thompson and Chad E. Pindar, October 2021.

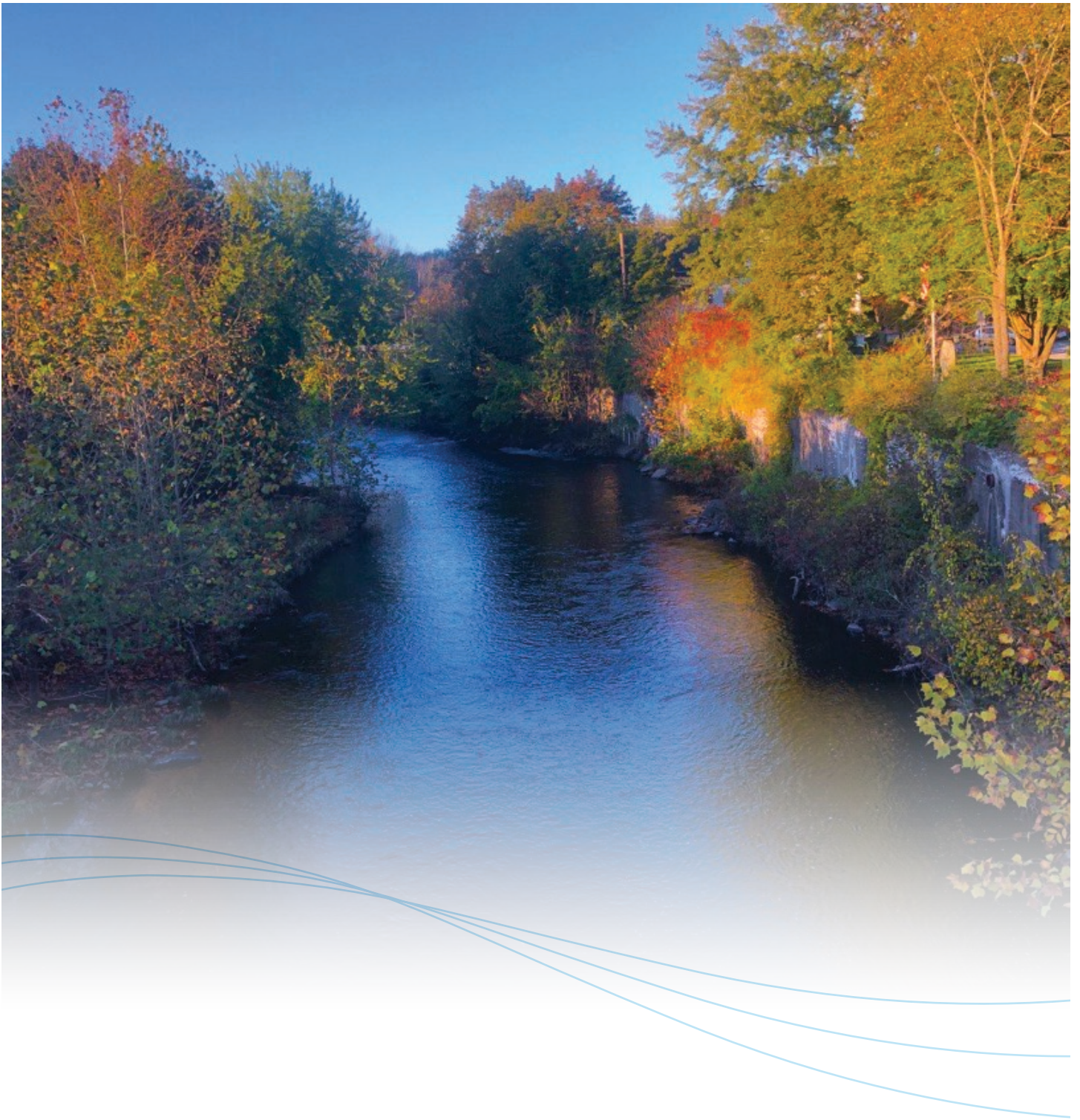
MacGillivray, A.R. (2021) [Temporal trends of PFAS in Delaware River Fish](#), USA. Integrated Environmental Assessment and Management. 17(2) 411-421, March 2021.

Kavanagh, Kristen Bowman, *Letter to the Editor: Collaboration needed to mitigate, adapt to climate change*, Bay to Bay News, March 24, 2021.

Eschbach, Peter, *Commentary: A sail on the Delaware, a field lesson about protecting our shared waters*, Bay to Bay News, November 19, 2021.

Tambini, Steve, *Commentary: Delaware River Basin Commission anniversary is a story of our shared waters*, Bay to Bay News, December 31, 2021.





# *Our Employees and Workplace*

Our Staff

Our Budget

Community Service





## Our Staff

Staff said farewell to Peter Eschbach, Director of External Affairs and Communications, upon his retirement in November 2021. Peter joined the DRBC in 2016. In 2017, he assumed the role of Director of External Affairs and Communications. Peter brought new ideas, unique perspectives, and a willingness to partner with others in the Basin community. He developed the *Our Shared Waters* partnership and many others for reaching and educating water users throughout the vast and diverse Basin territory. We thank Peter for his service to the Basin and wish him an enjoyable and well-earned retirement.

Four new staff joined the Commission this year:

**Sara Sayed, MEM**

Water Resource Scientist

**Sarah Beganskas, Ph.D.**

Water Resource Scientist

**Keven Pregent, Esq.**

Associate Counsel

**Elizabeth Koniers Brown**

Director of External Affairs and Communications



# Our Budget

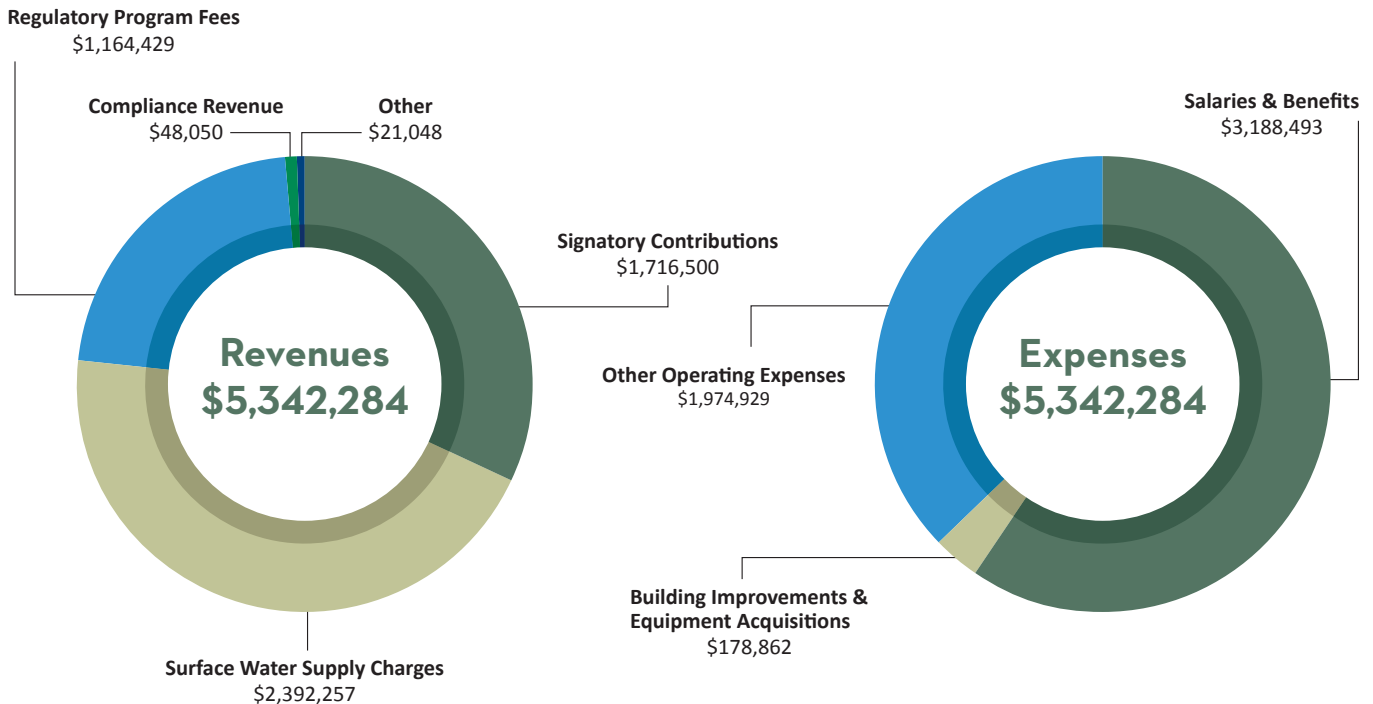
The DRBC operates and maintains two funds for budgeting purposes: a General Operating Fund and a Water Supply Storage Facilities Fund.

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 come from signatory party contributions, regulatory program fees, competitive grants, compliance revenue, transfers from the WSSF and other sources. The balance of the General Fund at the end of FY 2021 was \$5.34 million.

The Water Supply Storage Facilities Fund was created to support reliable water supply in the Basin and is used to repay obligations the DRBC assumed to purchase storage capacity at two

federal reservoirs, Beltzville and Blue Marsh. The Water Supply Storage Facilities Fund 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 General Fund) and any future required storage in the Basin. Revenues are generated from charges for applicable surface water withdrawals in the Basin. The balance of the Water Supply Storage Facilities Fund at the end of FY 2021 was \$24.92 million.

DRBC’s independently audited financial statements for FY2021 are available at: [www.nj.gov/drbc/library/documents/AuditReportFY21.pdf](http://www.nj.gov/drbc/library/documents/AuditReportFY21.pdf)



# Community Service

While the main efforts of DRBC staff are focused on managing and protecting the shared interstate waters of the Delaware River Basin, they also care about helping out in our local communities. Eleven DRBC staff recently volunteered at the Mercer Street Friends Food Bank in Ewing Township, N.J.

Mercer Street Friends is the leader of the community's response to hunger, offering prevention programs and annually distributing 5.5 million pounds of privately- and government-donated food to a network of more than 100 shelters, soup kitchens and food pantries in Mercer County. In addition to running the food bank, Mercer Street Friends also offers a free preschool and many programs for youth, adults

and parents. This year, our 7th running, staff helped make more than 870 food bags, which equaled over 1,700 meals.

This year, we were especially grateful to help, as we know that the need is greater than ever. The Food Bank's "Send Hunger Packing" Program provided over 20,000 weekend meals to Mercer County students since September 2021 alone. In total, over two million meals have been distributed since March 2020 through Mercer Street's Community Food Bag Program.

During the holiday season and all throughout the year, DRBC staff are proud to do their part to help those in need. A small agency can have a big impact when we all work together.







## Appendix: Advisory Committees

Advisory Committee on Climate Change (ACCC)

Flood Advisory Committee (FAC)

Monitoring Advisory and Coordination Committee (MACC)

Regulated Flow Advisory Committee (RFAC)

Subcommittee on Ecological Flows (SEF)

Toxics Advisory Committee (TAC)

Water Management Advisory Committee (WMAC)

Water Quality Advisory Committee (WQAC)



# Appendix: Advisory Committees

The DRBC's advisory committees provide a forum for the exchange of information and viewpoints on a variety of issues, enhancing communication and coordination. The Commissioners recognize the importance of engaging qualified representatives from state/federal government agencies, industry, municipalities, academia, public health, and environmental/watershed organizations to inform their policy decisions. Advisory committee and subcommittee meetings are open to the public and continued to meet virtually during 2021. A complete and up-to-date listing of members can be found on our website.

## Advisory Committee on Climate Change (ACCC) Membership

### Reserved Members

#### Delaware

**Robert Scarborough, Ph.D.**, Environmental Program Manager II, Delaware Coastal Programs Division of Climate, Coastal and Energy, Delaware Department of Natural Resources and Environmental Control

#### New Jersey

**Nicholas A. Procopio, Ph.D.**, GISP, Bureau Chief, Division of Science and Research, New Jersey Department of Environmental Protection

#### New York

**Mark Lowery, Assistant Director**, Office of Climate Change, New York State Department of Environmental Conservation

#### Pennsylvania

*Appointment Pending*

#### United States Government

**Amanda L. Babson, Ph.D.**, Coastal Landscape Adaptation Coordinator, National Park Service, Interior Region 1, North Atlantic – Appalachian

**Arthur DeGaetano, Ph.D.**, Director, NOAA Northeast Regional Climate Center, Cornell University

#### New York City

**Alan Cohn**, Managing Director of Integrated Water Management, New York City Department of Environmental Protection

#### City of Philadelphia

**Julia Rockwell**, Manager, Climate Change Adaptation Program, Office of Watersheds, Philadelphia Water Department

#### Partnership for the Delaware Estuary

**Danielle Kreeger, Ph.D.**, Senior Science Director, Partnership for The Delaware Estuary

### Non-Reserved Members

**William Brady III, P.E.**, Principal, CCS Strategies LLC

**John Callahan, Ph.D.**, Visiting Assistant Professor, University of Delaware

**James J. Chelius, P.E.**, Senior Director, Engineering Asset Planning, American Water, Inc.

**Marjorie B. Kaplan, Dr.P.H.**, (Committee Vice Chair), Associate Director, Rutgers Climate Institute, Rutgers University

**Upmanu Lall, Ph.D.**, Professor, Columbia University, Director, Columbia Water Center

**Christopher Linn**, AICP, Manager, Office of Environmental Planning, Delaware Valley Regional Planning Commission

**Howard Neukrug, P.E.**, (Committee Chair), Professor, University of Pennsylvania, Founding Director, The Water Center at Penn

**David Velinsky, Ph.D.**, Vice President, Academy of Natural Sciences of Drexel University, Head, Department of Biodiversity, Earth and Environmental Science

**Elizabeth Koniers Brown**, Director of Delaware River Watershed Program, Audobon Mid-Atlantic (through September 2021)



# Flood Advisory Committee (FAC) Membership

## **Delaware Department of Natural Resources and Environmental Control**

**Michael Powell, CFM**, Shoreline and Waterway Management, Division of Soil and Water Conservation

## **New Jersey Department of Environmental Protection**

**Vincent Mazzei, P.E.**, Principal Environmental Engineer, Division of Land Use Regulation

**John H. Moyle, P.E.**, Manager, Bureau of Dam Safety and Flood Control

**Joseph Ruggeri, P.E., CFM**, Supervising Engineer, N.J. State NFIP Coordinator's Office

## **Bureau of Dam Safety & Flood Control**

**John Scordato**, Flood Plain Management Section

## **New York Department of Environmental Conservation**

**Mark Klotz, P.E.**, Chief, Water Quantity Section

## **Pennsylvania Department of Environmental Protection**

**Hoss Liaghat, P.E.**, Civil Engineering Consultant

## **New York City Department of Environmental Protection**

**Tina Johnstone**, Bureau of Water Supply

**Thomas Murphy Jr., P.E.**, Chief, Water Systems Operations Division, Bureau of Water Supply

**Dana Olivio**, Assistant Environmental Engineer, Bureau of Water Supply, Strategic Services

**John H. Vickers, P.E.**, Chief, Western Operations Division, Operations Directorate, BWS, NYCDEP

## **Delaware Emergency Management Agency**

**Arthur Paul**

**Edward Strouse**

## **New Jersey Office of Emergency Management**

**Sgt. Michael K. Gallagher**

**Christopher Testa**, (Committee Chair)  
Hazard Mitigation Unit Manager

## **New York State Division of Homeland Security and Emergency Services**

**Gary L. Tuthill**, Regional Director, Region 2 Catskill Mountain Zone

## **Pennsylvania Emergency Management Agency**

**David Williams**, PEMA Eastern Area

**Thomas S. Hughes, CEM**, State Hazard Mitigation Officer

## **Federal Emergency Management Agency**

**Dave Bollinger, CFM**, FEMA Region III

**Scott Duell**, FEMA Region II:

Flood Insurance & Mitigation Division

**Patricia Griggs**, FEMA Region II:

Flood Insurance & Mitigation Division

**J. Andrew Martin**, CFM, FEMA Region II:

Mitigation Outreach

**Alan Springett**, FEMA Region II:

Risk Analysis Team Lead

## **U.S. Department of Agriculture – Natural Resources Conservation Service**

**Hosea Latshaw**, State Conservation Engineer

**David Lamm**, State Conservation Engineer

## **U.S. Geological Survey**

**William F. Coon**, Surface – Water Specialist,  
New York Water Science Center

**Heidi L. Hoppe**, Chief, Hydrologic Data Assessment Program, New Jersey Water Science Center

**Robert G. Reiser, Supervisory Hydrologist**, New Jersey Water Science Center

**Mark Roland, P.E., Hydrologist**, Pennsylvania Water Science Center

**Thomas P. Suro, P.H.**, CFM, Surface – Water Specialist, Hydrologist & Engineer, New Jersey Water Science Center

**Kirk White**, Supervisory Hydrologist,  
Pennsylvania Water Science Center

## **National Weather Service**

**Peter Ahnert**, Hydrologist In Charge,  
Middle Atlantic River Forecast Center (MARFC)

**Jim Brewster**, Senior Service Hydrologist,  
National Weather Service Forecast Office (BGM)

**Al Cope**, Science and Operations Officer,  
Mount Holly Weather Forecast Office

**Laurie Hogan**, NWS Eastern Region

**Raymond Krudzlo**, (Committee Vice Chair)  
Senior Service Hydrologist,  
Mount Holly Weather Forecast Office

**Al Matte**, NWS Eastern Region

**George McKillop**, NWS Eastern Region

**Patrick O'Hara**, Meteorologist

**Ted Rodgers**, Middle Atlantic River Forecast  
Center (MARFC)

**Ben Schott**, Meteorologist In Charge,  
National Weather Service Forecast Office (BGM)

### **U.S. Army Corps of Engineers**

**Jason F. Miller, P.E.**, Chief, Flood Plain Management  
Services Branch, Philadelphia District

### **National Park Service**

**Kristina Heister**, Superintendent, Upper Delaware  
Scenic & Recreational River

**Vince Pareago**, U.S. Park Ranger, Upper Delaware  
Scenic & Recreational River

### **Delaware River Joint Toll Bridge Commission**

**Sean M. Hill**, Deputy Executive Director  
of Operations

### **Electric Generation Industry (Hydropower and Off-Stream Storage)**

**Meredith Strasser**, Talen Generation, LLC

### **County Water Resources Agencies**

**Gerald Kauffman, P.E.**, Water Resources  
Coordinator, Water Resource Agency/IPA,  
CHEP DGS, University of Delaware

### **Emergency Management Representatives**

**David K. Burd**, Coordinator, Office of Emergency  
Management, City of Lambertville

**Steve Hood**, Director, Delaware County  
(NY) Department of Emergency Services

## **Monitoring Advisory and Coordination Committee (MACC) Membership**

### **Delaware**

**David Wolanski**, Delaware Dept. of Natural  
Resources and Environmental Control

### **Delaware River Basin Fish and Wildlife Cooperative (Fisheries)**

**Sheila Eyler**, U.S. Fish and Wildlife Service,  
Mid-Atlantic Fishery Resources Office

### **Education**

**Marc Peipoch**, Stroud Water Research Center

### **Environmental Organization**

**Eileen Murphy**, New Jersey Audubon

**Elizabeth Koniers Brown**, Audubon Mid-Atlantic  
(Through September 2021)

**Danielle Kreeger**, Partnership for the Delaware Estuary

### **New Jersey**

**Chris Kunz**, New Jersey Dept. of Environmental  
Protection, Bureau of Freshwater  
& Biological Monitoring

### **New York**

**Sarah Rickard**, NEIWPC, Environmental Analyst,  
c/o Standards and Analytical Support Section,

Division of Water, New York State Dept. of  
Environmental Conservation

### **Pennsylvania**

**Michael (Josh) Lookenbill**, Monitoring Section Chief,  
Water Quality Standards, Pennsylvania Dept. of  
Environmental Protection

### **Regulated Community**

**Matthew Fritch**, Philadelphia Water Department

### **U.S. Army Corps of Engineers**

*Vacant*

### **U.S. EPA – Region III**

**Kristin Regan**, Field Services Branch, Laboratory  
Services and Applied Science Division,  
U.S. EPA Region III

### **U.S. Geological Survey**

**Heather Heckathornk**, Hydrologist/  
Water Quality Specialist, U.S. Geological Survey,  
New Jersey Water Science Center

### **Watershed Organization**

**Preston Luitweiler**, Water Resources Association  
of the Delaware River Basin



# Regulated Flow Advisory Committee (RFAC) Membership

## Delaware Department of Natural Resources and Environmental Control

**William Cocke, P.G.**, Division of Water, Water Supply Section, Manager, Water Allocations

## Delaware Geological Survey

**Stefanie Baxter, P.G.**, University of Delaware

## New Jersey Department of Environmental Protection

**Steve Domber**, (Committee Vice-Chair)  
Environmental Specialist

**Joseph A. Miri, Ph.D.**, Research Scientist

## New York City Department of Environmental Protection

**Jen Garigliano**, Chief of Staff,  
Bureau of Water Supply

## New York State Department of Environmental Conservation

**Brenan Tarrier**, (Committee Chair) Division of Water, Bureau of Water Resource Management

## Office of the Delaware River Master

**Kendra Russell**, U.S. Geological Survey,  
Delaware River Master

## Pennsylvania Department of Environmental Protection

**Abdolhossian (Hoss) Liaghat, P.E.**, Consulting Hydrologist, Compacts and Commissions Office

## Philadelphia Water Department

**Kelly Anderson**, Office of Watersheds

## U.S. Army Corps of Engineers

**Laura Bittner**, Chief of Hydrology, Hydraulics, and Coastal Section, U.S. Army Corps of Engineers – Philadelphia District

# Subcommittee on Ecological Flows (A Subcommittee of the Regulated Flow Advisory Committee)

## Reserved Members

### New Jersey

**Ross Shramko**, New Jersey Division Fish & Wildlife, Bureau of Freshwater Fisheries

### Pennsylvania

**Daryl Pierce**, Pennsylvania Fish and Boat Commission, Division of Fisheries Management – Area 5

### New York

**Chris VanMaaren**, New York State Department of Environmental Conservation

### Delaware

**Ian Park**, Delaware Department of Natural Resources and Environmental Control, Division of Fish and Wildlife

### United States Government

**Peter Sharpe, Ph.D., PWS**, National Park Service, Natural Resources Stewardship and Science

### Philadelphia

**Molly Hesson, Ph.D.**, (Representing Philadelphia Water Department) Sage Services LLC

### New York City

**Lori Emery**, New York City Department of Environmental Protection

## Non-Reserved Members

**Sheila Eyster, Ph.D.**, (Representing Delaware River Fish and Wildlife Management Cooperative) United States Fish & Wildlife Service, Mid-Atlantic Fish and Wildlife Conservation Office

**Erik Silldorff, Ph.D.**, Delaware Riverkeeper Network

**Jeff Skelding**, Friends of the Upper Delaware River

**Jim Serio**

**Peter Kolesar, Ph.D.**

**Garth Pettinger**

# Toxics Advisory Committee (TAC) Membership

## Academic

**David Velinsky, Ph.D.**, Academy of Natural Sciences of Drexel University, VP for Academy Science and Department Head

## Agriculture

*Vacant*

## Delaware

**John Cargill**, Division of Waste and Hazardous Substances/Site Investigation and Restoration Section *and also* Division of Watershed Stewardship/Watershed Assessment & Management Section

## Environmental/Watershed

**Tracy Carluccio**, Delaware Riverkeeper Network

## Environmental/Watershed

**Diana Oviedo-Vargas, Ph.D.**, Research Scientist, Stroud Water Research Center

## EPA Region II

**Brent Gaylord**, U.S. EPA Region 2, Water Quality Standards Coordinator, Clean Water Regulatory Branch Clean Water Division

## EPA Region III

**Kuo-Liang Lai, P.E.**, U.S. EPA Region III, Office of Standards, Assessment, and TMDLs, Water Protection Division (3WP30)

## Federal Fish & Wildlife

**Clay Stern**, U.S. Fish and Wildlife Service, New Jersey Field Office

## Industry

**Scott Northey**, EHS Supervisor, The Chemours Company, Chambers Works

## Municipal

**Jason Cruz**, Aquatic Biologist Supervisor, Philadelphia Water Department

## New Jersey

**Biswarup (Roop) Guha**, New Jersey Department of Environmental Protection, Bureau of Environmental Analysis, Restoration, and Standards, Division of Water Monitoring and Standards

## New York

**Jason R. Fagel**, New York State Department of Environmental Conservation, Research Scientist, Bureau of Water Assessment and Management – Division of Water

## Pennsylvania

**Maria Schumack**, Bureau of Clean Water – PA Department of Environmental Protection, Project Manager

## Public Health

**Eric Bind, M.P.P.**, New Jersey Department of Health, Research Scientist, Environmental and Chemical Laboratory Services



# Water Management Advisory Committee (WMAC) Membership

## State of Delaware

**Steven Smailer, P.G.**, (Acting Representative)  
Environmental Program Administrator,  
Division of Water, Delaware Department  
of Natural Resources and Environmental Control

## State of New Jersey

**James MacDonald**, Bureau of Water Allocation  
& Well Permitting, New Jersey Department  
of Environmental Protection

## State of New York

**Erik T. Schmitt, P.E.**, (Acting Representative)  
Division of Water, New York State Department  
of Environmental Conservation

## Commonwealth of Pennsylvania

**Abdolhossian (Hoss) Liaghat, P.E.**,  
Consulting Hydrologist, Compacts and  
Commissions Office, Pennsylvania Department  
of Environmental Protection

## U.S. Army Corps of Engineers

**Laura Bittner, Chief**, Hydrology and Hydraulics,  
U.S. Army Corps of Engineers

## U.S. Environmental Protection Agency

**Katie Lynch**, Environmental Scientist, Drinking  
Water and Groundwater Protection Section,  
U.S. Environmental Protection Agency – Region II

## U.S. Geological Survey

**Daniel J. Goode**, Ph.D., Research Hydrologist,  
USGS Water Science Center

## City of New York

**Dana Olivio**, Assistant Environmental Engineer,  
New York City Department of Environmental  
Protection Bureau of Water Supply,  
Strategic Services

## City of Philadelphia

**Kelly Anderson**, Source Water Protection Program,  
Division of Planning & Research, Philadelphia  
Water Department

## County Water Agency

**Janet L. Bowers**, (Committee Vice-Chair)  
Executive Director, Chester County Water  
Resources Authority

## Water Resources Association

**Preston Luitweiler**, Water Resources Association  
of the Delaware River Basin

## Industry

**Jordan C. Rajan**, Senior Environmental Specialist,  
Exelon – Limerick Generating Station

## Water Utility

**Kathleen Thaefer**, (Committee Chair)  
Artesian Water Company, Inc.

## Agriculture

**Sandra Howland**, Research Scientist,  
Division of Agriculture & Natural Resources,  
New Jersey Department of Agriculture

## League of Women Voters or other Civic Organization

**Kathy Cook**, Environmental Policy Director,  
League of Women Voters of Pa.

## Environmental Organization

**Kelly Knutson**, Interim Director, Coalition for the  
Delaware River Watershed, New Jersey Audubon

## Watershed Organization

**Laurie Ramie**, Executive Director,  
Upper Delaware Council

## Academia

**Daniel J. Van Abs, Ph.D., FAICP/PP**,  
Associate Professor of Practice for Water, Society  
& Environment, Department of Human Ecology,  
SEBS, Rutgers University

## Recreation

**Emily Baldauff**, Mid-Atlantic Organizer,  
Trout Unlimited

## Fisheries

**Sheila Eyler, Ph.D.**, Mid-Atlantic Fish  
& Wildlife Conservation Office,  
U.S. Fish & Wildlife Service

# Water Quality Advisory Committee (WQAC) Membership

## Academia/Science

**John K. Jackson, Ph.D.**, Stroud Water Research Center

## Delaware

**David Wolanski**, Delaware Department of Natural Resources and Environmental Control (DNREC), Div of Water Resources – Watershed Assessment Section

## Environmental Professional

**Maya K. van Rossum**, Delaware Riverkeeper Network

## Local Watershed Organization

**Gail Farmer**, Executive Director, Wissahickon Trails

## National Park Service Wild and Scenic Rivers Program

**Richard Evans**, Ecologist, National Park Service, Delaware Water Gap National Recreation Area Resource Management and Science

## New Jersey

**Frank Klapinski**, Environmental Specialist 3, New Jersey Dept. of Environmental Protection, Bureau of Environmental Analysis, Restoration, and Standards, Division of Water Monitoring and Standards

## New York

**Sarah Rickard**, New York State Dept. of Environmental Conservation, NEIWGCC, Environmental Analyst, c/o Standards and Analytical Support Section – Division of Water

## Pennsylvania

**Thomas Barron (Committee Chair)**, Pennsylvania Dept. of Environmental Protection, Division of Water Quality Standards – Environmental Group Manager, Bureau of Water Standards & Facility Regulation

## Regulated Community – Industrial

**J. Bart Ruiter**, The Chemours Company

## Regulated Community – Municipal

**Bryan P. Lennon**, Assistant Water Division Director, City of Wilmington, Department of Public Works

## U.S. EPA

**Kuo-Liang Lai, P.E.**, Office of Standards, Assessment, and TMDLs, Water Protection Division (3WP30), U.S. EPA Region 3

**Brent Gaylord**, Water Quality Standards Coordinator, Clean Water Regulatory Branch, Clean Water Division, U.S. EPA Region 2





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