Annual Report

2019

DELAWARE RIVER BASIN COMMISSION

MANAGING, PROTECTING AND IMPROVING SINCE 1961

01 Governors' Leadership Summit

Posing by the Delaware River after signing a proclamation in support of the river and the DRBC are (from right) Del. Gov. John Carney, Pa. Gov. Tom Wolf and N.J. Gov. Phil Murphy. At left is DRBC Executive Director Steve Tambini.

On May 16, the governors of Delaware, New Jersey and Pennsylvania gathered at Philadelphia's Independence Seaport Museum and signed a proclamation reaffirming their commitment to protect the Delaware River Basin. The governors represent three of the five voting members of the DRBC.

Del. Governor John Carney, N.J. Governor Phil Murphy and Pa. Governor Tom Wolf agreed to work together as equal partners - through DRBC and beyond - for the people and wildlife that depend on a healthy and resilient Delaware River Basin. The commitment was touted as helping make the Basin a national model for sustainable economic development, drinkable clean water, healthy fish and wildlife populations, outdoor recreation and nature-based climate resilience.

"Millions of people in our region depend on the Delaware River Basin for clean drinking water and the river remains vitally important for outdoor recreation and economic development for communities in Delaware and beyond," said Carney.

Wolf echoed Carney's sentiment; "The Delaware River is a great resource for recreation, an economic engine for the eastern part of our state and a vital drinking water source for millions of Pennsylvanians."

"For the vibrant communities along our state-side riverfront, the waterway and its tributaries are the backbone of economic development, recreation and the sources of approximately 25 percent of our drinking water," said Murphy.

Front Cover Photo: DRBC Aquatic Biologist Jacob Bransky moves a seining net into position on the Delaware River near Phillipsburg, N.J. for an annual count of juvenile American shad (see page 25 for more info). Photography by Saed Hindash for LehighValleyLive.com.

2019 Annual Report

Delaware River Basin Commission

DELAWARE • NEW JERSEY
PENNSYLVANIA • NEW YORK
UNITED STATES OF AMERICA

02 Executive Director's Message

DRBC Executive Director Steve Tambini (left) and Dewayne Fox, Ph.D., Delaware State University with an Atlantic sturgeon during a tagging mission in the Delaware Bay. (Note: The sturgeon captured during this activity were returned unharmed to the Delaware Bay after scientific procedures were performed. This activity was conducted under a NOAA National Marine Fisheries Service PERMIT TO TAKE PROTECTED SPECIES FOR SCIENTIFIC PURPOSES [Permit No. 20548] issued to Dewayne Fox, Ph.D., Delaware State University, Dover, DE. Research fishing was performed in August 2019 in the Delaware Bay on board the Dana Christine II - Captain Kevin Wark.)

Manage…Protect…Improve.

As it states in the Delaware River Basin Compact, the DRBC was formed 58 years ago because: "*the conservation, utilization, development, management, and control of the water and related resources of the Delaware River Basin under a comprehensive multipurpose plan will bring the greatest benefits and produce the most efficient service in the public welfare.*" While much has changed in almost 60 years, what remains true today is the need for coordinated water resource management across the entire Delaware River Watershed.

Manage what?...Protect what?....Improve what?

The complete answer to those questions are reflected in annual reports dating back to our origin. This annual report includes several examples of how the trusted work of the DRBC continued in 2019 to meet its founding mission.

You cannot **manage** what you don't measure. In 2019, DRBC published a *State of the Basin Report* that tracked progress toward achieving key water resource **management** goals for maintaining an adequate supply of suitable quality water to meet the diverse needs of our region for public water supply, recreation,

industry, commerce, agriculture and aquatic life. The report provides 31 indicators for watersheds and landscapes, water quantity, water quality and living resources. It includes a rating and a directional trend for each. Unfavorable trends provide valuable insight as to where additional focus may be needed. For example, DRBC is currently **managing** several projects to examine the impacts of climate change, including a project to model future sea level rise to address increasing salinity trends in the Delaware Estuary.

Protection of our shared water resources is achieved through science-based policy, regulation and a system of approvals for projects that may have a substantial effect on the water resources of the Basin. In 2019, DRBC's project review team reviewed and examined more than 80 projects to **protect** our water sources and to ensure these wastewater discharges, water withdrawal or other projects did not conflict with the DRBC's Comprehensive Plan, policies and regulations (see Page 26). Many of these projects are proposed in areas designated by the Commission as lands that drain to Special **Protection** Waters. DRBC policy requires no measurable change in water quality except towards natural conditions, and, as such, DRBC's science and project review teams worked with project sponsors to be sure that those high-quality waters are **protected**.

Results matter. One of the primary reasons the DRBC was formed was to clean up the heavily polluted urban portion of the Delaware River near Philadelphia. A plan was put in place by the DRBC in 1967, and with the help of many, its implementation has resulted in significant **improvement** in water quality. This annual report also highlights the DRBC's efforts to write the "Next Chapter in Water Quality **Improvements"** in the Estuary (see Page 19). The Commission has undertaken a multi-year, multi-faceted and comprehensive project to model opportunities to **improve** and revise water quality standards to further support sensitive aquatic species.

The water resources of the Delaware River Basin are supported and impacted by a complex system of natural waterways, groundwaters and landscapes, plus man-made land features that can enhance the resource, like reservoirs, or that can impact the resource, like sources of pollution. Since 1961, the DRBC has committed to **manage**, **protect** and **improve** those resources through watershed based planning, policies and practices informed by science and collaboration with many partners, including our federal and state members.

Finally, it was my pleasure to join Governor Carney (Del.), Governor Murphy (N.J.) and Governor Wolf (Pa.) in Philadelphia in May to recognize the value of this shared resource and to re-affirm our collective commitment to **manage, protect and improve** the Delaware River and its watersheds for generations to come.

Steve Tambini, P.E.
Executive Director

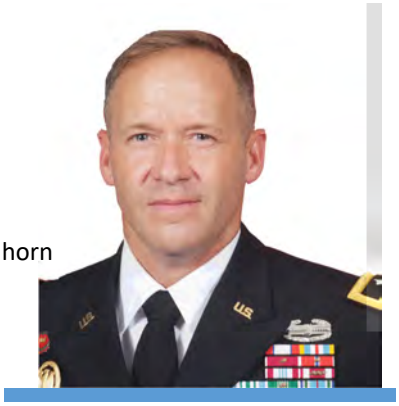
03 Our Commissioners

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

CHAIR
New York
Governor Andrew M. Cuomo

VICE CHAIR
Delaware
Governor John Carney

SECOND VICE CHAIR
Federal Representative
Major General Jeffrey L. Milhorn



New Jersey
Governor Philip D. Murphy

Pennsylvania
Governor Tom Wolf

Each Commissioner has one vote of equal power with a majority vote needed to decide most issues. The Delaware River Basin Compact requires the annual election of a chair and vice chairs, which historically has been based upon rotation of the DRBC's five members. *Chair, Vice Chair and Second Vice Chair listed here effective July 1, 2019 to June 30, 2020.*

ALTERNATES/ADVISORS—2019

From Left: Aneca Atkinson (Pa.), Kenneth Kosinski (N.Y.), Executive Director Steve Tambini, P.E., Lt. Col. David Park (Federal), Bryan Ashby (Del.) and Jeff Hoffman (N.J.)

FEDERAL GOVERNMENT

1st Alternate	Lieutenant Colonel Kristen N. Dahle, Commander, USACE Philadelphia District (Jan. 1 to July 7, 2019) Lieutenant Colonel David Park, Commander, USACE Philadelphia District (July 7 to Dec. 31, 2019)
2nd Alternate	Pending Alternate
3rd Alternate	Henry Gruber, USACE North Atlantic Division Deputy Chief of Planning & Policy Division

PENNSYLVANIA

1st Alternate	Patrick McDonnell, DEP Secretary
2nd Alternate	Aneca Y. Atkinson, Acting Deputy Secretary, Office of Water Programs
3rd Alternate	Jennifer Orr-Greene, Director, DEP Compacts and Commissions Office

NEW JERSEY

1st Alternate	Catherine R. McCabe, DEP Commissioner
2nd Alternate	Michele Putnam, Assistant Commissioner, Water Resource Management
3rd Alternate	Jeffrey L. Hoffman, State Geologist

NEW YORK

1st Alternate	Basil Seggos, DEC Commissioner
2nd Alternate	Mark Klotz, Director, DEC Division of Water
3rd Alternate	Vacant
4th Alternate	Kenneth Kosinski, Chief, DEC Watershed Implementation Section
Advisor	Vincent Sapienza, New York City DEP Commissioner

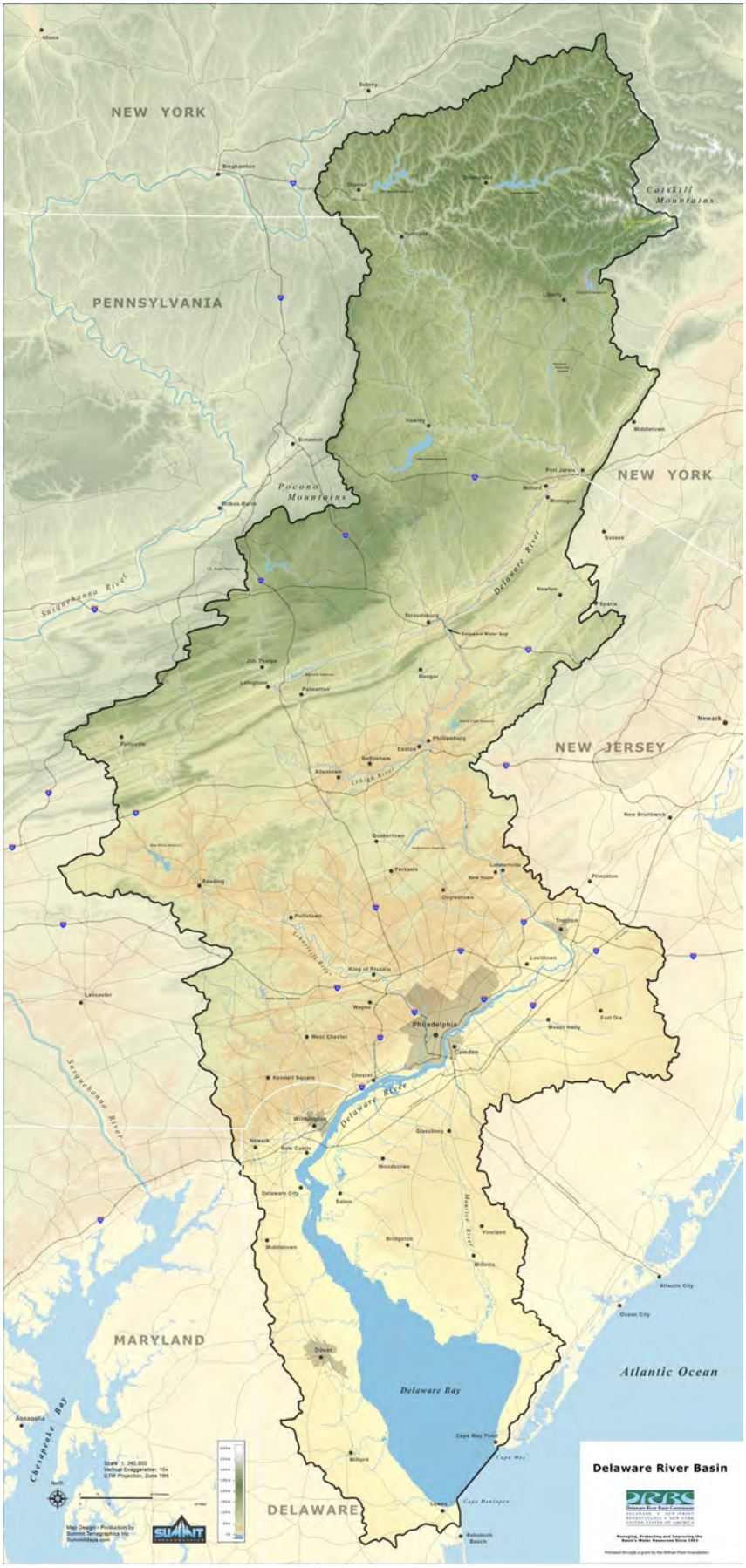
DELAWARE

1st Alternate	Shawn M. Garvin, DNREC Secretary
2nd Alternate	Pending Alternate
3rd Alternate	Virgil R. Holmes, Director, DNREC Division of Water: Management Section
4th Alternate	Brvan A. Ashby, Manager, DNREC Division of Water Resources: Surface Water Section

04 The Delaware River Basin

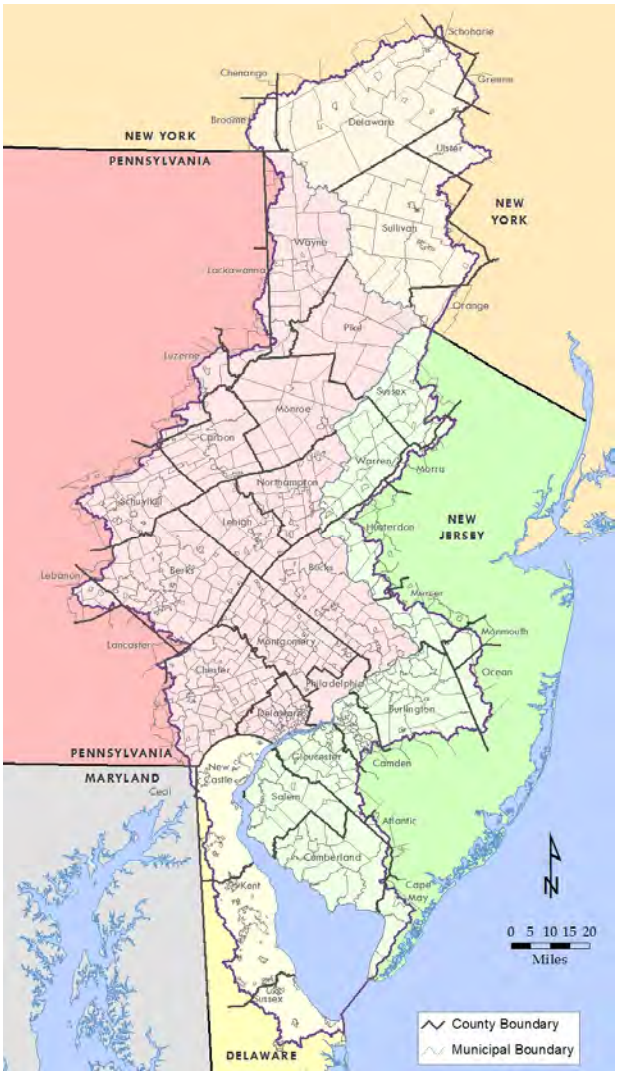
Lying in the densely populated corridor of the northeastern U.S., the 13,539 square mile Delaware River Basin stretches approximately 330 miles from its headwaters in New York State to its confluence with the Atlantic Ocean. The Basin includes approximately 12,800 square miles of land area, nearly 800 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., where the Delaware River descends about 800 feet on its journey to the Atlantic Ocean.

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



GEOGRAPHY & POLITICAL BOUNDARIES

The Delaware River Basin's drainage area encompasses extensive landscapes in New York, New Jersey, Pennsylvania and Delaware (and eight square miles in Maryland, which is not a member of the DRBC). All or part of 42 counties and 838 municipalities within the four Basin states contribute to and benefit from the resources of the Delaware River Basin (as shown in the map at right). Water resources are also exported to cities in N.J. and N.Y. outside of the Basin boundary.



While the states retain autonomy, the Basin is unique in governance. It the only river basin with both an interstate-federal Commission and a national estuary program in place. The 1961 Compact establishing the DRBC was the first federal-interstate agreement for basin-scale water resource management.

The DRBC predates the first Earth Day (April 22, 1970), the establishment of the Environmental Protection Agency (Dec. 2, 1970) and the passage of the Federal Water Pollution Control Act Amendments of 1971, typically referred to as the Clean Water Act (October 1972). The national significance of the Delaware Estuary was acknowledged in 1988 when it became part of the National Estuary Program.

WATERSHED OR BASIN?

A watershed can be simply described as the area of land draining to a particular stream.

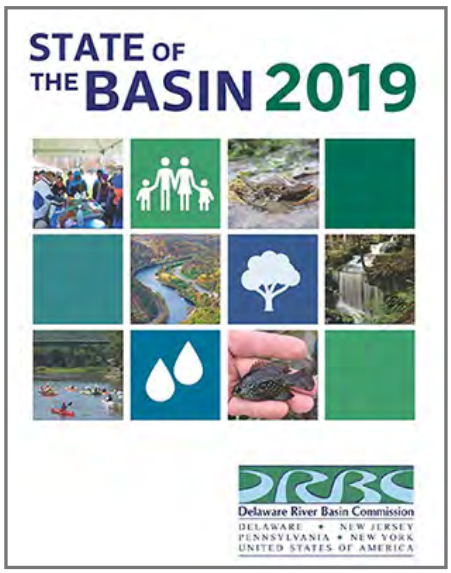
A Basin is that land from which all the water flowing through watersheds end up in a particular river and ultimately into a larger body of water such as the Atlantic Ocean.

The Delaware River Basin has four main regions and ten sub-regions. These are created by grouping watersheds together based on the segment of the Delaware River to which they drain.

The Delaware River Basin is equal to the sum of its parts, with regions and sub-regions defined by watershed boundaries rather than state or political boundaries.

05 State of the Basin Report

The Water Resource Planning team reviews the DRBC State of the Basin report. From left: Water Resource Engineer SeungAh Byun, Ph.D., P.E., Water Resource Engineer Michael Thompson, Water Resource Planning Manager Chad Pindar, P.E. and Water Resource Scientist Evan Kwityn.



In July, DRBC released its 2019 *State of the Basin* report, which provides an overview of the health of the water resources and key species of the Delaware River Basin, along with the factors that impact the Basin, primarily: pollution, climate change and development.

The State of the Basin Report 2019 – the third such publication since 2004 – benchmarks conditions and tracks progress toward achieving key DRBC water resource management goals for maintaining an adequate supply of suitable quality water to meet the diverse needs of our region for public water supply, recreation, industry, commerce, agriculture and aquatic life.

This report provides a detailed evaluation – essentially, a focused snapshot – of 31 indicators for watersheds and landscapes, water quantity, water quality and living resources and includes a rating and a directional trend for each. A majority of the indicators received a "Good" or "Very Good" rating, while trends are predominantly "Improving" or "Stable".

Lower ratings or declining trends for some indicators show us where additional study and stewardship are required. Some parameters, for example, groundwater availability and nutrients, received high ratings and are trending positively, thanks to proactive management strategies. Lower ratings, or declining trends, for some indicators, for example, impervious cover, salinity and invasive species, show us where additional focus is needed.

Indicator	2019 Status	Present Condition/Trend	Recommendations
○ = Poor ◔ = Fair ◑ = Good ◕ = Very Good ● = Excellent ◍ = Not Rated ↑ Improving ↓ Worsening ↔ Stable/No Trend			
Watersheds/Landscapes			
Population	◍	*No Rating* The population is expected to increase in the Basin from 2010 to 2030 by 700,000 people.	• Plan for land development and its impacts on natural resources • Balance increased need for development with stresses on water resources
Land Cover	◍	*No Rating* Urbanization has resulted in a loss of forested and agricultural lands, especially in the Lower Region.	• Manage effects of water resources associated with development • Partake in conservation efforts • Continue tracking land cover changes
Impervious Cover	◑ ↓	*Good* The lower region of the Basin had increased impervious surfaces due to urbanization.	• Apply impervious cover percentages to land cover categories • Reduce impact from impervious surfaces through stormwater management strategies
Water Quantity			
Water Withdrawals	◑ ↔	*Good* The public water sector has maintained a stable rate of withdrawals despite increasing population in the DRB.	• Continue reporting water withdrawals • Continue implementing water auditing program • Study potential growth in water demand for the thermoelectric sector
Consumptive Use	◑ ↔	*Good* Consumptive use for public water supply stayed flat; for thermoelectric power generation has increased; and industrial has decreased.	• Update consumptive use factors • Extend water loss accountability beyond water audit to develop normalized indicators • Create regulations to reduce industry standard losses
Groundwater Availability	◕ ↑	*Very Good* Groundwater conditions are exptected to continue to improve over time.	• Continue improving water use reporting
Flow	◑ ↔	*Good* The variability in precipitation and temperature makes it difficult to discern trends in flow.	• Continue developing models and analyses to understand how climate change affects hydrology • Evaluate flow and drought management plans
Climate Change	◍ ↓	*No Rating* There is an increasing trend in average temperature and annual rainfall.	• Continue developing models and analyses to understand risks of climate change during dry and wet periods • Evaluate future water demands • Develop plans to address risks
Water Quality			
Dissolved Oxygen	◑ ↑	*Good* From the mid-1990s onward, criteria has mostly been met, although DO concentrations exhibit high variability from year to year.	• Examine whether DO criteria needs revision • Measure sources of nutrient and oxygen-depleting materials • Build water quality model
Nutrients	◕ ↑	*Very Good* Total nitrogen and phosphorus concentrations were highest towards the Upper Delaware River.	• Continue developing and monitoring nutrient criteria • Develop eutrophication model
pH	◍ ↔	*No Rating* All pH values from each monitoring station are within DRBC's criteria.	• Develop a better understanding of the Estuary carbon cycle and its impact on pH
Salinity	◑ ↓	*Good* It is estimated that the range of the salt front will be pushed upstream along with its maximum extent of upstream intrusions.	• Create better models to establish relationship between sea level rise and salinity • Evaluate different adaptation options • Research increasing trends in chlorides
Temperature	◑ ↔	*Good* Temperature at Trenton is expected to remain stable for the forseeable future.	• Continue developing temperature criteria in non-tidal portion of Delaware River • Create stronger linkages between meteorological drivers and resultant water temperatures
Contaminants	◔ ↑	*Fair* It is likely that levels will remain relatively the same at their current levels.	• Continue evaluating and monitoring effects of contaminants on water quality • Continue implementing PCB PMPs • Provide techical reviews and support to the community
Fish Contaminants	◑ ↑	*Good* There is a trend of increasing concentration moving from non-tidal to tidal regions.	• Partake in pollution minimization efforts • Cooperate between state and federal agencies to reduce bioaccumulation contaminants and expand to address persistent toxic pollutants
Emerging Contaminants	◔ ↑	*Fair* PFOA and PFOS levels are below current EPA and basin state human health advisory levels in parts of the Delaware River.	• Continue monitoring PFAS in drinking water and the environment • Track and evaluate other emerging contaminants of concern
Whole Effluent Toxicity	◔ ↑	*Fair* Recent data do not predict exceedances of stream quality objectives for chronic toxicity by individual discharges.	• Continue coordinating between the basin states, DRBC, and USEPA to generate consistent WET testing • Monitor both effluent from discharges as well as ambient environment

A summary of the DRBC's 2019 State of the Basin report's findings are presented on the next two pages.

Indicator	2019 Status	Present Condition/Trend	Recommendations
○ = Poor ◔ = Fair ◑ = Good ◕ = Very Good ● = Excellent ◍ = Not Rated ↑ Improving ↓ Worsening ↔ Stable/No Trend			
Living Resources			
Atlantic Sturgeon		*Poor* Commercial demand for their meat and degraded water quality contributed to their declining population.	• Continue monitoring abundance • Continue telemetry studies to better understand behavior • Expand study of ship strikes • Collaborate with shipping industry
White Perch		*Very Good* The species' tolerance and wide range of habitat will help it continue to support healthy fisheries.	• Protect upper reaches of tidal tributary areas under developmental pressure • Establish an 8-inch minimum size for white perch to ensure they have a chance to spawn
Striped Bass		*Very Good* The overall status of the Delaware River spawning stock is positive.	• Continue monitoring long-term trends in biomass and recruitment
Weakfish		*Poor* Coastwide, weakfish population is considered depleted.	• Investigate factors contributing to recent weakfish decline • Recreational and commercial fishing sectors should practice catch and release • Continue artifical reef use and creation
American Eel		*Good* Coast-wide populations have declined in recent years, but there is no apparent bases for future predictions.	• Improve monitoring of species abundance in non-tidal reaches • Continue monitoring in the Estuary • Improve fish passage at dams
American Shad		*Good* 2017 and 2018 data show abundance well above the recent average.	• Continue restoring blocked habitat • Maintain and monitor habitat conditions in spawning reaches • Establish sustainable harvest limitations after restoration
Brook Trout		*Fair* There have been widespread reductions in populations due to many factors. Efforts to reverse this trend have increased.	• Continue conservation/management efforts • Determine if special designation or current status reclassification is needed • Continue researching and monitoring population
Blue Crab		*Good* They are at healthy levels of abundance and safe levels of fishing mortality.	• Continue long-term ad fishery-independent management surveys • Report fishery landings accurately • Preserve and restore habitat needed for critical life stages
Horseshoe Crab		*Good* Popuation within the Deleware Bay Area is increasing over time, but not within the HCR.	• Continue collecting and monitoring data • Continue protection efforts • Enhance habitats and reduce harvesting
Eastern Oyster		*Fair* Population has been steady between 2002-2016. Population may be limited by habitat availability.	• Continue annual oyster population and disease surveys • Improve shell planting • Continue monitoring/enhancing temperature and salinity
Freshwater Mussels		*Poor* As biodiversity is threatened, the population of freshwater mussels reduces.	• Improve coordinated monitoring/data sharing • Improve model of mussel conservation • Continue advacing survey technology for mapping mussel beds and habitats
Macroinvertebrates		*Very Good* All sample locations are above the biological integrity threshold.	• Continue using bioassessment of macroinvertebrates • Encourage refinement of growing datasets • Consistently monitor from year to year
Invasive Species		*Fair* As climate change continues, it is likely that more invasive species will be introduced.	• Replace invasive species with native species • Increase density/diversity of native plants • Inform citizens of invasive species and how to properly handle it
Osprey		*Very Good* Populations are increasing and the rates of nesting have reached sustainable levels.	• Encourage volunteers to monitor nests and productivity

06 Hydrologic Conditions Report

DRBC Water Resource Scientist Anthony Preucil speaks to the media at a public meeting announcing a study on potential modifications to the F.E. Walter Reservoir. DRBC is a partner in the study, along with the United States Army Corps of Engineers and New York City.

PRECIPITATION

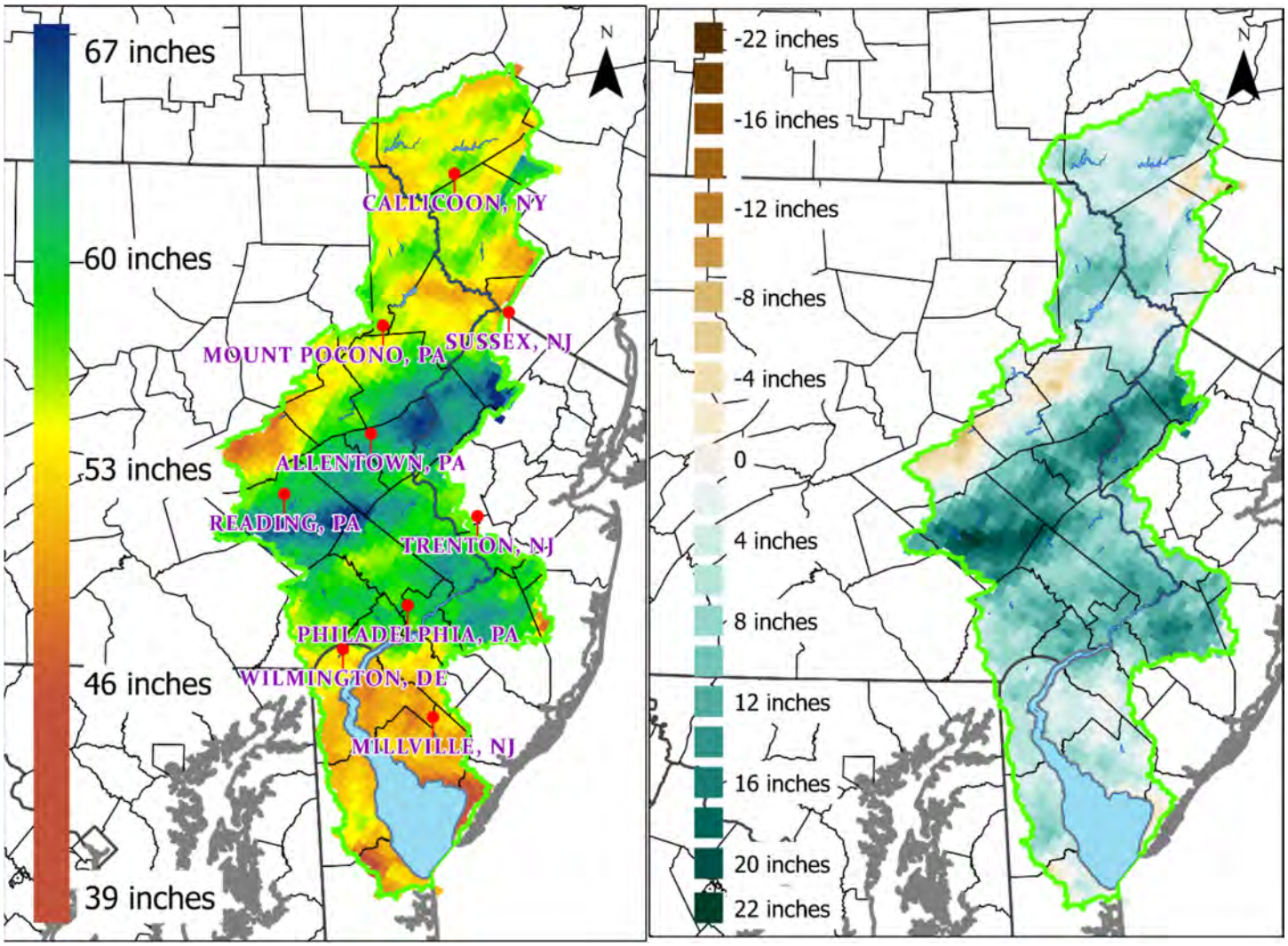
Total precipitation varied from 40.51 inches in southern New Jersey to 60.66 inches in the Lehigh Valley, according to observations at precipitation gages located at airports in the Basin. The largest amount of precipitation recorded occurred in Allentown, Pa., near the center of the Basin. The least occurred in Millville, N.J., in the southeastern portion of the Basin. The table below lists rainfall, departures and ranks for rain gages located at nine representative airport locations within the Basin.

According to the multi-sensor precipitation estimates available from the National Weather Service – Advanced Hydrologic Prediction Service (NWS-AHPS), there are areas in the Basin that received up to 67 inches of precipitation and other locations with amounts as low as 39 inches.

Station	Number of Years Reporting	2019 Precipitation Total	Normal	Departure	Annual Rank
Reading, PA	70	53.75	43.27	+10.48	3
Callicoon, NY	9	58.53	53.54	+4.99	3
Allentown, PA	80	60.66	45.53	+15.13	4
Trenton, NJ	40	50.39	46.44	+3.95	6
Sussex, NJ	19	40.77	45.28	-4.51	10
Philadelphia, PA	80	47.43	51.53	+5.9	20
Wilmington, DE	71	47.97	43.08	+4.89	20
Mount Pocono, PA	19	47.73	48.78	-1.05	11
Millville, NJ	61	40.51	41.59	-1.08	39

Source: National Weather Service—Advanced Hydrologic Prediction Service.

Total Annual Precipitation | **Departure from Normal**

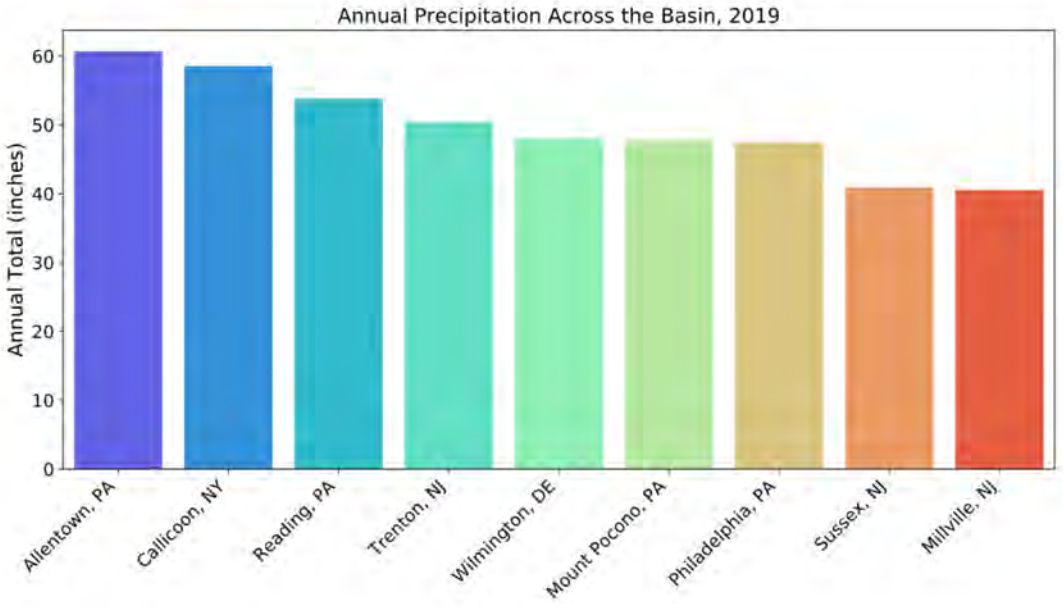


Rainfall amounts and departures available from NWS-AHPS. Areas of high precipitation were in the center of the Basin, from the Poconos to Philadelphia. Areas of low precipitation occurred in the outskirts of the Basin, with the lowest amounts in the far west and estuary regions.

RECORD WET AND DRY PERIODS

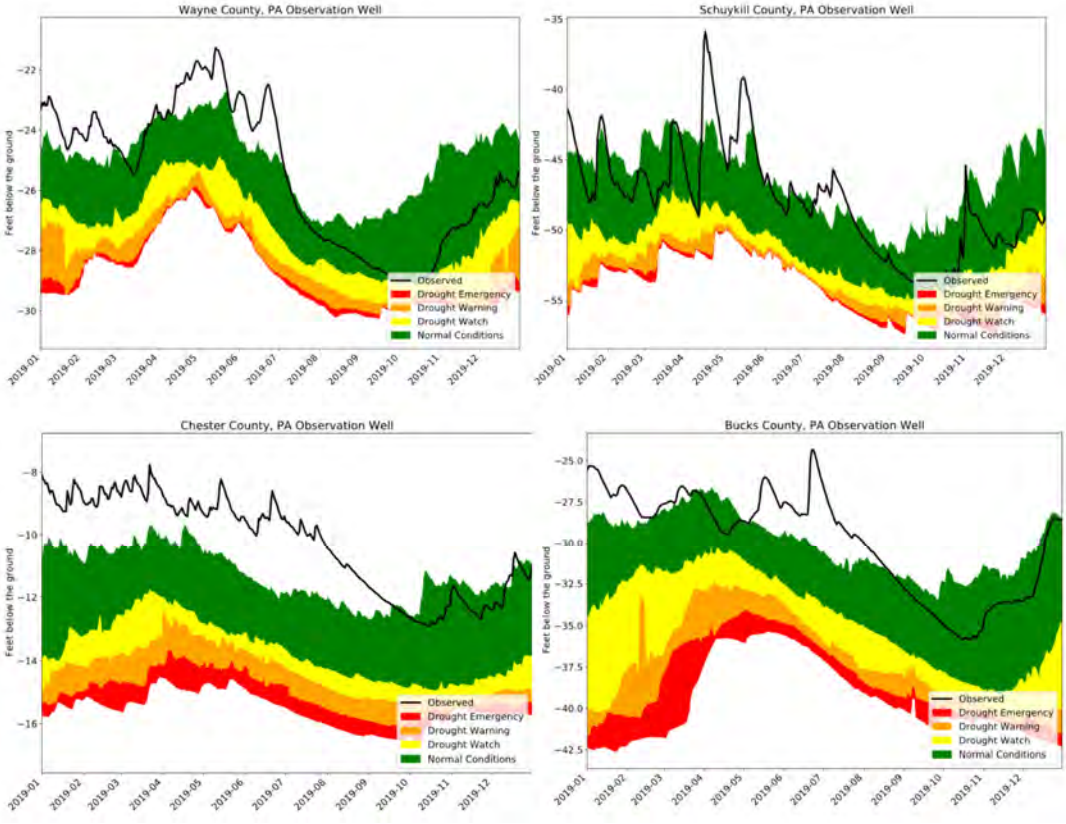
In 2018, annual precipitation records were broken at several locations. This year, the May—July period was the wettest on record at three locations: Reading, Pa., Allentown, Pa. and Trenton, N.J. Reading, Pa. received at total of 24.61 inches of rain; the normal amount is typically 12.5 inches. Allentown, Pa. normally receives 11 inches of rain from May—July. This year it received a total of 24.41 inches, more than twice the normal amount. Trenton, N.J. received 20.66 inches of rain from May—July, whereas normally it receives 13.7 inches. Many other stations also ranked in the top 5 highest May—July period on record.

In contrast, September 2019 was a dry month. The second driest September on record occurred at two locations: Mount Pocono, Pa. and Wilmington, Del. All other stations ranked in the top ten for driest September. Wilmington had 0.48 inches of rain; normally, Wilmington receives 4.32 inches in September. Mount Pocono, Pa. received 1.29 inches of rain; normally, this location receives 5.3 inches of rain in September.



Total precipitation records at the nine locations throughout the Basin.

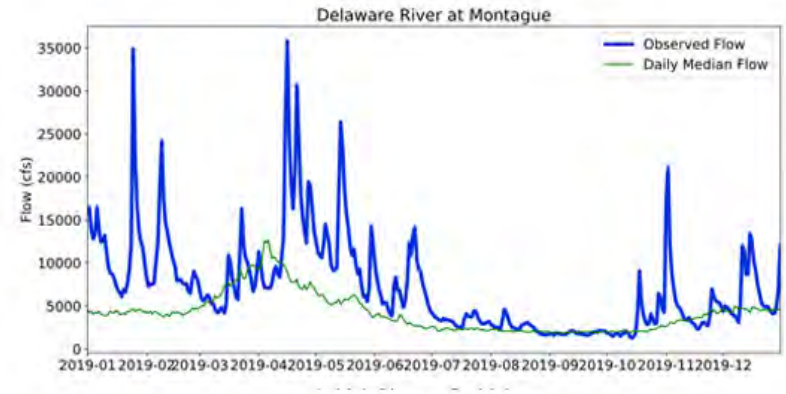
GROUNDWATER

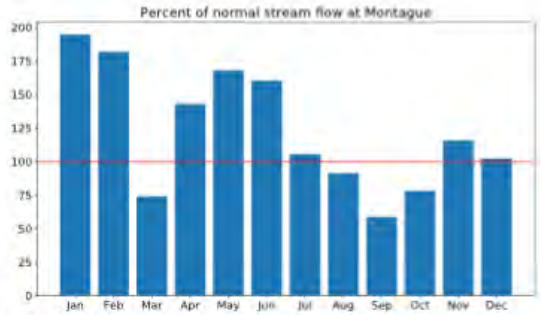


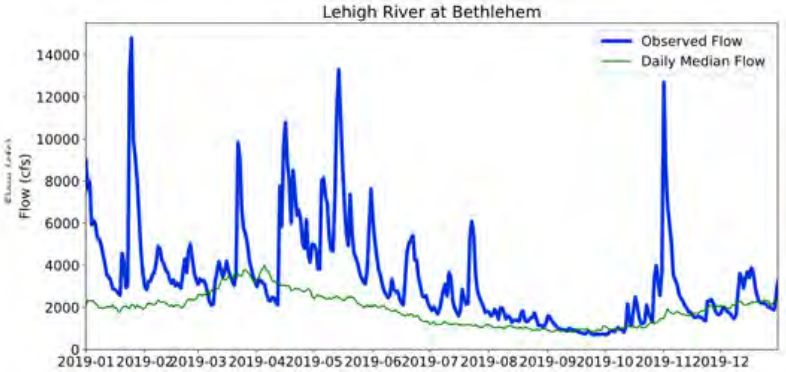
Groundwater levels in indicator wells for the Basin were in the normal or above normal range for most of the year. Levels in all of the wells decreased beginning in July. A few wells in the western and northern parts of the Basin reached drought watch levels in early October. However, levels quickly recovered; while the Wayne County well was in the normal range at the end of the year, the Schuylkill County well ended the year near drought watch levels.

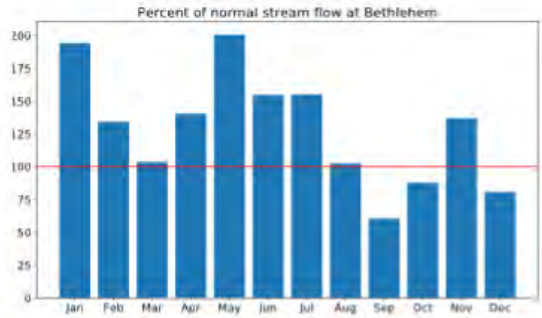
STREAM FLOW

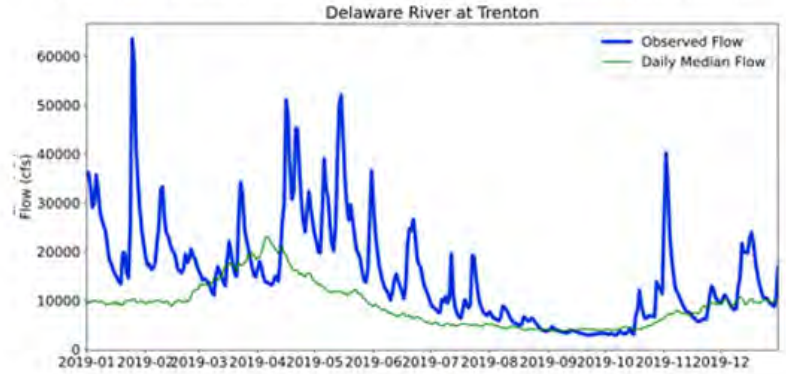
River flows were above normal for the majority of the year with short periods of below normal flows in March and September. January and February experienced monthly average flows that were twice the normal amount. High flows also occurred in mid-summer, with the Schuylkill River at 2.5 times its normal rate. In August and September, flows at most locations were below normal. At year's end, flows were normal or near normal across the Basin. The charts below on the left represent the observed daily flows in 2019 and the daily median for the period of record, and the charts on the right represent the monthly % of normal stream flow.

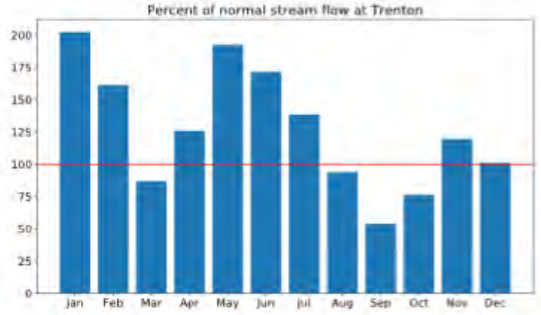


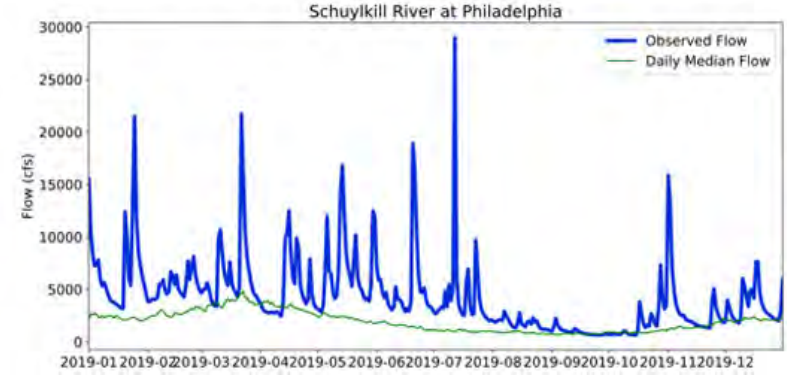


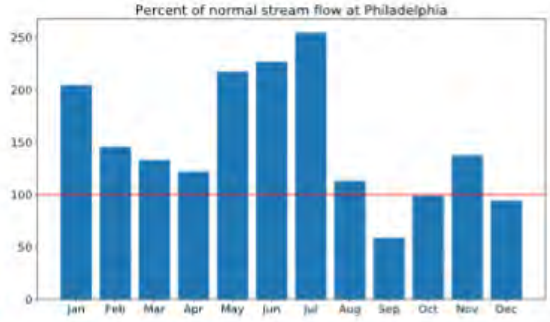




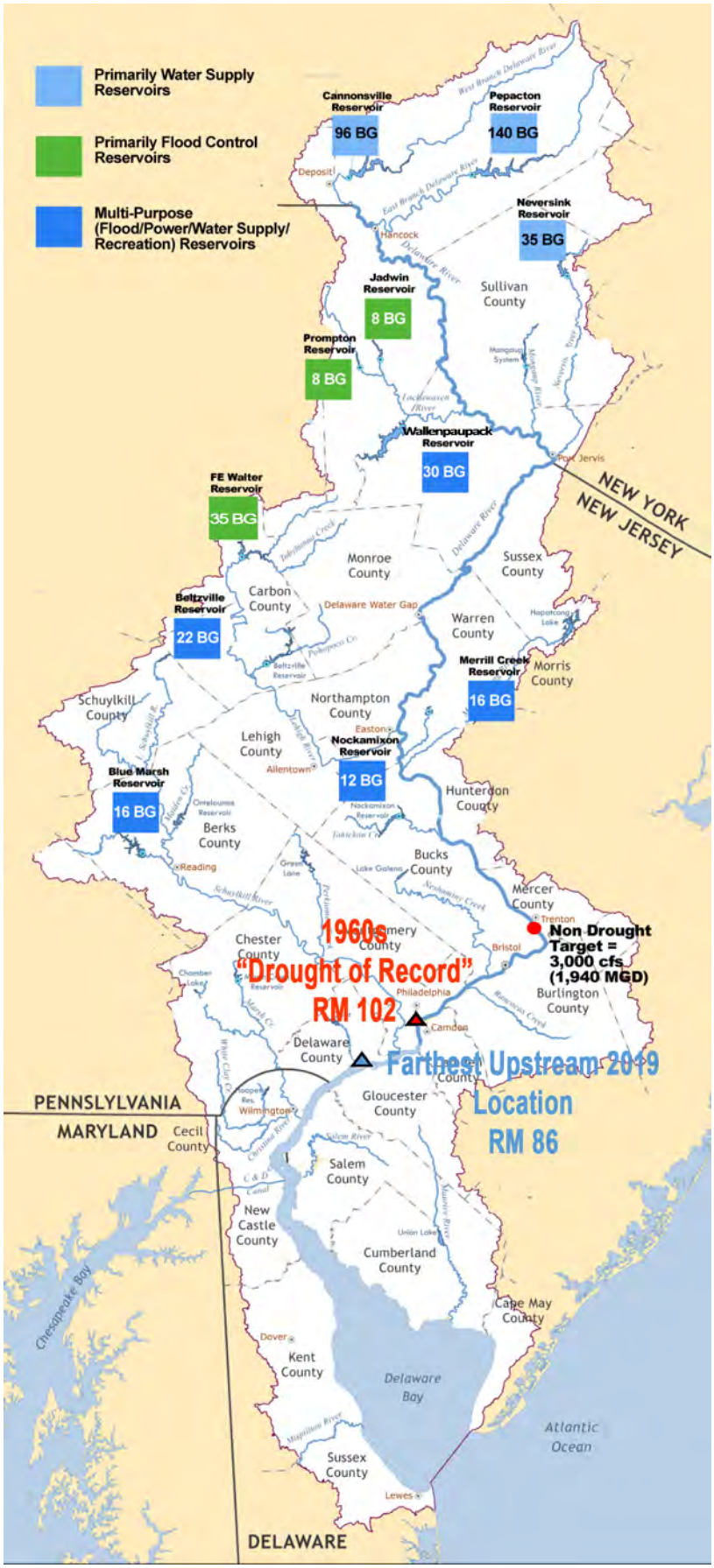








RESERVOIR STORAGE AND RELEASES



Pushing Back the Salt Front

The purpose of the Trenton flow objective (non-drought target of 3,000 cubic feet per second, or cfs) is to control the movement of the "salt front" or ("salt line") in the tidal Delaware River. Adequate freshwater flowing downstream is needed to repel the upstream advancement of "salty" or "brackish" water from Delaware Bay to protect drinking water intakes serving residents in Philadelphia and New Jersey, as well as industrial intakes along the river from corrosion.

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

The farthest upstream location of the salt front during 2019 was about RM 86 in late November. This location is across from Essington, Pa. near Little Tinicum Island, upstream of the Pennsylvania-Delaware state line.

By comparison, the farthest recorded upstream location of the salt front measured during the 1960's drought of record was RM 102.

There are several reservoirs in the Delaware River Basin, all located on tributaries. They have many purposes, including: water supply, hydropower generation, recreation and flood control. The Basin's major reservoirs are indicated on this map. *BG = Billion Gallons. MGD = Million Gallons/Day.*

Lower Basin

Releases of water from Beltzville Reservoir were made at DRBC's request on September 21 and 22 to support the Trenton Flow Objective. A total of 0.148 billion gallons (BG) of water was released. These releases were made in advance of requests for water from the Excess Release Quantity, a volume of water in the New York City Delaware River Basin Reservoirs reserved for use by the lower basin states. A total of 1.3 BG of the 6.1 BG Excess Release Quantity reserved for the Trenton Flow Objective was released at DRBC's request.

Beltzville Reservoir

The Beltzville Reservoir is located in Carbon County, Pa., near Lehighton. The dam is situated on the Pohopoco Creek, four and a half miles from its confluence with the Lehigh River. DRBC maintains 13 BG of storage in the reservoir for use in augmenting stream flows downstream into the Delaware River.

(Photo courtesy of USACE)

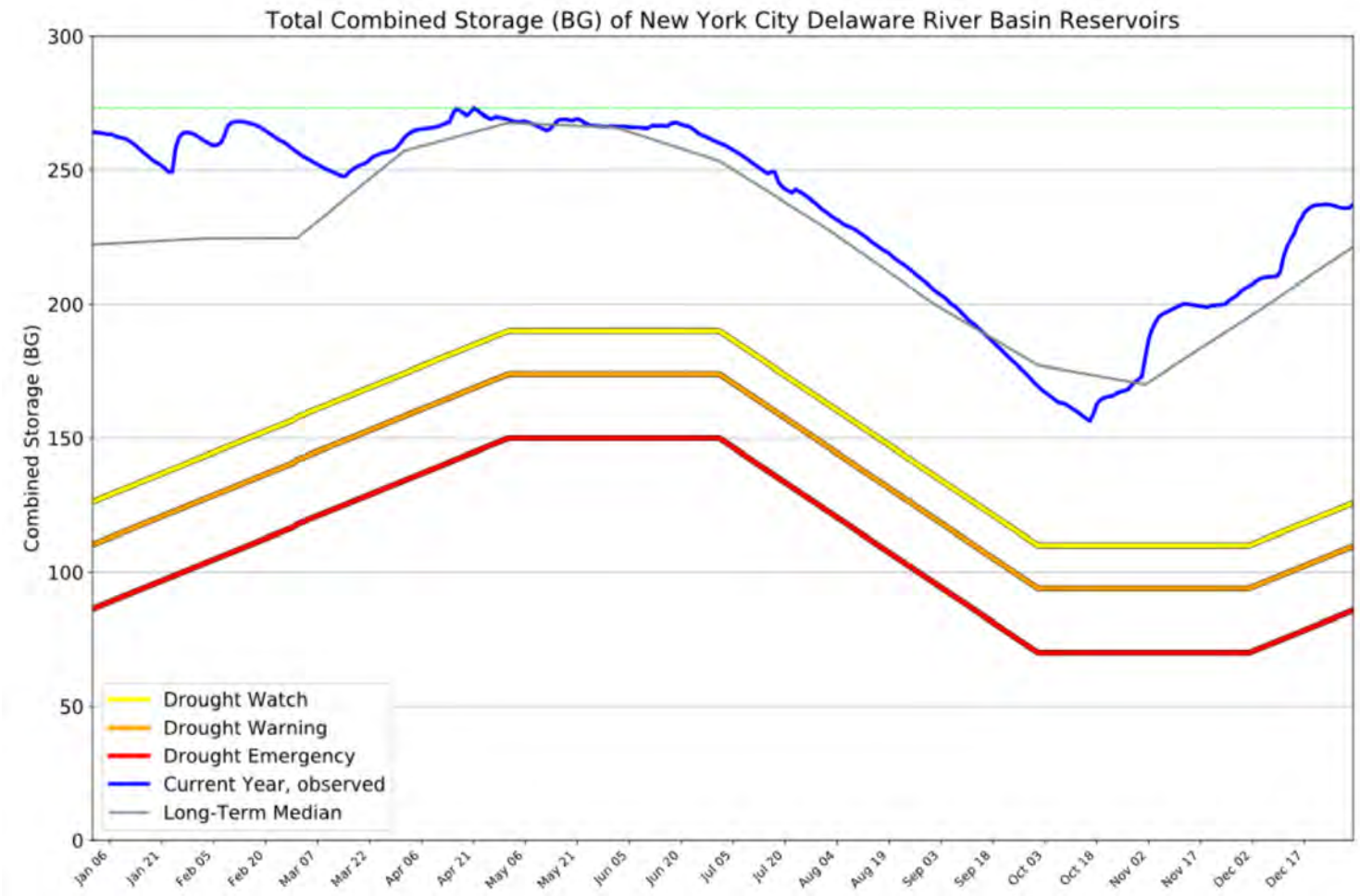
Blue Marsh Reservoir

Fed by the Tulpehocken Creek and located northwest of the City of Reading, in western Berks County, Pa., the 16 BG Blue Marsh Reservoir is owned and operated by the U.S. Army Corps of Engineers. DRBC maintains 6.5 BG of storage in the reservoir for use in augmenting stream flows downstream into the Delaware River.

Upper Basin

Releases from the three New York City (NYC) Delaware River Basin 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. The volume of water released for Montague was approximately 26 BG, starting on August 3 and lasting until October 13. Releases for thermal mitigation and rapid flow change mitigation totaled 994 million gallons (MG) and 477 MG, respectively. Thermal mitigation releases were made for six multi-day events (17 days total) in July and early August to alleviate heat stress in the cold-water fisheries below the dams. Rapid flow change mitigation releases, used to reduce the impact of sudden reductions in releases for the Montague target, were made for two events in October.

As of January 1, the combined storage of the NYC Delaware River Basin Reservoirs was 264 BG. The combined storage remained above 250 BG until the second week of July, with periods of spill at all three NYC reservoirs in April. The combined storage was lowest on October 14 at 150 BG, which was approximately 50 BG above drought watch for that time of year. At the end of December, the combined storage was 240 BG, 15.6 BG above the long-term median for December.



The three NYC Delaware River Basin Reservoirs are the Cannonsville, Pepacton and Neversink reservoirs. Owned and operated by New York City, they are located in the headwaters to the DRB. When full, their combined total storage equals 271 BG.

07 The Next Chapter in Water Quality Standards

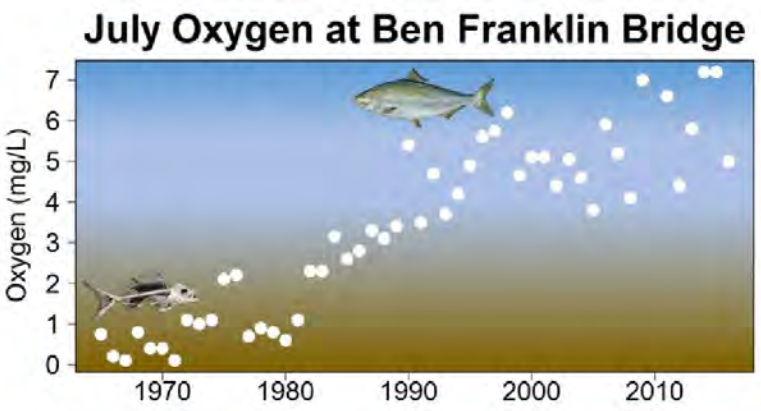
DRBC staff, along with staff from the Delaware Department of Natural Resources and Environmental Control, on the Delaware Bay, monitoring for and tagging Atlantic sturgeon.

THE FIRST CHAPTER

Restoring the River's Dissolved Oxygen (DO) Levels

Dissolved oxygen (DO) is among the most critical environmental parameters directly affecting fish populations. When DRBC was created in 1961, little to no DO was present in a 30-mile stretch of the Delaware Estuary from Wilmington, Del. to Philadelphia, Pa. for periods of up to six months each year, preventing the survival of resident fish and the passage of anadromous fish (*fish that live in saltwater, but return to freshwater tributaries to spawn*) through these waters. The water quality and aquatic life uses of the Delaware Estuary have significantly improved since DRBC adopted designated uses and water quality criteria for these reaches in 1967 (see chart at above right). These improvements are due to wastewater treatment plant upgrades to meet organic wastewater discharge limitations established by DRBC in 1968. While DO conditions have improved greatly in the tidal Delaware River, significant sags still occur in Zones 3 and 4 (see map at below right), especially during the summer months.

Given the apparent, albeit limited, propagation



Delaware Estuary water quality monitoring program locations and DRBC water quality zones.

of the endangered Atlantic sturgeon, as well as Striped bass, it is possible that higher dissolved oxygen conditions would better support the propagation and juvenile survival of these and other fish species within the estuary. Therefore, DRBC has embarked on the next chapter of water quality standards by undertaking a comprehensive scientific and engineering study of water quality to better support important fish populations in the Delaware Estuary.

A COLLABORATIVE EFFORT

In accordance with DRBC Resolution 2017-04, which affirms the important goal of continued water quality improvement, this study will allow the Commission to determine the "highest attainable use" of this portion of the river and will 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 of modelers comprised of nationally-recognized water resource scientists and engineers. These experts include: Steve Chapra, Ph.D., Louis Berger Chair and Professor of Civil and Environmental Engineering at Tufts University; Bob Chant, Ph.D. Professor, Rutgers University Department of Marine and Coastal Sciences; Tim Wool, Senior Water Quality Modeler at U.S. EPA Region 4; and Carl Cerco, Ph.D., U.S. Army Corps of Engineers (ret.). The panel's work is being done in close consultation with the Commission's Water Quality Advisory Committee, a stakeholder advisory group representing state and federal co-regulators, NGOs, academic institutions and municipal and industrial dischargers.

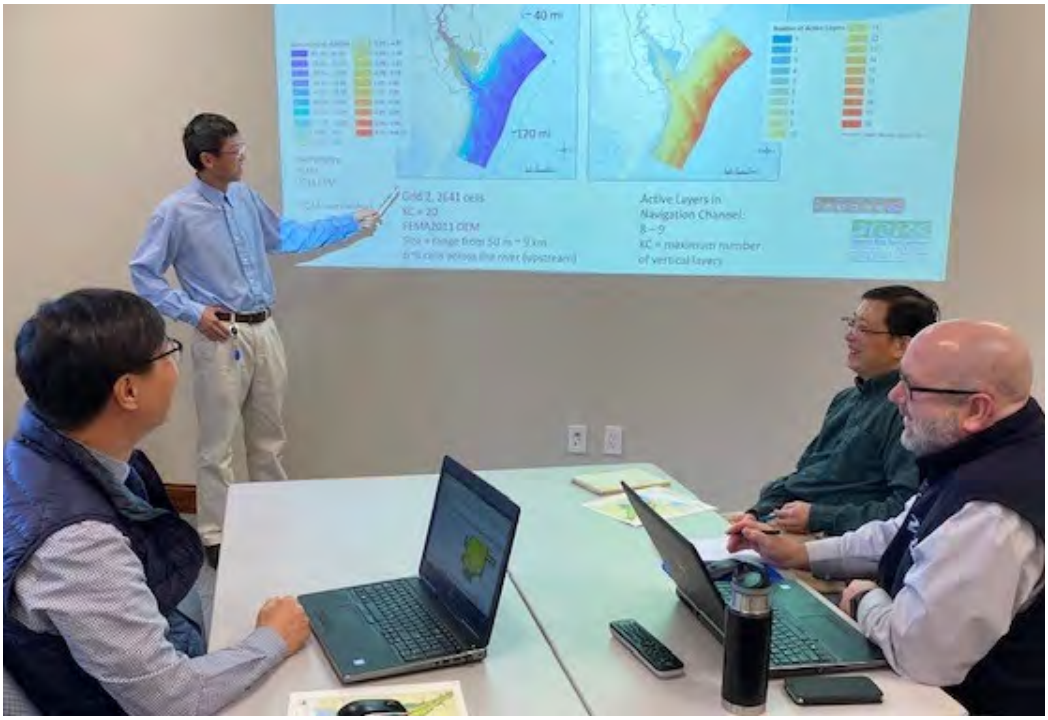
See https://www.state.nj.us/drbc/about/advisory/ (and page 31) for more details on DRBC's advisory committees.

DATA COLLECTION

In 2019, DRBC continued its ambitious data collection in order to characterize watershed sources and ambient water quality. Staff spent 75 days in the field during the year, collecting water quality samples from 25 tributary sites and 89 mainstem Delaware River sites, spatially covering the Delaware River from the head of tide at Trenton, N.J. to the C&D Canal in Chesapeake City, Maryland. A total of 690 samples were collected, with approximately 12,650 individual laboratory analyses performed. In addition, wastewater treatment plants within the tidal system performed effluent characterization sampling at DRBC's direction throughout 2019.

Deputy Executive Director Kristen Bowman Kavanagh, P.E., holds a juvenile Atlantic sturgeon during a monitoring and tagging operation. *(This activity was conducted under a NOAA National Marine Fisheries Service ESA Permit No. 19255-01. Permit issued to Ian Park, Fisheries Biologist, DNREC—Division of Fish and Wildlife.)*

MODELING



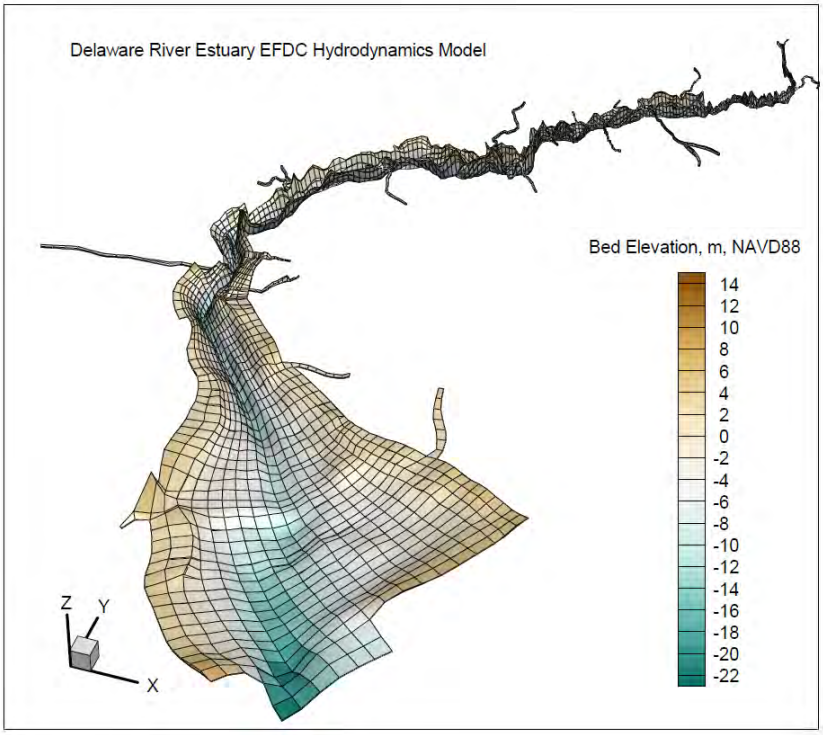
Senior Water Resource Engineer Fanghui Chen, Ph.D., P.E., presents one of the spatial model grids to (from left): DRBC Science and Water Quality Management Director Namsoo Suk, Ph.D., Senior Resource Modeler Li Zheng, Ph.D. and DRBC Water Resource Modeling Manager Thomas Amidon, BCES.

In support of the overall evaluation of highest attainable use (described previously), DRBC staff are working to develop a technically sound eutrophication model for the Delaware Estuary and Bay, from the head of tide at Trenton, N.J. to the ocean, utilizing an appropriate level of complexity within the current state of 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 seen in the top figure on the next page), as well as re-aeration, 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.

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 (EFDC) and Water Quality Analysis Simulation Program (WASP8).
- 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), as well as select historical periods, primarily 2012. Together these periods represent a full range of hydrologic conditions.
- Conduct forecast simulations with the calibrated model to determine the levels of external sources required to achieve varying levels of ambient dissolved oxygen conditions in the estuary.

A Number of Key Hydrodynamic Modeling Tasks were Performed by DRBC in 2019:



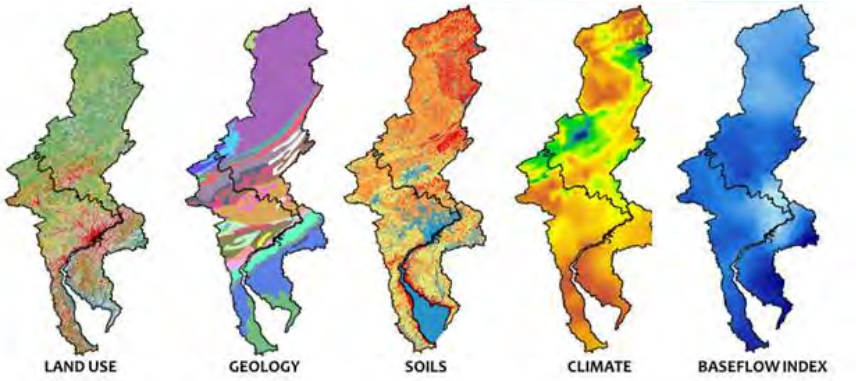
- Developed a systemwide EFDC model (see example diagram at left);
- Performed preliminary calibration of water surface elevation, salinity and water temperature;
- Evaluated the impacts of ocean boundary conditions, the C&D Canal and vertical resolution on hydrodynamic predictions; and
- Modified EFDC model code and linkage file to ensure internal consistency for water and mass balances between EFDC and WASP.

DRBC has experimented with a number of spatial grids, which vary primarily in the resolution of tributaries, vertical layers and ocean boundary. DRBC staff are finalizing the model grid for calibration use in early 2020.

Data, Lots of Data

Water quality modeling accomplishments in 2019 include construction of input files for WASP8 Model, conducting test runs and method development for post-processing model outputs. These tasks may sound simple, but the data needs for a systemwide model of this nature are prodigious. A one-year EFDC model simulation involves the preparation of 330,000 inputs and produces an output file for WASP that is approximately 700GB in size. A WASP water quality simulation is even greater in complexity; a one-year simulation can take up to 100 hours to run on a sophisticated PC workstation. DRBC is actively improving the efficiency and consistency of the model in order to be able to perform water quality calibration in 2020.

In cooperation with the United States Geological Survey, DRBC developed a sophisticated and robust methodology for estimating watershed flows into the system, as well as mass loads from point and nonpoint sources. A total of 124 sub-watersheds were delineated, each requiring flow and water quality inputs. Sub-watersheds without active gages were related to the 105 active stream gages within or near the estuary watershed based on hydrologic similarity characterized by a suite of characteristics known to influence streamflow. The GIS-based analysis was supplemented by loading models developed to analyze tributary and effluent data and predict concentrations during periods when they were not monitored. DRBC will be finalizing this inflow and loading estimation methodology in 2020.



A compilation of the Basin's hydrologic characteristics used to identify similarities among sub-basins.
Source: Vince DePaul, USGS

08 Microplastics

DRBC Water Quality Intern Scott Jedrusiak and Sr. Environmental Toxicologist Ronald MacGillivray, Ph.D., collect samples from the Delaware River that will be evaluated for microplastic levels.

Plastic debris comes in all shapes and sizes, but those that are less than five millimeters in length (or about the size of a sesame seed) are called 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 man-made products such as microbeads found in cosmetics and personal care products and industrial scrubbers used for abrasive blast cleaning.

In 2018, DRBC received a grant from the Delaware Watershed Conservation Fund to monitor for and model loadings of microplastics in the upper Delaware Estuary — from Trenton, N.J. to the mouth of the C&D Canal. This reach of river is largely urbanized and is likely a major contributor to microplastics found in the estuary and bay.

DRBC collected samples from four sites in the upper Delaware Estuary and ten tributary sites in the summer and fall 2019, which are being analyzed for microplastic concentrations by Temple University. These data will be used to model microplastic dynamics in the estuary, and the models will allow us to identify high plastic-loading tributaries, which will be targeted for cleanup efforts.

Removing large plastic debris prevents fish and wildlife from becoming entangled in objects like cords, nets and beverage containers. On a finer scale, removing these debris before they have a chance to break down will reduce the presence of microplastics and lower the risk of other harmful chemicals entering the Basin's waters. These cleanup efforts will also provide outreach opportunities to educate the public about the complex problems associated with plastics and microplastics. The effects of this public education will hopefully reach beyond the actual cleanup efforts and into our communities.

This project will provide DRBC with a better understanding of the concentration and distribution of microplastics in the upper Delaware River Estuary and will lay the groundwork for future microplastics monitoring and cleanup efforts in the Basin and beyond.

09 Mussel Deployment Pilot

DRBC Aquatic Biologist Jake Branksy (right) and Kurt Cheng from the Partnership of the Delaware Estuary measure and tag freshwater mussels before putting them in cages.

An adult mussel can filter more than 10 gallons of water per day. In this process, a mussel bed can remove substantial amounts of microscopic particles, including many forms of pollutants. As a result, freshwater mussels can serve as water quality indicators. It was this feature of the mollusks that led DRBC and the Partnership for the Delaware Estuary (PDE) to use the bivalves, specifically the Alewife floater (*Anodonta implicata),* to look at Delaware River water quality upstream and downstream of its confluence with the Lehigh River near Easton, Pa.

Staff from DRBC and PDE tagged and measured mussels (raised as part of PDE's Mussels for Clean Water Initiative) before putting a dozen each in plastic cages. Twenty four cages were deployed in six locations in the river: three upstream and three downstream from the Lehigh River's confluence. Rocks were mixed in with the mussels in each cage, and reinforcing steel bars were pounded into the river bottom, further securing and stabilizing the cages.

The mussels will be checked periodically for survival and growth, which may provide information on water quality.

DRBC Water Resource Scientist Elaine Panuccio (right) and PDE's Kurt Cheng ready a freshwater mussel cage for deployment into the Delaware River.

10 Shad Young of Year

DRBC Water Quality Intern Daisy DePaz (kneeling front), other DRBC staff and those from the N.J. Division of Fish and Wildlife measure and count juvenile American shad after collecting them in a seining net in the Delaware River at Phillipsburg, N.J.

The American shad (*Alosa sapidissima*) is a species of fish that lives in the ocean and returns to the river to spawn in freshwater. Young-of-year (YOY) are shad hatched from eggs that are spawned in the same year.

YOY surveys are organized by the Delaware River Basin Fish and Wildlife Management Cooperative (Co-Op), made up of fisheries representatives from the Delaware Division of Fish and Wildlife, N.J. Division of Fish and Wildlife, New York State Division of Marine Resources, Pennsylvania Fish and Boat Commission (PFBC), U.S. Fish and Wildlife Service and the National Marine Fisheries Service. DRBC is a liaison member to the Co-Op. Other supporting agencies include the National Park Service, the Philadelphia Water Department and The Nature Conservancy.

DRBC staff has provided fieldwork support for the past seven years. In 2019, DRBC staff joined with the PFBC and other organizations to conduct this annual YOY sampling program as the juvenile shad make their run downstream to the Atlantic Ocean. The survey is part of a continuing study that has been ongoing for decades and relies on partners such as DRBC to help perform sampling each August, September and October (as river conditions permit). Typically, four hauls are conducted along the Delaware River's shoreline using a 300 ft. seine net. Sampling locations include Trenton, N.J., Phillipsburg, N.J., Milford, Pa. and the Delaware Water Gap.

In 2019, a total of 15,859 YOY American shad were caught at the Phillipsburg, Water Gap and Milford locations, which are the sites historically used to estimate the juvenile production. This catch ranks 7th highest over the course of the roughly 30-year time-series. 2019 seems to have been a good year for juvenile production.

11 Our Regulated Community

DRBC Project Review Manager David Kovach, P.G., briefs the Commissioners on pending dockets and staff recommendations at the March 13, 2019, Business Meeting.

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

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

DOCKETS APPROVED MARCH 13, 2019

GEO Specialty Chemicals, Inc., D-1965-122-2.
Brookhaven Borough, D-1966-096 CP-5.
Melody Lakes Management, LLC, D-1980-079 CP-6.
Kimberly-Clark Corporation, D-1984-053-3.
Brightsmith, LLC, D-1985-059-3.
Eagle Lake Community Association, Inc., D-1987-055-4.
Delaware City Refining Company, LLC, D-1993-004-7
NRG REMA, LLC, D-1993-060-2.
Georgetown Town, D-1994-037 CP-3.
Lehigh Township Municipal Authority, D-1994-053 CP-3.
Lehigh Township Municipal Authority, D-1994-054 CP-3.
Richland Township Water Authority, D-1996-044 CP-4.
Central Carbon Municipal Authority, D-1999-048 CP-3.
Westfall Township Municipal Authority, D-2002-023 CP-6.
Maxatawny Township Municipal Authority, D-2007-001 CP-3.
UMH Properties, Inc., D-2007-022 CP-2.
UMH Properties, Inc., D-2009-021 CP-3.
Pocono Plateau Christian Association, D-2013-011 CP-2.
Maple Lane Estates c/o PMI, D-2014-004 CP-2.
Bristol Borough Water and Sewer, D-1969-066 CP-4.
Glenn Springs Holdings, Inc., D-1976-017-4.

Knights Bridge Corporation, D-1990-054-2.

Delaware County Regional Water Quality Control Authority - DELCORA, D-1992-018 CP-4.

Village of Buckingham Springs, D-2009-040 CP-3.

Gessner Products Company, Inc., D-2017-014-1.

Brookmont Health Care Center, D-2018-004-1.

Bangor Area School District, D-2018-007 CP-1.

DOCKETS APPROVED JUNE 12, 2019

William Henry Gardens, LLC, D-1968-092 CP-4.

Exelon Generation Company, D-1969-210 CP-15.

Bethlehem City, D-1971-078 CP-4.

Berks-Montgomery Municipal Authority, D-1973-060 CP-4.

Doylestown Borough, D-1979-018 CP-6.

Blue Ridge Real Estate Company, D-1985-081-2.

Reading Regional Airport Authority, D-1986-038 CP-4.

Monroe Energy, LLC, D-1986-041-3.

Rohm and Haas Chemicals, LLC, D-1989-002-4.

New Castle County Department of Special Services, D-1993-006 CP-4

Northeastern Schuylkill Joint Municipal Authority, D-1999-033 CP-3

Sanofi Pasteur, Inc., D-1999-071-5.

Muhlenberg Township Authority, D-2001-030 CP-3.

Bedminster Municipal Authority, D-2003-014 CP-3.

Upper Hanover Authority, D-2004-017 CP-4.

Pennsylvania Department of Conservation and Natural Resources, D-2005-008 CP-3.

Downingtown Municipal Water Authority, D-2006-031 CP-3.

Wallenpaupack School District, D-2009-027 CP-3.

Aqua Pennsylvania Wastewater, Inc., D-2014-005 CP-2.

Concord Township, D-2014-012 CP-2.

Lloyd's Otto, LLC, D-2014-017 CP-2.

Becker, Richard. C., D-2014-021 CP-2.

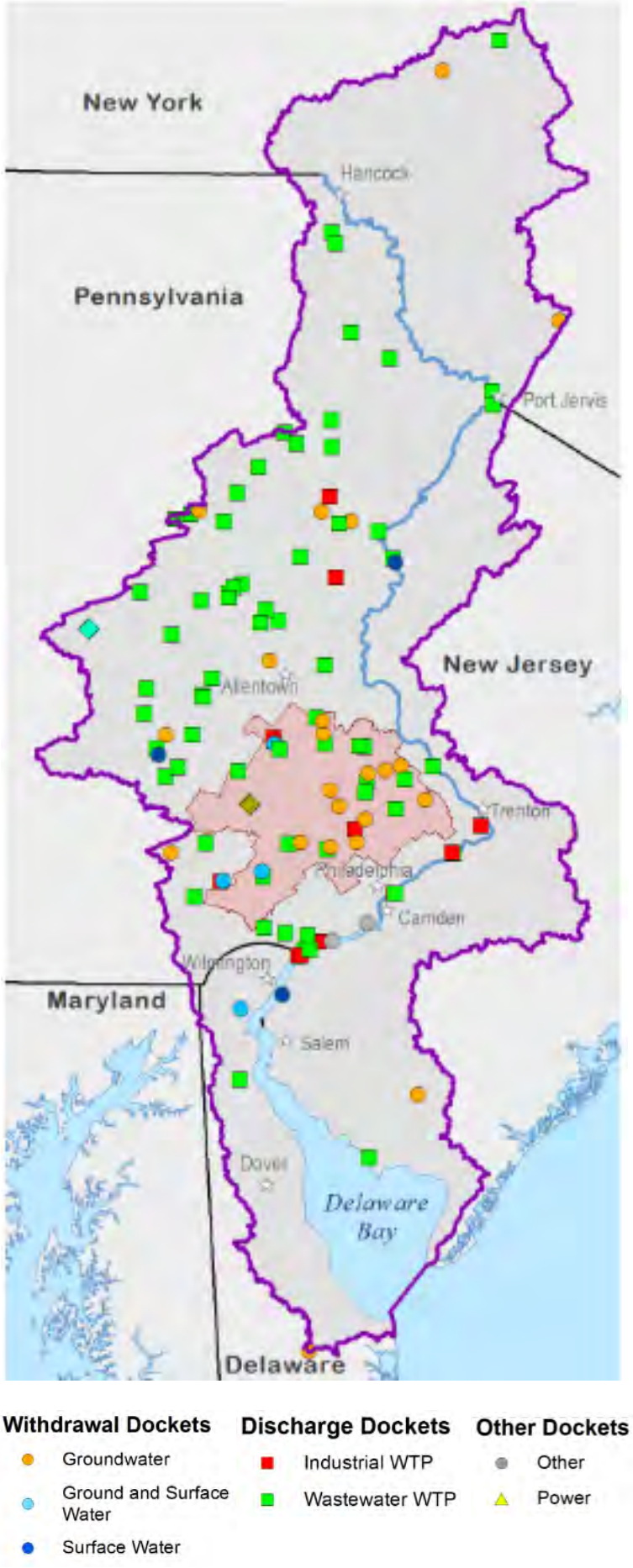
Arrowhead Sewer Company, Inc., D-2003-010-2.

Centerport Borough Municipal Authority, D-2018-006 CP-1

Berkshire Country Club, D-2018-010-1.

Downe Township, D-2019-001 CP-1.

Delaware River Partners, LLC (NJ) Gibbstown Logistics



DOCKETS APPROVED SEPTEMBER 11, 2019

Lower Providence Township Municipal Authority (PA), groundwater withdrawal, D-1999-021 CP-3.

The Pines at West Penn, LLC (PA), groundwater withdrawal, D-1999-025 CP-3.

Chalfont-New Britain Township Joint Sewage Authority (PA), wastewater treatment plant, D-1999-063 CP-4.

Quakertown Borough (PA), groundwater withdrawal, D-2000-064 CP-4.

Upper Hanover Authority (PA), groundwater and surface water withdrawal, D-2002-010 CP-4.

Portland Borough (PA), wastewater treatment plant, D-2003-009 CP-5.

Community Utilities of Pennsylvania, Inc. – Penn Estates (PA), groundwater withdrawal, D-2003-036 CP-3.

Bridgeport Borough (PA), wastewater treatment plant, 1970 -081 CP-4.

South Coatesville Borough (PA), wastewater treatment plant, D-1974-039 CP-6.

Ambler Borough (PA), groundwater withdrawal, D-1985-026 CP-6.

Central Wayne Regional Authority (PA), wastewater treatment plant, D-1986-009 CP-5.

Kutztown Borough (PA), wastewater treatment plant, D-1989-039 CP-4.

Downingtown Municipal Water Authority (PA), surface water and groundwater withdrawal, D-1989-063 CP-3.

Hamburg Municipal Authority (PA), wastewater treatment plant, D-1992-073 CP-5.

Camp Ramah in the Poconos (PA), wastewater treatment plant, D-2005-030-4.

White Haven Borough (PA), groundwater withdrawal, D-2008-012 CP-2.

Lakeview Estates Homeowner's Association (PA), wastewater treatment plant, D-2010-032-3.

Pennsylvania Department of Conservation and Natural Resources (PA), Beltzville State Park Wastewater Treatment Plant, D-2013-008 CP-2.

Pennsylvania Department of Conservation and Natural Resources (PA), Washington Crossing Historic Park Upper Wastewater Treatment Plant, D-2015-007 CP-2.

Village of Delhi (NY), groundwater withdrawal, D-1975-070 CP-2.

Pike County Environmental Enterprises, LLC (PA), wastewater treatment plant, D1989-082-4.

Camp Morasha (PA), wastewater treatment plant, D-2018-005-1.

Warrington Township (PA), Tradesville Wastewater Treatment Plant, D-1999-012 CP-4.

DOCKETS APPROVED DECEMBER 11, 2019

Freeland Borough Municipal Authority (PA), Wastewater Treatment Plant, D-1965-052 CP-5.

Chemtrade Solutions LLC (DE), Wastewater Treatment Plant, D-1969-038-4.

Knoll, Inc. (PA), Industrial Wastewater Treatment Plant, D-1974-162-5.

Philadelphia Gas Works (PA), Richmond Facility Non-Contact Cooling Water Discharge, D-1976-055 CP-4.

Reading City (PA), Wastewater Treatment Plant, D-1986-028 CP-4.

Dublin Borough (PA), Wastewater Treatment Plant, D-1986-070 CP-3.

Antietam Valley Municipal Authority (PA), Wastewater Treatment Plant, D-1987-045 CP-6.

Manwalamink Sewer Company (PA), Wastewater Treatment Plant, D-1988-034 CP-3.

Grand Central Sanitary Landfill, Inc. (PA), Leachate Treatment Plant, D-1988-052-5.

Chambers Cogeneration, LP (NJ), Electric Cogeneration Facility, D-1991-019-2.

Hobart Village (NY), Wastewater Treatment Plant, D-1991-063 CP-4.

Honey Brook Borough Authority (PA), Groundwater Withdrawal, D-1991-099 CP-3.

Valley Forge Sewer Authority (PA), Wastewater Treatment Plant, D-1995-006 CP-5.

JBS Souderton, Inc. (PA), Industrial Wastewater Treatment Plant, D-1996-021-5.

Clemens Food Group, LLC (PA), Groundwater Withdrawal, D-1999-072-3.

Yukiguni Maitake Manufacturing Corporation of America (NY), Groundwater Withdrawal, D-2003-026-2.

Warminster Municipal Authority (PA), Warminster - NAWC Wastewater Treatment Plant, D-2004-021 CP-3.

Ruscombmanor Township (PA), Golden Oaks Wastewater Treatment Plant, D-2007-034 CP-4.

Marcus Hook Energy, LP (PA), Cooling Tower Blowdown Discharge, D-2008-021 CP-3.

CMBK Resort Holdings, LLC (PA) Groundwater Withdrawal, D-2008-026-2.

Naval Surface Warfare Center Philadelphia Division (NSWCPD) (PA), Non-Contact Cooling Water Discharge, D-2009-004 CP-3.

Chester Valley Golf Club (PA), Groundwater and Surface Water Withdrawal, D-2009-035-2.

Springdale Estates, LP (PA), Springdale Gardens Wastewater Treatment Plant, D-2009-044-3.

Green Top Management, LLC (PA), Green Top Mobile Home Park Wastewater Treatment Plant, D-2010-002-4.

NIS Hollow Estates, LLC (PA), Wastewater Treatment Plant, D-2010-003-3.

Pennsylvania American Water Company (PA), Stony Garden Water Treatment Plant Filter Backwash Discharge, D-2010-025 CP-3.

HMS Host Corporation (PA), Peter J. Camiel Service Plaza Wastewater Treatment Plant, D-2013-018-2.

12 Financial Summary

DRBC Director of Finance and Administration Elba Deck, CPA, presents the annual management budget scenario to the Commissioners during a quarterly caucus meeting.

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

THE GENERAL OPERATING FUND

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

THE WATER SUPPLY STORAGE FACILITIES FUND

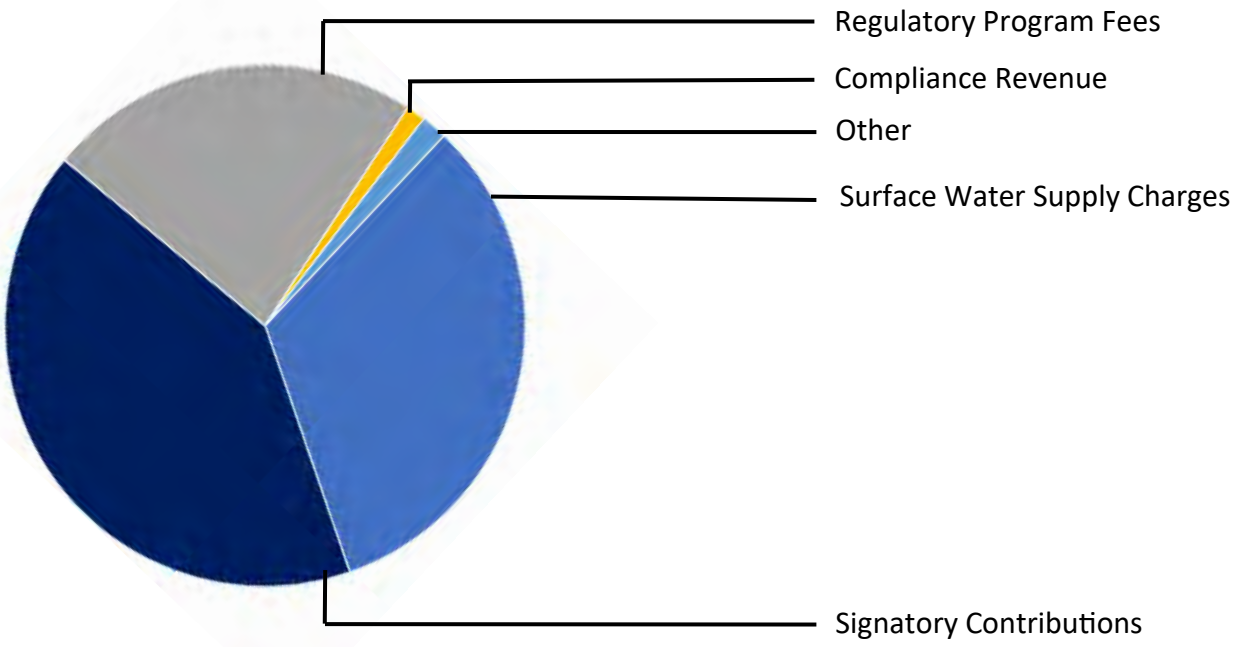
The WSSF was created to fund certain water supply storage facility projects in the Basin. The WSSF is used to repay the obligations the DRBC assumed to purchase storage capacity at the federal government's Beltzville and Blue Marsh reservoirs. The WSSF also supports DRBC's pro rata share of the annual operations and maintenance costs of the two reservoirs, the water supply share of any future required improvements at these two facilities, a share of DRBC operating costs to support a sustainable water supply within the Basin (transfers to the GOF) and any future required storage in the Basin. Revenues for the WSSF are generated from charges for applicable surface water withdrawals in the Basin. The balance of the WSSF at the end of FY 2018 was $19,937,785.

Independent Financial Audit

DRBC's financial records are audited annually as required by the Delaware River Basin Compact. The most recent annual independent audits are available at https://www.nj.gov/drbc/library/documents/AuditReportFY19.pdf.

2019 General Fund

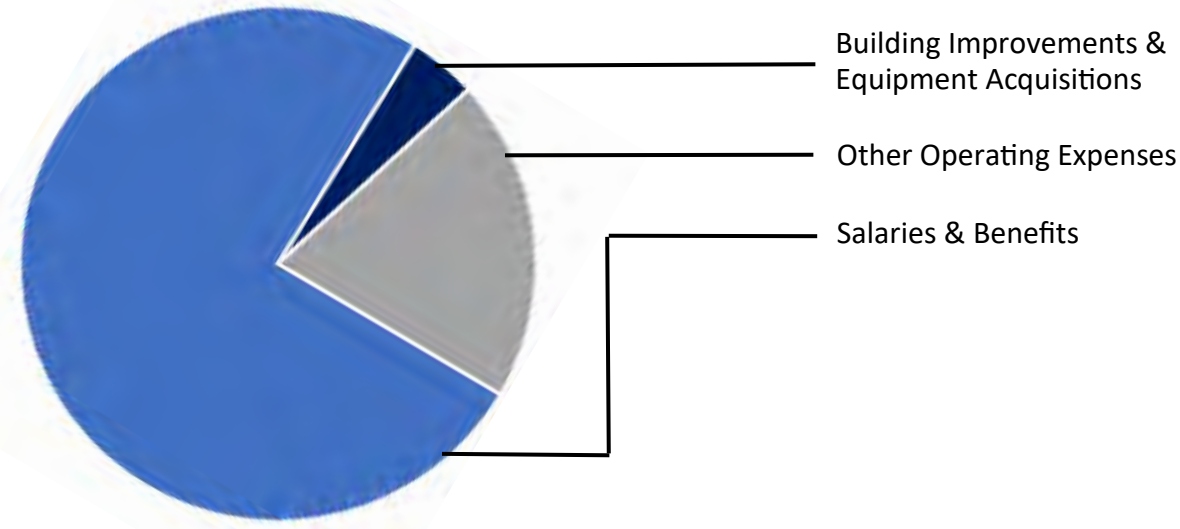
Revenues: $5,243,821



Signatory Funding

The 100-year Compact creating the DRBC stipulates that the five signatory parties agree to support the Commission's annual current expense budget. In 1988, the Commission members reached a tacit agreement to apportion signatory party contributions as follows: Delaware 12.5%, New York 17.5%, New Jersey 25%, Pennsylvania 25% and the United States 20%.

Expenses: $5,284,387



13 Advisory Committees

DRBC's Expert Panel of modelers includes: (from left): Steve Chapra, Ph.D., Bob Chant, Ph.D., Tim Wool and Carl Cerco, Ph.D.

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.

Flood Advisory Committee

Delaware Department of Natural Resources and Environmental Control
Michael Powell, CFM

New Jersey Department of Environmental Protection
Vincent Mazzei, P.E.
John H. Moyle, P.E.
Joseph Ruggeri, P.E., CFM
John Scordato

New York Department of Environmental Conservation
Mark Klotz, P.E

Pennsylvania Department of Environmental Protection
Hoss Liaghat, P.E.

New York City Department of Environmental Protection
Tina Johnstone
Thomas Murphy Jr., P.E.
Dana Olivio
John H. Vickers, P.E.

Delaware Emergency Management Agency
Arthur Paul
Edward Strouse

New Jersey Office of Emergency Management
Sgt. Michael K. Gallagher
Christopher Testa (Committee Chair)

New York State Division of Homeland Security and Emergency Services
Gary L. Tuthill

Pennsylvania Emergency Management Agency
David Williams
Thomas S. Hughes, CEM

Federal Emergency Management Agency
Dave Bollinger, CFM
Scott Duell
Patricia Griggs
J. Andrew Martin, CFM
Alan Springett

U.S. Department of Agriculture - Natural Resources Conservation Service
Hosea Latshaw
David Lamm

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

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

U.S. Army Corps of Engineers
Jason F. Miller, P.E.

National Park Service
Kristina Heister
Vince Pareago

Delaware River Joint Toll Bridge Commission
Sean M. Hill

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

County Water Resources Agencies
Gerald Kauffman, P.E.

Emergency Management Representatives
David K. Burd
Steve Hood

Pennsylvania
Michael Lookenbill, Pennsylvania Department of Environmental Protection

U.S. Geological Survey
Tom Imbrigotta

Volunteer Monitoring
Maya K. van Rossum

Pennsylvania Department of Environmental Protection
Jennifer Orr

Philadelphia Water Department
Kelly Anderson

U.S. Army Corps of Engineers
Laura Bittner

Members of the DRBC's Monitoring Advisory and Coordination Committee (MACC) meet at the Commission's headquarters in West Trenton, N.J.

Monitoring Advisory and Coordination Committee

Delaware
David Wolanski (Committee Chair), Delaware Department of Natural Resources and Environmental Control

Delaware River Basin Fish and Wildlife Cooperative
Sheila Eyler, U.S. Fish and Wildlife Service

National Park Service
Don Hamilton
Jessica Newbern

New Jersey
Leslie McGeorge, New Jersey Department of Environmental Protection
Bruce Friedman, New Jersey Department of Environmental Protection

New York
Sarah Rickard, New York State Department of Environmental Conservation

Regulated Flow Advisory Committee

Delaware Department of Natural Resources and Environmental Control
William Cocke, P.G.

Delaware Geological Survey
Stefanie Baxter, P.G.

New Jersey Department of Environmental Protection
Joseph A. Miri, Ph.D.
Steve Domber

New York City Department of Environmental Protection
Jen Garigliano

New York State Department of Environmental Conservation
Brenan Tarrier (Chair)

Office of the Delaware River Master
Kendra Russell

Toxics Advisory Committee

Academic
David Velinsky, Ph.D., Academy of Natural Sciences of Drexel University
Keith Cooper, Ph.D., Rutgers University
Dibyendu "Dibs" Sarkar, Ph.D., P.G., Stevens Institute of Technology

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

Delaware
Richard W. Greene, Ph.D., Division of Waste and Hazardous Substances/Site Investigation and Restoration Section

Environmental/Watershed
Tracy Carluccio, Delaware Riverkeeper Network
Diana Oviedo-Vargas, Ph.D., Stroud Water Research Center

Environmental Protection Agency Region II
Brent Gaylord

Environmental Protection Agency Region III
Kuo-Liang Lai, P.E.

Federal Fish & Wildlife
Clay Stern, U.S. Fish and Wildlife Service

Industry

J. Bart Ruiter, The Chemours Company, FC, LCC

Scott Northey, The Chemours Company, Chambers Works

Daniel Caldwell, Ph.D., CIH, DABT, BECES, Johnson & Johnson

Municipal

Jason Cruz, Philadelphia Water Department

Matthew Fritch, Philadelphia Water Department

New Jersey

Biswarup (Roop) Guha, New Jersey Department of Environmental Protection

Sandra M. Goodrow, Ph.D., C.F.M., New Jersey Department of Environmental Protection

Stephen Seeberger, New Jersey Department of Environmental Protection

New York

Scott J. Stoner, New York State Department of Environmental Conservation

Jason R. Fagel, New York State Department of Environmental Conservation

Pennsylvania

Maria Schumack, Pennsylvania Department of Environmental Protection

Public Health

Eric Bind, M.P.P., New Jersey Department of Public Health

Water Management Advisory Committee

Delaware

Steven Smailer, P.G., Del. Department of Natural Resources and Environmental Control

New Jersey

Carolyn Olynyk, N.J. Department of Environmental Protection

New York

Erik Schmitt, P.E., New York State Department of Environmental Conservation

Pennsylvania

Hoss Liaghat, P.E., Pennsylvania Department of Environmental Protection

U.S. Army Corps of Engineers

Laura Bittner

U.S. Environmental Protection Agency

Katie Lynch

U.S. Geological Survey

Daniel J. Goode, Ph.D.

City of New York

Dana Olivio, New York City Department of Environmental Protection

City of Philadelphia

Kelly Anderson, Phila. Water Department

County Water Agency

Janet L. Bowers, Chester County Water Resource Authority

Water Resources Association

Preston Luitweiler (Committee Chair), Water Resources Association of the Delaware River Basin

Industry

James Mershon, Merrill Creek Reservoir

Water Utility

John Thaeder (Committee Vice-Chair), Artesian Water Company, Inc.

Agriculture

Sandra Howland, New Jersey Department of Agriculture

League of Women Voters or other Civic Organization

Jill Green, League of Woman Voters of Pa.

Environmental Organization

Mary Ellen Noble, Delaware Riverkeeper Network

Watershed Organization

Pete Golod, Upper Delaware Council

Academia

Gerald J. Kauffman, Ph.D., University of Delaware

Recreation

Ann M. Pilcher, Pocono Mountains Visitors Bureau

Fisheries

Sheila Eyler, Ph.D., U.S. Fish & Wildlife Service

Academia/Science

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

Water Quality Advisory Committee

Delaware

David Wolanski (Committee Chair), Delaware Dept. of Natural Resources and Environmental Control

John Schneider, Delaware Dept. of Natural Resources and Environmental Control

Environmental Professional

Maya K. van Rossum, Delaware Riverkeeper Network

Local Watershed Organization

Abigail M. Pattishall, Ph.D., Wildlands Conservancy

National Park Service Wild and Scenic Rivers Program

Richard Evans

Peter Sharpe, Ph.D.

New Jersey

Frank Klapinski, New Jersey Department of Environmental Protection

Biswarup (Roop) Guha, New Jersey Department of Environmental Protection

New York

Sarah Rickard, New York State Department of Environmental Conservation

Pennsylvania

Thomas Barron, Pennsylvania Department of Environmental Protection

Matthew D. Kundrat, Ph.D., Pa. Dept. of Environmental Protection

Regulated Community, Industrial

J. Bart Ruiter, The Chemours Company

Kimberly Long, Exelon Corporation

Regulated Community, Municipal

Jason Cruz, Philadelphia Water Department

Bryan P. Lennon, City of Wilmington

U.S. Environmental Protection Agency

Kuo-Liang Lai, P.E.

Brent Gaylord

A NEW ADVISORY COMMITTEE:

CLIMATE CHANGE

At their Dec. 11, 2019, Business Meeting, the Commissioners approved the creation of the Advisory Committee on Climate Change (ACCC) and authorized it for a period of ten (10) years. The ACCC will be comprised of as many as 18 members, up to nine of which are Reserved Members appointed by the DRBC Commissioners or their Alternates to represent the states of Delaware, New Jersey and New York, the Commonwealth of Pennsylvania, the United States Government, the New York City Department of Environmental Protection, the Philadelphia Water Department and the Partnership for the Delaware Estuary. Appointments of Reserved Members shall be of no prescribed duration.

In addition, the committee will include up to nine Non-Reserved Members, who shall be individuals with relevant expertise appointed by the DRBC Executive Director from the following stakeholder groups: academic or research institutions, environmental or watershed organizations, businesses or industries and water/wastewater utilities. Non-Reserved Members shall be appointed for terms of up to two (2) years.

When operational, the ACCC's charge includes the following:

- Provide input to inform DRBC's ongoing 2060 Water Resources Planning Study and related models that have climate-dependent inputs;
- Develop science-based future scenarios for the Delaware River Basin as they relate to climate change;
- Define the scope and support the development of a comprehensive Basin-wide climate impact study to be undertaken collaboratively by DRBC and other Basin partners;
- Support an effort to fund or resource a Delaware River Basin comprehensive climate impact study; and
- Work with DRBC staff and partners to organize a Delaware River Basin Climate Forum (i.e., technical conference) and provide the Commission with a recommendation regarding the frequency of such events for sharing climate science focused on the Delaware River Basin.

14 Our Shared Waters

Elizabeth Brown, Director of Delaware River Watershed Programs, Audubon Pennsylvania (left) and DRBC's Basin Outreach Intern Meg Ruggles at the Our Shared Waters booth at a community event in Philadelphia's Fairmount Park.

THE STATE OF "OUR" BASIN

The Commission is required to produce a State of the Basin report every five years (see page 9). However, these reports are a bit too technical for the average Basin resident. Additionally, the report is DRBC's view of the Basin, and there are a lot of groups and people out there with their own opinions on the Basin's water quality, water quantity, aquatic species' health, etc.

The William Penn Foundation (WPF) supported a wider look at the Basin, getting input from non-profits and NGOs to regular members of the public. In short, what is the State of Our Basin? Following some research about what people think about the Basin's waters, a multifaceted campaign called *Our Shared Waters* was developed.

The campaign has several components. These include:

SOCIAL MEDIA

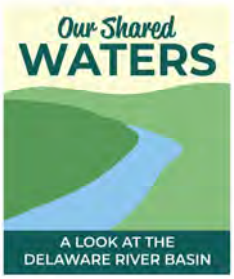
A Facebook page (OurSharedWaters) was launched, and by the end of 2019, the page had more than 2,600 followers. Most of these followers are average citizens interested or concerned about the Basin's waters, specifically their local watersheds. The page is a great way for organizations to spread the word about their events and activities to a Basin-wide audience.

OUR SHARED WATERS WEBSITES

www.OurSharedWaters.org was published and is being positioned as a central gathering point for the hundreds of organizations and people that are serious about their water, their watershed and their part in the larger interconnected Basin.

A webpage that allows crowdsourced evaluations of individual watersheds within the Basin, as well postings of reports, upcoming activities and photos. Think "Yelp" for the Basin. This will launch in 2020.

Following input from thousands of Basin residents, the program was named *Our Shared Waters.* The program logo is at right.



COMMUNITY EVENTS

DRBC joined other Our Shared Waters partners to attend several community events around the Basin. For example, DRBC staff joined with volunteers from the Tookany/Tacony-Frankford Watershed Partnership at PA Senator Art Haywood's block party in northwest Philadelphia. We handed out literature from the Partnership of the Delaware Estuary and exhibited new large plastic macroinvertebrate models from the Stroud Water Research Center. We also teamed up with the Lehigh Valley Iron Pigs minor league baseball team to demonstrate how to properly 'mud' a baseball with pitcher Cole Irvin and little leaguers (photo above).

EXPERIENCING THE RIVER

We all know that your view of the river changes forever once you get on (and in) it. To that end, we sponsored experiential opportunities to do just that. Working with the Delaware River Sojourn, we created several "Sojourn Scholarships" that put people, some of whom had never been in a kayak, on the river for a day of paddling and learning.

OUR BASIN, OUR SHARED WATERS

While funding for the program comes from WPF, and DRBC facilitates Our Shared Waters' different components, it is not a DRBC program. It belongs to everyone who works, plays and depends on the waters of the Delaware River Basin.

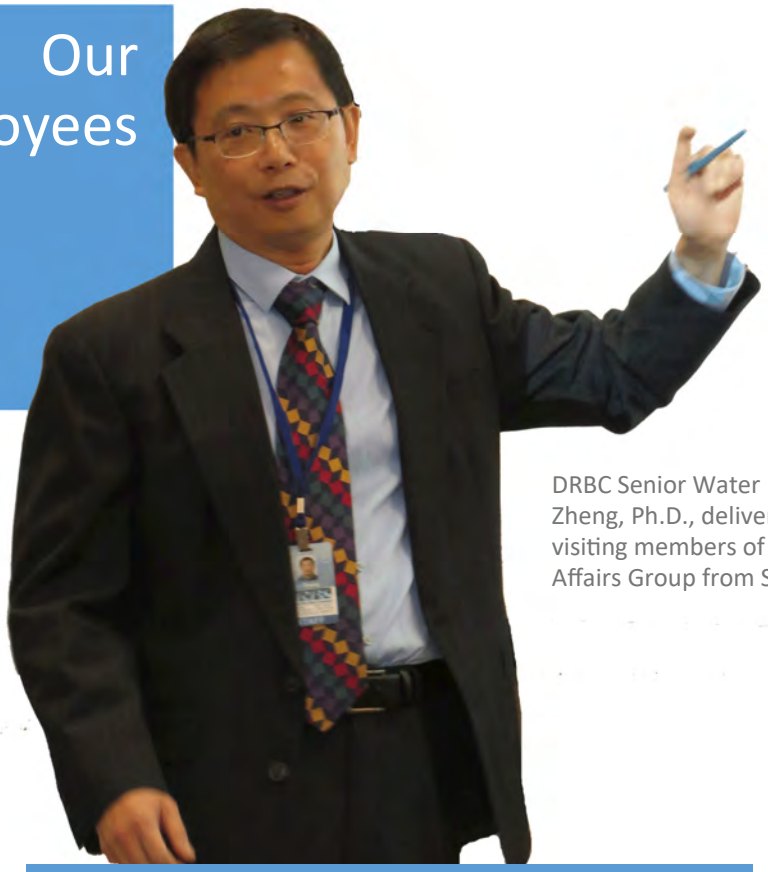
IT BEGAN WITH RESEARCH

Like almost everything DRBC does, it starts with research. Our Shared Waters was no different. To get started, we researched Basin residents' attitudes and levels of awareness on water resource topics.

In April, we conducted an online discussion group to determine audience familiarity with the Delaware River and Basin, as well as analyze perceptions of the different threats faced by the Basin's waters. Those results informed a more detailed phone survey of 602 respondents in June. Here's a sample of what we learned:

- The Delaware River is well-liked.
- However, the river is perceived to be dirtier now than 50 years ago.
- There are major concerns about the impact of pollution and climate change on the Basin's waters.
- Plastic trash, industrial waste and pesticides from farms are top of mind pollution sources.
- While respondents are familiar with the Delaware River, the concept of a Basin is less understood.
- "Historic" was one of the first words that came to mind when respondents think of the Delaware River.

15 Our Employees



DRBC Senior Water Resource Modeler Li Zheng, Ph.D., delivers a presentation to visiting members of the Shaanxi Water Affairs Group from Shaanxi, China.

2019

35	Full Time Employees
6	Doctorates
13	Advanced Degrees
9	Professional Engineers
3	Professional Geologists
252	Days in the Field
25	Average Years of Experience
11	Average Years at DRBC

Like any organization, the DRBC is only as good as its employees. In this category, the Commission benefits from a staff that is experienced, talented and diligent. Because of its small size (about one employee for every 350 square miles of the area for which DRBC is responsible), most staff members wear multiple 'hats' and often help in areas not part of their normal job descriptions. It is not unusual to find modelers on their knees on a shoreline helping with the young-of-year juvenile shad count (see page 25), water resource engineers volunteering to hang over a bridge to collect water quality samples or a toxicologist adding a coat of paint to a floating steamship classroom.

DRBC staff, interns and several alternate Commissioners take a break from a busy schedule and quarterly caucus meeting to pose in front of the Commission's West Trenton, N.J. building.

Trusted Technical Expertise

Commission staff are routinely invited to speak on water resource management and related technical issues. In 2019, examples of these included:

Peter Eschbach, Director, External Affairs and Communications

Cross-State Stakeholders Utilize the "Our Shared Waters" Campaign to Educate and Influence Elected State Officials at the Coalition for the Delaware River Watershed's 7th Annual Delaware River Watershed Forum

Our Shared Waters Program at the Water Resources Association of the Delaware River Basin's Annual Fall Technical Symposium

Ron MacGillivray, Ph.D. , Senior Environmental Toxicologist

Contaminants of Emerging Concern: Risks, Regs & Residents at the Pennsylvania State Association of Township Supervisors Annual Conference

PFAS in Surface Water, Sediment and Fish from the Delaware River at the Delaware Chapter of the Society of Environmental Toxicology and Chemistry meeting

PFAS in Surface Water, Sediment and Fish from the Delaware River at a American Water Resources Association, Philadelphia Section Seminar and again at the New Jersey Water Environment Association's Annual Conference

Lessons Learned from other Watersheds: Delaware River Contaminants of Emerging Concern in Agricultural and Urban Settings at a Chesapeake Bay Program, Scientific and Technical Advisory Committee workshop

Delaware Estuary Microplastics Monitoring and Cleanup at the Friends of the Heinz Refuge and Darby Creek Valley Association's Environmental Summit (photo right)

Delaware River Basin Commission Testimony on Plastics and a Current DRBC study with Temple University to Provide a Better Understanding of the Concentrations and Distribution of Microplastics in the Upper Delaware Estuary at the Pa. House of Representatives, House Democratic Policy Committee, Public Hearing on HB 1322 regarding Single Use Plastics (aka the Bottle Bill)

DRBC Senior Environmental Toxicologist Ron MacGillivray, Ph.D., address members of the Heinz Refuge and Darby Creek Valley Association.

(From left) Executive Director Steve Tambini, P.E. , Director of Science and Water Quality Management Namsoo Suk, Ph.D., and Manager of Water Quality Assessment John Yagecic, P.E., take part in a panel discussion at the Partnership for the Delaware Estuary's Science and Environmental Summit.

Elaine Panuccio, Water Resource Scientist

Delaware River Basin Commission at an Introduction to Environmental Science class, Rider University

Chad Pindar, P.E., Manager, Water Resource Planning

An Introduction to the Delaware River Basin Commission at a What is a River class, Lafayette College

Water Resource Management of the Delaware River Basin at the Water Resources Association of the Delaware River Basin's Annual Fall Technical Symposium

Kate Schmidt, Communications Specialist

A Delaware River Tour: From the Mountains to the Sea at Doane Academy, Burlington, N.J.

Tips to Improve Water Quality & Conserve Water: Simple Things We All Can Do to Keep DRB Waters Clean & Plentiful at a Lower Makefield Township Environmental Advisory Council meeting

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

Evaluating the Risks of Climate Change in the Delaware River Basin at a New Jersey Water Monitoring Council meeting

History of Flow Management at an Upper Delaware Council meeting

Current and Future Hydrology in the Delaware River Basin at the Water Resources Association of the Delaware River Basin's Annual Fall Technical Symposium

Modeling Hydrology and Reservoir Operations for Assessing the Big Picture Risks of Climate Change at a New Jersey Water Supply Advisory Council meeting

Flow Management for Multiple Water Uses in the Delaware River Basin at a N.J. American Water Resources Association webinar

The Basin-Wide Implications of Managing the Lower Delaware River Salt Front at the Coalition for the Delaware River Watershed's 7th Annual Delaware River Watershed Forum

Namsoo Suk, Ph.D., Director, Science and Water Quality Management

Water Quality Challenges at the Partnership for the Delaware Estuary's Science and Environmental Summit

Dissolved Oxygen in the Delaware Estuary: Past, Present, and Future at a Pennsylvania Coastal Zone Advisory Committee meeting

Modeling Eutrophication Processes in the Delaware Estuary to Link Watershed Efforts to Control Nutrient Impacts at the 3rd Annual Delaware Watershed Research Conference

Steve Tambini, P.E., Executive Director

The State of the Basin—2019 at the Water Resources Association of the Delaware River Basin's Annual Fall Technical Symposium

Managing, Protecting and Improving the Basin's Water Resources Since 1961 at the Delaware River Governors' Leadership Summit, held at the Independence Seaport Museum, Philadelphia, Pa.

Editorial Board Briefing to the Bucks County Courier Times Editorial Board, Levittown, Pa.

Legislative Briefing for elected officials' staff at the Independence Seaport Museum

The Need and Role for Clean Water Regulation at the Partnership for the Delaware Estuary's Science and Environmental Summit

Michael Thompson, Water Resource Engineer

Planning for a Sustainable Supply of Water for the Delaware River Basin at a Water Problems, Water Solutions class, Lafayette College

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

Electroshock or Instagram? Monitoring and Observation to Support Swimmable, Fishable Waterways at the Coalition for the Delaware River Watershed's 7th Annual Delaware River Watershed Forum

Implementation of Water Quality Management: Part 2—Applications, Successes, & Challenges at the Partnership for the Delaware Estuary's Science and Environmental Summit

DRBC Activities in Water Quality Monitoring and Management at a Trout Unlimited, Montgomery County Chapter meeting (photo right)

DO Early Action Workgroup at a Philadelphia Water Department's Dissolved Oxygen Partnership meeting

The State of the Basin 2019: Water Quality and Living Resources at the Water Resources Association of the Delaware River Basin's Annual Fall Technical Symposium

Evaluation of the Technical, Economic, and Social Impacts associated with Updating Major Wastewater Treatment Infrastructure to Address Aquatic Life Uses and Values for the Delaware Estuary at the 3rd Annual Delaware Watershed Research Conference

Upgrading the Aquatic Life Use and Developing New Dissolved Oxygen Criteria for the Delaware Estuary at an Academy of Natural Sciences of Drexel University lunch seminar

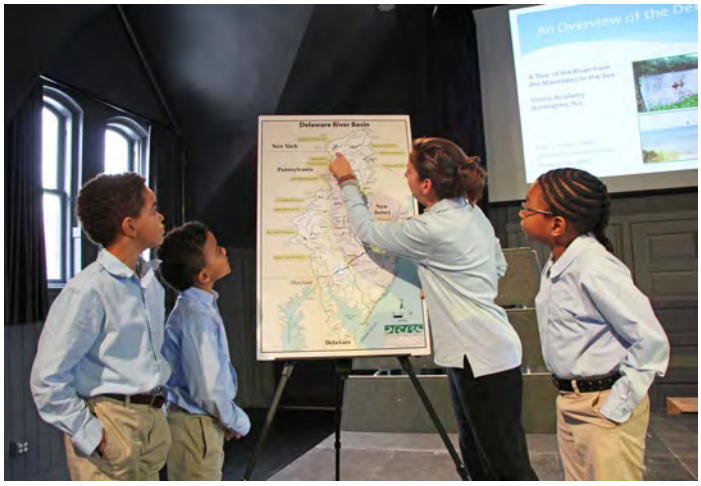
John Yagecic, P.E. (standing), discusses the Commission's water-quality programs with members of Trout Unlimited's Montgomery County Chapter.

16 Outreach & Service

For the past several years, DRBC staff have assisted the Mercer Street Friends Food Bank with weighing and preparing food for distribution. From Right: Finance and Administrative Specialist Denise McHugh, Director of Finance and Administration Elba Deck, CPA, and Water Resource Engineer Kendria Henson.

Outreach

DRBC considers outreach to support the Commission's mission and the needs of interested user groups to be a strategic goal. To that end, DRBC took part in numerous outreach events throughout the Basin in 2019.



Communications Specialist Kate Schmidt explains the Basin to students at Doane Academy in Burlington, N.J.

Executive Assistant Donna Woolf demonstrates water flow with an Enviroscape at the Temple Ambler EarthFest in Ambler Pa.

External Affairs & Communications Director Peter Eschbach demonstrates how a tree's rings can provide clues about past weather patterns with students from Ewing High School's Environment Club, Ewing, N.J.

Aquatic Biologist Jake Bransky (right) explains what bugs (macroinvertebrates) can tell you about water quality at the annual Shad Festival in Lambertville, N.J.

Government Affairs Lead Stacey Mulholland discusses water resource issues at Riverfest in Frenchtown, N.J.

Finance and Administration Specialist Denise McHugh uses real water on an Enviroscape model to demonstrate how water flows to children at Lehigh Valley Water Suppliers' Hydromania, held at Cedar Crest College, Allentown, Pa.

Outreach Intern Meg Ruggles explains what bugs (macroinvertebrates) can tell you about water quality at the annual Easton Heritage Festival in Easton, Pa.

Service

While the Commission's work is focused on the water resource management, staff have embraced the concept of being good community neighbors. In 2019, DRBC staff participated in many worthy causes. Whether it was preparing groceries for distribution at a local food bank or picking up trash along the Delaware River, DRBC staffers were generous with their time.

Water Resource Scientist Elaine Panuccio (facing) and Finance/ Accounting Manager Lulin Zhong, CPA, pick up trash at Palmyra Cove Nature Park, Palmyra, N.J.

(From left) Finance and Administration Specialist Denise McHugh, Support Services Technician Pat Rago, Accounting/Benefits Specialist Patti Hausler and Finance and Administration Director Elba Deck, CPA, stand with staff donations to the Salvation Army's Angel Tree Program.

Senior Environmental Toxicologist Ron MacGillivray, Ph.D., puts a new coat of paint on the Steamboat SPLASH floating classroom in Lambertville, N.J.

Staff provided six turkeys and "all the fixin's" to the Salvation Army for their Thanksgiving food truck, which served hundreds of people in the Trenton, N.J. area. Shown are Major Valerie Kahn (second from right) and her staff and volunteers.

17 A Legacy of Dedicated Staff

DRBC's staff is small, some would even say undersized, particularly when one looks at the magnitude of what they are asked to do: quietly manage, protect and improve the thousands of miles of waters flowing in a 13.5 thousand square mile area that supplies water to 13.3 million people, which is also the life blood of a multi-billion dollar economy. Done with little fanfare, and even less recognition, DRBC staff are dedicated professionals. When people leave the organization, it is typically after many years of service.

In 2019, we said goodbye to:

Deborah Allen

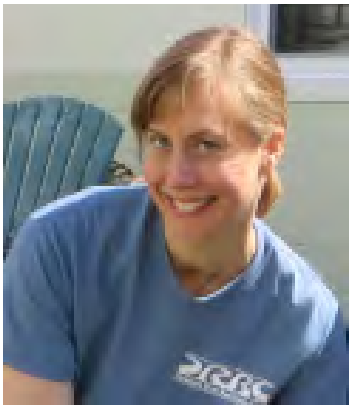
Accounting/Benefits Specialist

1 Year of Service

Kenneth F. Najjar, Ph.D., P.E.

Director of Water Resource Management

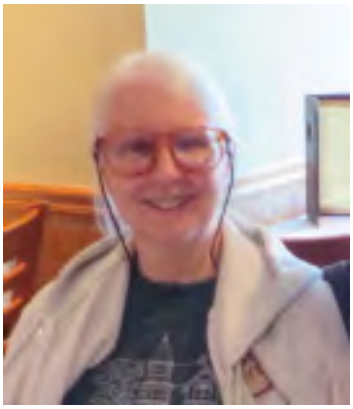
17 Years of Service, retired



Gail Blum

Water Resource Specialist

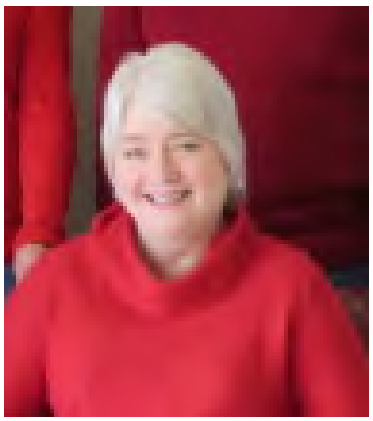
20 Years of Service



Susan Owens

Graphic Designer

45 Years of Service, retired



Paula Schmitt

Administrative Assistant

16 Years of Service, retired

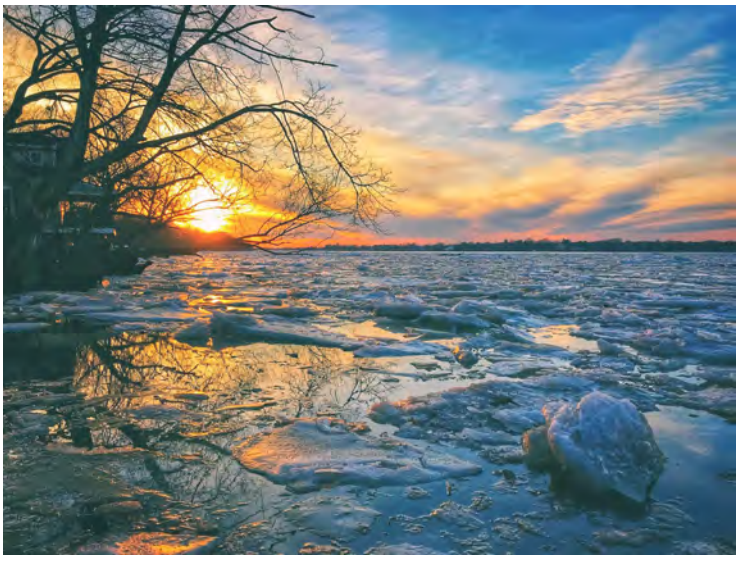
18 A Look Around The Basin

Bald Eagle Fishing in Snow by Martha Tully taken at Mongaup Reservoir, Sullivan County, N.Y.

Beaver Hard at Work by Keith Balderston, at Delaware Canal, New Hope, Pa.

Winters's Glory by Brenda Quinn, at Haycock Township, Pa.

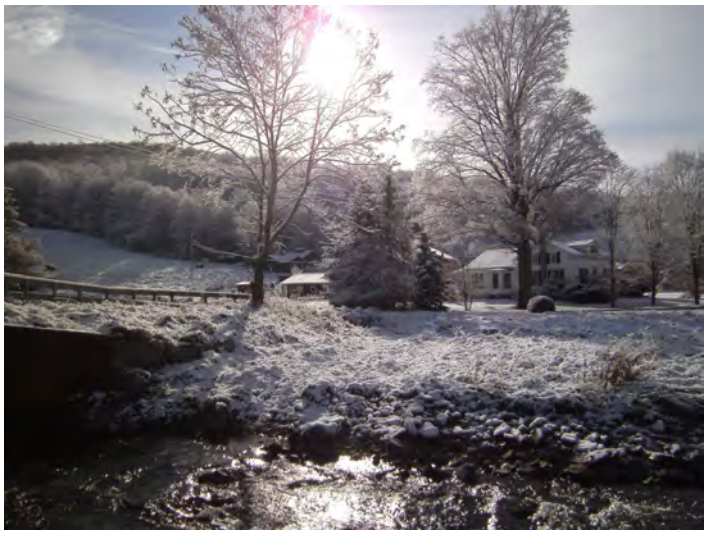
Polar Vortex Beauty by Bridget A. Davis, at Deposit, N.Y.



Icy Delaware River Sunset by Carolyn Suess, at Delanco, N.J.

Snowy River by Edna Gonzalez-Rothenberg, at Milford, Pa.

In the Mist by Ian M. Johnston, at Washington Crossing Park, Pa.



Silent White by JoAnn Kaufman, at Kaufman Farms, Bagley Brook, Delhi, N.Y.

Morning Jog with Dog by Lane B. Fike, at Schuylkill Banks and Walnut St., Philadelphia, Pa.

Sunrise on the Creek by Melissa A. Rozecki, at Rancocas Creek, Delanco, N.J.

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Delaware River Basin Commission