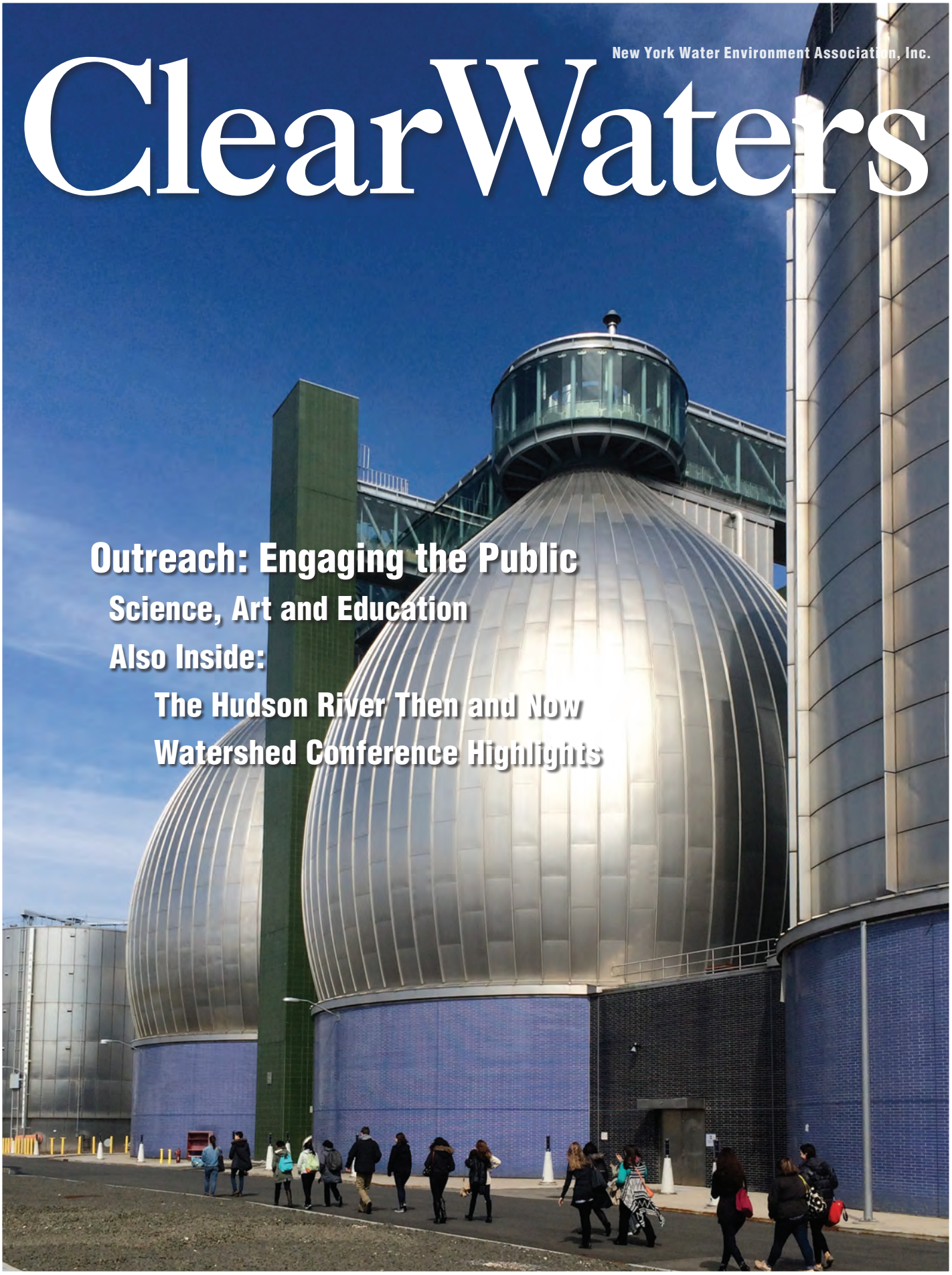
Fall 2016, Vol. 46, No. 3

New York Water Environment Association, Inc.

ClearWaters



Outreach: Engaging the Public

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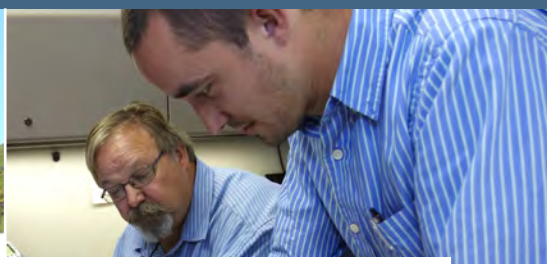
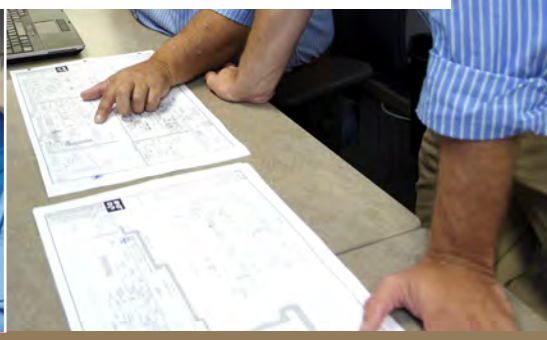


EQUIPMENT • SERVICE • PARTS • RETROFITS • DESIGN SUPPORT • INSTALLATION



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Clear Waters

New York Water Environment Association, Inc.

Cover Image: NYC students participate in a tour of the digester eggs at Newtown Creek. *Photo: NYC DEP*

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President's Message | Fall 2016

Outstanding Member Association Award

I am pleased to announce that the New York Water Environment Association (NYWEA) is the recipient of the Water Environment Federation's (WEF's) "Outstanding Member Association Award" for 2016. This award is a significant acknowledgement of NYWEA's excellence in all areas of performance in which WEF evaluates its member associations. Each of the following are the individual performance areas WEF assesses for this award:

Membership Retention: To excel in membership retention, first and foremost it is incumbent upon NYWEA to bring value to the members. NYWEA continually works to increase and vary its offerings by providing the membership with forums to interact with their peers, to increase their knowledge base, to advance their careers, and to contribute to the water quality industry. To highlight this value, NYWEA has developed a "Member Benefits" flyer that promotes the many areas in which professional careers are enhanced by participation in the Association. For long standing members, NYWEA celebrates their persistent support and loyalty by presenting them with honorary pins and recognizing them at meetings and in NYWEA publications. For those that may forget to renew their membership, a dedicated assistant in the executive office works with the Membership Committee and local chapter to interact with these individuals. As a result, NYWEA member retention rate is approximately 80 percent and NYWEA is one of the largest member associations in the nation.

New Memberships: Over the past five years NYWEA has experienced an eight percent growth in overall membership, with the largest gains in the Young Professional (YP) and Student categories. Growth in these two important membership areas is essential to Association sustainability and a strong foundation for the future. NYWEA has also been creative in attracting new members through formation of specialized membership categories. For example, in 1998, NYWEA was the first WEF member association to develop a "Utility Membership" and has since attracted 39 utilities of all sizes to be part of this category. As with membership retention, it is critical to provide strong and varied offerings to demonstrate NYWEA's value to those that may be interested in joining.

Financial Strength: An important component of NYWEA's operations is the continual process of planning and executing planned elements. Every four years the Association updates its Strategic Plan (the next iteration to be finalized by the close of this year) to provide a roadmap for NYWEA's programs. Subsequent to the Strategic Plan is development of the four-year Business Plan to connect the organizational goals to the necessary finances. The Business Plan is then used in the development of the annual budgets. While time consuming, this process is crucial to NYWEA's ability to adequately fund an increasing number of offerings and remain in a strong financial position. NYWEA members have been asked to present the Association's financial management practices to other WEF member associations at WEFTEC and WEFMAX meetings where NYWEA's Financial Procedures Manual and investment policies were shared for others to learn from.

Scholarship Programs: NYWEA's Scholarship program is remarkable, and one to be proud of. An aggressive goal was set to raise $1,000,000 to develop a sustainable scholarship fund. By 2010, the goal was achieved and to date NYWEA has awarded over $370,000 to 163 deserving students. By 2018, NYWEA expects to be giving out $50,000 annually to help make a difference in the lives of those considering an environmental career.

Student Achievement: NYWEA has several active student chapters at various universities in New York state. The Association and the local chapters support activities at these universities and award monetary scholarships to students who give noteworthy presentations at the NYWEA Annual Meeting. NYWEA's local chapters also give financial support to students who travel to nationwide events.

Technology Transfers: NYWEA offers a wide array of educational offerings to allow for "technology transfers." This includes the NYWEA Annual Meeting, the NYWEA Spring Meeting, watershed conferences and the biannual Energy Specialty Conference. Each one of these meetings provides continuing education credits and professional develop hours for operators and engineers, respectively. Besides these larger events, the NYWEA Member Education Committee also develops and holds routine training events across the state for members in our local chapters. Local chapters also develop their own local trainings and conferences, which are very well regarded. Significantly, since 2011 NYWEA has administered the operator certification and certificate renewal program, formally coordinated by the New York State Department of Environmental Conservation. NYWEA also has its own Voluntary Collection System Certification program for this key sector of our membership.

Award Programs: Recognizing those that go above and beyond in our volunteer organization is a great expression of appreciation for their good work. Through its Awards Committee, NYWEA has a tremendous number of awards that are frequently offered to recognize service to the organization, excellence in the workplace, significant achievements and accomplishments, well-crafted technical papers, and much more. The Awardees are celebrated at a luncheon hosted during the NYWEA Annual Meeting.

While the listing above is detailed, by no means is it an exhaustive list of all NYWEA activities (even within these performance areas). Be it NYWEA's government affairs and advocacy work, our publications, and even networking opportunities, there are many other areas in which NYWEA could be evaluated in the same positive light. All NYWEA members should be proud of this award, as it is built on the strength of the volunteers and staff in the Association and the work of water quality professionals across New York. This recognition confirms what many of us have long thought – that NYWEA is one of the top organizations of its kind!

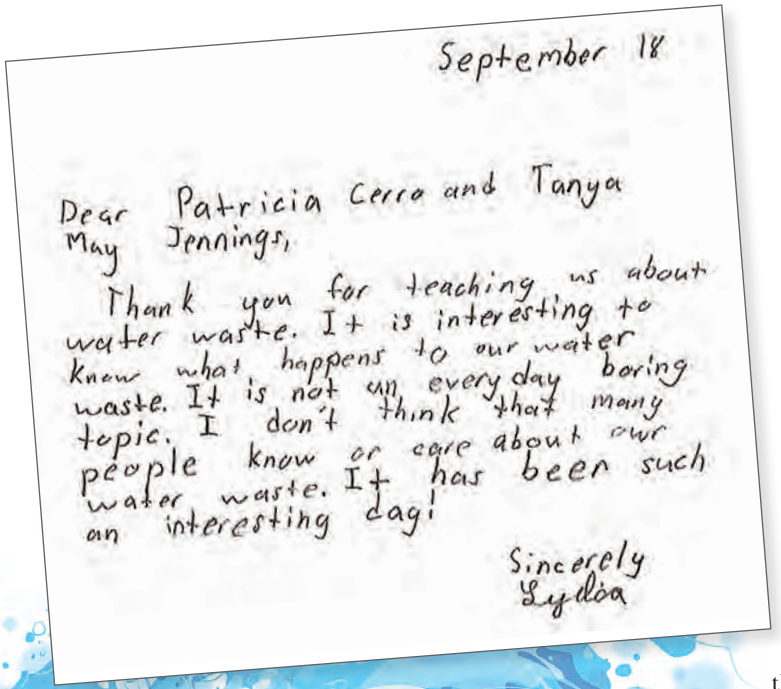
Public Outreach

This edition of *Clear Waters* is a perfect complement to NYWEA's current efforts regarding changing negative perceptions associated with our industry and developing accurate messaging on the importance of our work. It is our hope that with the roll out of NYWEA's messaging document at the Annual Meeting in February, utilities and other organizations will be able to strengthen their public outreach activities and advance programs like those highlighted herein.

Joseph L. Fiegl, PE, NYWEA President

Public Education, It's Up to Us!

For those of you who share your love of nature and our precious water environment with young people: you will understand this. If you have not stood up in front of a group of young people to talk about the important work our members carry out: I would encourage you to do so! It is almost always reassuring and inspiring to see the excitement on their little faces and understand how important the environment is to them. I have been fortunate to experience this on several occasions while visiting my son's school classes over the years and also when I attend the Oswego County Soil and Water Conservation District Field Days. I brought Tanya Jennings, our Certification Administrator, to one of these events and she found online a unique way to teach children about wastewater that is made simple by the organization, Water Wise (a campaign of the Rand Water Board, out of South Africa). This organization has put together a step-by-step experiment that simulates the treatment of wastewater. It is the best I've seen, and this model boils down the complexity of the process into seven steps going from wastewater to screening, to the grit chamber, primary settling tank, biological treatment, secondary settling and disinfection and ultimately, discharge. The process is illustrated using clear jars. There's a little prep work involved but in the end it is an effective way to show the process. It is delightful to see the students realize the process water goes through after it is used. These statements from fifth grade students allow us to look inward to see how effectively we communicated our message; these are some of my favorites!

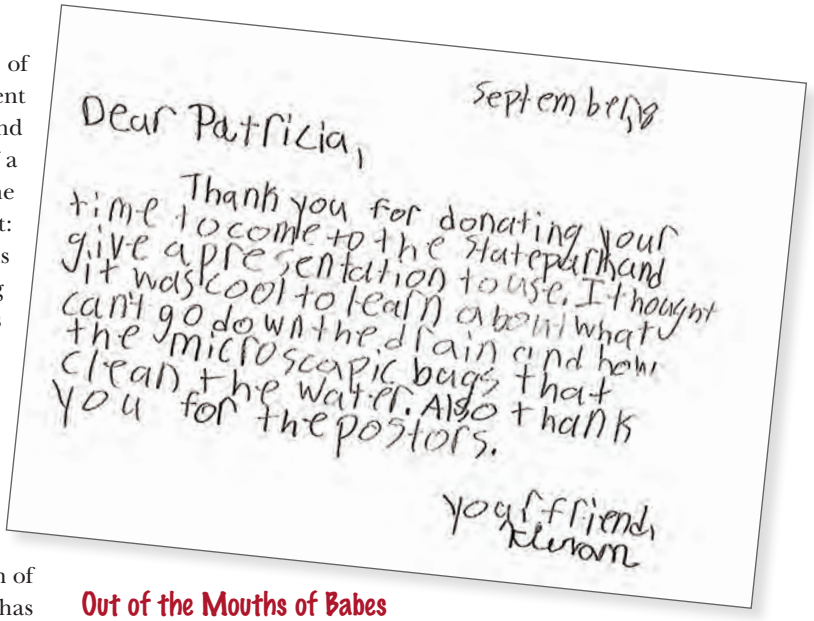


September 18

Dear Patricia Cerro and Tanya May Jennings,

Thank you for teaching us about water waste. It is interesting to know what happens to our water waste. It is not an every day boring topic. I don't think that many people know or care about our water waste. It has been such an interesting day!

Sincerely
Lydia



September 18

Dear Patricia,

Thank you for donating your time to come to the Hatepark and give a presentation to use. I thought it was cool to learn about what can't go down the drain and how the microscopic bugs that clean the water. Also thank you for the posters.

Your friend,
Kieran

Out of the Mouths of Babes

"Thank you for teaching us what happens at a wastewater treatment plant and how the water gets cleaned."

"It is interesting that you showed us that microscopic bugs help to clean the water."

"Now I know how used water is cleaned!"

"It is amazing how a rotifer's head spins!"

"Thank you for teaching us about how water is cleaned after we use it – and how to conserve water because most of it gets wasted. You helped me understand why water should not be taken for granted. I learned that putting grease into the sewers can make the water toxic. I will never do that!"

"My sister should hear you say that the toilet is not a trash can. Sometimes we put wipes down the toilet."

"I thought it was interesting how the Rotifer bugs eat the bacteria."

"I thought it was funny and serious when you said your toilet is not a garbage can."

"I can't believe people work 24/7 to clean our water! I want you to know I would never put grease down the toilet."

These lessons learned come in very useful as we put together President Fiegl's messaging document that will help us all communicate our clean water industry facts to children and adults alike.

Many thanks to all of the contributors of the articles in this issue, including the members of the Publications Committee and Khris Dodson, chair of NYWEA's Public Outreach Committee. In conjunction with Beth Guidetti's article on page 20, NYWEA members can look forward to receiving their 2017 calendars in the mail in November. We hope these calendars will serve as a reminder that public outreach is vital. If we are not the catalyst for exposure to our industry, then who will be? It's up to us!

Patricia Cerro-Reehil
pcr@nywea.org

Diamond Mills Hotel, Saugerties, NY

Highlights of NYC Watershed Science and Technical Conference

The NYC Watershed Science and Technical Conference held in Saugerties, NY, at the Diamond Mills Conference Center on September 13th was a great success with over 180 people in attendance. This one-day conference featured six sessions and kicked off with presentations by President Joseph Fiegl, Lisa Melville from NYS Department of State, Kathy Moser, Deputy Commissioner, Natural Resources at NYSDEC and Vincent Sapienza, Acting Commissioner from NYCDEP.

NYWEA President Joe Fiegl gives the Opening Session comments.

Lisa Melville from NYS Department of State kicks off the conference.

Left: Kerri Alderisio from NYCDEP talks about microbial source tracking techniques.

Larry Beckhardt, left, and John Schwartz

Right: Moderator Kara Pho introduces the next speaker.

William Kuhne

Kyongho Son speaks on sources of change in stream water quality.

(L-r) Carl Davis, Tina Johnstone and Chris Austin

Jordan Gass

Anne Seeley from NYCDEP talks about NYC's Waterborne Disease Risk Assessment Program.

Above: Mary McNamara (left) of Hudson River Watershed and Beth Reichheld, NYCDEP

Left: (l-r) President-Elect Paul McGarvey, Lisa Melville, NYSDOS, NYWEA President Joseph Fiegl and Executive Director Patricia Cerro-Reehil

Left: (l-r) Kimberlee Kane, Pam Young and Katie Lynch

Acting Commissioner Vincent Sapienza, right, and David Warne from NYCDEP

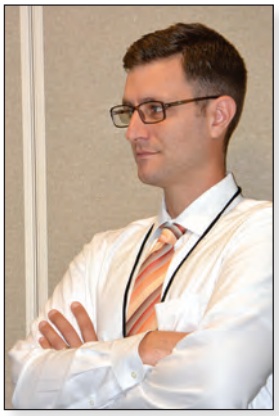
John Sansalone, left, and Richard Praetorius

(L-r) Lisa Melville, Maureen Cunningham, Phil DeGaetano and Geoff Baldwin

Karen Moore

Tim Clayton from Holland Company moderates Session VI.

Lorraine Janus



Right: Adam Bosch

Right: Steve DiLonardo, speaker

Above, Salome Freud, left, and Maria Mandarino

Carter Strickland, left, and Dave Warne

Above: Tim Koch, left, is presented the N.G. Kaul Scholarship certificate by President Fiegl.

Left: Kathy Moser, Deputy Commissioner of Natural Resources at NYSDEC talks about the Invasive Species program.

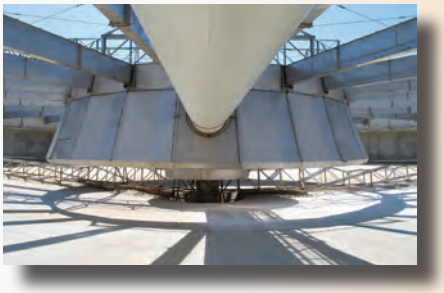
Above: Julie Barown, right, from Orenco talks with a conference attendee.

Right: Larry Arnold and Patrick Lambert

Left: Exhibitor David Railsback, left, from Schnabel Engineering speaks with a member.

Waste Water

Innovative processes for treatment
from headworks to sludge handling.



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Water Views | Fall 2016

Public Outreach

The success of the New York State Department of Environmental Conservation's (NYSDEC) efforts to protect New York's water resources depends on robust public involvement. The NYSDEC uses many techniques and tools to inform and engage our stakeholders. Some of them are "old school," such as brochures and posters, but we are working with many of the current social media tools as well.

The main way that NYSDEC stays in contact with its water stakeholders is through its weekly electronic newsletter *Making Waves*. Every Friday afternoon, we send the e-newsletter to over 15,000 subscribers. The weekly edition contains the latest NYSDEC water news covering topics such as grants, public comment opportunities for permits and regulations, public meetings, recent developments and new web pages. If you have not signed up for *Making Waves,* go to the NYSDEC web site *(dec.ny.gov)* and sign up today!

The NYSDEC uses electronic media extensively. If you have questions about any of NYSDEC's water-related programs, your first stop for information should be our web site. Staff work hard to make an abundance of up-to-date information available on a number of topics. NYSDEC staff also use social media, such as Facebook and Twitter. This year they will focus even more on this medium. Following the NYSDEC's Facebook page and Twitter feed is a great way to keep up-to-date on important issues and topics.

The NYSDEC provides many opportunities for our stakeholders to get involved. We have established committees and subcommittees on topics such as stormwater pollution reduction, wastewater infrastructure and concentrated animal feeding operations (CAFOs). These committees provide the NYSDEC's water programs with guidance on topics ranging from the municipal separate storm sewer systems (MS4) permit renewal to implementation of the Sewage Pollution Right to Know law. Some of these committees have been meeting for many years, and their input has helped shape and improve the programs.

Many of the watershed programs (e.g., Great Lakes, Lake Champlain, etc.) also have robust outreach programs. They have prepared Action Agendas for their watersheds which identify the pressing problems and the actions needed to protect water quality and habitat, and increase community resiliency. The Action Agendas are guides to promoting successful ecosystem-based management through existing programs and partnerships involving state and federal agencies, municipalities, academic institutions, non-profits, and other stakeholders in the watershed. Each watershed program has opportunities for interested parties to get involved and have real influence.

I encourage you to be involved in our programs. Take ownership! There is a wide variety of topics to choose from and many different ways to participate. We know that citizen involvement is key to our success and we truly welcome your contribution.

– James Tierney, Assistant Commissioner for Water Resources
NYS Department of Environmental Conservation

Focus on Safety | Fall 2016

Visitor Safety

One of the more interesting and pleasant aspects of community engagement is the opportunity to provide site visits and tours to local groups. Tours provide information to the public about protecting the environment and the water system. Sometimes, the site is fortunate to have the resources to have a formal interactive program, a website to tout the facility tours and the staff to conduct those tours. If the site is rather small, the responsibility for tours lies with the operating personnel. No matter who provides the tour, some basic safety requirements should be developed and formalized.

Basic rules of engagement need to be formalized in advance to prevent these types of situations from occurring: college engineering students arriving at an operating power plant in pajama pants and flip flops; or manufacturing plant employees attempting to bring their toddler grandchildren to the shop floor. Just as importantly, the requirements also need to be clearly communicated to those involved in the tour process – from the staff to the visitors. Staff members need to know that there are tour rules, and that if someone is acting in a risky manner (inadvertent or not), staffers have permission to intervene. The visitors need to know how to act and be prepared for the tour.

One would imagine that developing the tour rules is the easier portion, but while the big picture is easy, the details are hard! Here are a couple thoughts to consider:

- Determine the maximum tour group size. This may depend upon the age of the participants.
- Determine the minimum age of the participants. Require current photo ID from anyone over 18.
- Consider banning cellphones, cameras/photos, purses and backpacks.
- Establish a tour time and require that all tour participants arrive and depart at the same time.
- Require the appropriate attire. This may change depending upon the tour route, but at a minimum it should include solid-toe, flat-bottom shoes, long pants, and no loose-fitting clothing. If a tour member is not dressed appropriately, they cannot participate.
- Inform participants of any mandatory personal protective equipment. If a tour member will not wear all of the required PPE, then they cannot participate.
- Establish conduct parameters – no horseplay, wandering off, touching switches or leaning over railings, no smoking or eating. Give fair notice that any breach may curtail the tour.
- Require that each tour participant wash/clean their hands thoroughly at the conclusion of the tour. This could be accomplished by providing hand wipes.
- Develop a Release of Liability Form and require that all participants or their guardian sign prior to the tour. It may be as brief as acknowledging the safety rules or as detailed as your lawyer requires.

Inviting the public into your world is a great opportunity. Wrap that opportunity in a blanket of protection and safety for both you and your guests.

– Eileen M. Reynolds, Certified Safety Professional
Owner, Coracle Safety Management

PART 1: Educating and Engaging the Public on Water Resource Recovery

Getting People to Know What You Do

by Khris Dodson

Edited excerpt from Chapter 5 of the Wastewater Management Handbook for Local Representatives, 2nd Edition, published January 2013 by the New York Water Environment Association and Syracuse University Environmental Finance Center.

Clean water is important, yet educating and engaging the public about clean water is perhaps one of the least integrated aspects of any municipal service. An informed public – and an informed municipal governing body – can be your best assets in meeting water quality goals.

Developing and maintaining a positive relationship with the public is vital. However, the intricacies of water resource recovery are foreign to most people. Many in the community who benefit from this service may never think about wastewater, where it goes or what's involved in providing this service. Despite their unfamiliarity with water resource recovery practices, citizens often want to provide input to local government on the impact and cost of public facilities and services. In order for citizen input to be both useful and practical, there should be two things in place: robust public education; and an established, easy and efficient process by which the public may participate in deliberative discussions regarding municipal services. The public utility operators must consider how to improve education of the public served, such as what information to share, and how to inform and engage the public in the decision making process. Some key elements for reaching out to and educating the community include:

- Mission Statement
- Community surveys
- Presentations at schools, civic groups, etc.
- Bill stuffers
- Newsletters
- Open houses

Mission Statement

Every water resource recovery plant has a clear and distinct mission, but is there a clear and concise Mission Statement that communicates this mission to the community it serves? Mission statements are generally one or two sentences which can be created easily, but should be well-thought-out as they are the single most important tool in defining yourself to the public. Here's an example of a Mission Statement from the Onondaga County Department of Water Environment Protection: *To protect and improve the water environment of Onondaga County in a cost-effective manner ensuring the health and sustainability of our community and economy.*

Customer Surveys

A utility can often lose touch with its users. This may result from not actively engaging with the community, or listening to only a select and vocal few. To learn about the opinions of users, it helps to conduct a survey. The survey may also be used to gauge the level of understanding of services provided, user satisfaction, and to inform future service improvements. If the cost to hire a professional to create and administer your survey is a challenge, consider contacting a local college or university; generally, there are faculty, staff and/or students who are well trained in survey development that can help for free or for a more affordable rate.

Public Meetings and Presentations

As a public body, a community's utility commission will have regular public meetings. These meetings must be orderly, well managed and productive. Technical presentations at these meetings should be well prepared and should be both technically complete and – especially if requesting budgetary appropriations – easily understood by the public. Don't be reluctant to go out and talk about what you do and about the services provided to the community. Accept invitations to speak at community and civic meetings, and look for opportunities to discuss what you do. Prepare a presentation and/or handouts. Make it fun and interesting; it is your job and your plant and no one knows it better than you.

Courtesy of Amanda Westerdahl

Visitors tour the information exhibits at the Onondaga County Water Environment Protection Clean Water Fair.

Bill Stuffers

The bill stuffer has long been a favorite tool of many water and wastewater utility managers. Bill stuffer informational packets are available from a number of commercial suppliers and trade organizations. Some bill stuffers are specific to topics that may be of growing importance to the community, such as source water protection, stormwater or water reuse. Most bill stuffers can be customized to include utility-specific information. The Water Environment Federation *(www.wef.org)* has many types available that are designed to be customizable.

Courtesy of Amanda Westerdahl

A local engineering firm participates in the Onondaga County Water Environment Protection Clean Water Fair.

Newsletters

A regular newsletter, or regular appearance in the municipal newsletter, is an excellent way to communicate about plans and accomplishments. Newsletters should include pictures, graphs, figures, tables and charts whenever appropriate or possible. Overly lengthy articles or pages full of text may look too tedious to read. Also, as more people are moving into the digital age, you can create and send email newsletters. However, an important consideration in deciding to publish a newsletter is consistency. Once a utility decides it is going to publish a newsletter, it must maintain that commitment. Consistency in length, time of year sent, layout and design, and in voice, are all things to consider.

Open Houses

An open house, tour or other special event can be an excellent way to get the public to see what goes on at your utility. It can also be an event in which employees and public officials can involve their families in their work. The event should be well organized, with a specific schedule of activities. Tours should be in small groups along a safe (and, if possible, odor-free) route. If necessary, safety equipment such as hard hats, and eye and hearing protection should be provided. Tour guides should be well prepared and ready to answer questions. Some communities will invite other organizations, consulting firms, other government agencies, and educational institutions to set-up informational tables so attendees can learn more. Consider a barbecue, coffee and doughnuts, or other refreshments that could be provided for free, or provided by a local civic group for purchase to support its organization. Make it a true community event. It is important to publicize the event to make sure it is successful and worth the time invested. Think about developing a marketing plan that includes ads in the local newspaper, community, church and civic newsletters, flyers, mailings and other efforts that may help spread the word to as many people as possible for as inexpensively as possible. Don't underestimate the difficulty of attracting people to an event.

Khris Dodson is the Associate Director at the Syracuse University Environmental Finance Center. He may be reached at kadodson@syr.edu.

Educating Students at NYC DEP's Visitor Center and Nature Walk at Newtown Creek

by Sivan Schlecter

The New York City Department of Environmental Protection (DEP) offers a unique on-site education program at the Visitor Center and Nature Walk at Newtown Creek Wastewater Treatment Plant. Located in the Greenpoint section of Brooklyn, the Visitor Center at Newtown Creek is where the public can learn about the vast system that supplies New York City with one billion gallons of drinking water and treats 1.3 billion gallons of wastewater each day. Opened with the completion of the facility's multi-decade upgrade and waterfront access restoration, the Visitor Center and Nature Walk at Newtown Creek are learning environments intended for students, educators, and public visitors from New York City and beyond.

The Newtown Creek Wastewater Treatment Plant

The Newtown Creek Wastewater Treatment Plant was expanded and overhauled to meet secondary treatment requirements and to increase its flow volume from 620 million gallons per day (mgd) wet weather capacity to over 700 mgd for better management of stormwater during wet weather. First built in 1967, the state-of-the-art facility presently provides wastewater treatment services for over one million people in a drainage area of approximately 25 square miles throughout parts of Manhattan, Brooklyn and Queens. Today, the plant sits on 53 acres, but stands out from the others with its egg-shaped, large-volume digesters; detritors and degritters; centrifuges instead of gravity thickeners; and backup generators that can make the electricity the plant needs to run entirely off the grid during an emergency. The facility is also the first in New York City to be redesigned and upgraded in close collaboration with community stakeholders throughout the planning and construction process.

The Visitor Center at Newtown Creek

With its bright orange facade, the Visitor Center at Newtown Creek accentuates the plant's award-winning design. Inside, visitors experience a virtual watershed, including a rippling water sculpture designed by world-renowned Brooklyn-based artist, Vito Acconci, and made possible by New York City's Percent for Art program. From its museum-quality exhibits, seated classroom activities, and walking tours through the facility and atop the digester eggs, the DEP's education programs at the Visitor Center have become a preferred field trip for educators near and far.

"The Visitor Center at Newtown Creek is DEP's very own world-class education center. It's the only public utility building fully dedicated to teaching about where New York City's precious water resource comes from, how it travels to New York City, how it's collected after use, and how it's cleaned and safely returned to the water cycle through our surrounding waterways," says Robin Sanchez, the DEP's Deputy Director of Education. "It's also a tribute to the century-old ingenious system and the many dedicated employees who keep it sustainable."

Approximately 5,000 students attend education programs annually at the Visitor Center. As an extension of classroom curriculum, they leave with a better understanding of the sheer scale of New York City's water supply, delivery, collection, and cleaning system,

NYC DEP

A distinct feature of the Newtown Creek Wastewater Treatment Plant is the bright orange facade of the Visitor Center along Greenpoint Avenue.

including the complex network of infrastructure that makes it all possible. Discussions include how the DEP protects public health and city waterways with green infrastructure and harbor water quality monitoring programs. Students also learn how New Yorkers can play a direct role in helping DEP fulfill its mission through: water conservation; anti-littering, proper disposal of grease, and other stewardship activities; and job opportunities with the utility.

The DEP educators facilitate hands-on and inquiry-based Science, Technology, Engineering and Math (STEM) lessons and activities customized for each class experience around topic knowledge, learning abilities, and curriculum. Education programs at the Visitor Center complement the full range of educational and professional development opportunities that are supported by the DEP in the classroom, field and watershed. Programming includes school visits, the annual Water Resources Art and Poetry Contest, City that Drinks the Mountain Sky theater performances, Trout in the Classroom, and classroom teacher and non-formal educator trainings. The DEP offers robust teaching resources as well, from grant funding opportunities, to print materials and publications, to online education modules.

The Nature Walk at Newtown Creek

In conjunction with the Newtown Creek Wastewater Treatment

continued on page 14

continued from page 12

Nicholas Wilkie, Trees New York

Students take in scale of air main that feeds influent bacteria at New York City's largest waste resource recovery plant.

Plant upgrade and expansion, the Nature Walk at Newtown Creek connects the public with its first access to the historically industrial waterway. Planned with local community members to provide a public amenity and educational venue, the Nature Walk is a quarter-mile pathway designed by environmental sculpture artist George Trakas to articulate the important cultural, historical and ecological aspects of Newtown Creek. Reflecting the same themes as the Visitor Center, the Nature Walk offers a new perspective on the interplay between our natural and built environments.

Educators take students to the Nature Walk for self-guided tours, a DEP-designed scavenger hunt, or lunch after a program at the Visitor Center. It is open to the public from dawn until dusk seven days a week, weather permitting.

Learn More

Education programs at the Visitor Center are free and can be scheduled for pre-K through 12th grade, college and graduate-level students. Non-fee trainings for classroom teachers and non-formal educators are available as well. In addition to education programs, members of the public can visit by signing up to attend a Digester Egg Tour, which generally takes places around Valentine's Day, Earth Day, and Open House New York each year. For more information about the DEP's education programs and public programs at the Visitor Center at Newtown Creek, contact *educationoffice@dep.nyc.gov* or visit the NYC DEP's website at *http://nyc.gov/dep*.

Sivan Schlecter is the Visitor Center Coordinator for NYC Department of Environmental Protection. For more information about NYC DEP's education programs, she can be reached at educationoffice@dep.nyc.gov.

Nicholas Wilkie, Trees New York

Students learn about separate storm sewers that drain directly into Newtown Creek.

Nicholas Wilkie, Trees New York

A visiting group poses for a portrait after a tour atop the digester eggs to see sludge treatment.

Water Engineering and Ecology Field Trips

by Matt Malina

Educational non-profit NYC H2O is getting ready for its fall season of free outdoor field trips for New York City school children. Its education programs engage students and teachers in the engineering and history behind New York City's water infrastructure. This past spring, NYC H2O provided 76 free water ecology field trips reaching 2,100 students, a majority of whom are from high-poverty and immigrant neighborhoods (Title I schools).

NYC H2O brings classes to the historic reservoirs at Central Park, Jerome Park, Ridgewood, Silver Lake and Baisley Pond. Students get to walk on top of the Old Croton Aqueduct at High Bridge and discover live oysters (and their hangers-on) straight from the harbor at Ellis Island.

With increased support from corporations, foundations and individuals, NYC H2O was able to add new sites at Lemon Creek (Staten Island) and Plumb Beach (Gateway National Recreation Area, Brooklyn).

At Plumb Beach, students were fascinated by the horseshoe crabs, an ancient but local creature. They watched as females crawled up the beach to lay eggs and mate, and they learned of the horseshoe crabs' role as scavengers in marine ecology. Students found and identified many other creatures, including other types of crabs, clams, whelks and caterpillars. They watched terns fish and great egrets fly.

At Lemon Creek, students observed how New York City manages stormwater in a sustainable way by channeling it into streams and wetlands in the "Bluebelt." They learned how wetland plants can absorb and remove toxins from the water in a process referred to as "phytoremediation." They also used our new NYC H2O Harbor Map to help orient themselves. Mapmakers Rowan Dickson and Ken Chaya created this large-scale map for NYC H2O's field trips.

"Teachers value their students connecting with nature and infrastructure in an active way," said Jonathan Turer, NYC H2O's Education Director. "They tell their colleagues about the field trips and their students' experiences, so the word is getting out." The number of field trips that NYC H2O provides has grown steadily

NYC H2O

Above and below: Students play the Aqueduct Challenge at the Ridgewood Reservoir.

NYC H2O

NYC H2O

Participants run in Tree Races at the Central Park Reservoir.

NYC H2O

Learning about horseshoe crabs at Plumb Beach during a field trip

Rowan Dickson and Ken Chaya

Map created for NYC H2O to orient the students on field trips. (Available online at *http://www.nych2o.org/h2o-map.html*)

every semester from 22 in Spring 2014, its first season, to 76 in Spring 2016.

NYC H2O field trips draw a range of students from second through 12th grades, embracing the city's great diversity. Most live outside Manhattan and many attend schools where a high percentage of students are foreign language speakers from new immigrant families and are not fully proficient in English.

Many of the students who came on the tours have limited opportunities to explore parks and natural areas; and many have never been out of their own neighborhood. They got to experience flowers blooming and birds nesting. They used binoculars, many for the first time, to observe waterfowl that make their homes at the reservoirs and wetlands, like hooded mergansers, ruddy ducks and egrets. They enjoyed running outside, participating in "Tree Races." They engineered a working aqueduct out of straws when playing the "Aqueduct Challenge." In so doing, they become stakeholders in the purity of the city's water, and future stewards of a city that reaches out to include them.

Jia Lee, a fourth grade teacher at the Earth School in lower Manhattan who brought her class on a field trip to the Central Park Reservoir, said, "The tour was fantastic for many reasons, but what stood out was the ability for students to be able to see the maps and connect to where the watersheds upstate are located. There was a lot of movement and time to observe and discuss. The interactive building of the aqueduct system really engaged them to not just work collaboratively, but innovatively and problem solve. I especially appreciated how you guys tied it all together at the end."

Expansion of NYC H2O's field trips was made possible by many organizations and corporations, individuals and foundations, including:

- Lily Auchincloss Foundation;
- New York State Department of Environmental Conservation's Environmental Benefit Program;
- New York City Department of Environmental Protection;
- Catskill Watershed Corporation;
- Skanska, Turtle and Hughes;
- United Electric Power;
- Aggreko; and
- EJ Electric.

NYC H2O also raises money through its adult activities, such as kayaking, biking and walking tours. These tours also have an environmental and infrastructure focus.

For more information on all of NYC H2O's programs, or to find out about sponsorship and giving opportunities, visit their website at *nych2o.org*.

Matt Malina is the Director and Founder of NYC H2O. He may be reached at matt@nych2o.org.

Inspiring Our Future Water Professionals

by Beth Guidetti

As water professionals, we are all acutely aware of the issues that arise in protecting our water quality and conserving that precious, clean water for years to come. One of our greatest responsibilities is to pass this knowledge along to the children who will become our future water professionals.

Since 2004, the New York State Department of Environmental Conservation (NYSDEC) and NYWEA have collaborated to organize an annual poster contest for students. The intent of this contest is to pique students' interest in protecting our water resources, both here in New York state and around the world. The contest encourages middle school teachers to educate their students on the importance of conserving and maintaining the health of our surface water and groundwater by engaging them in the classroom with lessons about our valuable water resources. Teachers then encourage their students to create their own original artwork demonstrating what they have learned. NYSDEC's Division of Water staff and NYWEA's members vote to choose the winning posters, which most recently have been featured in calendars distributed to NYWEA members, NYSDEC staff and other water professionals.

After Water Management

In our most recent "Conserve and Protect Our Water" poster contest, we had 249 competitors from schools across New York state. The fourteen winners each received an engraved plaque, reusable water bottle, their original, framed artwork, and – perhaps most importantly – an invitation from their local NYWEA chapter to attend a water-related event of the chapter's choosing. By introducing middle school students directly to local water professionals, we are all inspiring them to become partners with us in the future of water management.

Please encourage your local schools to participate in this fun, educational contest! For more information, visit *http://www.dec.ny.gov/education/1896.html.*

Beth Guidetti is an Engineering Geologist I with the NYSDEC Division of Water. She can be reached at beth.guidetti@dec.ny.gov.

The winning poster from the 2016 "Conserve and Protect Our Water" Poster Contest was created by Gianna Alcala, an 8th Grade student at John F. Kennedy Middle School in Port Jefferson Station.

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Combining Stormwater Education with Artistic Creations: Onondaga County Save the Rain's Annual Rain Barrel Art Contest

by Madison Quinn

The Save the Rain Program is Onondaga County Executive Joanie Mahoney's award-winning comprehensive stormwater management program. As part of its robust education and outreach portfolio, Save the Rain sponsors a Rain Barrel Art Contest, which has been held each year since 2014. This annual event is an excellent opportunity for public outreach, combining the worlds of art and stormwater management! Art teachers at schools across Onondaga County are invited to have their students participate in the contest by submitting a design proposal for painting on a rain barrel that is provided by Onondaga County.

After receiving numerous design submissions, a selection committee chooses the finalists who each will receive a rain barrel to paint with their unique and creative designs. The artists have a couple of months to complete the painting, then the barrels are picked up and put on display at the Rosamond Gifford Zoo. Photos of the barrels are also curated on the Save the Rain website at *www.SaveTheRain.us/art*. Online voting begins and remains open until the culminating celebration two weeks later.

All participating students, as well as their families and teachers, are invited to the celebratory event at which attendees can cast their votes for their favorite barrel in each of the categories – Elementary School, Middle School, and High School. The votes from each ballot box are tallied and added to the online votes to determine the winner in each category. While the votes are being counted, we have the opportunity to talk to the audience about Onondaga County Save the Rain as well as our new initiative Connect the Drops, which aims to engage the community in reducing street litter to improve water quality.

Award certificates and donated prizes – such as admission vouchers for the local parks or science museum – are given to each winner, and all finalists are given a prize of free admission to the zoo for their excellent work in crafting their rain barrel art. The event is fun, educational, and a great opportunity to combine the students' passion for art with environmental education on stormwater management. At the end of the event, the barrels are raffled off to attendees and they can take a barrel home to use for capturing stormwater at home. Participants are excited to be part of the Save the Rain program and very proud of their artistic contribution. This is a tremendous public education and outreach opportunity to reach children of all ages, their families and their teachers in a fun, creative way that incorporates the message of sustainability, the importance of clean water and water reuse, and the ongoing efforts to further improve environmental quality in our community.

Madison Quinn is the Project Coordinator for the Save the Rain Program at the Onondaga County Department of Water Environment Protection. She can be reached at madisonquinn@ongov.net.

Onondaga County Save the Rain (www.savetherain.us)

At the Rosamond Gifford Zoo in Syracuse, artfully decorated rain barrels were on display.

Onondaga County Save the Rain (www.savetherain.us)

Rain barrel art displayed at the Rosamond Gifford Zoo in Syracuse.

Onondaga County Save the Rain (www.savetherain.us)

Left to right: Ally Briggs, Shayla Donath and Rylee Conklin, three talented students from Onondaga High School pose with their painted rain barrels.

Onondaga County Save the Rain (www.savetherain.us)

Student artists, along with their families and teachers, were invited to a celebration at the Rosamond Gifford Zoo, where votes were tallied and contest winners were announced.

The New York City Department of Environmental Protection: Annual Water Resources Art and Poetry Contest

by Kim Estes-Fradis and Robin Sanchez

The New York City Department of Environmental Protection (DEP) held its 30th Annual Water Resources Art and Poetry Contest from January through May 2016. More than 1,800 public, private, parochial and home school students in grades two through 12 participated from New York City and the New York City Watershed communities. These students – or Water Ambassadors – created 1,600 original pieces of artwork and poetry that reflected an appreciation for New York's water resources, drinking water supply and wastewater treatment systems, and the importance of water conservation. In addition, through art and poetry, students expressed themselves creatively about healthy marine ecosystems and their role in protecting and enhancing harbor water quality.

"The Water Resources Art and Poetry Contest allows students to exhibit their wonderful talents by creating original art that demonstrates their knowledge of New York City's essential drinking water and wastewater systems," said DEP Acting Commissioner Vincent Sapienza. "Once again this contest had record-breaking participation, which demonstrates that our creative young people are genuinely curious and concerned about the environment around them and are well-poised to become future stewards of our waterways."

From the more than 1,600 submissions from the Water Ambassadors, a group of judges selected 66 winning entries that were created by 184 students, working individually and in groups, as this year's DEP Water Champions. Winning art and poetry entries were selected based on originality, artistic ability, and understanding of one or more contest themes. The central contest themes included:

- Water: A Precious Resource
- The New York City Water Supply System
- The New York City Wastewater Treatment System
- Harbor Water Quality and Healthy Marine Ecosystems
- Climate Change and Water Stewardship

On May 19, the Water Ambassadors and Water Champions were honored at the DEP's 30th Annual Water Resources Art and Poetry Celebration. Held at Manhattan Community College's Tribeca Performing Arts Center, the celebration included remarks from Patrick Dougher, Program Director at Groundswell, a New York City-based organization – and a long-time partner with the DEP's education office – that brings together artists, youth and community organizations to use art as a tool for social change. Also featured in the Celebration were special performances by Tem Blessed, multitalented musician, artist and poet, and Mahogany L. Browne, slam poet and author. All three special guests applauded the students on their dedication and knowledge of the environmental themes displayed in their contest submissions. Speakers encouraged students to continue to use their voice, written words and creative expression to share important social environmental messages. Additionally, two high school student groups presented their art and poetry submissions, including dance and rap performances that had the crowd of more than 600 guests on their feet celebrating the work of all of these talented young people.

To learn more about the DEP's comprehensive education programs and projects for students, formal and non-formal educators,

Waters of the World

Shades of blue
Ripple across the world
Carrying the whispers of the rain
In the sound of its peaceful pitter patter

And in the midst of nature's music
Come the cascading angels of snow
Blanketing the world in white

Until all that remains are the
Arms and legs of a roaming
River flowing in its freedom

To embrace the place
We call home

NICOLE PEREZ
St. Athanasius School
Eighth Grade

What teachers say about the annual Water Resources Art and Poetry Contest:

"I like that every entry gets acknowledged with a certificate. And that every entrant is invited to the ceremony." **Teacher, Visitation School, Bronx**

"The students are excited and motivated to participate in the contest. I like how it brings all the communities together in a celebration to share their work at the end. It creates another positive activity and memory." **Teacher, P.S. 133, Queens**

"Participation in the contest allowed my students to think about the role they play in protecting water and saving the earth." **Teacher, Stephen Gaynor School, Manhattan**

school administrators, and parents, please visit *www.nyc.gov/dep* and click on Environmental Education. Education resources include professional development workshops, in-class lessons, assembly presentations, citizen-science opportunities, field trips and facility tours, assistance with student research projects, curriculum development, student internships, public exhibitions, on-line modules, theatrical performances, and print material. All programs align with education standards and focus on advancing STEM learning.

Kim Estes-Fradis is Director of Education for the New York City Department of Environmental Protection and can be reached at kime@dep.nyc.gov. Robin Sanchez is Deputy Director of Education for the New York City Department of Environmental Protection and can be reached at SanchezR@dep.nyc.gov.

I am Water

I am majestic.
I am flowing.
I am life.

Fish swim through me.
You drink me.

Part of you is me.
No me, no you.

I am water.

HARPER HAYNE
Stephen Gaynor School
Fourth Grade

NYCDEP

NYCDEP

Two photos above show high school students from Brooklyn International High School's dance class performing on stage at the 2016 Water Resources Art and Poetry Contest Celebration.

NYCDEP

Water Champions, selected for their outstanding art and poetry from Grades 8-9, are honored on stage at the 2016 Water Resources Art and Poetry Contest Celebration.

continued on page 26

"This was a precursor to our poetry unit. We also talked about the importance of conserving natural resources as part of our science unit. This writing contest integrated writing and science. The children enjoyed writing the poetry and illustrating it." **Teacher, P.S. 174, Queens**

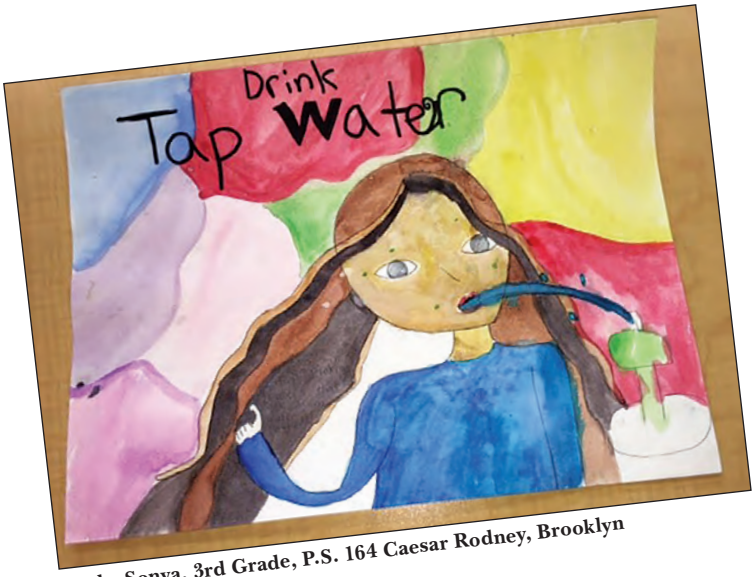
"I like the way you manage to maintain student interest both at the ceremony and on your website. Students were interested in reading all about water conservation and New York's reservoirs. Their reading increased awareness of the issues regarding conservation." **Teacher, Bishop Kearney High School, Brooklyn**

"I liked the opportunity to connect my Technology/Computer Graphics students to our local environment and its concerns. The visiting educator helped tremendously with this effort. It helped the students make their posters demonstrating real concerns." **Teacher, JW Bailey Middle School, Ulster County**

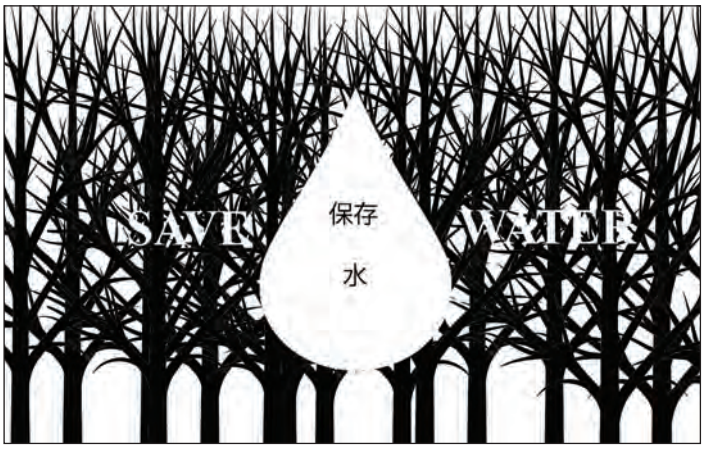
"This program allowed me to teach students about the infrastructure of their city and to give them a creative outlet for communicating what they learned. They felt special participating in something that went beyond their school and really incorporated children from all five boroughs and watershed communities." **Teacher, P.S. 183, Manhattan**

continued from page 25

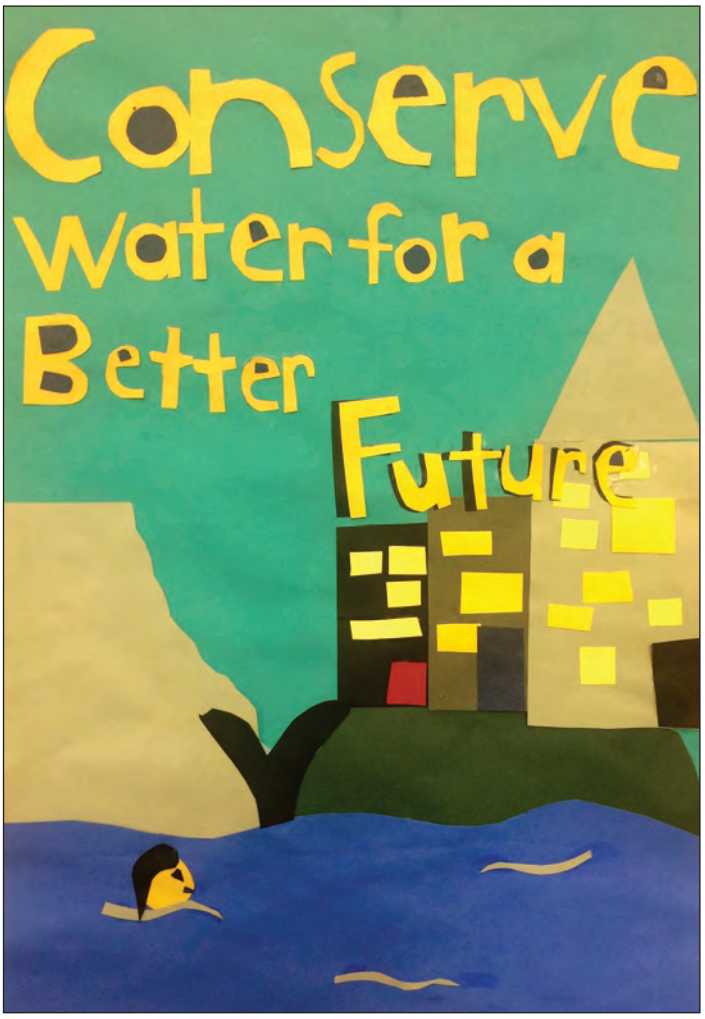
Art by Billye, 6th Grade, Sacred Heart School, Staten Island



Art by Sonya, 3rd Grade, P.S. 164 Caesar Rodney, Brooklyn



Art by Dominic, 8th Grade, J. Watson Bailey Middle School, West of Hudson



Art by NatalyLi, 4th Grade, P.S. 134 Henrietta Szold, Manhattan

Art by Eric, 12th Grade, Washington Heights Expeditionary Learning School, Manhattan

PART 2: Educating and Engaging the Public on Water Resource Recovery

What to Talk About

by Khris Dodson

Edited excerpt from Chapter 5 of the Wastewater Management Handbook for Local Representatives, 2nd Edition, published January 2013 by the New York Water Environment Association and Syracuse University Environmental Finance Center.

Now that you have the tools to reach out and educate your community, of what should you inform them? Obviously, you will want to frame the message in terms of local issues, current events and the needs of the resource recovery plant and its community. In other words, keep it real!

Promoting Best Practices/Consumer Responsibility

As important as it is to educate your community on the operations, maintenance and finances of its resource recovery plant, it is equally important to let the consumers know how they can help, why their behaviors and contributions matter, and why it is important to do – or to *not* do – some simple things to improve water quality. Keep in mind that the actions or inactions of the community in regards to water quality concerns can have negative effects on other things the community might value. In promoting consumer responsibility, answer these questions:

- What is your receiving water body?
- Could it be negatively affected or improved by the actions of the surrounding community?
- Does your community value local water bodies for hunting, fishing, boating, swimming and other recreation?
- How can community actions help the plant and others in efforts to advance community values?

Human Health and Safety

It is helpful to educate consumers about how their actions can protect the environment, their own health and safety and that of the community. More importantly, let them know that through its efficient operation, the water resource recovery plant protects public health and the environment as is mandated by the Clean Water Act. The costs of inaction or short-term economizing is much more expensive for the community in the long term, and can result in potentially dangerous situations for the local community and for those downstream. If hosting a public event at the plant, you may also want to discuss all of the requirements and procedures necessary to ensure human health and safety at the plant.

Courtesy David Lassman

Onondaga Lake, the receiving water body for runoff from the City of Syracuse, benefits from public education as the community's values and actions are reflected in the lake's overall health.

Water and Energy Conservation

Experience and public opinion surveys indicate that most customers are interested in conserving water and appreciate the cost savings from reduced usage. However, they may not know how to conserve, despite the fact that water conservation techniques are convenient and easy to implement. Effective public education campaigns can substantially improve water conservation, contribute to system capacity and build appreciation for the important work of treatment plant staff and local officials.

The topics to touch upon when discussing water conservation with the community include:

Courtesy Amy Samuels

A watershed model helps inform young people at an educational event in the Town of DeWitt.

Courtesy Brad DeFrees

Volunteer water monitoring and education programs are valuable tools in community understanding of its local water resources.

Courtesy Amy Samuels

Educational programs teach best practices, such as using leaf bags, to help keep leaf litter from entering the storm drain.

- Leak Protection: know if you have one and how much water a leak can waste.
- Lawn and Garden: how much water generally is used for landscaping; the types of landscaping that use less water; and more efficient ways to water.
- Car Washing: how to reduce water use with driveway car washing; how water can be saved in commercial car washing.
- Household Use: changes in household water use habits that save on water usage.
- Industrial and Commercial: pollution prevention by reducing water usage and wastewater generation.
- Water Metering: how water usage is affected by billing method based on usage versus flat rates with no restrictions on usage.

Source Water Protection

The actions of irresponsible individual consumers can have disastrous effects on groundwater and surface water supplies. These impacts on water supplies can also prevent recreational usage and harm natural habitats. Customers must be informed about how their actions, such as the use and disposal of chemicals, fertilizers, pharmaceuticals and household cleaning products, can affect water supplies. It is important to educate the community on what happens when individuals flush these items down the drain. To protect water supplies from contamination, communities need watershed management plans (surface water supplies) and wellhead protection programs (groundwater supplies).

Storm Sewers

While the operation of storm sewers may not be governed by the sewer authority, storm sewers are an important and often misunderstood part of a community's infrastructure. Misuse of storm sewers can lead to significant water pollution. Many people do not know that sanitary sewers flow to water resource recovery plants that provide significant treatment to remove pollutants before discharge while most storm sewers flow directly to natural waters, with little or no treatment. Often these natural waters are drinking water supplies. Chemicals, trash, leaves and other debris discharged into storm sewers, or that run off into storm sewers from lawns or driveways, are not removed before they reach those natural waters. Many communities have started educational programs to help the public understand the importance of limiting polluting discharges into storm sewers. These programs have often included painted messages next to street drains to indicate that only rainwater should go down the drain.

iStockphoto.com

Meetings with local officials and the community they serve offer another opportunity to discuss water resource management issues.

Many people do not know that sanitary sewers flow to water resource recovery plants that provide significant treatment to remove pollutants before discharge while most storm sewers flow directly to natural waters, with little or no treatment. Often these natural waters are drinking water supplies.

Proper Disposal of Hazardous Waste

Improper disposal of hazardous waste can cause contamination of surface water supplies, groundwater and soil. Hazardous waste can also adversely affect the biological treatment processes at water resource recovery plants. Many communities have started household hazardous waste programs to inform the public of the proper disposal procedures for various waste products. Often the first step in a household hazardous waste program is to educate the public about the types of common materials that are hazardous. Many products used daily are considered hazardous when they become waste. For example, the used or leftover contents of household products – such as paints, cleaners, stains and varnishes, car batteries, motor oil and pesticides – are all household hazardous wastes. Brochures and bill stuffers can be used to address the issues relating to proper hazardous waste disposal. In addition, most state environmental protection agencies offer hazardous waste disposal programs that can help communities address this matter.

Khris Dodson is the Associate Director at the Syracuse University Environmental Finance Center. He may be reached at kadodson@syr.edu.

NYWEA Asks the Public Education Professional: Kristen Lawton

by Khris Dodson

Meet Kristen Lawton, the Public Information Officer with the Onondaga County Resource Recovery Agency (OCRRA). For over eight years, Ms. Lawton has managed all facets of OCRRA's public relations and outreach, including media appearances and communication tools such as advertising, online outreach (web and social media) and print collateral. Ms. Lawton sat down with Khris Dodson to talk about her experience and insights with public education and outreach working for OCRRA.

Kristen Lawton
Public Information Officer, Onondaga County Resource Recovery Agency

1 *Different people, especially those who may not fully understand or realize the importance of Public Education, define it in different ways. How do you define Public Education?*

To me, Public Education is the opportunity to share your message with the masses through marketing and outreach (social media, email blasts, the printed word, media appearances, events, day-to-day interactions) and advertising (traditional and digital). I believe you need a combination of these initiatives to have a successful public education campaign.

Strategically focusing your efforts on several initiatives that you can manage – and manage well – means your message will hit your target audience with repeat frequency. The more frequency you achieve, the better chance you have of imparting awareness and ultimately, soliciting action.

For OCRRA's mission, I'm a big fan of community-based social marketing (CBSM), which in a nutshell is a way of inciting action for the greater social good – in our case waste reduction, recycling, composting and proper management of toxics and materials that cannot be reused or recycled – by motivating the masses toward a desired behavior using positive messaging.

The way CBSM works is you define your desired action or behavior change. Then you determine what barriers prevent your community from engaging in that behavior. Next you find ways around these barriers and run a pilot project to see if that improves your behavior change rate. If it does, then you implement it on a broad scale, making sure to employ CBSM tools such as soliciting "buy-in"; explaining "what's in it for them"; and reinforcing positive messaging as opposed to negative.

Traditional persuasive tactics involve explaining how big a problem is, but studies show if you take the opposite approach and reinforce the positive you have more success moving the social norm meter. For instance, if you want to encourage people to recycle in their bathroom, instead of highlighting that 59 percent of people don't bother to recycle in the bathroom, you'd want to underscore that 41 percent of people already recycle in the bathroom. This sets the social norm tone as positive and encourages people to become part of the group doing the right thing. As opposed to highlighting that many people DON'T recycle in the bathroom, which indirectly supports an undesired behavior.

2 *It seems that education is a continual process, or task. Is it ever 'safe' to take your 'foot off the gas,' or assume folks already know enough about the work you do, like recycling and compost?*

Unequivocally education is a continual process. If you've been putting a message out for an extended period of time, in OCRRA's case over 25 years, some make the erroneous assumption that people "get it." I can assure you, this is not the case. There are thousands of competing messages out there. Assuming that your message is understood if you've done a single campaign, or even years' worth of campaigns, is naïve in my opinion.

Not long ago, I had the privilege of sitting in on a focus group that looked at Onondaga County resident perspectives on trash and recycling. Residents had to classify themselves indicating how proficient they were at recycling. It was fascinating to me that those who classified themselves as "extreme recyclers" – so the most informed of the masses – needed reminding of basic blue bin rules. With so many messages being thrown at society and so many competing priorities out there, it is imperative that you continue to beat the drum for your message.

It is commonly understood by marketing professionals that it takes time for an audience to absorb an idea, and even longer for them to adopt a behavior associated with the idea. Let's call it a one-year lag between a heavy marketing campaign and actually seeing results. The same is true when you back off a campaign. It can take time to build up to previous levels of participation. Certainly budget and staff impact what you can devote to your public education efforts, but it is essential to keep a steady flow of messaging out there.

3 *I think it is easy to measure the value, or efficacy, of public education when it is tied to a specific project, event or time-bound. But, how do you measure effectiveness of public education programs in the long-term? How do we know we are making a difference?*

One of my favorite things about *digital* media is the ability to see measurable return on investment. We utilize various facets of Facebook, Syracuse Media Group and Google advertising and have seen tremendous results.

Forty-four percent of *all* visits to our website were a result of our digital ads. Fifty-five percent of *new* website visits were a result of our digital ads. Digital advertising is driving visits to our website. It is also motivating people to attend our events and visit our compost sites. We saw record numbers at our 2015 Earth Day Litter Cleanup event and a nearly 30 percent increase in attendance at our Confidential Document Shredding event following targeted digital advertising.

When it comes to measuring overall effectiveness of public education, OCRRA looks to the recycling numbers. We track our community's overall recycling rate – how much of our waste stream is recycled. We have been doing this pretty much since the beginning of time. Okay, since the early 1990s. What we have seen over the decades is a steady rate of recycling, currently clocking in at 60 percent of the waste stream being recycled in some fashion.

We firmly believe we are making a difference as this has held steady despite economic downturns (which impact disposable income and therefore purchasing and packaging/waste generation) and despite the thin-walling of materials. Thin-walling refers

continued on page 32

continued from page 31

to the fact that recyclable items today are made of lighter weight materials (the cardboard of today is lighter/thinner than the cardboard of yesteryear), therefore you need to recycle more to achieve the same recycling rates as in the past.

Pinckney Hugo Group, Syracuse, NY

Pinckney Hugo Group, Syracuse, NY

Above and below: A survey of Onondaga County residents revealed that most residents felt two messages would motivate them most to recycle: every little bit of recycling helps and recycling makes the world a better place for our children. Based on this information, OCRRA developed an ad campaign with a "save the world a little each day" tagline that featured local children. The children were contest winners who submitted essays on why recycling was important. Following the ad campaign, paper recycling increased 14% in Onondaga County (21,880 additional tons).

In addition, we look at the contamination rate of our recycling bins (just under four percent). Contamination rate is another way of saying how much of the material in the blue bin doesn't actually belong there because it isn't recyclable, it is trash. Waste Management, the private company that operates the recycling sorting facility here in Onondaga County, notes that we have the lowest contamination rate out of all their facilities across the nation.

Clearly, our extensive public education efforts related to what belongs in the blue bin – and what does not – have had a positive impact on our community's recycling behaviors.

4 *How do you explain or describe complex or technical aspects of the OCRRA system?*

Well, I'm only the messenger. I make things look and sound pretty. When it comes to the meat of an issue, I rely on the vast expertise of OCRRA's technical staff and those that do the work associated with the technical aspects of our system to help me understand it. I'm fond of the phrase, "I know enough to be dangerous." I seek out the experts to understand the deeper issues and then turn it into something I feel will be easy for the average person to understand. You know, something I can understand!

Metaphors and visuals help a lot in this department. If you can make something easily identifiable – compare it to a commonplace item, or turn it into a visual for your audience – you'll be better able to convey your underlying concept.

My predecessor (and cherished mentor) Andy Brigham, a former TV news director and investigative reporter, was great at the metaphor exercise. For example, when trying to explain the importance of waste uniformity necessary for efficient trash processing at our Waste-to-Energy Facility, I heard him describe the mixing process, which is done with an industrial-size grapple, as similar to tossing a salad. At the Waste-to-Energy Facility, where trash is turned into electricity (enough to power 30,000 homes in our community), different trash streams must be well-blended to achieve a consistent and uniform fuel supply. In other words, trash needs to be fairly homogenous in order to be processed most efficiently. While few people have probably been to a Waste-to-Energy Facility and seen this process in action, you'd be hard pressed to find someone who didn't understand how tossing a salad mixes everything together in an even fashion.

5 *We are living in an ever-evolving communication environment. How do you use, or keep up with, new ways of communicating?*

I spend a lot of time pumping my Gen Y and Z cousins for information. Seriously, there is nothing like a younger person to help you understand trends. Researching what they share and keeping up with industry publications is helpful. I also rely on our ad agency, Pinckney Hugo Group, as they have a broader perspective than I could ever hope to obtain; they work daily with many diverse clients and they have their finger on the pulse of effective communications. Like so many things in the public education realm, it is about knowing where to seek out answers and putting the best ideas into practice.

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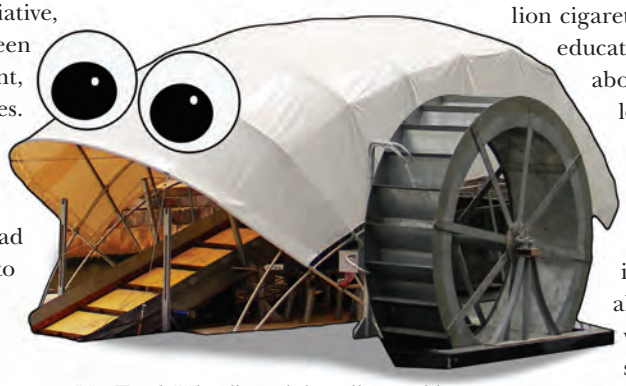
Baltimore's Mr. Trash Wheel

by Adam Lindquist

Originally published as an essay in the summer issue of Journal of Ocean Technology, ISSN 1718-3200 (Volume 11 Number 2).

The Healthy Harbor Initiative

In 2009 the Waterfront Partnership of Baltimore launched a campaign to make the Baltimore Harbor swimmable and fishable by 2020. Known as the Healthy Harbor Initiative, the campaign is a unique partnership between environmental nonprofits, city government, community leaders and waterfront businesses. One impact of setting such an aggressive goal is that, rather than waiting for governments and regulators to make infrastructure improvements that eventually lead to cleaner water, the partnership is driven to find more immediate and innovative solutions. In 2011 the Healthy Harbor Initiative planted 2,000 square feet of floating wetlands in the Inner Harbor and in 2013 began growing over 100,000 spat (baby oysters) in the Harbor with the goal of planting five million by 2020.



Mr. Trash Wheel's social media graphic created by What Works Studios

In May 2014, the Waterfront Partnership of Baltimore made history when it installed the world's first solar and hydro powered trash interceptor in the Jones Falls, a river that flows into the Inner Harbor. John Kellett, a local man who was tired of seeing trash flow into the Baltimore Harbor during rainstorms, invented the device known as Mr. Trash Wheel. Kellett had the ingenious idea of combining new and old sustainable technologies to cleanly and efficiently collect trash at the end of the river before it reaches the open waters of the Baltimore Harbor and Chesapeake Bay.

Mr. Trash Wheel's primary engine is a 14-foot steel water wheel powered by the current of the river. Water wheels have been around for hundreds of years and powered much of Baltimore's mill industry throughout the 1800s in factories along the banks of the Jones Falls. Instead of powering a mill, the water wheel powers a rake and conveyor system that pulls floating litter and debris from the river and deposits it into a dumpster barge. The Trash Wheel also has an array of thirty solar panels to power pumps that pump water onto the wheel so that the machine can continue to operate even when the current of the river is slow. During a large rainstorm these two systems work in tandem to give the machine the strength it needs to collect anything that floats down the river, from a single cigarette butt to an entire tree.

Waterfront Partnership (a nonprofit) raised the $750,000 needed to hire Kellett's company – Clearwater Mills – to design, build and install the device and has an ongoing contract with them for operation and maintenance. Funding came from two main sources: the Maryland Port Administration, and Constellation, a subsidiary of Exelon headquartered in Baltimore. The Baltimore City Department of Public Works helps to pay for the ongoing operation cost with funds raised by the city's stormwater remediation fee established by state law in 2012.

Cleaning Up the Baltimore Harbor

In its first 22 months of operation the Trash Wheel has picked up 127 dumpsters full of trash and debris adding up to a total of 420 tons. The public is invited to track its trash collection online at *www.MrTrashWheel.com* and can even download a spreadsheet detailing the composition of each individual dumpster. Clearwater Mills samples the dumpsters to estimate the number of each major item of litter collected. As of March 2016 this included: 247,520 plastic bottles; 316,789 polystyrene containers; and 7.3 million cigarette butts. This data is then used to educate the public and elected officials about the impact that trash has on local waterways and to support legislation aimed at reducing litter.

The majority of trash and debris is collected during significant rain events because that is when trash from streets and alleys is carried into storm drains, which flow unfiltered into the city's streams and Baltimore Harbor. During periods of drought the Trash Wheel may not operate at all, but during a particularly strong storm in June 2015 it filled twelve dumpsters in 24 hours.

Once a dumpster is filled a boat transports it to shore and an empty dumpster barge is put in place. The trash is taken to a waste-to-energy plant where it is burned to generate power for Maryland homes. While a handful of other cities collect and burn marine debris, like fishing nets, to generate energy, Baltimore is the only city in the world generating power from litter intercepted in urban waterways. Each ton of trash can power up to 16 households for a day. Since Waterfront Partnership began sending trash to the incinerator, garbage collected by the Trash Wheel has generated enough electricity to power 3,365 homes.

Trash and organic matter aren't the only things the Trash Wheel has collected. In August 2015 a five-foot ball python, native to West Africa, was found wrapped around the machine's power inverter. Likely somebody's lost pet snake, it was removed by the National

Courtesy Adam Lindquist

Jack Cover, General Curator for the National Aquarium, shows off the ball python picked up by Mr. Trash Wheel.

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Aquarium and adopted out to a good home. Other items of note include a beer keg, a hula-hoop and a pint of still frozen strawberry ice cream. Fish, eels, ducklings and other wildlife also find their way on to the conveyor, but the machine moves slowly enough that wildlife can get out of the way before ending up in the dumpster.

Going Viral

Soon after its installation, a short handheld video of the Trash Wheel operating during a rainstorm went viral online and to date has accumulated nearly 1.5 million views. To capitalize on the growing interest in the device, Waterfront Partnership developed a unique social media marketing strategy. Working with What Works Studios, a creative agency in Baltimore, Mr. Trash Wheel was born. Initially just a photo of the Trash Wheel with a pair of eyeballs added digitally, Mr. Trash Wheel soon developed his own personality and Internet following on several popular social media platforms.

Mr. Trash Wheel loves eating tires, but hates broccoli. He loves NASA and dreams of one day visiting outer space to help clean up the trash orbiting our planet. He is literally the world's biggest *Star Wars* fan and was inconsolable when he realized he was too large to fit into a theater to see *The Force Awakens*. He is friends with Baltimore Harbor wildlife, a lifelong fan of the Baltimore Ravens and Baltimore Orioles and promoter of all that is great about his city. Mr. Trash Wheel fans proudly wear "Keepin' It Wheel" t-shirts and have even dressed up like him for Halloween.

Courtesy Adam Lindquist

Before Mr. Trash Wheel, trash and debris fill the water of Baltimore's Inner Harbor after a large storm.

Courtesy Adam Lindquist

After Mr. Trash Wheel, large storms no longer cover the Baltimore Harbor with trash and debris. On this day Mr. Trash Wheel collected 12 dumpsters full of trash.

Mr. Trash Wheel has become something of a local celebrity, whose antics are frequently covered by Baltimore media and sometimes even national media including NBC News, National Geographic and National Public Radio. Twice Waterfront Partnership has hosted an Ask Me Anything event on the popular website Reddit, where thousands of people from around the world ask Mr. Trash Wheel questions about how he works, his social life and his personal opinions. All of this interest in Mr. Trash Wheel has resulted in over 4.9 million social media impressions on Twitter and Facebook.

Millions of views and impressions are evidence of a successful social media campaign, but how does that success translate to a cleaner Baltimore Harbor? By being a source of entertainment first and the mascot for an environmental movement second, Mr. Trash Wheel has the ability to reach an audience who may not have previously considered the impact of their waste. An example of such a transformation is this story, relayed to Mr. Trash Wheel by a fan:

"I was hanging out with some friends after a fitness class the other night and I noticed that one of them was wearing one of the Mr. Trash Wheel 'Keepin' it Wheel' t-shirts. I'd never known her to have an interest in the environment before, so I commented on it. She was very enthusiastic, talking about how funny he is on Twitter and how much she loved his Reddit Ask Me Anything. And then she said that it's caused her to be much more serious about recycling (she said she's a 'fanatic' now) and to think about trash a lot more. It's so awesome to see the impact that a personal connection (via googly eyes and a Twitter feed) can have on behavior change."

Another impact of the Mr. Trash Wheel campaign has been on Waterfront Partnership's fundraising efforts to further the Healthy Harbor mission. In June 2015 Waterfront Partnership launched a crowd-funding campaign *(www.CantonWaterWheel.com)* to build the world's second Trash Wheel at another Baltimore stream known for carrying tons of trash into the Baltimore Harbor each year.

Five hundred and fifty thousand dollars are needed to build this second slightly smaller Trash Wheel and, thanks to the popularity of Mr. Trash Wheel, over 80 percent of these funds have been raised via donations from Baltimore businesses, foundations and individuals. Waterfront Partnership hopes to complete their fund raising and have the new Trash Wheel installed by the end of 2016.

What's Next for Mr. Trash Wheel?

Many organizations struggle to integrate social media into their outreach strategies. When done poorly it can be a waste of time or worse. Mr. Trash Wheel is a clear example of an organization harnessing the power of social media to further its mission and raise awareness of its cause. Of course it all started with John Kellett's incredible invention, but by actively participating in online culture and inviting the public to join in the fun, the Mr. Trash Wheel project has created a fandom of individuals who want to be a part of a positive story about cleaning up the environment.

Waterfront Partnership's approach of embracing social media along with all its quirks and chaos has helped Baltimore to reframe a negative issue into a positive one. Public opinion is evolving. Where residents once talked about how hopelessly polluted the

Adam Lindquist

Baltimore's Mr. Trash Wheel sits at the end of the Jones Falls stream in Baltimore Inner Harbor.

Baltimore Harbor has become, they are now starting to believe that its restoration is possible and imagine that maybe one day they might even join Mr. Trash Wheel for a swim.

Clearwater Mills receives weekly requests from cities around the world that want to know how to bring a Mr. Trash Wheel to their own rivers and streams. The company has visited Rio de Janeiro and Bali as well as a number of cities throughout the United States. It's only a matter of time before this technology is implemented in other places, but whether those Trash Wheels are given personalities and social media accounts will be up to the people living there. As for the gender and personality of Baltimore's second Trash Wheel, Waterfront Partnership has refused to disclose any details until its fundraising is complete.

Waterfront Partnership continues to find new ways to use Mr. Trash Wheel as an engagement and outreach tool. Last fall an online petition appeared asking that permanent eyeballs be installed on the device. "These googly eyes could save the planet," the petitioner proudly proclaimed. Fifteen hundred signatures later, Waterfront Partnership responded by reaching out to Key Tech, a local technology solutions company. Key Tech donated time and materials to build and install five-foot tall eyeballs on the device along with LEDs to light them up at night. Now, when people visit Mr. Trash Wheel they don't just see an incredible invention, they see a mascot fighting to clean up the Baltimore Harbor and, maybe one day, the oceans of the world.

Adam Lindquist is the Director of the Healthy Harbor Initiative at the Waterfront Partnership of Baltimore. He has a Master's degree in Community Planning from the University of Maryland College Park and has been with the Waterfront Partnership of Baltimore since 2011. In addition to anthropomorphizing inanimate objects, he loves hiking, kayaking and working to reconnect urban populations to their waterways with innovative and educational projects.

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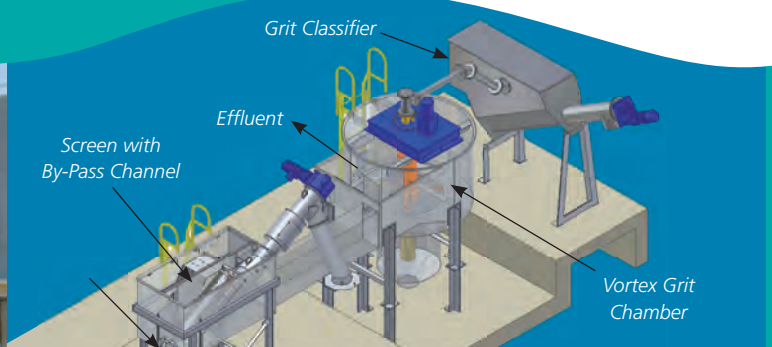

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Clean Streets = Clean Beaches

Anti-Littering Campaign Launches in Coney Island

New York City Department of Environmental Protection Public Affairs Press Release, July 28, 2016

Educational Initiative Aims to Improve Cleanliness and Aesthetics of City Beaches by Reducing Littering on Streets and in Parks Summer Youth Employment Program Will Spearhead Cleanups of Waterfront Properties.

Environmental Protection (DEP) Acting Commissioner Vincent Sapienza, Sanitation Commissioner (DSNY) Kathryn Garcia, NYC Parks Brooklyn Borough Commissioner Kevin Jeffrey and U.S. Environmental Protection Agency Region 2 Clean Water Acting Director Jeffrey Gratz today launched *Clean Streets = Clean Beaches,* a public information campaign and beach clean-up program aimed at reducing littering and improving the cleanliness and aesthetics of New York City beaches. When it rains, trash and debris discarded on city streets and sidewalks can be washed down storm drains and end up on beaches. This summer, *Clean Streets = Clean Beaches* posters will be displayed at area beaches and on approximately 2,000 sanitation vehicles citywide. In addition, DEP will join with the Department of Youth and Community Development (DYCD) to clean trash and debris from waterfront properties. The program was launched at MCU Park in Coney Island, home of the Brooklyn Cyclones, where children attended the Cyclones game from area day camps and the City's Summer Youth Employment Program.

"Throughout the summer, the city's beautiful beaches, from Orchard Beach in the Bronx to Cedar Grove Beach on Staten Island, are choice destinations for New Yorkers looking to swim and sunbathe," said DEP Acting Commissioner Vincent Sapienza. "I'd like to take this opportunity to encourage all New Yorkers to pitch in, do their part and keep the beaches safe and clean. Do the right thing and put your trash where it belongs – in a litter basket and not on the street."

NYC Water. ©All rights reserved.

August 2, 2016. Brooklyn Cyclones mascots Sandy the Seagull (left) and Pee-Wee (right) take a sip from the portable NYC Water drinking fountain, provided as part of the NYC Water On the Go program.

NYC Water. ©All rights reserved.

The Clean Streets = Clean Beaches poster is displayed on a city street sweeper.

"The *Clean Streets = Clean Beaches* partnership goes a long way in helping to ensure all New Yorkers can enjoy our City's incredible beaches," said Sanitation Commissioner Kathryn Garcia. "Litter on our streets today could end up on our beaches tomorrow. When everyone does their part, we can all look forward to a cleaner and more beautiful New York City for many years to come."

"New York's fourteen miles of beaches are some of our city's greatest assets, and they've never been better, as proven by the millions of visitors who enjoy them. And keeping the beaches clean and free of litter is a vital part of caring for our city," said NYC Parks Brooklyn Borough Commissioner Kevin Jeffrey. "And care is the difference that will bring our public spaces from being simply resources, to being emotional touchstones for the communities they serve. NYC Parks is proud to work with our partners from DSNY, DYCD, DEP, EPA, the Brooklyn Cyclones and local kids on the *Clean Streets = Clean Beaches* campaign, drawing needed attention to the link between litter on the streets that washes down storm drains and litter that washes up onto area beaches. Together, we can all chip in to maintain and enjoy a healthy, beautiful environment."

"The *Clean Streets = Clean Beaches* campaign means a cleaner and greener City and an opportunity for our Summer Youth Employment Program participants to learn the value of hard work, giving back to their communities, and beautifying our neighborhoods and waterfront properties for all to enjoy," said Department of Youth and Community Development Commissioner Bill Chong. "Through this initiative, our young people not only learn about the value of civic engagement, but inspire their peers and all New Yorkers to take great pride in their City."

"The *Clean Streets = Clean Beaches* campaign is about taking pride in our community – both on land and in our ocean and harbor," said Jeffrey Gratz, Acting Director of EPA Region 2 Clean Water Division. "The marine life that live in and around our waterways

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The *Clean Streets = Clean Beaches* program was launched at a Brooklyn Cyclones game attended by children from area day camps and the City's Summer Youth Employment Program.

and beaches are precious. We must all remember that garbage on our streets can end up in storm drains, and that garbage can end up on our beaches. Let's work together to stop littering and reduce our waste."

The *Clean Streets = Clean Beaches* campaign began in the early 1990s to highlight the link between litter on the streets and trash found on area beaches. The 2016 program will utilize an informational poster for display at area beaches as well as on Department of Sanitation fleet vehicles, which include approximately 450 mechanical brooms that sweep litter from more than 6,000 miles of streets per day. Additionally, the Department services more than 25,000 litter baskets daily.

DEP inspects and cleans approximately 148,000 catch basins citywide, which trap litter before it can make its way into the sewer line. In addition, a fleet of skimmer boats, along with booms surrounding 23 major sewer outfalls throughout the city, are used to capture any debris that makes it through the catch basins before it reaches local waterways, including wood, plastic, metal, rubber, and glass. DEP has also built three litter control devices located within sewer outfalls along the Bronx River, and one at the head of the Gowanus Canal, that use hydraulic bar screens and nylon netting systems to capture litter before it can reach the river.

Also recently launched is the Summer 2016 Waterfront Clean-Up program where DEP partners with DYCD's Summer Youth Employment Program to hire nearly 200 young New Yorkers who will spend approximately 25 hours a week removing litter and debris from waterfront properties. The program helps to promote environmental stewardship and provide valuable work experience.

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More photographs are available on the DEP Flickr page (https://www.flickr.com/photos/nycwater/sets/72157671913925005/)

For more information, contact NYC Department of Environmental Protection, Public Affairs, 59-17 Junction Boulevard, 19th Floor, Flushing, NY 11373, (718) 595-6600, or any of these departments of New York City or the US Environmental Protection Agency (USEPA):

Department of Sanitation (DSNY): (646) 885-5020
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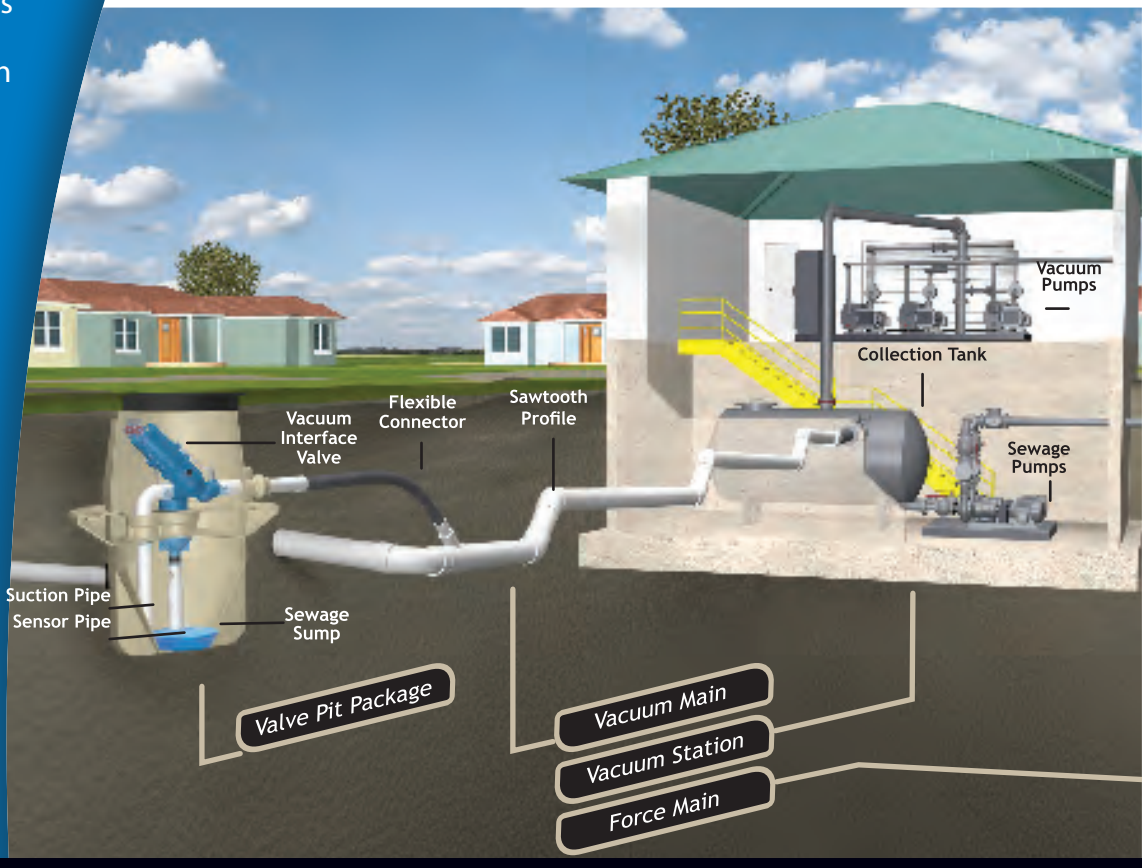

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PART 3: Educating and Engaging the Public on Water Resource Recovery

Water Environment Federation's Public Education Program

by Khris Dodson

Edited excerpt from Chapter 5 of the Wastewater Management Handbook for Local Representatives, 2nd Edition, published January 2013 by the New York Water Environment Association and Syracuse University Environmental Finance Center.

As a leading source of water quality information, the Water Environment Federation (WEF) develops programs and materials to help its members communicate with their target audiences about key water quality issues. As a not-for-profit technical and educational organization for water quality professionals, its goal is to increase understanding of the direct role water and wastewater services have in the protection of public health, the economy and the environment.

For the General Public, Educators and Students

For the general public, WEF offers a full brochure series, videos, posters and CD-ROMs on a wide range of water quality topics including water resource recovery processes, careers, point and non-point source pollution, watershed management, water and wastewater infrastructure, fats, oils and greases, and water and biosolids recycling. Developed by water quality professionals, the materials can be used as informational mailers, bill inserts, and handouts for community meetings, exhibits, plant tours and school programs.

For educators, WEF offers, "The Water Sourcebook," a supplemental K-12 school curriculum on water quality. The popular hands-on series is designed to be an easy way for teachers, nonformal educators and water quality professionals to teach elementary and secondary grades about today's most important water quality issues which include wastewater and drinking water treatment, groundwater, surface water and wetlands. To supplement this effort, WEF also offers a full-day, hands-on training workshop for high school science teachers at WEFTEC. Featuring Sewer Science, a mobile water resource recovery plant equipped with specially designed tanks, real-life laboratory analytical equipment and a workbook, the award-winning simulation guides teachers through the water resource recovery process. The miniature laboratory and supplemental materials, through a unique partnership of corporations, municipalities, consultants, community organizations and area high schools, are then provided exclusively to high schools in the WEFTEC host city for a full academic year.

For students, WEF organizes the Stockholm Junior Water Prize (SJWP), the most prestigious international youth award for a high school water science research project. Organized in the United States by WEF and its member associations, its purpose is to increase students' interest in water-related issues and research, and to sensitize them as future leaders to global water challenges.

Goals of the Water's Worth It Campaign

- DEMYSTIFY water and water resource recovery by showing the direct connections between what water sector professionals do and what the public values – create jobs, protect health, protect the environment, and provide clean water.
- EXPAND and deepen the awareness of the value of water.
- EXPLAIN that water is a precious and limited resource that needs to be recycled and reused.
- ELEVATE the profile of water sector professionals by building respect and appreciation for the services they provide.
- CREATE a foundation of public awareness to support needed infrastructure investments.
- SUPPORT cutting-edge practices to deliver, recover, and reuse water resources.

Water's Worth It Campaign

Understanding the influential role of the general public, public officials and the media in the formation of public opinion and policy, WEF also works to inform those audiences about water quality through educational tours, congressional testimony, newsletters, news releases, press events, formal comments on regulatory and legislative matters, and grassroots public education programs. The Water Environment Federation's campaign, *Water's Worth It,* aims to raise awareness about the value and importance of water, water-related issues, and the water profession. The program is designed to inform a range of audiences, including the general public, media, opinion leaders, decision-makers, and elected officials.

How does it work? For members of the water sector, the campaign provides communication tools; assistance to build alliances at the state, regional, and community level; and support to coordinate a flexible outreach and education effort that is easily tailored to what's happening in your state, region, community or agency. For the general public, the campaign provides the information needed to be an educated and responsible consumer; helps to create a personal connection with water; shows how our lives are inextricably linked to this vital resource; and enhances understanding about how important the water profession is and the essential services that it provides for quality of life in our communities.

We encourage you to learn more about this program and how you can help be a voice for water. Get started here: *http://www.watersworthit.org/get-started/*

Khris Dodson is the Associate Director at the Syracuse University Environmental Finance Center. He can be reached at kadodson@syr.edu.

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Finding Strength in Numbers

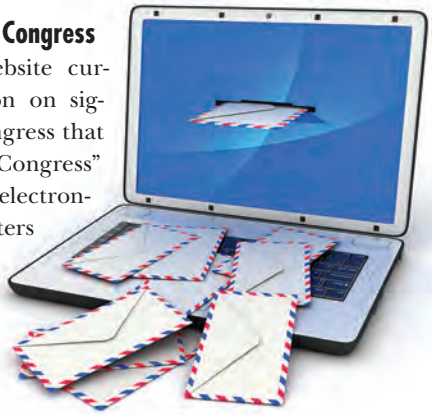
The Water Advocates Website Makes It Easier to Get Involved in Water-related Legislation and Regulations

by Steve Dye, WEF Government Affairs

The Water Environment Federation (WEF; Alexandria, Va.) has launched a new website *(http://cqrcengage.com/wef/home)* an on-line grassroots advocacy tool for the Water Advocates program that features important legislative and regulatory matters and calls-to-action on issues impacting the water sector.

The website offers a number of free grassroots tools to help WEF members engage with their elected officials. Although the website is accessible to all water professionals, WEF invites members to join the Water Advocates program to increase their effectiveness in advocating for the water sector. WEF members can join the Water Advocates community on *wefcom.org*, as well as the Water Advocates website.

Automated Letter Writing to Congress



The Water Advocates website currently has two calls-to-action on significant bills pending in Congress that connect users to a "Write Congress" tool on the website. The tool electronically submits pre-drafted letters to Senators and Representatives. The tool uses the official Congressional correspondence process so the emailed letter will not get marked as spam.

The first call-to-action urges the House and Senate to increase funding for water infrastructure in FY2017 appropriations bills. The letter asks Congress to fund the Clean Water and Drinking Water State Revolving Fund (SRF) programs at $2 billion each. In addition, the letter includes a link to a new report by WEF and the WateReuse Association that states that for every $1 million in SRF funding, $930,000 is returned to the federal treasury in tax revenues, 16.5 high-paying jobs are created, and $2.95 million in economic growth is generated in the U.S. economy.

The second call-to-action urges the Senate to pass the Water Resources Development Act of 2016 (WRDA). The Senate version of this bill includes a number of important policy and funding provisions that benefit water infrastructure investment. The bill was passed out of committee earlier this year, but now needs to go to the Senate floor. The draft letter asks senators to urge Senate Majority Leader McConnell to bring the WRDA bill to the floor and pass it with the water infrastructure provisions.

Grassroots Advocacy Toolkit

Members and Member Associations have another toolkit for their grassroots advocacy efforts. This toolkit explains the benefits of grassroots advocacy at the federal, state, and local levels, and provides advice and guidance on how to engage with elected officials and the public on important issues affecting the water sector. The toolkit outlines essential steps to grassroots advocacy, and provides quick tips on calling, writing, and meeting with elected officials. Also, the toolkit includes useful links to Congressional and federal agency websites and directories.

WEF members can download the PDF version of the toolkit at the Water Advocates website *(http://cqrcengage.com/wef/home)*. Member Associations are urged to share it with members as a resource.

Since 2011 Steve Dye has served as Legislative Director for the Water Environment Federation (WEF). In his government relations role Steve represents the Federation before Congress, monitors key legislation and federal policies, develops and executes legislative strategies and proposals, and maintains WEF's excellent reputation before public and private interests in the water sector. He also leads WEF's Water Advocates Program, a grassroots program designed to mobilize and train WEF members to advocate before federal, state, and local officials.

Save the Date: WaterWeek 2017

Mark your calendars! WaterWeek 2017 is happening in Washington, D.C., on March 20–25, 2017. At WaterWeek, the National Water Policy Forum, Fly-In, and Expo will be hosted by WEF, NACWA, WE&RF, and WateReuse from Tuesday, March 21, through Thursday, March 23. Other partner organizations such as AWWA and WWEMA are also hosting their annual fly-ins the same week.

Sign-up for *This Week in Washington*

If you'd like to get all the latest news from Washington, D.C., and elsewhere around the country on important legislation, regulations, legal action, and national policies and programs, sign up for WEF's weekly government affairs e-newsletter, *This Week in Washington.*

Every Friday afternoon you will receive a brief report on important issues affecting the water sector as well as upcoming events, webcasts, and publications. And best of all, it's free to subscribe. Sign up at *http://www.wef.org/GovernmentAffairs/ThisWeekInWashington/*

Department of Environmental Protection Announces NYC Tap Water Wins Regional Taste Competition

DEP Public Affairs Press Release, July 28, 2016

Department of Environmental Protection (DEP) Acting Commissioner Vincent Sapienza today announced that the City's tap water was awarded the top prize in New York State's Regional Metro Tap Water Taste Test competition. The contest was held on July 28, 2016, at the American Museum of Natural History in Manhattan and pitted New York City's tap water against drinking water suppliers from Westchester, Nassau, Suffolk and Orange counties. Museum visitors sampled tap water from the five suppliers and ranked them by taste. New York City's tap water was judged to be the best tasting, followed by water from Elmsford in Westchester County. After winning the Regional Taste Test competition, New York City tap water will next compete in a state-wide contest to be held in Syracuse, N.Y. on September 2. The annual taste test competition, which takes place in county, regional, and statewide contests, is organized by the U.S. Environmental Protection Agency and the New York State Water and Wastewater Education and Outreach Committee.

"Generations ago New Yorkers had the foresight to construct the incredible network of infrastructure that carries our water from as far away as 125 miles and provides us with a robust supply of high-quality drinking water from a pristine and protected watershed," said Acting Commissioner Sapienza. "Under Mayor de Blasio's leadership we have continued that tradition, investing billions of dollars in upgrades to our water supply system and watershed protection programs, to ensure that the next generation of New Yorkers continue to enjoy high quality drinking water."

New York City's tap water is internationally renowned for its quality. New York is one of only five large cities in the country permitted to run a largely unfiltered drinking water supply, due in large part to the City's comprehensive watershed protection programs. The City has invested more than $1.7 billion in watershed protection programs since 1993, when the U.S. Environmental Protection Agency first issued the City a waiver from the federal requirement to filter the water from the Catskill/Delaware System. In addition, DEP recently activated the $3.2 billion Croton Filtration Plant, for water from the Croton supply system.

To ensure the water is safe and of the highest quality, DEP performs more than 500,000 analyses of the city's drinking water every year. Samples are collected from the streams that feed the reservoirs, the reservoirs themselves, the aqueducts that carry the water to the city, and from nearly 1,000 sampling locations throughout the five boroughs. Each year, DEP publishes a Water Supply and Quality Report with detailed information about the water supply and the quality of the City's drinking water. To view the report, visit the website *http://www.nyc.gov/html/dep/pdf/wsstate15.pdf.*

NYC Water is a healthy alternative to sugar-sweetened beverages, containing zero calories, zero sugar, and zero fat. A typical 16-ounce bottle of soda contains about 180 calories and 20 cubes of sugar. Sports drinks, marketed as healthy alternatives, have as many calories as sugary beverages and usually contain high levels of sodium. NYC Water is also affordable – at roughly one penny per gallon, it is approximately 1,000 times less expensive than bottled water. In addition, drinking NYC Water helps to protect the environment as the production of plastic water bottles for use in the United States uses 1.5 million barrels of oil a year – enough to power 250,000 homes or 100,000 cars all year.

DEP manages New York City's water supply, providing approximately 1 billion gallons of water each day to more than 9 million residents, including 8.5 million in New York City. The water is delivered from a watershed that extends more than 125 miles from the city, comprising 19 reservoirs and three controlled lakes.

NYC Water. ©All rights reserved.

New Croton Dam Spillway, August 2014, Westchester County, NY. Located about 22 miles from New York City, the New Croton Reservoir was placed into service in 1905. It replaced the original, much smaller Croton Reservoir, which was New York City's first upstate water supply that went into service in 1842.

Approximately 7,000 miles of water mains, tunnels and aqueducts bring water to homes and businesses throughout the five boroughs, and 7,500 miles of sewer lines and 96 pump stations take wastewater to 14 in-city treatment plants. In addition, DEP has a robust capital program, with nearly $14 billion in investments planned over the next 10 years that will create up to 3,000 construction-related jobs per year. This capital program is responsible for critical projects like City Water Tunnel No. 3; the Staten Island Bluebelt program, an ecologically sound and cost-effective stormwater management system; the city's Watershed Protection Program, which protects sensitive lands upstate near the city's reservoirs in order to maintain their high water quality; and the installation of more than 820,000 Automated Meter Reading devices, which will allow customers to track their daily water use, more easily manage their accounts and be alerted to potential leaks on their properties. For more information, visit *nyc.gov/dep,* like us on Facebook, or follow us on Twitter.

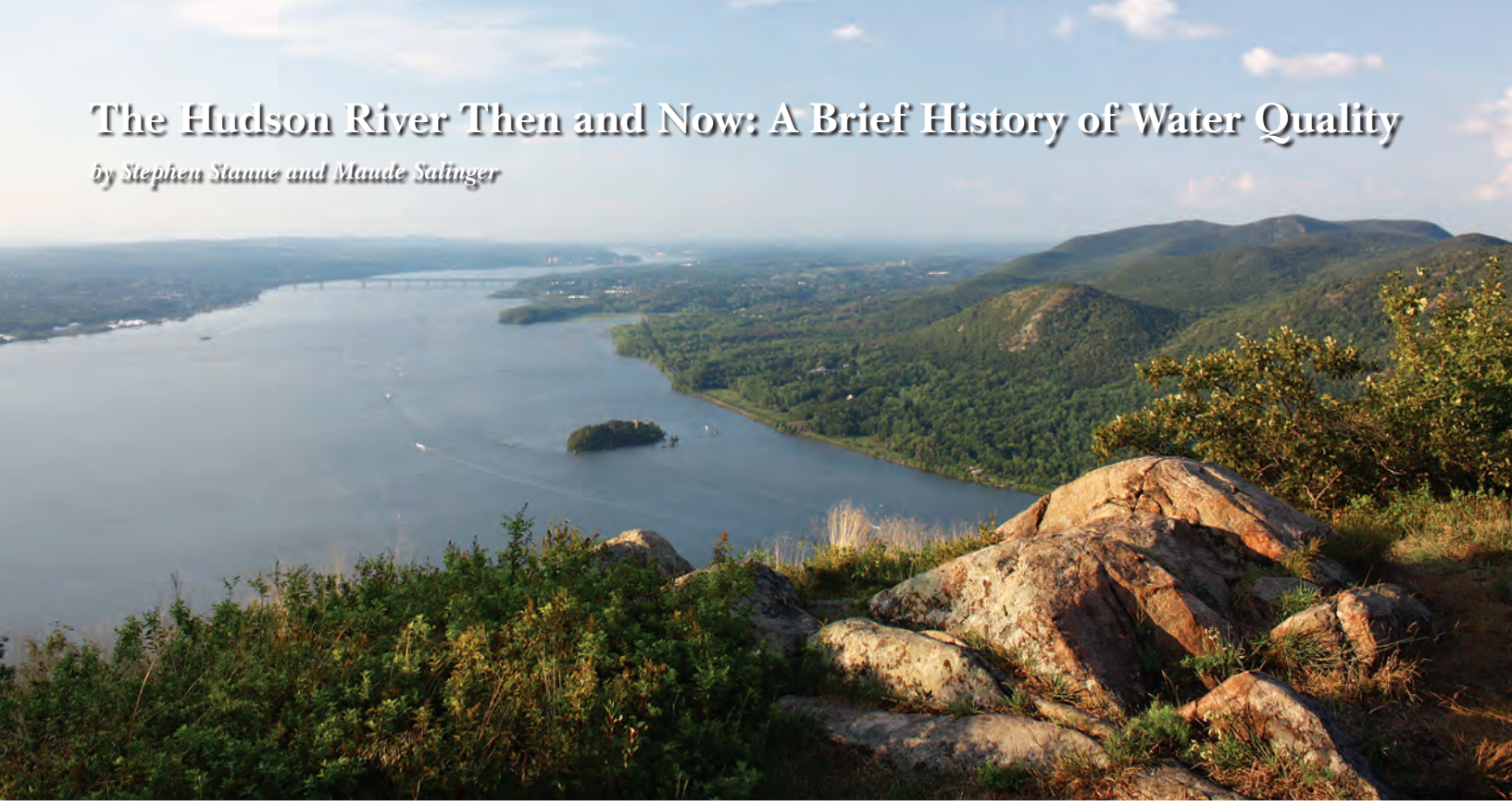
This article is reprinted with permission from the NYC.gov Web site (http://www.nyc.gov/html/dep/html/press_releases/16-077pr.shtml).

For more information, contact NYC Department of Environmental Protection, Public Affairs, 59-17 Junction Boulevard, 19th Floor, Flushing, NY 11373, (718) 595-6600.

Editor's Note: For those readers wondering about the results of the statewide best-tasting tap water contest held at the New York State Fair in Syracuse on September 2: A report published in the *Daily Gazette* (Schenectady) by contributor Indiana Nash announced that the 2016 winner was … the Town of Niskayuna, from the Capital Region. According to the report, New York City came in second place, although the exact margin of victory was not provided. Congratulations! *(http://yourniskayuna.com/blog/2016/09/06/niskayuna-wins-best-tasting-water-in-the-state/)*

The Hudson River Then and Now: A Brief History of Water Quality

by Stephen Stanne and Maude Salinger



This view of the Hudson and Cornwall Bay was taken from Storm King Mountain in the Hudson Highlands. *Courtesy Stephen Stanne*

On September 11, 1609, when Henry Hudson's sailing ship *Half Moon* entered the river later named for its captain, crew member Robert Juet recorded the river's physical characteristics – its depths, shoals, winds, tides and currents. He noted a rich array of fishes, "...they tooke four or five and twentie Mullets, Breames, Bases, and Barbils..." and trees, "...goodly Oakes, and Wal-nut trees, and Chest-nut trees, Ewe trees, and trees of sweet wood in great abundance...".[1] Native tribes who had settled the shores of the river long ago, called it *Mahicantuck,* translated as "river that flows both ways." Mahicantuck is an apt description of the Hudson River estuary – a long arm of the sea in which saltwater meets fresh water running off the land, moving back and forth by tidal currents.

A sailor would find the river very different today than it was in Henry Hudson's time. Human activities are a lingering threat to the health of the Hudson and streams in its basin. Is the river clean? Swimmable? Will it ever again be what Henry Hudson experienced? We can't dial back four centuries, but we can do our best to restore the Hudson so people can enjoy the benefits of clean water.

Pollution and Early Clean-Up

"The river from Troy to the south of Albany is one great septic tank that has been rendered nearly useless for water supply, for swimming, or to support the rich life that once abounded there." Governor Nelson Rockefeller, 1965[2]

As cities grew within the watershed of the Hudson, their sewage discharges increased, especially at New York City in Westchester County and the Albany Capital District. Untreated sewage, tannery and paper mill discharges, and industrial and commercial chemicals routinely entered the river in these and many other cities. Combined Sewer Overflows (CSOs) also caused untreated or poorly-treated waste to flow into the Hudson. In 1965, New York State voters passed a billion dollar Pure Waters Bond Act to fund sewage treatment. In 1972, the federal Clean Water Act made clean-up a national priority, providing billions more, and the Hudson benefited.

Water quality has greatly improved since state and federal actions of the 1960s and 1970s made water quality improvement a priority. For example:

- Around Manhattan, 150 million gallons of raw sewage entered the river daily until 1986. When the North River sewage treatment plant began operating off Manhattan in 1986, bacteria concentrations dropped significantly.
- Near Albany, sewage treatment plants did not disinfect their discharges; these organic wastes fed bacteria that in turn depleted the river's oxygen. In the summer of 1970, a study found so little dissolved oxygen that the few fish seen were "swimming slowly at the surface, gulping air, and disturbing an oil film which covered the water surface."[3] After treatment plants came online near Albany, New York State Department of Environmental Conservation (NYSDEC) monitoring programs in the area collected 3,314 fish representing 27 species in the summer of 1975.

In addition to requiring sewage treatment, the Clean Water Act limited discharges from factory waste pipes. North of the City at Tarrytown, the Hudson's color once matched the paint applied to vehicles at a General Motors plant there. In the years following the law's passage, industrial and municipal discharges gradually came into compliance. In recent decades, conditions have improved for fish and other river creatures. At last count, 222 species of fish had been recorded in the Hudson and its watershed.

River Habitats

Nearly 300,000 acres of tidal wetland and shallow water habitat in New York Harbor have been lost to landfill and dredging since European settlement began. Between Catskill and Albany, nearly

one-third of the river has been filled in, starting in the mid-1800s as engineers created a single, deep shipping channel through a complex of islands, shallows, and wetlands. Railroad construction also greatly altered habitat, burying wetlands and cutting bays and coves off from the river. A permitting system established under the Clean Water Act has slowed the pace of wetlands loss. Unfortunately, few of these historically altered habitats can be restored to their former condition, so protecting what still exists today is a priority.

Management of the Hudson River Estuary

Another boon to river clean-up was the passage in 1987 of the Hudson River Estuary Management Act (ECL 11-0306) which created the Hudson River Estuary Program, administered by NYSDEC. The program focuses on the tidal estuary and its adjacent watershed from the federal dam at Troy to the Verrazano-Narrows Bridge in New York City. The program is guided by the *Hudson River Estuary Action Agenda* which aims to achieve six key benefits the public receives from our work: clean water; resilient communities; a vital estuarine ecosystem; conservation of fish, wildlife, and habitats; preservation of the river's natural scenery; and enhanced opportunities for education, river access, recreation, and inspiration.[4]

Delivering these diverse ecological and human benefits requires an approach that is watershed-wide in scale and addresses the region's streams and tributaries as well as the main stem of the Hudson. The Estuary Program relies on partnerships with federal and state agencies, as well as local municipalities, non-profits, academic and scientific institutions, businesses, trade organizations, landowners and dedicated volunteers to accomplish its mission.

Funding is an important element of the revitalization of the Hudson. One source of funding, New York State's Environmental Protection Fund (EPF), includes a line item for the Hudson as well as water quality improvement projects. The EPF increased from $25 million when it was created in the 1990s, to $300 million in the 2016-17 state budget, the highest level in the fund's history. Another source of funding comes from state Environmental Bond Acts. Several New York State Bond Acts have provided substantial grants to support water quality

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The Hudson River Watershed

NYSDEC/Hudson River Estuary Program

The Hudson River watershed covers nearly 13,400 square miles. The federal lock and dam at Troy, 135 miles north of New York Harbor, marks the northern limit of tidal influence in the Hudson estuary. The salt front – the leading edge of diluted seawater – typically pushes upriver to the Newburgh-Beacon Bridge by late summer.

continued from page 51

improvements, including millions invested in municipal facilities and infrastructure, brownfield cleanups, and open space programs since 1965. The state also assists with individual grants to municipalities for seasonal disinfection of wastewater discharges and the development and implementation of Long-Term Control Plans to address CSOs.

The entire stretch of the Hudson estuary was designated a "No Discharge Zone" in 2003, prohibiting discharge of vessel waste from the Troy Dam to the Battery in Manhattan. As part of this designation, 15 pump-out stations along the river are now available to recreational boaters.

Legacy Contaminants – The PCB Cleanup

In 2008, a contaminant reduction model was developed under the Contaminant Assessment and Reduction Project (CARP), in partnership with the NY-NJ Harbor and Estuary Program, to assess priorities for clean-up by addressing dioxins, heavy metals, DDT and PCBs in water and river sediments. The model identified PCB pollution in the river as the number one chemical contaminant issue.

Between 1947 and 1977, General Electric (GE) released about 1.3 million pounds of toxic polychlorinated biphenyls (PCBs) into the river from plants in Fort Edward and Hudson Falls. After 1977, PCBs continued to enter the Hudson from subsurface contamination beneath the Hudson Falls plant, adding to the burden of earlier discharges in the river bottom. However, it wasn't until 2002 that the US Environmental Protection Agency (USEPA) settled on a cleanup plan with GE. Years of sampling, feasibility studies, and design work followed before sediment removal began in 2009. Completed in 2015, the cleanup dredged approximately 2.75 million cubic yards of PCB-contaminated sediments, containing 150 tons of PCBs, from a 40-mile stretch of river between Fort Edward and Troy.

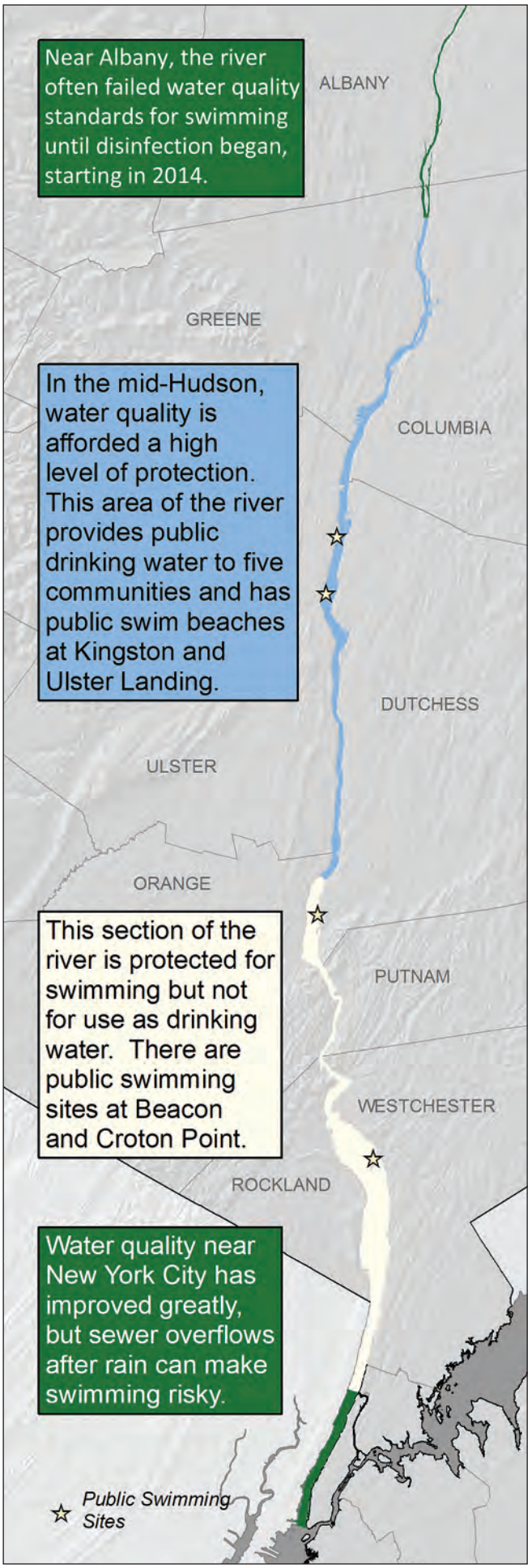
The USEPA has initiated a five-year review of the cleanup effort to ensure that implemented remedial actions are protective of human health and the environment. In August of 2016, NYSDEC challenged the effectiveness of USEPA's remedy and officially requested a reevaluation, citing that unacceptably high concentrations of PCBs remain in river sediment. The result of this request is pending as of this writing.

CSOs and Water Quality Improvements

CSOs continue to be a major source of contaminants to the Hudson River. Annually, CSO discharges into the Albany Pool area total 1.2 billion gallons, while 27 billion gallons discharge into New York City waters. However, communities with CSOs are required by the state to develop long-term control plans, and almost all communities along the estuary have done so. Implementation of these long-term control plans will reduce the future contaminant loading to the river from many of these CSO areas.

In 2012, NYSDEC and New York City signed an agreement to develop ten waterbody-specific, long-term control plans, plus a citywide plan. This agreement should reduce CSO discharges into New York City waters by approximately 8.4 billion gallons a year.

In 2008, NYSDEC partnered with the Capital District Regional Planning Commission to address more than 100 CSOs in the Capital District, contributing more than $2 million for planning and engineering studies. Updated permits now require municipalities in this area to achieve the goal of swimmable water quality. Grants totaling over $15 million have provided funding to help meet permit requirements



NYSDEC/Hudson River Estuary Program

Right: While water quality in all parts of the estuary is regulated to safeguard boating and fishing, additional protections vary from place to place. Poughkeepsie is one of five river communities with water systems that draw directly from the Hudson.

The Hudson

- The Hudson River flows from the Adirondack Mountains to New York Harbor. Lake Tear of the Clouds, located high on Mt. Marcy, New York's tallest peak, is considered to be the Hudson's source. However, the name Hudson River first appears on maps in Newcomb, where the outlet from Henderson Lake joins Calamity Brook.
- Measured from Lake Tear of the Clouds, the Hudson is 315 miles long. It is widest at Haverstraw Bay – about three and a half miles from Haverstraw across to Croton-on-Hudson – and deepest at West Point – 175 feet. In shallow reaches, engineers maintain a channel 32 feet deep to allow large vessels to get to Albany.
- At the base of the Troy Dam, the river's surface is only five feet above sea level. From this point south, the waters of the Hudson rise and fall to the rhythm of tides originating in the Atlantic Ocean. The tides cause the river to flow two ways: its current alternates between an ebb running south toward the sea and a flood running north toward Troy.

in sections of the river that do not currently meet the swimmable standard. The Rensselaer Sewer District began disinfection in 2013, and disinfection came online at two large Albany plants in 2014. The Albany Pool plan, announced early in 2014, is expected take 15 years to implement and cost $136 million. The plan includes $5.8 million for green infrastructure projects and $2.13 million for tributary enhancements.[5]

Looking Ahead

Investments in clean water infrastructure over the past few decades have dramatically improved water quality. On many days, in many places throughout the Hudson River Estuary, water quality is excellent for swimming. In 2014, nearly 6,500 people swam in organized public swim events in the Hudson River Estuary and New York Harbor, and thousands more swam at public beaches or other water access points. After periods of dry weather, the Hudson River Estuary is safe for swimming in many locations. But after rain, the water is more likely to be contaminated, especially in areas affected by combined sewer overflows and street water runoff.[6]

While there has been much improvement in recent years, the water quality in the Hudson Valley will never be as unblemished as it was when the region was a wilderness. Human influence is pervasive and threats remain. In the watershed, water resource recovery infrastructure and separated/combined sewer overflows along the estuary and its tributaries require significant investments to continue to improve water quality for the future. On a larger scale, climate change and changing weather patterns are affecting all aspects of water management, including the impact of sea-level rise on water resource recovery infrastructure in shoreline communities.

The good news is that investments toward improved water quality are being made. This year's state budget boosted critical funding to help the state confront an emerging water infrastructure crisis. The state made available an additional $200 million for grants to municipalities for drinking water and wastewater system improvements through the Water Infrastructure Improvement Act. These grants will leverage over $2 billion in local investments while creating an estimated 33,000 construction jobs. Since 2011, Governor Cuomo has provided more than $680 million through "New York Works" funding for direct environmental projects such as dam repairs, coastal resiliency, water resource recovery upgrades, and park investments. These funds have also provided for recreational infrastructure; for plugging of abandoned oil and gas wells; grants for municipal brownfield cleanups; and water quality improvement projects for water resource recovery systems.[7]

We don't have to turn back the clock to have a drinkable, swimmable, and fishable Hudson. By protecting and restoring streams that replenish the estuary and nourish its web of life, and through continued investment in water resource management strategies, we can continue on the path of restoring the water resources critical to the health and wellbeing of the state's residents.

About the Hudson River Estuary Program

The New York State Department of Conservation's Hudson River Estuary Program helps people enjoy, protect and revitalize the Hudson River and its valley. The program was created in 1987 and extends from the Troy Dam to upper New York Harbor. It is guided by an Action Agenda, which is updated every five years. The program achieves real progress through a collaborative approach that includes:

- Grants and restoration projects
- Education, research and training
- Natural resource conservation and protection
- Community planning assistance

Implementation of the Action Agenda relies on partnerships with federal and state agencies, as well as local municipalities, non-profits, academic and scientific institutions, businesses, trade organizations, landowners and dedicated volunteers. The Hudson River Estuary Management Advisory Committee (HREMAC) provides guidance to the program, helps the state define goals and evaluate progress, and provides a communication bridge to a wider group of partners and stakeholders. Numerous government partners participate as *ex-officio* members of the committee and help deliver our Action Agenda results.

Stephen Stanne is the Estuary Education Coordinator for the Hudson River Estuary Program, NYS Water Resources Institute/Cornell University. Maude Salinger is the Communications Coordinator for the Hudson River Estuary Program at the New York State Department of Environmental Conservation. For questions about this article, contact Maude Salinger at maude.salinger@dec.ny.gov.

Endnotes

1 *Juet's Journal of Hudson's 1609 Voyage,* from the 1625 Edition of Purchase his Pilgrimes, by Robert Juet; Transcribed by Brea Barthel for the New Netherland Museum, *www.halfmoonreplica.org*

2 *The Knickerbocker News* and *Union Star,* Nov. 6, 1971. *'Septic Tanks': Cleanup Job Slowed as Costs Rise*

3 Quirk, Lawler & Matusky Engineers, 1971 p. 54. Environmental Effects of the Hudson River, Albany Steam Station Discharge

4 *Hudson River Estuary Action Agenda 2015-2020, www.dec.ny.gov/lands/5104.html*

5 *www.dec.ny.gov/chemical/95122.html*

6 *Riverkeeper, How's The Water? 2015: Fecal Contamination in the Hudson and Its Tributaries, www.riverkeeper.org*

7 *www.ny.gov*

Hudson River's Troy Lock and Dam: 100 Years and Going …

by JoAnne Castagna

You're taking a boat ride on the entire length of the Hudson River. Your journey begins upstream in the Adirondack Mountains of Upstate New York, continues south through the Hudson Valley and will end at the Atlantic Ocean, between New York City's Battery Park and Jersey City.

As you travel downstream on the Hudson, you will reach and will have to pass through the Troy Lock and Dam in Troy, New York. The lock holds the distinction of being one of the oldest in the country, celebrating its 100-year anniversary this year. The lock continues to provide significant economic and recreational support to the region and serves as a gateway to the New York State Canal System.

One Hundred Years Ago …

The Hudson River and other navigation channels in the United States are kept at certain depths so that water vessels can safely transport their goods along the river. To maintain this specific depth, it was mandated in the early 20th century that a system of locks and dams be constructed on rivers.

"In 1915 the construction of the Troy Lock and Dam was completed. It was constructed to improve navigation between the Hudson River and the New York State Canal System that includes the Erie and Champlain Canals," said William Petronis, chief, Albany Field Office, New York District, US Army Corps of Engineers. Mr. Petronis has worked for the Army Corps for 38 years and has supervised the maintenance of the Troy Lock and Dam for more than 30 years.

In order to construct the lock and dam, a labor force was hired and supervised by the Army Corps. Many of these laborers were men returning from constructing the historic Panama Canal.

The Army Corps has operated the lock and dam since its construction. This involves making both major and minor repairs to the lock and dam structures, electrical, mechanical and hydraulic systems, as well as performing routine maintenance and maintaining the building and grounds.

An interesting piece of history is that following the construction of the Troy Lock and Dam, a hydropower facility built by Henry Ford was required to provide power free of cost to operate the Troy Lock.

After the lock and dam was constructed and the Federal Government decided to not pursue development of federal hydropower at the site, Henry Ford and his friends, Thomas Edison and Harvey Firestone, were camping near the dam. Ford saw the potential for hydropower and in 1918 he petitioned Congress for permission to construct a non-federal hydropower facility.

In 1921, Ford and his sons were the first citizens in the United States to secure a license for development of private power at a federal facility. As a condition, Ford was required to supply power free of charge for operation and maintenance of the Troy Lock and Dam.

This was the first time that the Federal Government allowed for private development of hydropower at a civil works project and it took an Act of Congress to get it done. Today, many of the Army Corps' civil works projects across the country have private hydropower development and it all started with the Troy Lock and Dam project.

US Army Corps of Engineers (USACE)

Aerial view of the Troy Lock and Dam in Troy, N.Y.

How Locks and Dams Work

Navigation dams are built on rivers to hold back water and form deeper navigation pools. Dams make it necessary for river vessels to use a series of locks to "step" up or down the river from one water level to another and safely bypass the dam. The Troy Lock and Dam is in operation from May 1 to November 30 every year.

As your boat approaches the Troy Lock and Dam you will be greeted by a massive structure that is the size of more than one and a half football fields and includes a lock chamber, a long main spillway, auxiliary spillway, a support pier, ice pass spillway and a headgate bulkhead.

"When carrying out a lockage many people think we pump the water but we don't," said Petronis "The lock is filled or emptied by gravity. When filling the lock, the water level will rise to the elevation of the upstream pool. When emptying, the water level will drain to the elevation of the downstream river's tide at the time. On average the difference between the upstream and downstream water levels is about 17 feet.

"Each lockage passes between 2.5 to 3.0 million gallons of water. It takes less than 10 minutes to raise or lower the lock; however, a typical lockage takes approximately 20 to 30 minutes including vessel entry, securing and exit."

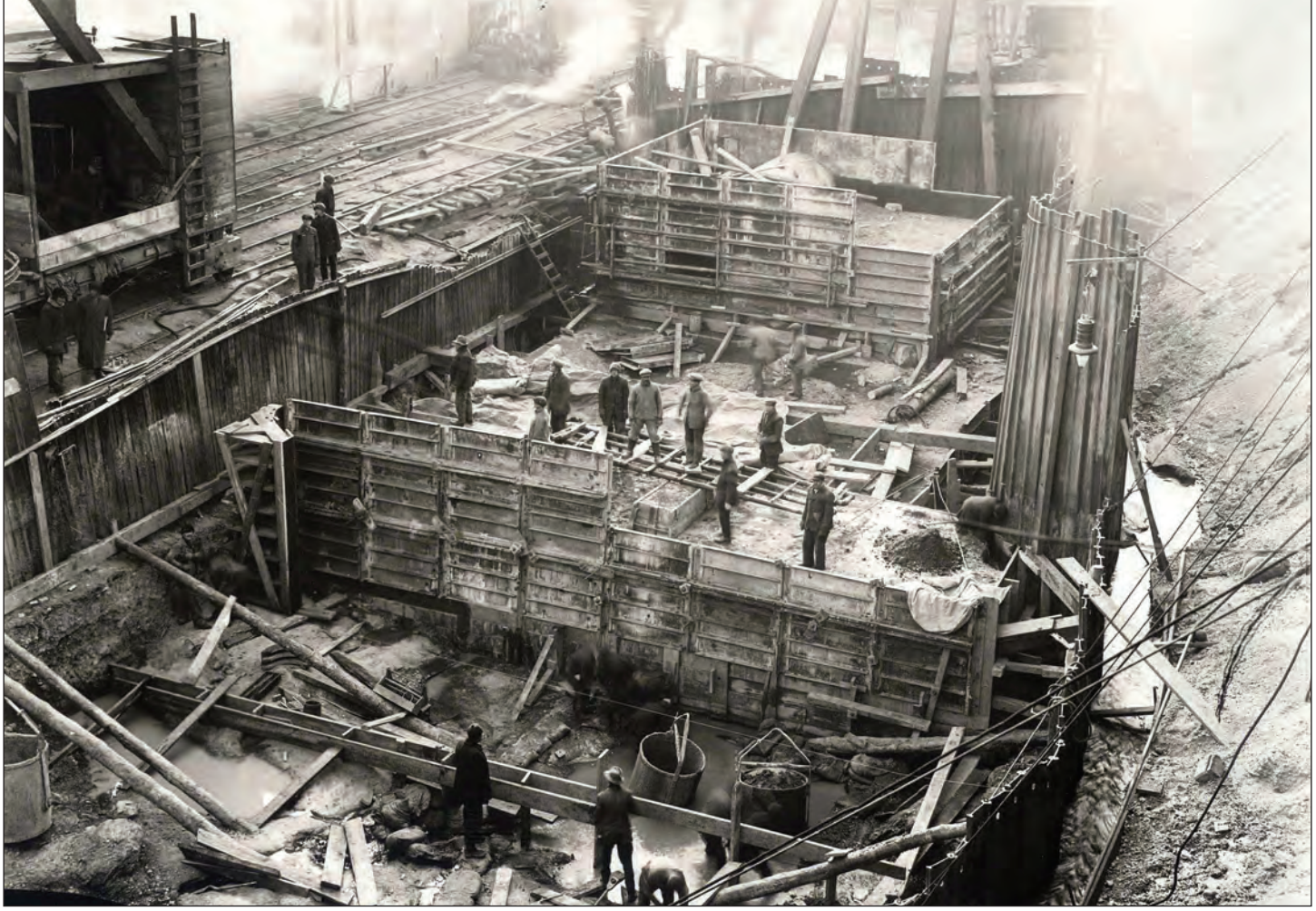
Locks and Dams and Economic Flow

Your boat ride on the Hudson River is contributing to the local economy.

According to Petronis, the Troy Lock and Dam serves as the eastern gateway to New York State's extensive canal system and is integral to the viability of a system that consists of 524 miles of waterways and 56 locks. This ensures safe navigation of $6 billion worth of commerce annually. Although there is no fee to specifically use the Troy Lock and Dam, vessels do have to pay to use the New York State Canal System to help defray some of the operation and maintenance costs.

"The lock and dam allows for transport of construction equipment, bulk commodities, oversized loads – such as large turbines, generators and steel – that cannot be transported over the highway," said Petronis.

Shipping on the canal system is also economically beneficial for the shipper. According to the New York State Canal Corporation,



USACE

This historic image shows the Troy Lock and Dam being constructed a century ago.

the canal system is a considerably cheaper mode of transportation for shippers. For example, one gallon of fuel will move a ton of cargo 155 miles by truck, 413 miles by rail, and 576 miles by barge.

In addition to commercial shipping endeavors the lock also supports a great deal of tour boats, yachts, and local and long distance recreational vessels. The economic impact from activities associated with the New York State Canal System is estimated to be approximately $380 million per year.

According to Canal officials, the historic waterway offers a high quality of life to communities and visitors alike along its shoreline. People motorboat on it; fish on it; paddle with canoes, kayaks, and stand up paddleboards; bike on its parallel path; dine at its waterfront establishments; take dinner cruises; and just generally relax next to it – all while helping to support local businesses.

Spending the bulk of his career working at the Troy Lock and Dam facility has given Petronis a unique appreciation not only for the job but also for the people who keep the facility running 24 hours a day, seven days a week.

"After 31 years at the Army Corps' Albany Field Office, there are many things I find rewarding about working on the Troy Lock and Dam," he said. "This includes the team members I have been fortunate to work with over the years, the various improvements we have made to the Troy Lock structure and equipment, the successful relationships we have developed with our partners and the public, and the development of successful maintenance dredging program on the Hudson River."

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Michael Embrich, Public Affairs, New York District, USACE

A vessel travels through the Troy Lock and Dam.

Polymer Reduction and Drier Cake Solids in Centrifuge Dewatering Result from *Hydro*FLOW Struvite Control Investigation

by Douglas L. Miller

Background

Wastewater treatment can be a very elaborate process. Controlling the physical, chemical and biological treatment processes requires knowledge and the correct tools and equipment.

The Somersworth, New Hampshire Wastewater Treatment Facility (Somersworth), a 2.4 million gallons per day (mgd) facility, serves a city with a population of about 11,800 people. The plant uses a Modified University of Cape Town (MUCT) biological nutrient removal process to control both nitrogen and phosphorus discharges to the environment. They are required by permit to remove nitrogen to a limit of seven milligrams per liter as ammonia nitrogen (7 mg of NH_3-N/L) and achieve seasonal phosphorus removal of 0.5 mg PO_4/L (as phosphate) during the summer months to reduce the impact of their discharge on downstream waters. In addition, the Somersworth facility utilizes a GEA Westfalia Separator, model CB 505-00-32 centrifuge in its sludge dewatering process.

To reduce polymer usage in their process, the plant's management team agreed to evaluate the product *Hydro*FLOW, developed by Hydropath, a company based in Nottingham, England. This investigation of polymer usage in centrifuge dewatering resulted from previous *Hydro*FLOW studies for struvite control in other water resource recovery facilities.

What is *Hydro*FLOW?

The *Hydro*FLOW water conditioning device induces an electric signal of +/-150 kilohertz (kHz) in the liquid inside any pipe on which it is installed. A specialized transducer connected to a ring of ferrites performs the electric induction. The technology was developed in England over 20 years ago for calcium carbonate scale removal and scale prevention in domestic water heating applications. However, the use of this technology is not limited to residential systems; various device configurations are being successfully applied in the following water use sectors: power generation; commercial and industrial; hospitality and food service; municipal; mining, oil and gas; maritime; agriculture and aquaculture.

Wastewater Development Status – Struvite Control Leads to Polymer Use Reduction

*Hydro*FLOW USA, the company that produces the *Hydro*FLOW devices, is planning to expand use of this technology in the wastewater sector, with the focus on enhancement of existing processes and the reduction of struvite and other scale forming issues. Two examples of these applications are:

- During the summer of 2013, *Hydro*FLOW equipment was installed at the Walla Walla, Washington water resource recovery facility. The purpose was to determine if the Hydropath technology could reduce the accumulation of struvite forming on their belt press dewatering equipment. The initial results were very promising.
- *Hydro*FLOW equipment was subsequently installed in the fall of 2013 on the Orlando, FL Water Conserv II Water Reclamation Facility for a struvite removal and prevention trial. The results reported after five months of trials showed significant reduction of struvite build up and a 20 percent reduction in polymer use.

These positive results led *Hydro*FLOW USA to conduct a mini-seminar at WEFTEC 2015 in Chicago, with the goal of sharing this technology within the water resource recovery industry and finding partners with which to collaborate. One outcome of this seminar was the arrangement with GEA Westfalia Separator to suggest a trial at a centrifuge installation in Somersworth, N.H..

Installation of *Hydro*FLOW Units at Somersworth Facility

In November 2015, *Hydro*FLOW USA staff installed two *Hydro*FLOW 160i units on the 6-inch sludge pipe feeding the GEA Westfalia Separator, model CB 505-00-32 centrifuge. One *Hydro*FLOW unit (Unit #1) was placed about 50 feet prior to the centrifuge, just after the thickened waste activated sludge (TWAS) pump, and the other unit (Unit #2) was placed five feet prior to the feed tube just before the centrifuge. Both units were installed without process down-time as they are fitted around existing piping and do not require plumbing modifications. The units use 120V AC and draw less than 1 Amp, which is similar to the power consumed by a 60-watt light bulb.

Provided by Jamie Wood, Somersworth Plant Manager

Aerial view of Somersworth Water Resources plant, Somersworth, N.H.

Success Factors

Success for this facility meant reducing polymer usage and producing dryer cake while not adversely impacting the centrate quality. The centrate quality in Somersworth typically averages about 500 mg TSS/L (Total Suspended Solids), but rarely exceeds 1,000 mg TSS/L. Surpassing the 1,000 mg TSS/L threshold could affect the plant treatment capacity. The trial protocol dictated an incremental reduction of polymer dosing while monitoring the cake solids. If the cake became too wet (below 20 percent Total Solids [TS]), polymer reduction would cease.

Baseline Data Collection Procedure

On December 14, 2015, the plant staff were directed to gather baseline data by operating the centrifuge normally at a feed solids flow rate of 175 to 185 gallons per minute (gpm) with the

*Hydro*FLOW units turned OFF.

- Typically, the feed sludge is approximately 10,000 mg TSS/L (1 percent) concentration.
- The staff related that they use about 27 pounds of polymer per ton of dry solids to produce a sludge cake of about 21 percent to 22 percent TS solids. This was confirmed while *Hydro*FLOW technicians were on site.
- The plant staff were instructed to incrementally (or step wise) reduce the polymer addition by about one pound per dry ton and allow the centrifuge to stabilize after each adjustment (about a 30- to 60-minute process).
- After about an hour and a half of reductions, the plant staff lowered the polymer feed to 22 pounds per dry ton, at which point the dewatering process became ineffective (lost the centrifuge "seal") and the sludge cake became wet.
- Thus the polymer use lower limit on this day was determined to be 24 pounds of polymer per ton of dry solids.

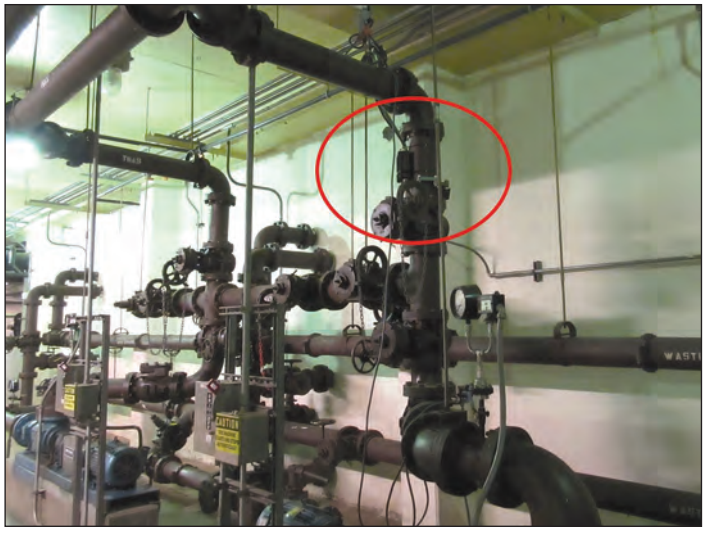
Summaries of the testing results are presented in ***Figure 1*** and ***Table 1***.

First Testing Sequence

On December 16, 2015, the trial began under normal centrifuge operations with feed sludge of 12,000 mg TSS/L. The centrifuge was started at 27 pounds of polymer per ton of dry solids with the *Hydro*FLOW unit OFF until the centrifuge was stabilized with cake solids of 23.1 percent TS. Then Unit #1 (located near the TWAS pump) was energized (Unit #1 ON) and the polymer was

Courtesy of Chuck Glessner

Douglas Miller installing Unit 2 on centrifuge feed pipe



Courtesy of Chuck Glessner

Unit 1 (circled in red) on TWAS pump discharge line

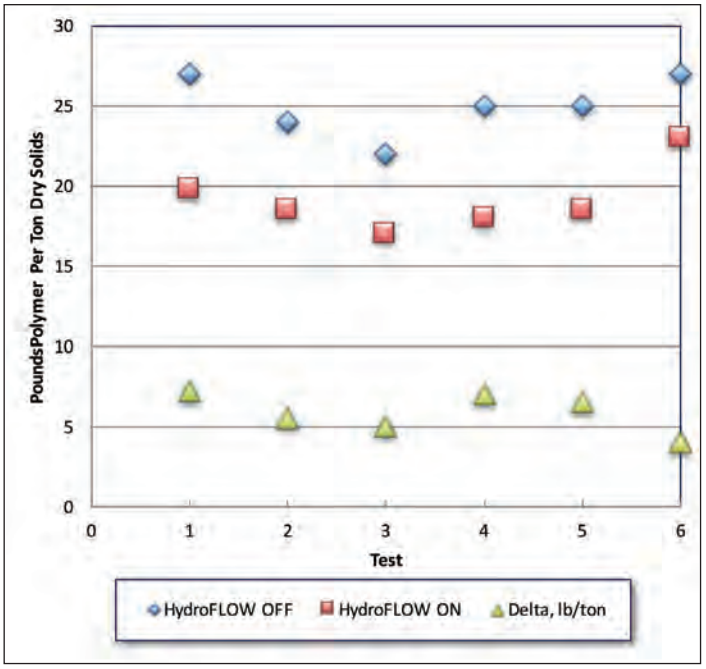


Figure 1. Somersworth Facility *Hydro*FLOW Testing Results: Effects on Polymer Dose over Six Tests

continued on page 58

Table 1. Results of Six *Hydro*FLOW Tests

Test		Polymer Feed Rate (gpm)	*Hydro*FLOW Location	*Hydro*FLOW Status	Feed Sludge Flow (gpm)	Feed Sludge Concentration (mg/L TS)	Output Quality Centrate (mg/L TSS)	Output Quality Cake (% TS)	Polymer Dose (lbs/ton)
Baseline	Stabilized	0.5	–	OFF	175	10,400	60	23.7	27
(12/14/15)	End	2.3	–	OFF	175	10,800	320	22.8	22
Test 1	Stabilized	3.3	–	OFF	175	12,000	180	23.1	27
(12/16/15)	End	2.3	1	ON	175	12,500	240	22.7	19.8
Test 2	Stabilized	2.6	–	OFF	185	10,000	60	21.5	25
(01/04/16)	End	2.0	1	ON	185	10,300	3,100	21.9	18.5
Test 3	Stabilized	2.4	–	OFF	185	10,500	60	21.3	22
(01/06/16)	End	1.9	2	ON	185	10,160	672	23.9	17
Test 4	Stabilized	3.3	–	OFF	185	12,300	354	21.9	25
(01/11/16)	End	2.4	1 & 2	ON	185	11,300	732	20.5	18
Test 5	Stabilized	2.6	–	OFF	185	9,500	1,294	21.4	25
(01/20/16)	End	2.0	1 & 2	ON	185	10,140	1,036	20.8	18.5
Test 6	Stabilized	3.7	–	OFF	185	11,700	1,252	21.1	27
(02/01/16)	End	2.8	2	ON	185	11,700	718	24.8	23

continued from page 57

incrementally reduced to 19.8 pounds per dry ton with resulting cake solids of 22.7 percent TS. The centrate remained about 200 mg TSS/L (+/- 40 mg TSS/L) throughout the trial. The trial ended when the cake container became full. A polymer reduction of 26.7 percent was achieved during the first testing sequence.

Second Testing Sequence

On January 4, 2016 the trial continued with Unit #1, to repeat a successful dewatering point of roughly 20 pounds of polymer per dry ton with a centrate quality of 100-200 mg TSS/L and cake solids of 21 percent TS or higher. The trials began under normal centrifuge operations with feed sludge of 10,000 mg TSS/L. The centrifuge was started at 25 pounds of polymer per ton of dry solids with Unit #1 OFF until the centrifuge was stabilized with cake solids of 21.5 percent. Then Unit #1 was turned ON and incremental polymer reduction began. The cake solids and centrate quality remained consistent as the polymer was reduced, cake solids of 21.5 percent TS and centrate 100-200 mg TSS/L. The trial continued to a point where the polymer dose became ineffective at 18.5 pounds per dry ton, when the centrate quality exceeded 1,000 mg TSS/L and the cake solids stayed at +/-21.5 percent TS. Over 20 percent polymer reduction was achieved during the second testing sequence.

Third Testing Sequence

On January 6, 2016 the trials began with normal centrifuge operations with feed sludge of 10,500 mg TSS/L, polymer dose at 22 pounds per dry ton, cake solids of 21.3 percent TS and centrate of 60 mg TSS/L. Unit #2 (located next to the centrifuge) was then energized (Unit #2 ON). The sludge cake solids initially increased to 23.6 percent TS with the centrate at 78 mg TSS/L. At a polymer dose of 20 pounds per ton of dry solids the centrate concentration rose to 246 mg TSS/L with cake solids of 24.6 percent TS. The polymer dose was decreased to 17 pounds per ton that resulted in a 23.9 percent TS cake and centrate of 672 mg/l TSS. During the third testing sequence a 22.8 percent polymer reduction was achieved and cake solids improved.

Fourth Testing Sequence

On January 11, 2016 both Units (#1 and #2) were turned ON after the centrifuge was stabilized at 25 pounds of polymer per ton of dry solids with a feed concentration of 12,300 mg TSS/L, producing a cake of 21.9 percent TS. The polymer was reduced with both Units ON until a polymer dose of 18 pounds per dry ton was achieved, producing cake of 20.5 percent TS and centrate of 732 mg TSS/L. Feed solids had reduced slightly to 11,300 mg TSS/L during the trial period. Some biological scum was added which adversely impacted the results causing the centrate to get dirtier, with one sample exceeding 1,000 mg TSS/L. This fourth trial achieved a 28 percent polymer reduction.

Fifth Testing Sequence

On January 20, 2016, testing was conducted with a jumper wire inserted within the ferrites of both Units. This was done in order to boost the Hydropath signal throughout both the piping network

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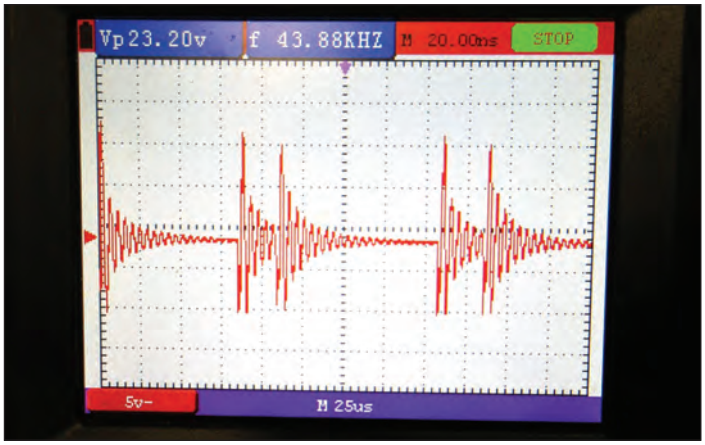
Courtesy of Chuck Glessner

Checking signal strength of Unit 2 on centrifuge feed



Courtesy of Chuck Glessner

Typical signal pattern with a 160i Unit

Courtesy of Chuck Glessner

Unit 2 (circled in red) on centrifuge feed piping

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and the liquid feeding the centrifuge in order to evaluate possible change in performance. This did not produce any noticeable improvement. Quite a bit of scum was added on this day as well. The end result was 10,140 mg TSS/L feed solids, 18.5 pounds of polymer per ton, cake solids of 20.8 percent TS and centrate of 1,036 mg TSS/L. A polymer reduction of 26 percent was achieved during the fifth testing sequence (based on the normal centrifuge operations without *Hydro*FLOW).

Sixth Testing Sequence

It appeared that the trial with Unit #2, close to the centrifuge, provided the most effective results. A confirmation trial was conducted on February 1, 2016. Due to plant operations, there was a significant amount of biological scum that had to be processed through the centrifuge affecting its general performance. Dewatering results with *Hydro*FLOW OFF with a feed solids of 11,700 mg TSS/L and a polymer dose of 27 pounds per dry ton, produced a cake of 21.1 percent TS and centrate of 1,252 mg TSS/L. Unit #2 was turned ON and was able to reduce polymer dose to 23 pounds per dry ton while producing a cake of 24.8 percent TS and a centrate quality of 718 mg TSS/L. A polymer reduction of 15 percent was achieved during this sixth testing sequence. In addition, cake and centrate quality improved greatly.

Summary

During six testing sequences, utilization of the *Hydro*FLOW devices allowed for reduction in polymer use from an average of 25.5 to 19.1 pounds per dry ton (25.1 percent reduction) and increased cake solids by up to 3 percent TS as compared to the same process without the devices operating. Additionally, the centrate quality was maintained within testing limits of less than 1,000 mg TSS/L. Based upon current polymer costs and use, the estimated payback for Somersworth for this device is approximately 1.5 to 2 years. Actual reduction of polymer and cake dryness in the dewatering watering process has many variables.

Acknowledgements

The author, Douglas Lee Miller, PE, BCEE would like to thank the principals of *Hydro*FLOW USA, Tal Journo, CEO and Chuck Glessner, Vice President, for their support and guidance allowing the author to conduct this research. The author would like to thank the staff of the Somersworth Water Pollution Control Facility, specifically Jamie Wood, Project Manager and Peter Fistere, Plant Operator for their permission to conduct this research at their facility and for their skill in operating the equipment. Lastly, thanks are extended to James Hanson, PE and Rick Seaburg, PE from GEA Westfalia Separators, and Glen Daigger, PhD, PE, BCEE, NAE and James Morris, PhD, PE and all personal/professional associates for their review and guidance in the preparation of this article.

*Hydro*FLOW USA is based in Redmond, Washington. The company is the sole US distributor of the *Hydro*FLOW water conditioning devices powered by the patented Hydropath technology.

For more information about *Hydro*FLOW go to the website: *www.HydroFLOW-USA.com*.

Douglas L. Miller, PE, BCEE, is a consultant for Douglas L. Miller Consulting LLC. He can be reached at dlmiller@maine.rr.com.

Operator Quiz Test No. 113 – Nutrient Removal

The following questions are designed for trainees as they prepare to take the ABC wastewater operator test. It is also designed for existing operators to test their knowledge. Each issue of *Clear Waters* will have more questions from a different section of wastewater treatment. Good luck!

1. Denitrification is accomplished by:
   a. Converting ammonia to nitrite
   b. Converting ammonium to nitrate
   c. Converting nitrate and nitrite to nitrogen gas
   d. Converting nitrate to nitrite

2. Denitrifying bacteria need which of the following conditions to denitrify:
   a. Aerobic
   b. Anoxic
   c. Anaerobic
   d. Acidic

3. Nitrogen can be removed from wastewater biologically by which of the following methods:
   a. Gas Stripping
   b. Activated Sludge
   c. Breakpoint Chlorination
   d. Ion Exchange

4. Kjeldahl nitrogen consists of:
   a. Organic nitrogen and ammonia nitrogen
   b. Inorganic nitrogen and ammonia nitrogen
   c. Inorganic nitrogen and nitrite
   d. Inorganic nitrogen and nitrate

5. In order to denitrify dissolved oxygen concentration should be:
   a. 0.3 – 1.0 mg/l
   b. Greater than 1.0 mg/l
   c. Less than 0.3 mg/l
   d. 0.0 mg/l

6. When ammonia stripping is used to remove nitrogen, the pH should be:
   a. Less than 7.0
   b. Between 7.5 and 8.5
   c. Between 9.0 and 10.0
   d. Between 10.5 and 11.5

7. Which of the following is least likely considered when applying chemical for phosphorus removal?:
   a. Mixing zone
   b. Flocculation zone
   c. Injection point
   d. Ambient air temperature

8. A stable inorganic form of phosphorus found in waste streams is called:
   a. Orthophosphate
   b. Polyphosphate
   c. Organic phosphate
   d. Paraphosphate

9. Which of the following is not commonly applied to wastewater for phosphorus removal?:
   a. Ferrous Chloride
   b. Ferric Chloride
   c. Sodium Hypochlorite
   d. Aluminum Sulfate

10. Which application is not typically considered when trying to remove phosphorus from wastewater?:
    a. Tertiary filtration aided by the addition of chemicals
    b. Enhanced biological nutrient removal
    c. Chemical addition of aluminum or iron salts
    d. Incineration of settled sludges

Use the information below to answer the following questions.

Plant Flow: 4.5 MGD
Influent P concentration: 1.5 mg/l
Aeration tank volume: 2000 cu.ft.
Effluent P concentration: 0.5 mg/l

11. What is the influent plant loading of phosphorus?:
    a. 56 mg/l
    b. 56 lbs/d
    c. 5.6 mg/l
    d. 5.6 lbs/d

12. What is the phosphorus removal efficiency?:
    a. 34 percent
    b. 66 percent
    c. 1.0 percent
    d. 10 percent

Answers on page 62.

For those who have questions concerning operator certification requirements and scheduling, please contact Tanya May Jennings at 315-422-7811 ext. 4, tmj@nywea.org, or visit www.nywea.org/OpCert.

Fall 2016, Vol. 46, No. 3

Clear Waters

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Answers from page 61: 1 C, 2 B, 3 B, 4 A, 5 C, 6 D, 7 D, 8 A, 9 C, 10 D, 11 B, 12 B

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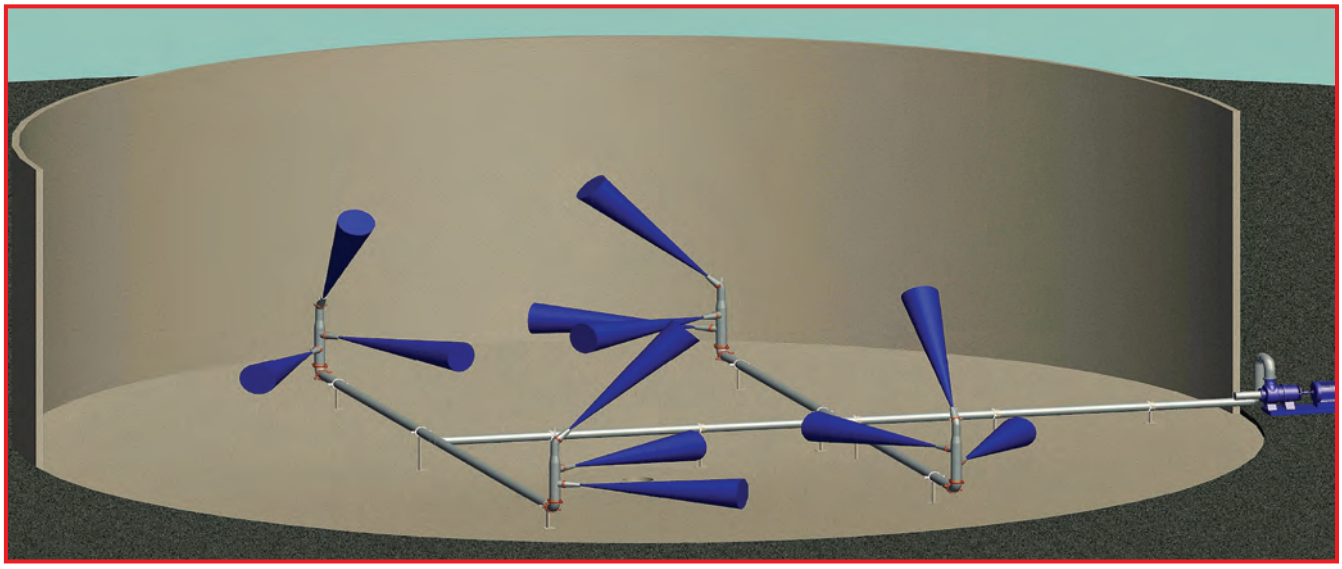

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