

Delaware River Basin Commission

Annual Report
2014

The Delaware River Basin Commission (DRBC) is a federal-interstate agency created in 1961 by compact legislation signed into law by President John F. Kennedy and the governors of the four basin states with land draining to the Delaware River. The passage of this compact marked the first time that the federal government and a group of states joined together as equal partners on a regional body with the force of law to oversee a unified approach to managing a river system without regard to political boundaries. DRBC programs focus on the subjects of water supply, water conservation, water quality, flow/drought management, flood loss reduction, project review, and planning.

The Delaware is the longest un-dammed river in the United States east of the Mississippi, extending 330 miles from the confluence of its East and West branches at Hancock, N.Y. to the mouth of the Delaware Bay where it meets the Atlantic Ocean. In all, the Delaware River Basin (DRB) contains 13,539 square miles, draining parts of Pennsylvania, New Jersey, New York, and Delaware. Over 15 million people (approximately five percent of the nation's population) rely on the waters of the DRB for multiple uses, but the watershed drains only four-tenths of one percent of the total continental U.S. land area. The population served by DRB water includes about 8.3 million basin residents as well as over seven million people in the New York City area and northern New Jersey who live outside the basin. New York City gets roughly half its water from three large reservoirs located on tributaries to the Delaware.

This publication, which covers calendar year 2014, was compiled and edited by DRBC Communications Manager Clarke Rupert and created by DRBC Graphic Designer Susan Owens. Numerous commission staff provided valuable assistance. In order to save paper and reduce costs, the public is encouraged to view this annual report on the commission's web site at www.DRBC.net. Limited paper copies are available upon request by contacting the DRBC (P.O. Box 7360, West Trenton, NJ 08628; 609-883-9500).



President John F. Kennedy and the basin state governors sign ceremonial Delaware River Basin Compact documents at the White House on Nov. 2, 1961. Seated next to President Kennedy (from right to left) are Gov. David Lawrence of Pennsylvania, Gov. Elbert Carvel of Delaware, and Gov. Robert Meyner of New Jersey. Gov. Nelson Rockefeller of New York was unable to attend.

Cover photo: DRBC staff monitoring for young of year (YOY) American shad in September 2014 at the Marine Terminal Park in Trenton, N.J. The boat used here to spread out the seining net in the Delaware River is about to head out under a setting sun. Additional information can be found on page 19. Photo taken by Lauren McGrath/DRBC.



Ice jam on the Delaware River at the Calhoun Street Bridge in January 2014. This is a view from Morrisville, Pa. looking across the river towards Trenton, N.J. Additional information about the ice jam can be found in the Annual Hydrologic Conditions Summary beginning on page 12.

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Executive Director's Message

By Steve Tambini

Summer 2015

It has been about a year since I joined DRBC. The transition to a new executive director was a significant move for me and for the DRBC. I am often asked . . .

"How's it going?"

The simple answer is . . . "it's going well."

I want to thank the DRBC Commissioners and staff for all their support and guidance. It is truly a pleasure and privilege to work with such dedicated professionals on such an important mission.

The DRBC has been effectively managing our shared basin water resources since 1961. As you will quickly note on the pages that follow, our commitment to the basin continued in 2014.

Being new to the DRBC, I made a commitment to listen and learn as much as I could from Commissioners, from staff, from state and federal partners, from stakeholders, and from the public. Needless to say, there was, and still is, much to hear and much to learn. While my learning journey will never be complete, let me share a few thoughts about DRBC in 2014 and into the future.

Our Water Resources present numerous management challenges and 2014 was no different. Looking beyond "routine" wet springs and dry autumns, we are reminded of the need to continue to plan for a sustainable and resilient resource that can be managed through significant droughts and floods. Climate change and the potential impacts related to sea level rise as well as the intensity and frequency of precipitation extremes only reinforce the need for continued collaborative planning to be able to balance often competing water needs. While the future presents numerous challenges and opportunities, we cannot forget about our day-to-day commitment to flow management in the basin. During periods of low flow, DRBC defines and directs releases from lower basin reservoirs, when required, to ensure adequate fresh water flows past Trenton, N.J. to the tidally influenced portion of the Delaware River. The goal is to keep high concentrations of salt water downstream of drinking water intakes and aquifers.

Our Water Resources will also see improved water quality thanks to continued efforts of DRBC. This report notes continued progress on several fronts and highlights the continued DRBC-led progress towards collaborative reduction of PCBs in the Delaware Estuary.

Our Regulated Community includes thousands of water users, wastewater dischargers, and sponsors of other projects that could have a significant impact on the water resources of the basin. They expect us to be responsive, efficient, collaborative with other agencies of similar scope and mission, and to avoid duplication of unnecessary effort. DRBC started an effort in 2014 to improve the project review process and to work with our partner basin states towards meeting all the responsibilities of the DRBC in a more effective and efficient manner.

Our Publics and Our Stakeholders have a long and valued history of providing input and advice to the DRBC through our advisory committees, through opportunities for public comment on rules and projects, and through public input and dialogue at our quarterly commission meetings. The stakeholders and their range of input are as diverse as the basin itself. My listening and learning meetings in 2014 took me to places throughout the basin and beyond. The investment I made to

meet with numerous stakeholders to listen to their perspectives continues to enrich our mission each day.

Our Employees and Our Workplace allow a relatively small group of professionals to effectively manage this significant and critical water resource. From planning, to science, to engineering, to professional support . . . from project review, to water operations, to modeling, monitoring and assessment . . . the results of our employee's commitment to the basin are outlined on the pages that follow.

As the page turns to a new chapter at DRBC with a new executive director, you can expect that the areas of strategic focus highlighted above will guide me going forward. The DRBC at its core is responsible for the management of our shared interstate water resources in the basin.

Our Water Resources will always be our primary area of focus. As a federal-interstate compact agency, we have a responsibility to those we regulate and to the publics we serve. ***Our Regulated Community and Our Publics and Our Stakeholders*** are areas of focus that will lead us to improve our relationships throughout the basin. And finally, our staff and our culture allow us to bring the resources, the expertise, the hard work, and the solutions to meet often complex and challenging water resource issues. We must keep ***Our Employees and Our Workplace*** as an area of focus for the future as well.

So . . . yes, it is “*going well*” . . . and it can always be better. DRBC will continue to adapt to the challenges ahead, based upon the Delaware River Basin Compact and its long history of value-added water resource management. I am enjoying the journey and looking forward to a rewarding future at DRBC.



Steve Tambini offering remarks along the banks of the Delaware River at Washington Crossing State Park (N.J.) after taking the oath of office as DRBC's new executive director. (Photo by Clarke Rupert/DRBC)

Signatory Members

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 (NAD), 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 drought declarations and apportioned amounts among the signatory parties to support the current expense budget, which require unanimity.

New York



Governor Andrew M. Cuomo's designated representatives during 2014 continued to be Department of Environmental Conservation Commissioner **Joseph Martens** (alternate), Division of Water Director **Mark Klotz** (second alternate), Division of Water Assistant Director **Tom Cullen** (third alternate), and Bureau of Water Resource Management Director **Angus Eaton** (fourth alternate).

New York City Mayor **Bill de Blasio**, who assumed office in January, named DEP Commissioner **Emily Lloyd** as the advisor to the

Governor Cuomo's designated representatives during 2014 continued to be Department of Environmental Conservation Commissioner **Joseph Martens** (alternate), Division of Water Director **Mark Klotz** (second alternate), Division of Water Assistant Director **Tom Cullen** (third alternate), and Bureau of Water Resource Management Director **Angus Eaton** (fourth alternate).

New York State DRBC commissioner in May 2014, succeeding **Carter Strickland, Jr.** who had served in that role since 2011.

Delaware



Governor Jack A. Markell was appointed by Governor **Markell** to represent him on the DRBC. Department of Natural Resources and Environmental Control (DNREC) Secretary **David Small** was named as alternate in September, succeeding **Collin O'Mara** who left state service earlier in the year. DNREC Surface Water Section Program Manager **Bryan Ashby** was named as the new second alternate in September, replacing Division of Water Director **Kathleen Stiller** who retired after 27 years of service to the State of Delaware.

Federal Government



Brigadier General Kent D. Savre's designated alternate, second alternate, and third alternate for the first half of 2014 continued to be **Lieutenant Colonel John Christian Becking** (Philadelphia District Engineer), **David Leach** (NAD Director of Programs), and **Erik Rourke** (Chief, Project Development Branch, Planning Division), respectively. Lieutenant

Colonel Michael Bliss replaced Lt. Col. Becking as Philadelphia District Engineer and federal alternate on the DRBC in July. **Henry (Hank) Gruber** (NAD Program Manager) was named as the new third alternate in July, while Mr. Leach remained as Brig. Gen. Savre's second alternate.

Pennsylvania



Governor Corbett's appointments to represent him on the commission in 2014 continued to be Department of Environmental Protection (DEP) Deputy Secretary for Water Management **Kelly Jean Heffner** (second alternate), DEP Director of Interstate Waters **Andrew Zemba** (third alternate), **Charles Kirkwood** (fourth alternate), and DEP Executive Assistant **Randal (Duke) Adams** (fifth alternate). DEP Acting Secretary **Dana Aunkst** was selected as the governor's new alternate in October, replacing Secretary **E. Christopher Abruzzo**.

New Jersey



Governor Christie's alternate and third alternate on the DRBC during 2014 continued to be DEP Commissioner **Bob Martin** and Division of Water Supply and Geoscience Director **Fred**

Sickels, respectively. DEP Assistant Commissioner for Water Resource Management **Daniel Kennedy** was named as second alternate in July, succeeding Deputy Commissioner **Michele Siekerka**. State Geologist **Karl Muessig** served as fourth alternate during the first half of 2014.

Commission Officers

The Delaware River Basin Compact requires the annual election of a chair and vice chairs, which historically has been based upon rotation of the compact's five signatory parties. The following members served as commission officers during calendar year 2014:

*January 1, 2014 through June 30, 2014
(one-year term began July 1, 2013)*

Chair: Governor Christie (New Jersey)
Vice Chair: Governor Cuomo (New York)
Second Vice Chair: Governor Markell (Delaware)

The current list of commission members and their alternates can be viewed at www.nj.gov/drbc/about/commissioners/.

July 1, 2014 through December 31, 2014 (one-year term to end June 30, 2015)

Chair: Governor Cuomo (New York)
Vice Chair: Governor Markell (Delaware)
Second Vice Chair: Brigadier General Savre (Federal Government)



(from left to right) Commissioner E. Christopher Abruzzo (Pa.), Commissioner Bob Martin (N.J.), Executive Director Steve Tambini, Lt. Col. Michael Bliss (U.S.) and Commissioner Bryan Ashby (Del.) on the banks of the Delaware River at Washington Crossing State Park, N.J. Mr. Tambini was administered the oath of office at a brief ceremony held here in August 2014. (Photo by Tim Boyle/U.S. Army Corps of Engineers)

DRBC News

DRBC Welcomes New Executive Director

Steve Tambini was sworn in as the Delaware River Basin Commission's new executive director at a brief ceremony held on the banks of the Delaware River at Washington Crossing State Park in Titusville, N.J. on August 14, 2014.

"I commit to working with Delaware, New Jersey, New York, Pennsylvania, and the federal government to carry out my oath of office, while meeting our common goals and your unique needs," Executive Director Tambini said. "Together, we will plan for a sustainable future to meet the region's water demands while balancing the need for greater water efficiency. We will use the expertise of the commission's signatory members, DRBC staff, and our many partners to protect, maintain, or improve the basin's water quality."

He was administered the oath of office by New Jersey Department of Environmental Protection Commissioner Bob Martin, who



Commissioner Bob Martin administering the oath of office to Steve Tambini, with Steve's wife, Laura, holding the Bible.
(Photo by Clarke Rupert/DRBC)

Two DRBC Executives Retire in 2014

Carol R. Collier and Bob Tudor both retired during 2014, thus concluding DRBC careers that spanned a combined total of more than 28 years.

Carol Collier served as DRBC's executive director from August 1998 to March 2014, and was the first woman to head an interstate river basin compact agency. Carol's leadership of DRBC was marked by collaboration both inside and outside the commission, including partnerships with co-regulators, non-governmental organizations and water users throughout the region, and by agency-wide initiatives to learn from and consider all perspectives. Throughout her 15-year tenure, Carol was a tireless advocate and spokesperson for watershed-based management nationally and internationally. Notable achievements of the DRBC under Carol's leadership included the development and implementation of a program for reducing PCB loadings to the Delaware Estuary through tailored pollutant minimization plans, expansion of the commission's Special Protection Waters program to include the 76-mile reach of the main stem known as the "Lower Delaware," adoption in 2004 of the Water Resources Plan for the Delaware River Basin, and initiation of a new water audit approach in 2009 for identifying and controlling water loss.

Bob Tudor, who held the post of deputy executive director from October 2001 to June 2014, had management responsibilities for DRBC's scientific, regulatory, and planning programs. He was a strong advocate of managing the Delaware River as a holistic system from the mountains to the sea. Bob shepherded the intensive effort of the Delaware River Basin Flood Mitigation Task Force, convened after the main stem floods of 2004-2006, which returned in less than 10 months a 45-point action agenda for mitigating future flooding impacts. He also guided development of DRBC's 2008 State of the Basin report, the first for the Delaware Basin, which used environmental metrics to inform policy makers and the public. In addition, he was actively involved with the Delaware Bay Oyster Restoration Project, an ongoing effort to revitalize Eastern oysters in the bay, which received an environmental award from the White House in 2008. Prior to joining the DRBC staff, Bob served more than 21 years with the N.J. Department of Environmental Protection. While at NJDEP, he was appointed by Governor Christine Todd Whitman as her alternate on the DRBC from 1998 to 2001.

is the first alternate for Gov. Chris Christie on the DRBC.

Mr. Tambini is a native of New York and a long-time resident of Burlington County, N.J. He brings over 30 years of experience in water supply engineering and water resource planning, management, and operations to the DRBC. His previous work on both the Pennsylvania and New Jersey sides of the Delaware River has allowed him to develop and build

relationships with regulators and stakeholders throughout the basin. He holds a B.S. degree in Civil and Environmental Engineering and a M.S. degree in Environmental Engineering, both from Clarkson University in Potsdam, N.Y. He is a registered professional engineer in New Jersey and New York.

He is only the fourth executive director in the DRBC's 53-year history. He succeeds Carol R. Collier (appointed in 1998) who retired in

March 2014, Gerald M. Hansler (appointed in 1977), and James F. Wright (appointed in 1962). Mr. Tambini's selection, which was announced on March 10, 2014, concluded a national search process undertaken by the commissioners.

Rich Gore Honored for Service as Acting Executive Director

Richard C. Gore was recognized by the commissioners at their September 10 meeting for his exemplary service to the DRBC and the basin as acting executive director from March 13 through July 31, which bridged the time period between Carol Collier's retirement and Steve Tambini assuming the duties of executive director.

The resolution honoring Rich noted that he "demonstrated particular skill and sensitivity to ensure a smooth leadership transition for Commissioners, staff, and DRBC's incoming Executive Director" and "approached his wide-ranging responsibilities over the entire 141-day period with great

enthusiasm and his characteristic 'never had a bad day' attitude."

Rich has been the commission's chief administrative officer since January 1988.

DRBC Staff Help to Lead Interstate Council on Water Policy

DRBC Secretary and Assistant General Counsel Pamela Bush has been named to the Interstate Council on Water Policy's (ICWP) Board of Directors. ICWP is a national organization of state and regional water resource management agencies that promotes integrated water resource management to address water quantity and quality concerns, ground water and surface water management, and economic and environmental sustainability. The board of directors adopts position statements on topics of interest for the organization, such as data collection and sharing, comprehensive planning, and water supply emergency preparedness.

DRBC's Amy Shallcross, Supervisor of the Operations Section in the Water Resource Management Branch, also serves ICWP as the chair of its Water Data Science and Planning Committee. ICWP is a vocal advocate for continued funding of the U.S. Geological Survey (USGS) streamflow monitoring system, and a main focus of this committee is championing support

for this essential real-time stream gage network. Additional committee priorities include water data collection, accessibility and compatibility, model development, and mapping.

As a long-time member of ICWP, DRBC recognizes the value of being a part of this national network of water managers and supports its mission to promote the principles of integrated water resource management.

Successful Partnership Highlighted in Re-Signing of Delaware Estuary Agreement

DRBC Executive Director Steve Tambini joined environmental officials from federal, state, and regional agencies on December 5 for a ceremonial signing of an agreement renewing their joint commitment and responsibility for continued water quality improvements and water supply sustainability in the Delaware Estuary and Bay.

Organized by the Partnership for the Delaware Estuary (PDE), the signing ceremony occurred at its offices in Wilmington, Del. The agreement highlights a unique partnership between PDE, U.S. Environmental Protection Agency (EPA), state environmental agencies in Delaware, New Jersey, and Pennsylvania, DRBC, and the Philadelphia Water Department (PWD). It is renewed every seven years and outlines the roles and responsibilities of these key partners of the Delaware Estuary Program, which was created in 1996.



(from left to right) Commissioner Hank Gruber (U.S.), Chief Administrative Officer Rich Gore, Commissioner Angus Eaton (N.Y., Chair), Commissioner Kelly Heffner (Pa.), Commissioner Bryan Ashby (Del.), Commissioner Dan Kennedy (N.J.), and Executive Director Steve Tambini at the Sept. 10, 2014 DRBC meeting held in the Washington Crossing Historic Park Visitor Center. (Photo by Katharine Schmidt/DRBC)

Executive Director Tambini was one of the featured speakers. His remarks focused on how the mission and activities of the DRBC and the Delaware Estuary Program are closely connected: both emphasize the importance of collaboration and cooperation, utilizing a watershed approach to managing resources, and using sound science to improve water quality, maintain adequate water supply, and plan for future needs.

"Today we renew our ongoing commitment with our estuary partners to join together in planning for a sustainable future to ensure that we have a resilient water inventory to meet the region's needs as well as use our collective expertise to protect and improve water quality throughout the tidal river and bay," said Tambini.

Using tap water pumped from the Brandywine River (a Delaware River Basin tributary), the event

culminated in a toast celebrating the accomplishments that have been achieved jointly through these partnerships since the formation of the Delaware Estuary Program. The signing of the new agreement highlights each agency's continued commitment to work together towards the common goals of an environmentally healthy and economically viable Delaware Estuary and Bay.

20th Delaware River Sojourn a Huge Success

Themed *Sharing the Journey for 20 Years*, the 2014 Delaware River Sojourn was a huge success with a record number of participants, great paddling conditions, and a family-friendly atmosphere that all enjoyed. As one of the longest, continuously running sojourns, celebrating its 20th adventure on the Delaware River in 2014 was a true milestone.

Traditionally held in June to

celebrate National Rivers Month, the Delaware River Sojourn is a guided paddling trip that combines canoeing/kayaking, camping, educational programs, and historical interpretation. Geared for novice to experienced paddlers, participants can sign up for the whole event or for the section(s) or day(s) of their choice. By getting individuals out on the river to experience it first-hand, the Delaware Sojourn aims to promote stewardship of the Delaware River Watershed and its resources.

The 2014 sojourn began on June 22 in Lackawaxen, Pa., with participants spending two days paddling the Upper Delaware Scenic and Recreational River. The group then paddled through the Delaware Water Gap, followed by three days on the lower Delaware River. These first six days of paddling highlighted several sections of the non-tidal Delaware River that are included in the National Wild and Scenic Rivers System. This year's event concluded on June 28 with the sojourners paddling a six-mile round-trip route on the tidal Delaware River between Neshaminy State Park and Bristol, Pa. In all, nearly 65 miles of the Delaware River were paddled in 2014 and the week-long event averaged 100 paddlers each day.

DRBC is a proud supporter of the Delaware River Sojourn and participates on its steering committee, which plans and organizes the annual not-for-profit event. The 2014 committee was co-chaired by Richard Egan, a



Officials make a celebratory toast to the Delaware Estuary Program's past accomplishments and to its future. Pictured (from left to right) are Del. Dept. of Natural Resources and Environmental Control Secretary David Small, Pa. Dept. of Environmental Protection Deputy Secretary for Water Management Kelly Heffner, N.J. Dept. of Environmental Protection Assistant Commissioner for Water Resource Management Dan Kennedy, PDE Board of Directors Chairman Kevin Donnelly, EPA Region 2 Chief of Staff Lisa Plevin, PWD Commissioner Howard Neukrug, EPA Region 3 Administrator Shawn Garvin, and DRBC Executive Director Steve Tambini. (Photo by DRBC)

volunteer with the National Park Service Upper Delaware Scenic and Recreational River, and Ian Kindle, an environmental education specialist with Pennsylvania's Delaware Canal State Park. Learn more by visiting the sojourn's web site at www.delawareriversojour.org.

Recreation Maps Can Now Be Ordered On-Line

Delaware River and Schuylkill River recreation maps became easier for the public to obtain in 2014 when DRBC offered the option of ordering and making payments on-line by using PayPal or a major credit card. Check or money order payments via mail continue to be accepted.

Published in 2007, the 10-section, waterproofed Delaware River recreation map set covers the river's east and west branches prior to their confluence at Hancock, N.Y., the entire 200 mile non-tidal reach of

the river from Hancock to Trenton, N.J., and an additional 25 miles of the tidal river from Trenton to just south of the Betsy Ross Bridge (which connects Northeast Philadelphia and Pennsauken, N.J.). The GIS-based maps depict river channel locations and depths, public access areas, stream miles, and reference points. They also provide a detailed classification of streamflow characteristics in accordance with the International Canoe Federation's Scale of River Difficulty.

The Schuylkill River recreation maps, a 10-section waterproof set published in 2003, cover portions of the Little Schuylkill River, West Branch Schuylkill River, and the main stem Schuylkill River from Port Clinton to the Delaware River in southeastern Pennsylvania.

The popular map sets are intended to serve as a general guide in exploring the many recreational activities offered on the Delaware and Schuylkill rivers. While these maps show river depths and rapids classifications, it is important to remember that actual river conditions may vary. DRBC strongly encourages paddlers to be aware of current weather and



Recreation maps make great holiday gifts! (Image by John Yagecic/DRBC)

river conditions, and always wear a personal flotation device (PFD).

Please visit DRBC's web site at www.nj.gov/drbc/basin/recreation/ to order a map set or for more information.

(Editor's Note: In 2015, the price of the Delaware River recreation map set was reduced from \$25 to \$10.70, while the price of the Schuylkill River map set dropped from \$10 to \$5.35. Both prices include N.J. sales tax and shipping/handling.)

DRBC Hosts Brazilian and Chinese Delegation Visits

The fact that five separate governmental bodies with their own sovereign powers can successfully work together on an equal footing in managing a common resource has caught the eye of other river managers not only in this country, but around the world. This was evidenced once again in 2014 when environmental officials from South America and Asia requested meetings with DRBC staff during fact-finding trips to the United States.



Participants enjoying a break during the 2014 Delaware River Sojourn. (Photo by DRBC)

DRBC staff hosted a delegation from the Agência Nacional de Águas (ANA, or National Water Agency) of Brazil in late July. This visit was arranged with the assistance of the U.S. Army Corps of Engineers (USACE) Mobile (Alabama) District and the USACE Institute for Water Resources (IWR). USACE and ANA are engaged in an ongoing technical exchange of information pertaining to integrated water resource management, and part of this collaboration included a visit to the United States by ANA staff. The majority of the delegation's time in the U.S. was spent visiting various agency offices in Washington D.C., but they took a field trip to West Trenton to learn about the DRBC and its approach to integrated water resource management.

DRBC Communications

Specialist Kate Schmidt was an invited contributor to a section of a December 2014 report, "Aspects of Governing Water Allocation in the U.S.," which was prepared by the USACE IWR for the Brazil ANA as part of the three-year information exchange project.

Later in 2014, DRBC hosted a 20-member delegation from China's Ministry of Environmental Protection at the commission's headquarters. The officials requested to visit the DRBC during their fact-finding journey to the United States to gain a better understanding of the commission's unique approach to managing the water resources in the Delaware River Basin without regard to political boundaries. Presentations during the 2.5 hour visit focused on an overview of the DRBC's organizational structure and programs.

DRBC Informs National Water Resources Discussion

The important work of the DRBC was among the subjects highlighted at the American Water Resources Association's annual conference in November which celebrated 50 years of the AWRA. Several staff members provided presentations on DRBC water quality efforts and water supply programs as well as participated on a Mid-Atlantic river basin commission special session panel. DRBC staff participants included Steve Tambini, Thomas Fikslin, Ph.D., Kenneth Najjar, Ph.D., and David Sayers.

Earlier in the fall, the AWRA's *Water Resources IMPACT* magazine featured an article, "The Delaware River Basin Commission: A Unique Partnership," authored by DRBC Communications Manager Clarke



DRBC, ANA, and USACE staff standing in front of the DRBC office building following their July 2014 meeting. (Photo by Denise McHugh/DRBC)

Rupert. The September issue of the bi-monthly *IMPACT* publication was devoted to the subject of river basin coordination.

Founded in 1964, AWRA is a national, professional association dedicated to the advancement of water resource management, research, and education.

DRBC Staff Volunteers to Rescue Stranded Horseshoe Crabs

Just before retiring from the DRBC, Deputy Executive Director Bob Tudor spent an evening in May volunteering his time to rescue stranded horseshoe crabs. During his shift under the light of the full moon, Bob assisted over 450 horseshoe crabs while walking Moores Beach in New Jersey.

Mid-spring is the time of year when horseshoe crabs emerge from the depths of the ocean to lay their eggs on the beaches of the Delaware Bay. Horseshoe crabs are ancient creatures that have been on the

earth since dinosaurs roamed over 300 million years ago. Although appearing crab-like, horseshoe crabs are more closely related to spiders. The horseshoe crab's blue blood is used to test intravenous drugs, vaccines, and medical devices for bacterial contamination to protect public health.

Each year, Delaware Bay beaches host more breeding horseshoe crabs than anywhere else in the world. When horseshoe crabs wash ashore in the surf, they sometimes become overturned by waves or trapped in jetties or behind bulkheads, which can prove dangerous for them. One partnership, *reTURN the Favor New Jersey*, collaborates with several organizations and individual volunteers to walk New Jersey's public, but seasonally closed, Delaware Bay beaches during spawning season (May-June) to help rescue overturned or trapped crabs.

Timing their arrival to that of the horseshoe crabs, hundreds of thousands of migrating shorebirds land on the beaches of the Delaware Bay. The birds are tired and starving, having flown for thousands of miles from South and Central America where they spend the winter. Their stop at the bay is only temporary. After about two weeks of rest and refueling on the eggs laid by the horseshoe crabs, the shorebirds will have the energy needed for the non-stop, two thousand mile journey to their Arctic

breeding grounds.

Horseshoe crabs and shorebirds are ecologically linked. The crab's eggs are crucial to the birds' survival. Depleted of fat reserves on arrival, shorebirds can double and sometimes triple their body weight during their Delaware Bay layover, which is one of the largest staging areas for shorebirds in North America. Unfortunately, reduced numbers of horseshoe crabs over the years have threatened some species of shorebirds. Reduced numbers of eggs for these birds to eat means that they cannot refuel adequately for their journey to the Arctic and, therefore, less are breeding.

Learn more about the horseshoe crabs, shorebirds, and volunteer opportunities by visiting www.nj.gov/drbc/edweb/special/horseshoe/.



DRBC Executive Director Steve Tambini (*center*) was a featured panelist on "The First and Next 50 Years of Compact River Basin Management in the Mid-Atlantic" special session at the 2014 AWRA annual conference. Other panelists included Interstate Commission on the Potomac River Basin Executive Director Carlton Haywood (*left*) and Susquehanna River Basin Commission Executive Director Andrew Dehoff (*right*). (Photo by DRBC)



DRBC's Bob Tudor volunteered in May 2014 to rescue stranded horseshoe crabs. He is pictured here walking Moores Beach in New Jersey along the Delaware Bay. (Photo by DRBC)

Water Resource Management Branch

Annual Hydrologic Conditions Summary

This brief recap for 2014 was prepared by the DRBC's Operations Section. More detailed information about hydrologic conditions can be found at www.nj.gov/drbc/hydrological.

2014 Highlight Events

Ice Jams in Trenton and Easton

Cold arctic air produced extensive icing throughout the Delaware River Basin (DRB) during January and February. Although frigid temperatures kept the river ice stable and prevented serious flooding, two jams in the lower basin caused localized problems.

In early January, large chunks of ice formed a mile-long jam along the Delaware River at Trenton, N.J. The jam covered the river from bank to bank, causing water to back up and rise to 20.76 feet on January 8, which is above the flood stage of 20 feet. The National Weather Service (NWS), concerned about flash flooding if the jam suddenly

broke apart, issued flood warnings on both sides of the river in New Jersey and Pennsylvania. Fortunately, flash flooding did not occur, but several locations were impacted by ice and water displaced by the jam. In particular, the New Jersey State House garage near the river was shut down for two days and it was necessary to close portions of Route 29 in Trenton and Route 32 in Yardley, Pa. The U.S. Coast Guard sent three ice cutter boats to break apart the jam, but it was not until warmer temperatures arrived a few days later that the ice jam dissipated.

The second ice jam formed on the Lehigh River approximately two miles upstream of Easton, Pa. This jam spilled water and ice onto nearby roadways, prompting the NWS to issue a flood warning in Pennsylvania for portions of Northampton County. Like the Delaware River jam, the Lehigh River jam broke up without any serious flooding problems when air temperatures warmed.



Ice jam on the Delaware River at Trenton during January 2014. (Inset) This ice jam caused water to back up and spill over its banks onto portions of Route 32 in Yardley, Pa. (Photos by John Yagecic/DRBC)

in Pennsylvania locations along the Neshaminy Creek at Langhorne, the Perkiomen Creek at Graterford, the Schuylkill River at Norristown, and the Brandywine Creek at Chadds Ford. Record flooding occurred along the Brandywine at Wilmington, Del., where the creek crested at 20.43 feet, or 1.7 feet higher than the previous record set in August 2011. Flooding did not occur in the upper basin, which received less rainfall.

Precipitation

Twenty-two of the 38 reported DRB counties experienced normal to above-normal precipitation during 2014. Annual precipitation totals ranged from 34.6 inches in Lackawanna County, Pa. (11.1 inches *below* normal) to 56.0 inches in Ocean County, N.J. (10.5 inches *above* normal).

The observed annual precipitation above Montague, N.J. was 42.4 inches (2.9 inches *below* normal), while observed 2014 precipitation above Trenton was 43.2 inches (4.8 inches *below* normal). In contrast to these totals, precipitation in Wilmington, Del. was 50.9 inches (7.8 inches *above* normal) in 2014.

Spring Flooding

Widespread, heavy rainfall of two to six inches fell April 29-30 causing minor to record flooding in portions of the central and lower basin. While the main stem Delaware River was spared, major flooding occurred

Upper Basin Reservoir Storage

The three New York City (NYC) Delaware Basin reservoirs—Cannonsville, Pepacton, and Neversink—are located in the upper DRB on headwater tributaries feeding the main stem Delaware River. Since the combined storage in these three reservoirs did not fall below the

The DRBC's Water Resource Management Branch is comprised of 11 full-time staff in two sections: Operations and Project Review.

drought watch level during 2014, the implementation of DRBC's basinwide drought operating plan was not required.

On January 1, 2014, combined storage in the three NYC Delaware Basin reservoirs was 233 billion gallons (bg), which is 86% usable capacity and approximately 8 bg above the long-term median for that date. Combined storage dropped below the long-term median in early March, but rainfall combined with melting snowpack refilled the reservoirs to 100% usable capacity by mid-April. Combined storage

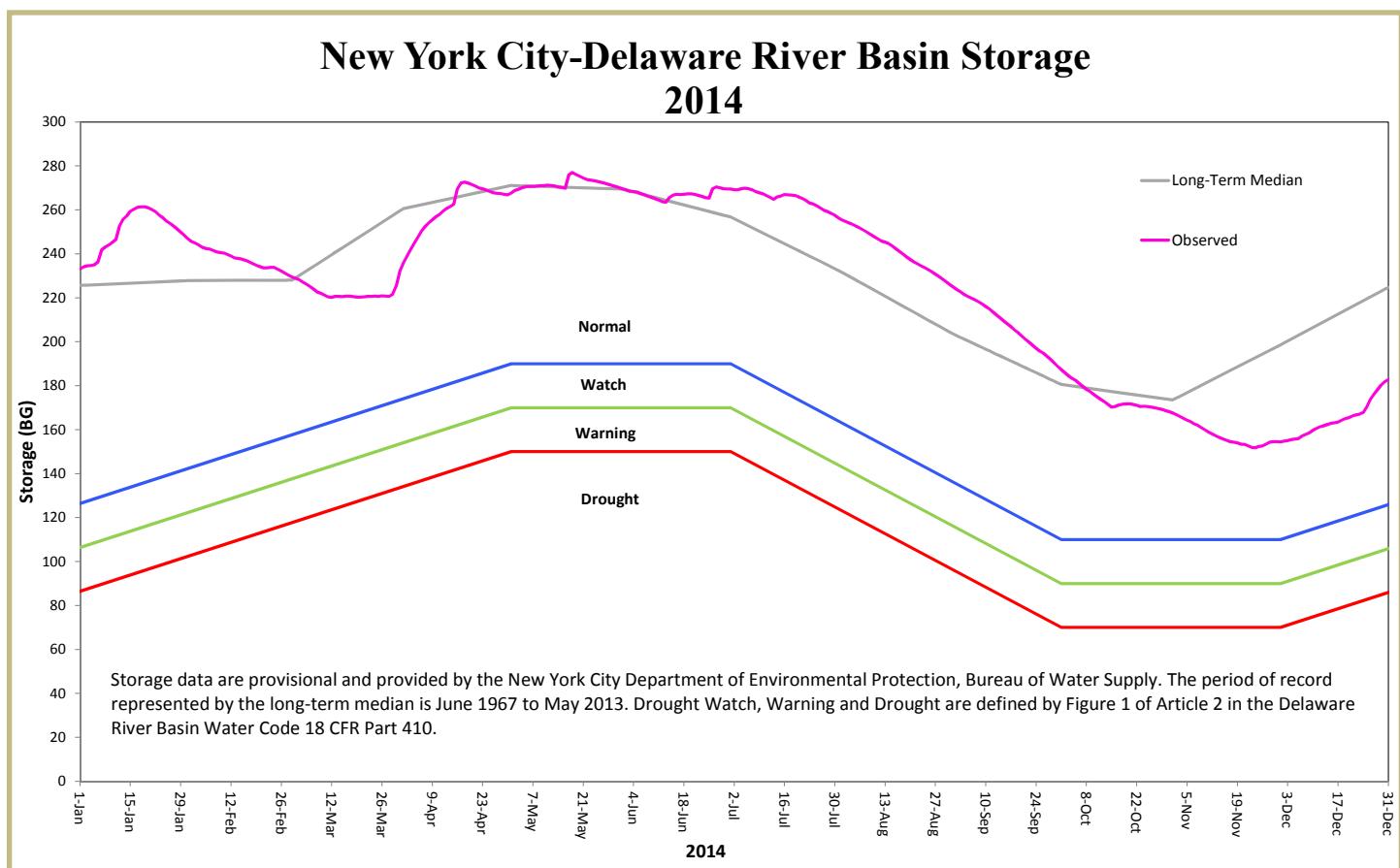
seasonally declined as the year continued, but remained above the long-term median for most of the summer. Drier conditions caused storage to drop below the median in early October, where it would remain through the end of the year. On December 31, combined storage was 183 bg, which is 68% usable capacity and 42 bg below the long-term median storage for the last day of the year.

The Office of the Delaware River Master directed releases from the NYC Delaware Basin reservoirs totaling approximately 43 bg from

August through November to meet the normal flow objective of 1,750 cubic feet per second (cfs) in the Delaware River at Montague as required by the 1954 U.S. Supreme Court Decree. For comparison purposes, directed releases to meet the Montague minimum flow target totaled nearly 25 bg in 2013 and 101 bg during the drought year 2001.

Lower Basin Reservoir Storage

Both Beltzville Reservoir (located on the Pohopoco Creek, a tributary of the Lehigh River) and Blue Marsh Reservoir (located on the



This graph shows the observed combined water storage in the NYC Delaware Basin reservoirs (Cannonsville, Pepacton, and Neversink) during 2014, as well as the long-term median and drought rating curves.

Tulpehocken Creek, a tributary of the Schuylkill River) maintained storage in the normal range during 2014. Consequently, the DRBC's lower basin drought operating plan was not implemented.

The commission directed a total of 3.7 bg from Beltsville Reservoir during September, October, and November to maintain the Delaware River flow objective of 3,000 cfs at Trenton. In addition, a total of 0.6 bg was directed from Blue Marsh Reservoir during late September and early October to meet the Trenton minimum flow target.

No releases were made from Merrill Creek Reservoir during 2014. Storage in this reservoir, located near Phillipsburg N.J., is used to replace evaporative losses (consumptive use) caused by power generation when the basin is under DRBC-declared drought operations and the equivalent average daily flow target for the Delaware River at Trenton is below 3,000 cfs.



The Merrill Creek Reservoir was designed to provide makeup water for riverbank electric generating plants during low flow conditions on the Delaware. It became operational in 1988.

Streamflow

Monthly mean streamflow observations at select stations along the main stem Delaware River and its two largest tributaries, the Schuylkill and Lehigh rivers, were above normal during January, but fell to below-normal levels through early spring. Flows at these stations improved after rainfall kept flows in the normal to above-normal range during the spring and summer months. Heavy rainfall in the lower basin during the last days of April produced many of the year's highest streamflows.

Drier conditions returned to the basin by late summer and flows declined accordingly. By November, monthly flows on the Delaware River at Montague and Trenton averaged only 45% and 38% of normal, respectively. Similarly, November monthly flows on the Lehigh River at Bethlehem, Pa. and on the Schuylkill River at Philadelphia averaged only 32% and 50% of normal, respectively. Streamflow observations at the select stations averaged normal to below normal through the end of 2014.

Salt Front

The salt front or salt line is defined as the 250 parts-per-million (or milligram-per-liter)

chloride concentration. The seven-day average location of the salt front is used by DRBC as an indicator of salinity intrusion in the Delaware Estuary. The salt front's location fluctuates along the Delaware River as streamflow increases or decreases in response to changing inflows, diluting or concentrating chlorides in the river.

The farthest upstream location of the salt front during 2014 was river mile (RM) 84 in October. This location is six miles upstream of the Pennsylvania-Delaware state line. In comparison, the salt front reached RM 102 (two miles upstream of the Benjamin Franklin Bridge) during the 1960's drought of record.

DRBC Helps Announce Grants for Water Quality Improvement Projects in the Schuylkill Watershed

DRBC staff participated in the Schuylkill River Restoration Fund (SRRF) awards ceremony in September 2014 to help announce the distribution of over \$330,000 to various water quality improvement projects throughout the Schuylkill River Watershed. The Schuylkill is the Delaware River's largest tributary and a source of drinking water for 1.5 million people.

The ceremony took place at the Cook Wissahickon School in Philadelphia, which was awarded SRRF grant monies in 2012 to convert part of its school grounds to a native meadow that would help reduce stormwater runoff from the school property and enhance the habitats of nearby Fairmount

Park. The school was also one of the 2014 grant recipients, with the new funding to go towards building a second phase of the meadow project.

The \$337,465 distributed from the SRRF in 2014 will directly support six projects and one land transaction grant. In addition to Cook Wissahickon School, recipients included the Berks County Conservancy, Berks County Conservation District, Borough of Pottstown, Schuylkill Headwaters Association, and Lower Frederick Township. The funded projects will mitigate stormwater runoff and agricultural pollution, while the land transaction grant will help to permanently protect priority watershed parcels.

Award ceremony speakers included DRBC Executive Director Steve Tambini, along with Schuylkill River Heritage Area (SRHA) Executive Director Kurt Zwickl, Kelly Anderson with the Philadelphia Water Department (PWD), Chris Gerdes with Exelon Generation Limerick Generating Station, and Cook Wissahickon Principal Melanie Lewan. Teachers Diane Powers and Jose Ramos, along with students who helped create the native meadow, also provided remarks.

Contributors to the SRRF in 2014 included Exelon Corporation, PWD, Aqua PA, and MOM's Organic Market. Administered by SRHA, the fund was originally created under a DRBC docket approved in 2004 and Exelon Generation's desire to support restoration efforts in the Schuylkill River and its tributaries.

Through 2014, the SRRF has awarded over \$2 million to 62 projects that help reduce pollution entering the Schuylkill River and its tributaries. DRBC is one of several entities serving on an advisory committee that chooses which projects get funded annually and approves the projects that are selected for funding using the Exelon funds.

For more information, please visit www.nj.gov/drbc/programs/project/limerick/schuylkill.html.

Project Review/Permitting

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 ..." In accordance with Section 3.8 of the Compact, 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 commission provides by regulation for the procedure of submission, review, and consideration of projects and for its determinations pursuant to Section 3.8.

During 2014, the commissioners approved 140 project permits (referred to as "dockets") at the DRBC's four quarterly business meetings. Prior to any action taken by the commissioners, the projects are the subject of a public hearing and comment period to provide interested persons the opportunity

to offer written or oral comments. Nearly 80% of the dockets were issued to wastewater treatment or groundwater withdrawal projects. Docket applications are reviewed by the DRBC Water Resource Management Branch with support provided by the Modeling, Monitoring and Assessment Branch, as needed.

Additional information can be found on the DRBC web site at www.nj.gov/drbc/programs/project/.

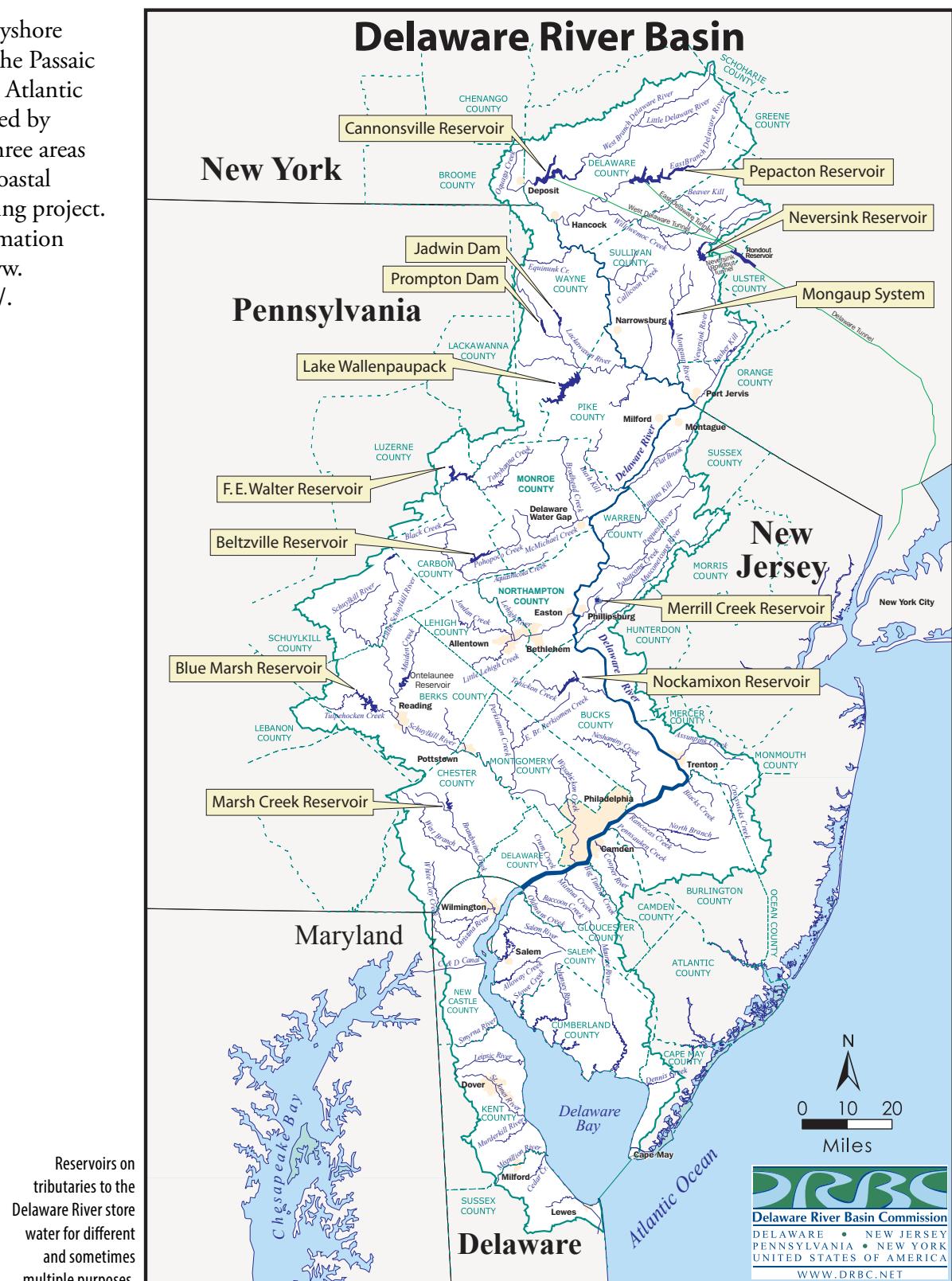
DRBC Assists New Jersey to Improve Community Flood Risk Awareness

Beginning in 2013 and extending through 2014, DRBC assisted the New Jersey Department of Environmental Protection with outreach to local Bayshore governments and, along with the Nurture Nature Center, customized flood risk mitigation messaging for the state's Bayshore communities.

Federal Emergency Management Agency (FEMA) Region II and New Jersey recently updated regulatory Flood Insurance Studies (FIS) and Flood Insurance Rate Maps (FIRM) as well as non-regulatory flood risk tools for the state's Delaware Bay communities in Camden, Gloucester, Salem, Cumberland, and Cape May counties. The goal of the Coastal Outreach Program was to increase public, community, county, state, and congressional understanding of the updated analysis and mapping of coastal flood risks from storm surge, and to facilitate the reduction of flood risk by increasing community resilience.

The Delaware Bayshore region, along with the Passaic River Basin and the Atlantic Coast, were identified by New Jersey as the three areas prioritized in the Coastal Analysis and Mapping project.

Additional information can be found at www.region2coastal.com/.



The Delaware River: Wild, Scenic . . . and Managed

DRBC Operations Section Supervisor Amy Shallcross, P.E. authored the following article that appeared in the Summer 2014 issue of *Estuary News*, which is published by the Partnership for the Delaware Estuary.

The Delaware River has no reservoirs or dams on its main stem. Water flows freely and unimpeded from the confluence of the East and West Branches, where the Delaware River forms, all the way to the estuary. Approximately half of the river miles on the main stem are designated as part of the National Wild and Scenic Rivers System. Congress created this system to preserve certain rivers or sections of rivers in a free-flowing condition for present and future generations. Two sections of the river, totaling 113 miles, were designated as Wild and Scenic in 1978. Another 39 mile section was designated in 2000.

The flow in the Delaware River is somewhat managed by flow management policies and dams, located in upstream tributaries within the basin. These dams and resulting reservoirs store water for different and multiple purposes such as flood damage reduction, water supply, recreation and power generation. Combined, these reservoirs control roughly 21% of the drainage area along tributaries above Trenton, New Jersey.

Reservoir releases are made to support ecological systems and reduce locally high in-stream temperatures. They are also made to maintain a constant reservoir elevation (normal pool), support recreation (white water), or create extra room for the capture of floodwaters. Depending on the purpose of the reservoir, additional releases may be made to achieve specific flow objectives or to support multiple goals. In some cases, reservoir operators use rainfall and runoff predictions to determine if there is extra water to release for beneficial uses. During dry periods, some reservoir operators have agreed to release water to maintain river flows. Doing so can relieve the impacts of droughts because water in addition to what nature can provide is now available for use.

During low flow periods, reservoir operators are typically required to make minimum conservation releases to ensure a specific amount of freshwater flows downstream and ultimately into the estuary. Assurance of freshwater inflows is achieved by releasing water to meet flow objectives at two specific locations. Trenton, New Jersey, at the head of tide, is one such location.

The flow objective at Trenton ranges from 2,500 cubic feet per second (cfs) to 3,000 cfs, depending on reservoir storages, season, and salinity (saltiness) in the estuary. Prior to the establishment of the flow objective in the 1980s, the minimum recorded daily flow at Trenton was 1,240 cfs and occurred in October 1914 and in July 1965. By increasing freshwater flows in the river, the reservoirs and flow objectives have improved the basin's drought resilience.

The other location with a flow objective is Montague, New Jersey. It ranges from 1,100 cfs to 1,750 cfs. Releases from three reservoirs, located in New York State, are used to meet the flow objective. Cannonsville Reservoir, located on the Delaware's West Branch, is the reservoir that is typically used to do so. Reservoir operators may also make releases from Neversink and Pepacton Reservoirs. Releases from Lake Wallenpaupack and the Mongaup System are used to generate hydropower, which may reduce the amount of water that is needed to meet the flow objective from the other three reservoirs.

In Pennsylvania, there are five other reservoirs, which are operated by the U.S. Army Corps of Engineers (USACE), specifically constructed for flood damage reduction. Jadin and Prompton are located in Northeast Pennsylvania and have what are known as uncontrolled outlets. This means the outflow from the reservoirs cannot be adjusted. Much of the time, the inflows are immediately released downstream. During high flow events, water is stored because inflows to the reservoirs exceed the amount of water that can be released through their outlet works. The other three USACE reservoirs are F.E. Walter and Beltzville in the Lehigh River Valley and Blue Marsh in the Schuylkill River Valley (downstream from Trenton). F.E. Walter is used for flood damage reduction and recreation (white water releases). Beltzville and Blue Marsh are used to increase freshwater flows into the estuary during dry periods and for water supply. During normal conditions when these reservoirs are full, releases are made to maintain the normal pool elevation. With the exception of refilling if below the normal pool elevation, releases will be nearly equal to the reservoirs' inflow.

Some water within the basin is controlled by dams, reservoirs and flow management programs. However, there is little control of the streamflow coming from much of the Delaware River's drainage area. During low and high flow events, the reservoirs and flow management programs result in beneficial outcomes, particularly drought resiliency and flood damage reduction. The development of these reservoirs in tributary basins has allowed the Delaware River to remain the longest undammed river in the eastern United States.

Modeling, Monitoring and Assessment Branch

Enhanced Implementation of PCB TMDLs in Preparation for Next Step

At the request of Delaware, New Jersey, Pennsylvania, and the U.S. Environmental Protection Agency (EPA), DRBC is leading a program to reduce PCB contamination in the Delaware Estuary to eliminate the need for existing state-issued fish consumption advisories. The estuary extends from the head of tide at Trenton, N.J. downstream to the mouth of the Delaware Bay where it meets the Atlantic Ocean.

PCBs, or polychlorinated biphenyls, are a class of carcinogenic chemicals present in the waters of the Delaware Estuary at concentrations 100 to 1,000 times higher than the water quality criteria. Widely used in transformers, capacitors, and other electrical equipment, the U.S. banned the manufacture of PCBs in 1976. Existing uses were permitted, however, and their chemical stability allows them to persist in the environment to this day. There are numerous sources of PCBs in the Delaware Estuary, which enter fish and other wildlife through absorption or ingestion, and accumulate in their tissues at levels many times higher than in the surrounding water and sediment, and at levels presenting a health risk for human consumption.

Because high levels of PCBs have resulted in state-issued fish consumption advisories for certain species caught in the Delaware Estuary, these waters were and continue to be listed as impaired,

requiring the establishment of a PCB total maximum daily load (TMDL). A TMDL expresses the maximum amount of a pollutant that a water body can receive and still attain water quality standards.

DRBC, working closely with its Toxics Advisory Committee and others, developed the technical basis for Stage 1 PCB TMDLs. As a result of this work, EPA established Stage 1 TMDLs for the tidal Delaware River in 2003 and for the Delaware Bay in 2006.

DRBC monitors ambient waters, sediment, and fish tissue to provide data on PCB concentrations in the estuary. DRBC also works with the three estuary states to ensure consistent effluent monitoring requirements as well as the development and implementation of PCB reduction plans by wastewater dischargers. As a result of these efforts, PCB loadings from the 10 dischargers that contribute 90% of total point source loadings decreased 71% between 2005 and 2013. In addition,

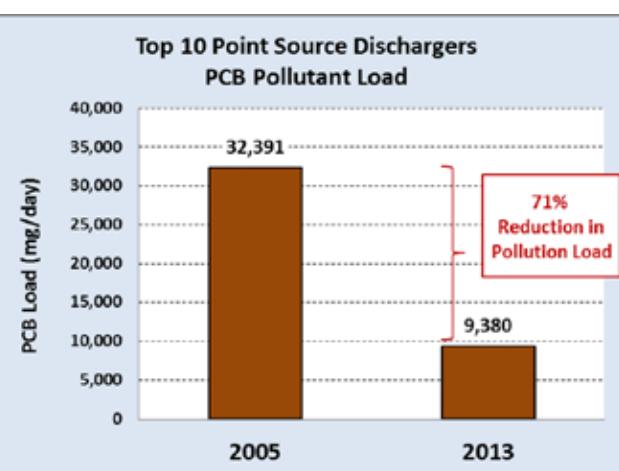
Delaware and New Jersey in 2013 lifted the "Do Not Eat" fish consumption advisory for the tidal Delaware River between the Pennsylvania-Delaware state line downstream to the eastern end of the C&D Canal near Delaware City (the current recommendation is no more than one meal

per year for the general population).

In December 2013, DRBC approved a revision to its human health water quality criteria for protection from carcinogenic effects of PCBs in the Delaware Estuary.

DRBC unanimously approved a resolution in September 2014 directing the executive director and commission staff to complete and submit to the EPA the final documentation for Stage 2 TMDLs for PCBs in the estuary corresponding to the revised criteria adopted by DRBC in 2013. The resolution also requests that EPA Regions 2 and 3 establish the new Stage 2 TMDLs to replace the earlier Stage 1 TMDLs.

It is hoped that an updated implementation strategy under development by DRBC, state and federal regulators, and dischargers will advance our region toward the goal of unlimited consumption of Delaware River fish and a healthier estuarine environment.



The top 10 dischargers responsible for 90% of the point source PCB loadings have reduced their contributions 71% from 2005-2013.

For more information, please visit the DRBC web site at www.nj.gov/drbc/quality/toxics/pcbs/.

DRBC Continues to Partner to Monitor Juvenile American Shad

In September and October 2014, DRBC staff members provided their expertise to count numbers of juvenile American shad in the Delaware River at two different sites that are included in a joint effort undertaken by state and federal fisheries biologists. Juvenile American shad, called young of year (YOY), are those that are born in the spring and spend their first

summer in the river. As the water temperatures cool, they travel south to overwinter in the warmer waters.

American shad, a member of the herring family, are anadromous fish, meaning they are born in fresh water, live for several years as adults in the ocean, and return to their natal waters (where they are born) to spawn (lay their eggs) in the spring. Historically, American shad have spawned in the main stem Delaware River, as well as in several of its tributaries. Today, the Delaware River continues to support American shad, thanks in part to the absence of dams on the main stem river and to water quality that has seen significant improvement over the years due to efforts of DRBC and other stakeholders.

To help determine how well the fishery is doing each year, YOY shad numbers are monitored in late summer and the fall as they travel downriver to the estuary. The shad are collected by seining, using a large net to catch the fish in the river. Other fish species are also caught, and the fisheries team must then sort and identify which are YOY shad so their numbers can be recorded. In August, September, and October, four different sites—Trenton, N.J., Phillipsburg, N.J., Delaware Water Gap, Pa., and Milford, Pa.—are monitored once monthly, for a total of 12 data points annually. The data collected from these surveys support an approved management plan that is in place to ensure that the fishery remains viable and sustainable.

In 2014, DRBC staff participated

The DRBC's Modeling, Monitoring and Assessment Branch is comprised of seven full-time staff and one shared administrative assistant in two sections: Modeling Section and the Standards and Assessment Section.



Monitoring for YOY American shad in October 2014 at the Phillipsburg, N.J. boat launch. DRBC Senior Aquatic Biologist Erik Silldorff is pictured here helping to sort and catalogue the collected fish during the non-tidal YOY shad survey.
(Photo by DRBC)

in several of the voluntary and cooperative survey efforts. Staff helped seine, sort, and count the numbers of YOY shad collected.

For more information, please visit www.nj.gov/drbc/edweb/special/shad/.

DRBC Water Quality Monitoring

You can't manage what you don't measure. This tenet is the basis of DRBC's water quality monitoring programs, which play a key role in the commission's management of the Delaware River's water resources.

DRBC regulates the waters of the basin through established water quality criteria that protect both human health and aquatic life. DRBC's monitoring programs provide a mechanism to evaluate whether the criteria are being met.

Here are some examples of DRBC staff activities during 2014, which can also be viewed on the commission's web site at www.nj.gov/drbc/home/newsbytes/approved/20140616_summer-monitoring.html.



DRBC staff members John Yagecic (right) and Jerrell Spotwood collect a Delaware Bay water sample to analyze for primary productivity. (Photo by DRBC)

Primary Productivity Monitoring in Delaware Bay

DRBC staff collected samples from the Delaware Bay in May 2014 to be analyzed for primary productivity, which indicates the water's capacity for growing phytoplankton. These results will help DRBC scientists better understand the relationships between nutrients (for example, nitrogen and phosphorus), the growth of phytoplankton, and healthy levels of dissolved oxygen in

the Delaware Bay. Sample analysis was completed by the University of Maryland.

Toxicity Monitoring in the Tidal Schuylkill River and Crosswicks Creek

Monitoring toxicity is an essential component of programs designed to protect water quality and assess compliance with regulatory standards. Based on DRBC's water quality regulations for the Delaware Estuary, no adverse effects on aquatic life should be observed in short-term and long-term toxicity tests with undiluted ambient water. DRBC conducts periodic monitoring of ambient water toxicity in the Delaware Estuary to assess any toxicity. Staff sampled the tidal Schuylkill River in Pennsylvania as well as Crosswicks Creek in New Jersey during 2014.

Radiochemistry Monitoring

In advance of adopting natural gas development regulations, DRBC has been working to characterize

Additional photos on DRBC's monitoring activities can be found on its Flickr page at www.flickr.com/photos/drbc1961/collections/.

pre-drilling water quality conditions in the non-tidal Delaware River Watershed. Toward this end, DRBC has performed significant monitoring to characterize baseline specific conductance, biological condition, and water chemistry relating to hydraulic fracturing.

The commission realized, however, that additional information was needed to characterize background pre-fracturing naturally occurring radioactive materials (NORMs). Under this project, supported by funding from the William Penn Foundation, DRBC will strengthen the protection of the basin's water quality against potential future natural gas development impacts by collecting baseline radiochemistry data.



DRBC's Ron MacGillivray collects mid-depth water samples to monitor for ambient toxicity in the tidal Schuylkill River in August 2014. (Photo by DRBC)



DRBC's Tom Fikslin pilots the sampling boat to the next ambient toxicity monitoring station in the tidal Schuylkill River in August 2014. (Photo by DRBC)



DRBC's John Yagecic collects a surface water sample for radiochemistry monitoring in May 2014. (Photo by DRBC)

For this investigation, DRBC performed one year of quarterly monitoring for radiochemistry, including alpha and beta emitters, radium-226, and radium-228 at 33 water quality control points in the upper and middle Delaware River Basin. The survey kicked off in January 2014, with staff collecting surface water samples from various bridges crossing the Delaware River. Additional information can be found at www.nj.gov/drbc/programs/natural/baseline-monitoring.html.

Delaware Estuary Boat Run Data Explorer Application

Thanks to the efforts of DRBC Standards and Assessment Section Supervisor John Yagecic, this interactive application allows the user to explore water quality data collected from the commission's Delaware Estuary Boat Run Monitoring Program over the period 1999-2013. The data are displayed as box plots by river mile or by month and include the following water quality parameters: water temperature, salinity, nitrate + nitrite, dissolved oxygen, secchi depth, and turbidity.

Initiated in 1967, the Delaware Estuary Boat Run is one of the longest running monitoring programs in the world. Each year, DRBC contracts with the Delaware Department of Natural Resources and Environmental Control to collect water samples in the Delaware Estuary, from the head of tide at Trenton, N.J. to the mouth of the Delaware Bay. Samples are

collected at 22 stations once monthly from April to October.

Additional information can be found at www.nj.gov/drbc/quality/datum/ambient/explorer-app.html.

Delaware River and Bay Water Quality Assessment Report 2014

Every two years, the DRBC compiles a Delaware River and Bay Water Quality Assessment Report for EPA, which provides an assessment of the Delaware River and Bay's support of various uses during previous years. The uses, which are protected by the DRBC's Water Quality Regulations or by the federal Clean Water Act of 1972, are:

- Protection and propagation of aquatic life;
- Providing a raw water source for human consumption;
- Swimming and recreation;
- Fish consumption; and
- Shellfish consumption

The assessment compares levels of key water quality indicators (pH, for example) with DRBC stream quality objectives and identifies those that do not meet standards. DRBC regulations define "zones" in the Delaware River to which the stream quality objectives are applied, and the report assesses water quality based in part upon those zones.

Data used for the report come from a variety of sources. The foundation for the assessment comes from DRBC's three water quality monitoring programs that cover different sections of the Delaware River. These include the Scenic Rivers Monitoring Program (from

Hancock, N.Y. to the Delaware Water Gap), the Lower Delaware Monitoring Program (from the Delaware Water Gap to Trenton, N.J.), and the Delaware Estuary Boat Run Program (from Trenton to the mouth of the Delaware Bay). In addition, data from a variety of other sources are utilized in making the water quality assessments, including the U.S. Geological Survey, Pennsylvania Department of Environmental Protection (DEP), Delaware Department of Natural Resources and Environmental Control, New Jersey DEP, and EPA. The data sets considered in the assessment include all readily available data; in addition, a solicitation for data was published in the Federal Register. DRBC provides its findings to the basin states for consideration in their listing determinations under the federal Clean Water Act section 303(d).

Additional information can be found at www.nj.gov/drbc/quality/reports/quality/.



DRBC's Bob Limbeck records water quality data at the Portland (Pa.) foot bridge in May 2013 as part of the Scenic Rivers Monitoring Program. (Photo by DRBC)

DRBC Staff Called On to Share Knowledge and Experience

The work of the Modeling, Monitoring and Assessment Branch has not gone unnoticed, as evidenced by the multiple invitations extended to staff to speak at conferences, workshops, and other events during 2014. Here is a sampling:

- Standards and Assessment Section Supervisor John Yagecic and Senior Aquatic Biologist Bob Limbeck were invited to present at the National Water Quality Monitoring Council's 9th National Monitoring Conference in Cincinnati, Ohio. This biennial conference is attended by water quality monitoring professionals from state and federal agencies, interstate commissions, universities, and consulting firms. With its main focus on water quality monitoring, the conference

highlights new findings and technical innovations, as well as cutting edge tools in monitoring, assessment, and reporting. This year's conference included an emphasis on continuous real-time monitoring systems. Visit www.nj.gov/drbc/home/newsbytes/approved/20140506_NWQMC.html for more information.

- Senior Environmental Toxicologist Ron MacGillivray, Ph.D. participated in a roundtable panel discussion hosted by the Delaware Section of the American Water Resources Association (AWRA) in September. Themed "Pharmaceuticals and Personal Care Products (PPCPs) in Water," Dr. MacGillivray's presentation focused on the commission's research investigating the presence of contaminants of emerging concern (CECs) in the Delaware River Basin. CECs are chemicals that have been found to persist in the environment, but are not routinely monitored for and are currently unregulated. Examples include PPCPs, stain repellents and fire-fighting foams, flame retardants, and hormones. Although most of these compounds have been detected in surface waters at very low concentrations, there is concern about how CECs may impact drinking water quality and the river's ecology. Increased interest in these substances and their toxic effects by scientists, the public, and regulators is occurring due to improved analytical methods and a growing body of information on their adverse effects. A leader in water quality initiatives in the basin, DRBC recognized years ago the need to understand the sources, source pathways, persistence, and fate of CECs, as well as how they degrade in surface water. For additional information, please visit www.nj.gov/drbc/quality/reports/emerging/.
- The DRBC's ongoing work to reduce PCB contamination in the Delaware Estuary was a commonly requested subject for staff speakers. Modeling, Monitoring and Assessment Branch Manager Tom Fikslin, Ph.D. presented on *Incremental Progress Toward the PCB Water Quality Standard in the Delaware Estuary* at the New Jersey Water Environment Association's conference in May and on *Implementing Complex TMDLs for PCBs in the Delaware River Estuary* at the AWRA's annual conference in November. Senior Geologist Greg Cavallo presented on *PCBs in the Pennypack Creek, Philadelphia – Potential Sources* to the Pennypack Ecological Restoration Trust in January and on *Evaluation of PCB TMDL Efforts in the Delaware Estuary* before the New Jersey Clean Water Council in June.



DRBC's Tom Fikslin describes the commission's ongoing work to reduce PCB contamination in the Delaware Estuary as part of a session on Water Quality Standards and TMDLs during the 2014 AWRA conference. (Photo by DRBC)

Planning and Information Technology Branch

DRBC'S New Water Loss Reporting Program Helps Track Water Supply Efficiency in the Basin

The DRBC has long recognized the importance and value of using water wisely at all times, not just during times of drought. The commission has an ambitious water conservation program in place, the newest component being its water loss reporting initiative for public water suppliers. This new water audit initiative is part of the commission's ongoing efforts to ensure progressive water resource management and enhance water conservation in the basin by helping to decrease water demand at the source, reduce treatment costs, and improve system efficiency.

DRBC approved a regulation in 2009 requiring public water suppliers to implement a new water audit approach established by the International Water Association and the American Water Works Association (AWWA) beginning with calendar year 2012. The new approach, which reflects the latest thinking in the field of water efficiency, utilizes the AWWA Free Water Audit Software© program for data collection and reporting. The software tracks how effectively water is moved from its source to customers' taps, helping public water supply systems quantify and account for their water losses. The first reports covering 2012 were due to the commission by March 2013, with subsequent reporting required annually thereafter.

In the spring of 2014, DRBC released the summary results from the first year of reporting which

indicated that *approximately 150 million gallons of treated and pressurized water is lost from public water supply distribution systems in the Delaware River Basin every day*.

The reported loss of approximately 150 million gallons a day is considered non-revenue water, or water that is treated, but "lost" before it reaches the customer. These losses may be real or physical losses (resulting from leaks, for example) or apparent losses (such as through theft or metering inaccuracies).

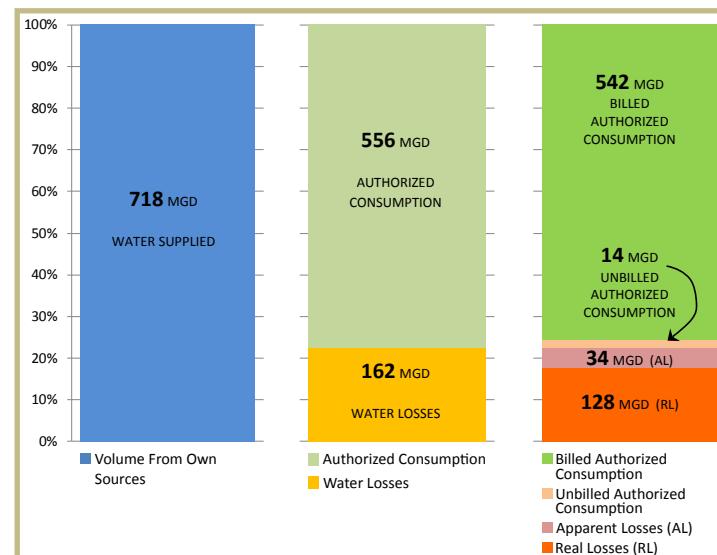
The first year of data collection under the DRBC's water audit program marks a significant step in a long-term effort to improve water efficiency and promote best practices in water loss

control for basin water purveyors. During the first few years of the program, the emphasis will be on ensuring water purveyors build confidence in the data submitted in the water audit.

Developing and providing accurate data to the water audit process will result in a clearer understanding of the causes

The DRBC's Planning and Information Technology Branch is comprised of eight full-time staff and one shared administrative assistant in two sections: Water Resource Planning Section and the Information Technology and Water Use Section.

of water loss and is a vital first step in the process (akin to "if you don't measure it, you can't manage it"). Once a sufficient baseline dataset has been established, it is anticipated that DRBC will adopt a selection of performance indicators and metrics



Billed Authorized: All consumption that is billed to customers of the utility; this includes metered and unmetered connections.

Unbilled Authorized: All consumption that is unbilled, but is still authorized by the utility. This is likely to include water used in activities such as firefighting, flushing of mains and sewers, street cleaning, and fire flow tests. It may also include water consumed by the utility itself in treatment or distribution operations, or metered water provided to civic institutions free of charge.

Water Losses can be **Real Losses** (through leaks, also referred to as physical losses) or **Apparent Losses** (for example, through unauthorized consumption or metering inaccuracies).

DRBC water audit program summary for calendar year 2012, including an aggregate of 232 individual water systems.

against which it will assess water system performance.

The DRBC is one of only a handful of regulators in the U.S. that has made the AWWA Water Audit Methodology a regulatory requirement. DRBC staff worked with the AWWA Water Loss Control Committee to help develop the new software that implements the water audit approach. Additionally, DRBC's Water Management Advisory Committee was instrumental in developing the commission's water audit rule and in engaging water purveyors from the basin in a nationwide pilot study.

The DRBC would like to recognize the efforts of those water utilities that submitted their water audits for 2012 and their contribution to making the first year of the DRBC's new water audit program a success.

Additional information can be found on the commission's web site at www.nj.gov/drbc/programs/supply/audits/.

DRBC's Commitment to Basinwide Water Resource Planning Marks Another Milestone

The year 2014 marked the 10th annual implementation progress report for the *Water Resources Plan for the Delaware River Basin* (Basin Plan).

Compiled by DRBC staff, the implementation progress report highlights the efforts of various agencies and local partners to restore and protect the water resources of the Delaware River Basin and maintain the Delaware River as a system of national significance.

The following were among the many examples of successful programs and projects compiled in the 2014 implementation progress report presented to the commissioners:

- The state of Delaware established the Clean Water for Delaware's Future initiative, a plan to protect public health and clean up the state's waterways within a generation;
- The Partnership for the Delaware Estuary developed a living shorelines monitoring framework that the scientific and management community can use to validate that installed projects address shoreline erosion, minimize property loss, and protect habitat;
- The Pinchot Institute for Conservation and the Common Waters Partnership worked with the Model Forest Policy Program to write *Adapting to a Changing Climate: Risks and Opportunities for the Upper Delaware Region*, a plan that addresses how to protect the region's excellent water resources as the climate changes;
- The Musconetcong River Restoration Partnership, made up of federal, state, local, and non-profit organizations, received the prestigious Coastal America Partnership Award for a dam removal project that will enhance freshwater flows and improve water quality; and
- The successful inaugural year of *Schuykill Acts and Impacts: An Expedition to Inspire Watershed Action*, an applied service-learning

program piloted by the Schuylkill Headwaters Association in collaboration with Outward Bound Philadelphia.

With powers and duties emanating from the Delaware River Basin Compact which created the commission in 1961, DRBC is the only agency in the region with a mandate to conduct basinwide watershed planning. As directed by the four governors and the federal government, DRBC led the development of the 2004 Basin Plan, a 30-year, goal-based framework that serves as a guide for all governmental and non-governmental stakeholders whose actions affect water resources in the basin. It is the product of a four-year stakeholder process, which included the establishment of a broad-based Watershed Advisory Council to provide guidance to the commission with the plan's development.

The Basin Plan is organized into five key result areas (KRAs), each with its own goals and objectives: Sustainable Use and Supply (KRA 1); Waterway Corridor Management (KRA 2); Linking Land and Water Resource Management (KRA 3); Institutional Coordination and Cooperation (KRA 4); and Education and Involvement for Stewardship (KRA 5).

The annual implementation progress reports, along with information about the Basin Plan, can be found at www.nj.gov/drbc/programs/basinwide/plan/.

Basin News Briefs

People News

The DRBC works with numerous agencies, organizations, and other stakeholders throughout the basin. Two of these partners experienced leadership changes in 2014 due to retirements.

Upper Delaware – National Park Service

Sean McGuinness, the superintendent of the Upper Delaware Scenic and Recreational River since February 2010, retired in January 2014. His career with the National Park Service (NPS) spanned over 30 years and also included assignments in Wyoming, Alaska, Mississippi, Oregon, California, and Washington, D.C.

The 73-mile stretch of the river associated with this NPS unit, which extends from the confluence of the Delaware's East and West branches at Hancock, N.Y. downstream to Milrift, Pa., was added to the National Wild and Scenic Rivers System by Congress and President Jimmy Carter on November 10, 1978. Nearly all of the land along this 73-mile-segment is privately owned.

Sean's successor is Kristina Heister, who began her new duties in July 2014. A life-long resident of Pennsylvania with over 20 years of NPS experience, Kris is only the sixth superintendent since the park unit was designated in 1978.

Water Resources Association

Bob Molzhan, who held the post of president of the Water Resources

Association of the Delaware River Basin (WRA) since June 2001, retired at the end of 2014. An active and valued member of the WRA for 36 years, Bob represented his member's views on a variety of issues while enhancing communication with the commission. He served as chair of DRBC's ad hoc Water Charges Advisory Committee and the Water Management Advisory Committee, which during his chairmanship played an important role in developing the new and innovative water loss accountability program adopted by the commission in 2009.

Established in 1959 by representatives from industry, public and private utilities, and other entities with diverse water interests, the WRA has contributed valuable input into initiatives of the DRBC and other agencies with water resource management responsibilities across the four basin states.

The DRBC looks forward to working with his successor, Kathy Klein, who previously served over 10 years with the Partnership for the Delaware Estuary in different roles, including executive director.

White Clay Creek Federal Designation Expanded

On December 19, 2014, President Barack Obama signed into law a bill that added approximately nine miles of the White Clay Creek and its tributaries to the existing National Wild and Scenic Rivers designation for the waterway. The earlier designation in 2000 had included approximately 190 miles of segments



DRBC Executive Director Steve Tambini presented WRADRB President Bob Molzhan with a ceremonial resolution recognizing him on the occasion of his retirement.

and tributaries of the White Clay Creek as components of the national system. This designation is unique since the entire White Clay Creek Watershed is now included in the system, making it the first National Wild and Scenic River protected in its entirety. The 2014 legislative effort was led by U.S. Senator Chris Coons (Del.) and U.S. Representative Joe Pitts (Pa.-16), with support from Sen. Tom Carper (Del.), Sen. Bob Casey (Pa.), and Rep. John Carney (Del.-At Large).

Other Delaware River Basin waterways have been designated as National Wild and Scenic Rivers, including about 150 miles of the main stem Delaware River and portions of several tributaries.

Detailed information can be found at www.nj.gov/drbc/basin/wild.html.

Financial Summary

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

This annual report covers calendar year 2014 (January 1 – December 31), which does not coincide with DRBC fiscal years extending from July through June. As a result, portions of two fiscal years comprise this 2014 annual summary.

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

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 primary sources, including signatory party contributions, project review fees, compliance-related actions, and transfers from the WSSF. The use of equity, or the General Fund's balance of unspent revenues accumulated since the DRBC was created in 1961, closes budget gaps when expenses exceed revenues in any given year.

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 Beltsville and Blue Marsh reservoirs in Pennsylvania. The WSSF also supports DRBC's pro rata share of the annual operations and maintenance costs of the two federal 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 for the WSSF are generated from charges for surface water withdrawals in the basin; however, waters allocated before the DRBC was created in 1961 are exempt from water use charges. The balance in the WSSF at the end of FY 2014 was approximately \$16.6 million.

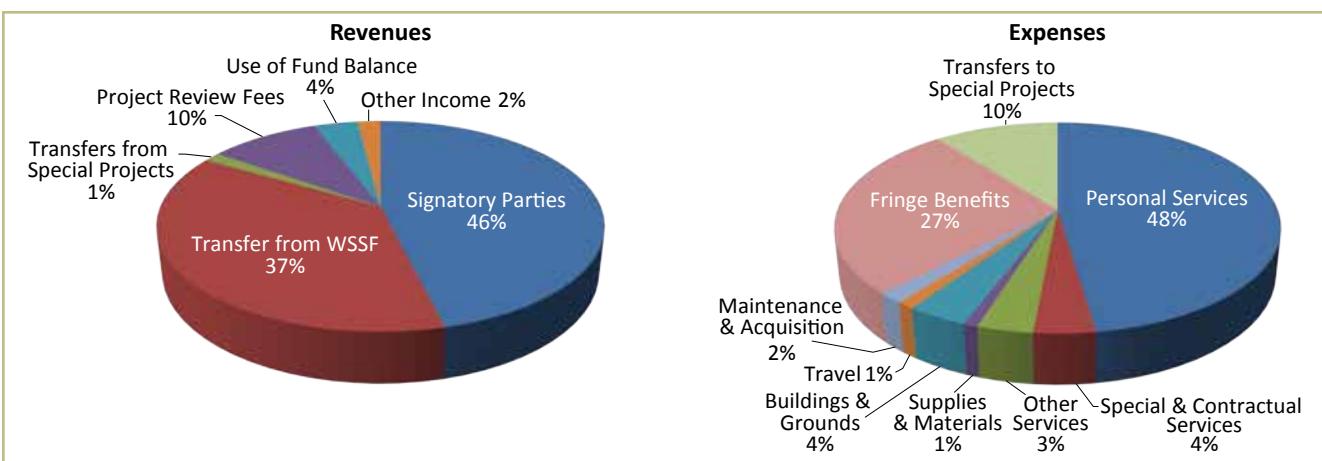
DRBC Fiscal Year 2014 (July 1, 2013 – June 30, 2014)

Actual expenses totaled \$5,166,545, or \$481,005 below the originally

budgeted amount. Primarily due to the reduced signatory party contributions, it was necessary to use approximately \$194,000 in equity to balance the General Fund operating budget.

The following signatory party contributions were received during the fiscal year ending June 30, 2014: Delaware \$447,000, New Jersey \$693,000, New York \$246,000, Pennsylvania \$998,350, and the federal government \$0. Pennsylvania's contribution reflected an additional payment of \$150,000 above the amount in the adopted FY 2014 budget intended to address a contribution shortfall in FY 2012.

Under the tacit agreement reached by the commission members in 1988 to apportion signatory party contributions, the annual full payments would have been Pennsylvania \$893,000 (25%), New Jersey \$893,000 (25%), federal government \$715,000 (20%), New York \$626,000 (17.5%), and Delaware \$447,000 (12.5%).



DRBC General Fund revenues and expenses for the year ending June 30, 2014. (Source: Independent Auditors' Report)

DRBC Fiscal Year 2015 (July 1, 2014 – June 30, 2015)

The commissioners on June 11, 2014 approved the DRBC's current expense budget of \$5,457,500 for the fiscal year ending June 30, 2015. It calls for the following signatory member contributions totaling \$2,648,500: Pennsylvania \$434,000, New Jersey \$693,000, federal government \$715,000, New York \$359,500, and Delaware \$447,000. In addition, the commissioners approved the DRBC's WSSF budget providing for revenues of \$4,003,800 and expenditures of \$3,641,400.

Federal Government Update

The Delaware River Basin Compact which created the DRBC in 1961 requires each signatory party to include in its budget an apportioned amount to annually support the DRBC's operating budget. While the four states have generally and historically met this statutory obligation, the United States has not contributed its apportioned share of this legal obligation since October 1, 1996 (with the exception of a congressionally directed appropriation in federal FY 2009). The cumulative federal shortfall from October 1996 through the end of FY 2014 (June 30, 2014) totals \$11,424,250, or double the size of the DRBC's FY 2015 budget.

President Obama on June 10, 2014 signed into law the Water Resources Reform and Development Act of 2014 (WRRDA), which received the overwhelming support of Congress. Section 4001 of WRRDA directs the Secretary of the Army to allocate funds to the DRBC to fulfill the equitable funding requirements of its interstate compact. WRRDA further stipulates that if this directive is not followed, the Secretary of the

Army must inform the appropriate House and Senate committees why funds were not allocated and also explain the impact of that decision with respect to nine listed areas of jurisdiction (such as water supply allocation, water quality protection, and flood loss reduction). While WRRDA is an authorizing bill and not an appropriations bill, its clear and direct language is a very encouraging development to the ongoing efforts to restore federal signatory member funding support

Congress representing portions of the Delaware, Susquehanna, and Potomac river basins.

Additional noteworthy activities during 2014 in pursuit of restoring the federal contribution included:

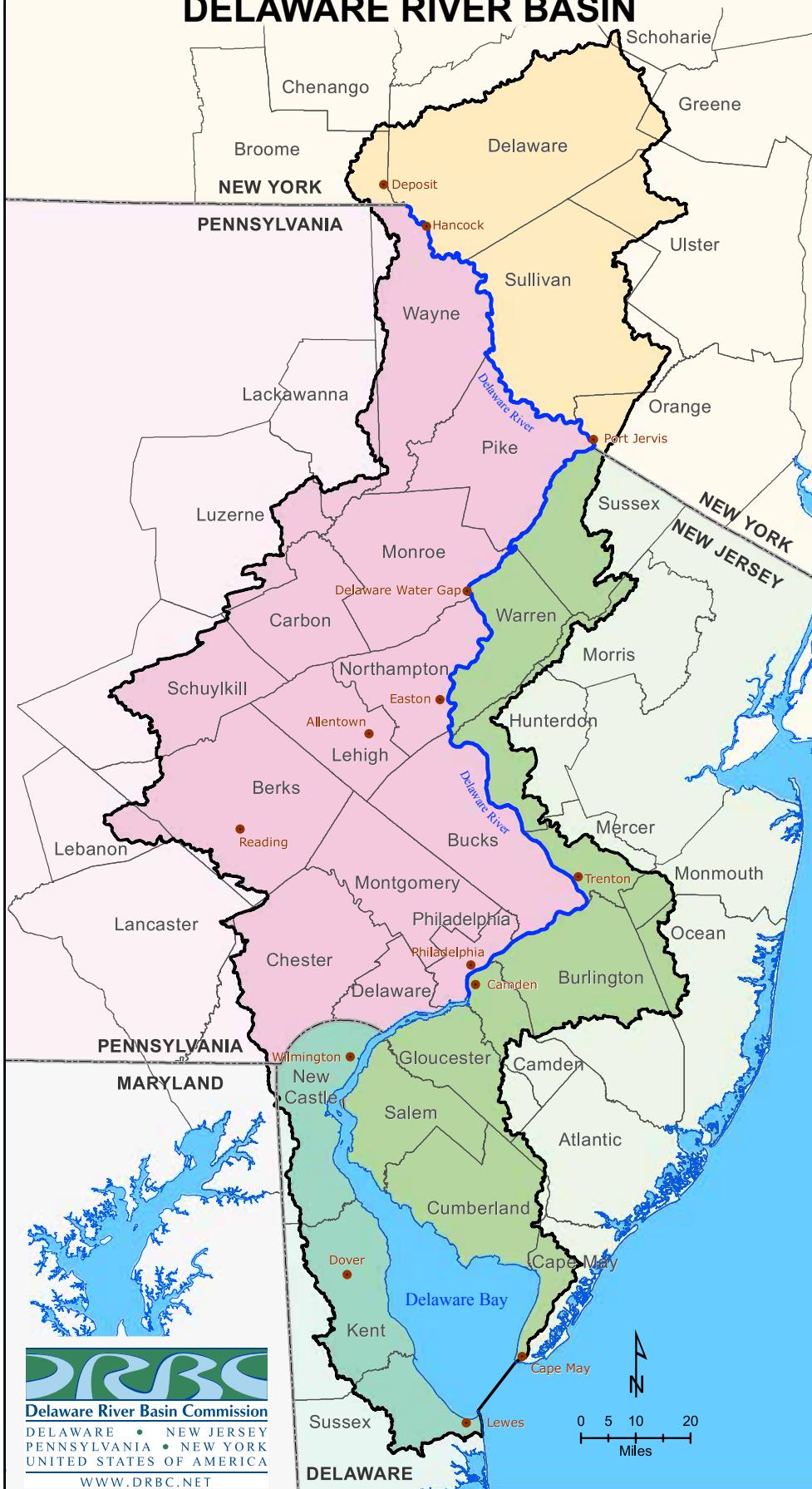
- Meeting in July with staff from the Office of the Vice President, National Economic Council, Council on Environmental Quality, and Domestic Policy Council. Vice President Joe Biden was a strong supporter of the DRBC during his years of service in the U.S. Senate.
- Meeting in September with staff from the Office of Management and Budget (OMB). Joining staff from the DRBC, Susquehanna River Basin Commission (SRBC), and Interstate Commission on the Potomac River Basin (ICPRB) were Pennsylvania DEP Secretary E. Christopher Abruzzo and Maryland Department of the Environment Secretary Robert Summers.
- A September letter of support addressed to OMB Director Shaun Donovan and signed by the state environment agency leaders from Delaware, Maryland, New York, Pennsylvania, Virginia, and West Virginia, as well as the District of Columbia. The letter strongly urges the Administration to restore annual funding in future Presidential budgets to support DRBC, SRBC, and ICPRB. Additional letters of support were sent to the OMB director in 2014 from Senators Carper, Coons, Casey, Menendez, Schumer, Gillibrand, and Cory Booker (N.J.) as well as from Philadelphia Water Commissioner Howard Neukrug and the Water Resources Association of the Delaware River Basin, among others.

“The respective signatory parties covenant and agree to include the amounts so apportioned for the support of the current expense budget in their respective budgets next to be adopted, subject to such review and approval as may be required by their respective budgetary processes.”

*Delaware River Basin Compact
(Public Law 87-328,
Section 13.3c)*

of the commission's operating budget as required by the compact. The language contained in WRRDA originated in the Senate thanks to the leadership of Senators Tom Carper (Del.) and Chris Coons (Del.). The Carper-Coons amendment was cosponsored by Senators Bob Casey (Pa.), Frank Lautenberg (N.J.), Robert Menendez (N.J.), Charles Schumer (N.Y.), and Kirsten Gillibrand (N.Y.). This language was also supported by a bipartisan group of 18 Members of

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