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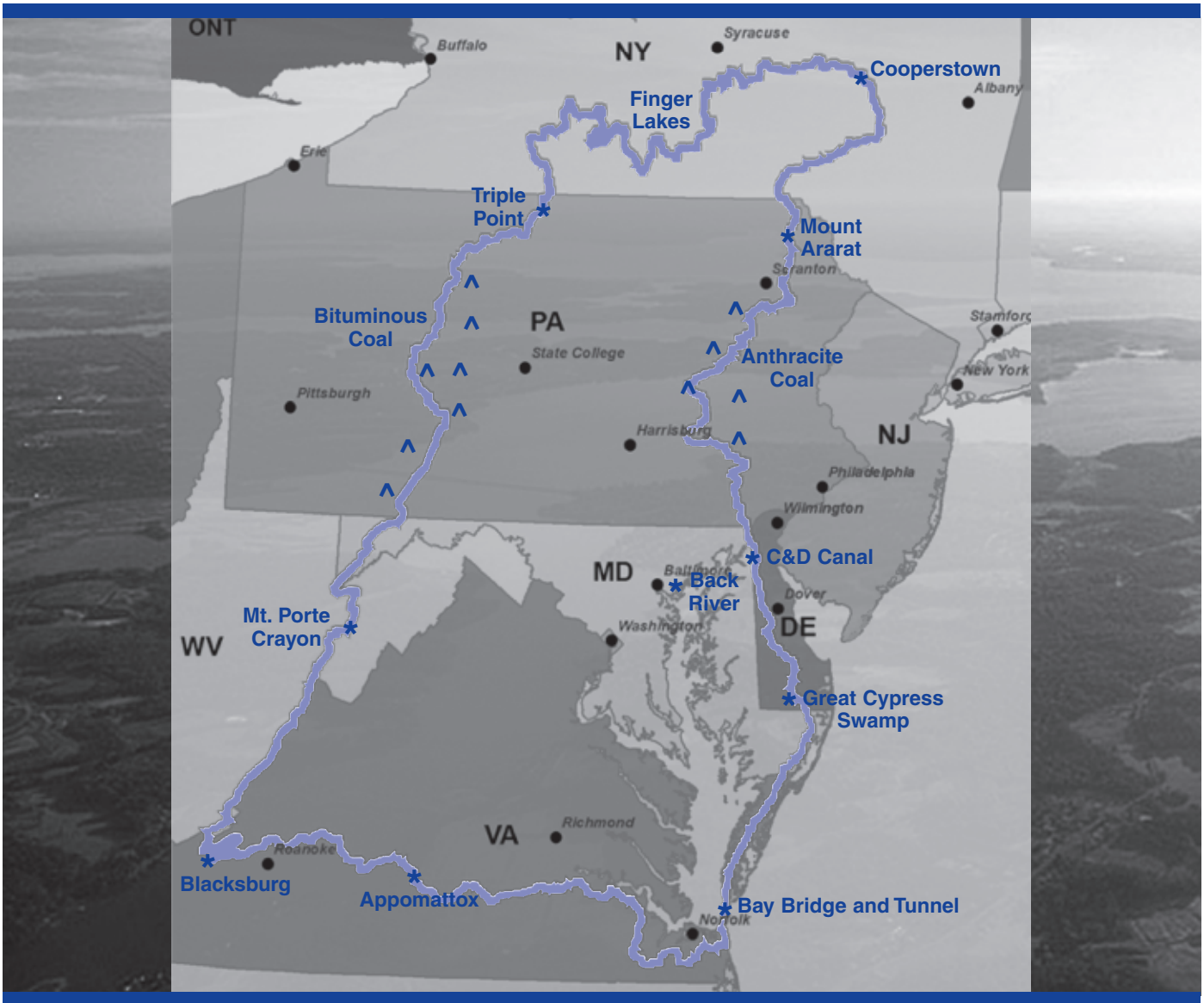
SPRING 2010 ISSUE



Braced for a TMDL – The Chesapeake's Watershed

CHESAPEAKE

A Publication of the
Water and Waste Operators Association of
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Chesapeake Water Environment Association

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PRESIDENT'S MESSAGE

CWEA President

—Hiram Tanner

Spring is one of the busiest times of the year for CWEA. Fortunately, this year the Association has a new Administrator to help keep us on target with all that we do. With that as an introduction, I would like to welcome Ann Baugher on aboard, our new Administrator. If you are active with any committee see how an email from her brings a new joy to your day. You know that she is working hard on your behalf. One of her biggest priorities is to work with the Board Secretary, Carlos Espinosa. So if you need her services please place your request with him, so that her talents are used to the fullest.

Welcome aboard Ann!!!

Last week I had the pleasure of representing CWEA and presenting a plaque in memory of Jake Bair to the Maryland Center for Environmental Training. As I learned from the many attendees, Jake was a great man and a great leader in the environmental field, especially for blazing a trail to train water works and waste systems operators. Operator training and certification continues to be a proven way to establish skill sets and pay grades so that operators are recognized for all they do for our communities. Thanks a bundle to Russ Sharpe for spearheading this effort to get the Chesapeake Tri-Associations to support this tribute and donating the plaque to MCET.

The only regret that I have about this event is that this honor was bestowed on a deserving man posthumously. For the past several years I have served on CWEA Awards Committee and it always seems such a struggle to find nominees for the various WEF Awards. Whether one wins is not as important to the nominee as much as knowing your fellow colleagues feel you are worthy of the award.

During this years' Awards Committee meeting I challenged the committee to adopt WEFs Water Heroes program. So as to not let this idea drop, I am designating CWEA's Inaugural Water Hero, Russ Sharpe. Need I say more? For the rare person who does not know Russ—Russ is a treasure of knowledge, history and support for CWEA, WWOA and CSAWWA. Now retired, Russ embodies the dedication necessary to make treatment and distribution of safe drinking water and collection and treatment of wastewater that meets the goals of the Clean Water Act happen.

Thanks Russ, for all you have done for our industry and association!!

WWOA President

—Duane McCoy

Hello members! As the season changes we are looking forward to spring bringing new challenges for you. As I sat through Jake Blair's memorial dedication, I recognized the impressive accomplishments and sacrifices he made for our industry. Jake's drive and passion were like a tree, and the people he touched were the branches. People like Karl Ott, Steve Elder and Lenny Gold are just a few of the branches that will continue to reach out and carry the torch that he lit.

I have received certification training from many sources, from North Carolina State University to Virginia Tech ; but the best operator training I received was at the Maryland Center for Environmental Training (MCET), an organization that Jake helped found in 1982 and where he served for many years as its director. Jake formulated and put a plan into action that has been the model for the rest of the country to follow. A lot of information was shared at MCET about the direction water and wastewater professionals have taken and future goals and ideals were promoted for our profession. One of those ideals is incorporating more schools in the work we do as an industry. By doing this, we are educating our children and possibly igniting a spark of interest that will lead our children to follow in our foot steps to a rewarding career. We need to continue work at changing the perception of water and wastewater professionals and educate people on the important role we play in the improving the environment, public health, and safety of our workforce.

I, as president, would like our members to invest back into our profession and organization as volunteers. We have so many committees that not only need your support but also need your involvement. I know we have a lot of untapped talent that needs sharing so we can all be the best we can be. Our collective knowledge, like my slogan says, is a terrible thing to waste. So step up and make a contribution. I'm proud to be a part of what we do and how we do it. With that being said, we have a spring eastern regional section meeting coming up along with our yearly short course school. I hope to see you there so we can continue our education. Last but not least, don't forget we have a Tri-Conference at the Convention Center in Ocean City the first week of September that our members will truly enjoy. I look forward to seeing you there.

ecoletter

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CALENDAR OF EVENTS
Spring 2010

May 6–CWEA/CSAWWA Joint Spring Meeting
Johns Hopkins University Conf. Ctr., Baltimore, MD

May 18–CWEA Water Reuse Seminar
Maritime Institute, Linthicum Heights, MD

June 7-11–61st Short Course
Washington College, Chestertown, MD

August 31-September 3–Tri-Conference
Ocean City, MD

October 2-6–WEFTEC
New Orleans, LA

www.wwoa-cwea.org

TO ALL MEMBERS:

When completing membership renewals, make sure all information is correct and current. We use WMBA (WEF Membership By Access) for membership information. If there is an e-mail address, please include it.

CHANGE OF ADDRESS

Please forward your change of address and membership number to the appropriate organization:

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TABLE OF CONTENTS

EDITOR'S CORNER

With the end of the year the deadline for the Bay wide TMDL, EPA has issued a heads up in the form of preliminary annual limits of 200 million pounds of nitrogen and 15 million pounds of phosphorus. And they went further and made the following annual allocations:

Maryland—41.0 million pounds of N, consisting of 0.8 for the Susquehanna, 12.8 for Eastern Shore, 10.2 for Western Shore, 3.1 for the Patuxent and 14.1 for the Potomac. For phosphorus, 3.04 million pounds, consisting of 0.05 for the Susquehanna, 1.24 for Eastern Shore, 0.62 for Western Shore, 0.24 for the Patuxent and 0.89 for the Potomac.

Virginia—59.2 million pounds of N, consisting of 1.6 for Eastern Shore, 16.1 for the Potomac, 6.5 for the Rappahannock, 6.5 for the York and 28.5 for the James. For phosphorus, 7.05 million pounds, consisting of 0.15 for Eastern Shore, 1.97 for the Potomac, 0.82 for the Rappahannock, 0.61 for the York and 3.5 for the James.

Pennsylvania—73.6 million pounds of N, consisting of 68.8 for the Susquehanna and 4.8 for the Potomac. For phosphorus, 3.16 million pounds, consisting of 2.69 for the Susquehanna and 0.47 for the Potomac.

The District—2.37 million pounds of N and 0.13 million pounds of P.

New York—10.54 million pounds of N and 0.56 million pounds of P.

Delaware—5.25 million pounds of N and 0.28 million pounds of P.

West Virginia—5.71 million pounds of N and 0.62 million pounds of P.

Before you go trying to make this numbers add up to 200 for N and 15 for P, keep in mind these are preliminary estimates. In 2008 it is estimated that 291 million pounds of N and 13.8 million pounds of P entered the Bay. So we got our work cut out for us on nitrogen but are looking pretty good on phosphorus.

●●●●●●

Associated with the upcoming Bay wide TMDL, EPA has issued guidance on what they are expecting to happen. The States and The District must make adequate progress in; developing Watershed Implementation Plans, developing two year milestones in load reductions, developing NPDES permits to support TMDL reductions, and developing appropriate mechanisms to ensure non-point source reductions are achieved.

If EPA is not satisfied each of the jurisdictions does what they are asked they could step in to; expand NPDES permits to currently unregulated sources such as certain stormwater discharges and concentrated animal feeding operations, increase NPDES oversight, require net improvement offsets to accommodate development and growth to 2025, and require additional point source reductions.

●●●●●●

We all know excess algae are bad for the Bay but now a group is saying wait a minute. The Chesapeake Algae Project is studying harvesting the wild algae growing in the Bay thanks to over fertilization and using it to produce biofuel. And they see real potential here. And we say go for it. So wish the researchers from the Virginia Institute of Marine Science working with scientists from William and Mary and the University of Maryland good luck and Godspeed.

●●●●●●

Speaking of over fertilization it's the time of the year for the mailbox to be full of papers from all the lawn companies with their offers to give you the lawn you always wanted, and to give you a customized treatment plan and free lawn applications, not to mention a full lawn audit and free service calls. We hope everyone who reads this publication knows what to do with these ads. Put them straight in the recycling pile—that is if the ads were printed on recyclable paper.

●●●●●●

The March 1, 2010 issue of *The High County News* (check it out and see what's going on out west) reported on a cave outside of Steamboat Springs, Colorado that it is believed to contain the first hydrogen sulfide dependent animals found on land. Previously the only hydrogen sulfide dependent animals were found at hydrothermal vents in the Pacific Ocean. What scientists found in the Colorado cave were small red worms that eat hydrogen sulfide. You have to wonder if there might be a potential wastewater application here.

●●●●●●

If you're wondering where the Bay Restoration Fund money is going, one place is septic tanks. MDE plans to spend $8 million a year to upgrade septic and on-site disposal systems to Best Available Technology for nitrogen removal.

Continued on page 35

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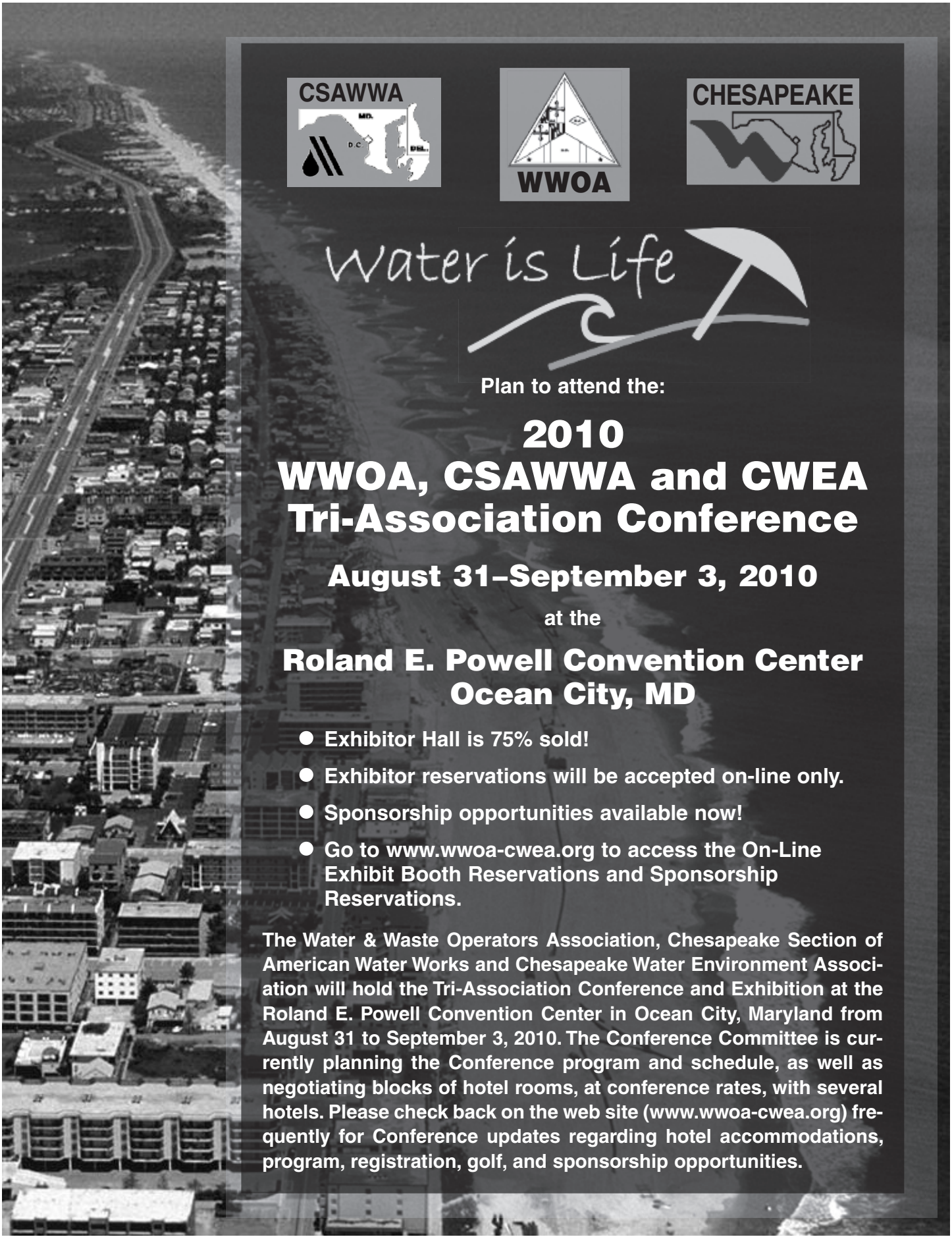

Plan to attend the:

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August 31–September 3, 2010

at the

Roland E. Powell Convention Center Ocean City, MD

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- Go to www.wwoa-cwea.org to access the On-Line Exhibit Booth Reservations and Sponsorship Reservations.

The Water & Waste Operators Association, Chesapeake Section of American Water Works and Chesapeake Water Environment Association will hold the Tri-Association Conference and Exhibition at the Roland E. Powell Convention Center in Ocean City, Maryland from August 31 to September 3, 2010. The Conference Committee is currently planning the Conference program and schedule, as well as negotiating blocks of hotel rooms, at conference rates, with several hotels. Please check back on the web site (www.wwoa-cwea.org) frequently for Conference updates regarding hotel accommodations, program, registration, golf, and sponsorship opportunities.

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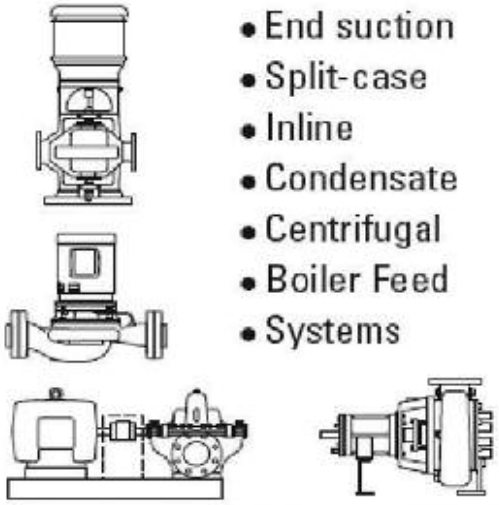

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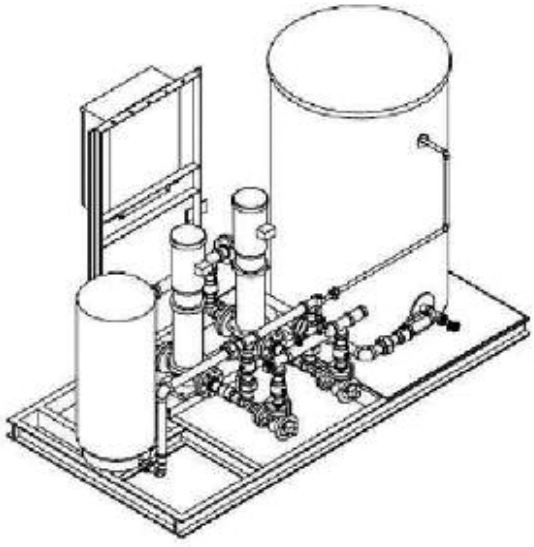


Contact AMES, Inc. for information.

Introducing Ann Baugher

As of March 2010, Ann Baugher has been contracted by the Chesapeake WEA (CWEA) to provide administrative services. Ann is no stranger to the water industry. She has worked for over 16 years in the water and wastewater operations and maintenance field through the County government in Maryland and in Environmental Compliance. Ann has also served as registration coordinator for the Tri-Conference which is an annual event of CWEA and WWOA/CSAWWA. She provided the following introduction for CWEA members:

My name is Ann Baugher. I come to you, new to CWEA, but not new to the water/wastewater industry. My "water" roots go back to my childhood, yes, I know, that is a LONG time ago! My father worked in water for 45+ years, and I, in water and wastewater operations, along with environmental compliance for just about 20 years. Working in a small county DPW operations office, with over 42+ facilities including surface and ground water treatment, distribution and collection systems, tanks, several small SRB WWTPs, pretreatment, capital improvement and operating budgets, those beloved annual Water Quality reports and mandated monthly compliance reports, etc., one pretty much does everything from soup to nuts! (I know a lot of you can relate to some of the same.) The past four years I served as recording secretary to an Environmental Advisory Council which generated a lot of publicity and was nothing short of a valued experience in itself. On December 31, 2009, I retired from Carroll County, Maryland government. Serving the citizens was my pleasure. As some of you probably know holding dual memberships, for the past 18 months I have served as CSAWWA's Section Administrator. Even before the present state of the economy, many events/conferences were held with CWEA/WWOA/CSAWWA partnering together in the water/wastewater profession. I look forward to meeting you and reaquainting with those I have had the pleasure of networking with during my career.

Russ Sharpe— CWEA Inaugural Water Hero

CWEA has adopted WEFs Water Heroes program and has designated CWEAs Inaugural Water Hero—Russ Sharpe. For the rare, person who does not know Russ, Russ is a treasure of knowledge, history and support for CWEA, WWOA and CSAWWA. Now retired, Russ embodies the dedication necessary to make treatment and distribution of safe drinking water and collection and treatment of wastewater that meets the goals of the Clean Water Act happen.

Russ Sharpe obtained his Civil Engineering Degree from the University of Maryland in 1974 and began working at the Washington Suburban Sanitary Commission. In 1976, he was promoted to Plant Superintendent at the Piscataway Model Plant. He was promoted to Senior Plant Superintendent at the Seneca Plant in 1979 and was assigned as Superintendent of the Damascus Plant in 1981. In 1994, he was promoted to Facilities Maintenance Engineering Section Head. Russ is a certified Wastewater Operator, and has been an instructor at the Annual Short Course and the Maryland Training Center for Environmental Operators. Russ lives in Laurel, Maryland with his wife Shirley.

Russ joined WWOA, WEF and CWEA in 1981. Norm Connell appointed him to be the CWEA Awards Committee Chair in 1984. He chaired the Awards Committee for several years and is still a member of the Committee. He has chaired several committees and served as a member of numerous other CWEA Committees. Russ was one of the 4 founding members of CWEA's "5S" society in 1999 and was inducted into the CWEA "5S" in 2000. Russ has served as CWEA's Maryland Trustee, was President in 2001–2002, and has served as a Director to WEF. As President, he created the CWEA Plant Operations and Maintenance Committee, and is currently a member. Russ chaired the 2006 Tri-Association Conference Committee, served on a Safety Task Force for WEF and was recently appointed to be Vice-Chair of the WEF Safety and Occupational Health Committee. He has served on 2 Manual of Practice Task Forces for WEF and received the WEF William D. Hatfield Award.

WEF Member Advisory:

'Work for Water' Campaign & Call to Action

April 13, 2010—The Water Environment Federation (WEF) and the American Water Works Association (AWWA) have joined forces on a public outreach campaign that will enhance the image of water careers and encourage students and job seekers to "Work for Water."

The campaign will promote water careers as both professionally fulfilling and aligned to the greatest public health and environmental cause of our day. The outreach will also address one of the water community's top concerns in the coming decade—the expected retirement of 30% of the water workforce and the need to recruit new talent to the field.

One of the primary resources of the Work for Water effort is a Web-based clearinghouse that provides a gateway to the many recruiting and retention resources already available throughout North America. The campaign will ultimately include a suite of outreach resources for promoting water careers to high school and vocational school students, college students, second career and retired military job seekers, and others.

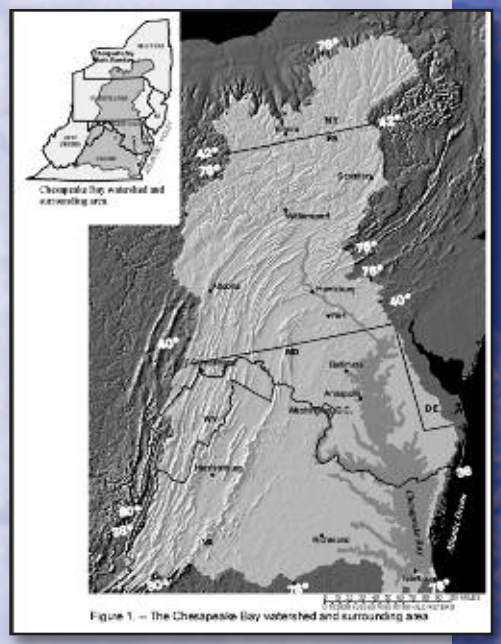
The campaign's Web site—www.WorkforWater.org—will officially launch in May 2010. It will highlight efforts such as H2Opportunity!, created by the Georgia Association of Water Professionals, and BAYWORK in California. It will also include tools such as the Water Sector Competency Model, that was jointly released by WEF, AWWA, the U.S. Department of Labor and U.S. Environmental Protection Agency last November. The competency model defines the necessary knowledge, skills, and abilities for prospective water professionals and encourages careers in the water sector.

The Chesapeake's Watershed

By Floyd B. Johnson, Ecoletter *Co-editor*

I'm in a traveling mood, so gather up your maps and binoculars and come along with me. I have always been fond of circle routes, not coming back the way I went, and that is what I have in mind here in a journey around the perimeter of the Chesapeake Bay watershed. To places close by and far away we will go, making observations and taking notes.

A logical place to begin is a ride across the water out of sight of land on the 18 mile long Chesapeake Bay Bridge and Tunnel. This engineering marvel built in 1964 serves as demarcation between the Bay and the Atlantic Ocean. We will go northward on Rt. 13 to Cape Charles, the southernmost point of the Delmarva Peninsula. Rt. 13 serves as the watershed boundary with slight variation all the way along the three–ten mile wide finger of Virginia land to within five miles of the Maryland border where the peninsula widens to twenty miles between Chincoteague and Pocomoke Sound. In Accomack County, we traverse the southern portion of the well known poultry operations on Delmarva. The boundary enters Maryland four miles east of Rt. 13's Maryland entrance.

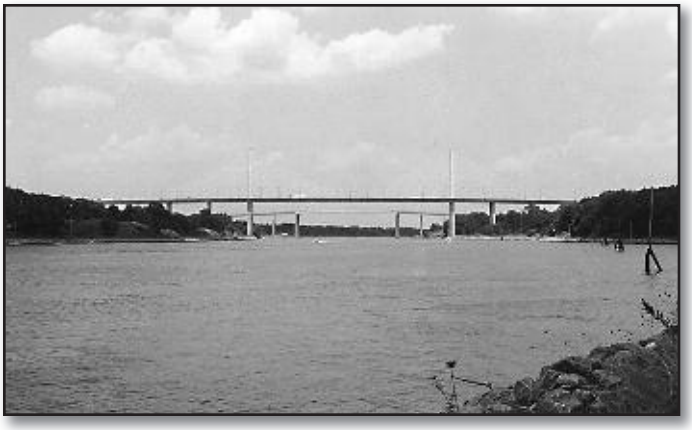


Map of the Chesapeake Bay Watershed

The Bay Bridge and Tunnel entering Cape Charles

As the boundary continues north it runs parallel to the Pocomoke River only two to five miles from Chincoteague Bay to the east. When it passes just west of Berlin, we are eight miles from Ocean City. From here the boundary takes a more northwest track ten miles to the Delaware border. The 40 mile route through Maryland has been entirely in Worcester County and has loped off approximately one fourth of the county for Ocean drainage.

Things get dicey for the boundary once in Delaware. The Great Cypress Swamp makes it hard to decide the location of the boundary and only when it comes out of the swamp will we continue on a northwest course thanks to the headwaters of the Indian River pushing it in that direction. The boundary wiggles past flat farmland, going through the towns of Georgetown and Harrington. Concentrated poultry operations clustered near along our path since Berlin



Chesapeake and Delaware Canal

thin out above Georgetown. To the east flows the Murderkill River. This interestingly named body of water has a doubly redundant name. Kill means water channel in Dutch.

Eight miles west of Dover, we cross Rt. 8 and take a mostly northern course parallel to the Maryland line. After passing just to the west of Middletown, and going six miles further north something curious happens. The boundary divide is breached by the Chesapeake and Delaware Canal. If you look at a map it is plain to see why this canal was built. By extending Back Creek 14 miles to the Delaware River, 300 miles were removed from the water route between Philadelphia and Baltimore. When the canal was built in 1829, these cities were only outranked by New York City as the largest cities in the country. As the boundary exits Delaware near where I-95 enters Maryland one understands why the state has a stiff back turned to the Chesapeake. Delaware Bay receives flow from 72% of the state.

Just as the boundary re-enters Maryland, 200 miles from Cape Charles, we finally encounter land over 100 feet above sea level and enter the Piedmont Physiographic Provence. The land of slow flowing streams is behind us. The boundary follows Rt. 316 north into Pennsylvania, slicing off an 8 square mile sliver of Cecil County for the Delaware Bay.

Entering the fertile farmland of southeastern Chester County, the boundary skirts the outer limits of the Philadelphia exurbs, first separating the watersheds of Big Elk Creek (Chesapeake) and the Christiana River (Delaware), then further up, the East Branch of Octoraro Creek (Chesapeake) and the West Branch of Brandywine Creek (Delaware). South of Reading, the boundary meets its first extensive forests in the form of state game lands (we are after all in Penn's Woods and a state with a million licensed hunters) as it rides shotgun with the Pennsylvania Turnpike at a position of 4–8 miles north. Just east of Lebanon, it takes a turn to the northeast and scales Blue Mountain close to the route taken by Rt. 183. At the top of the ridge, we cross the Appalachian Trail. Five miles across a valley just west of Schuylkill Haven, we climb another ridge appropriately called Second Mountain. To the east is the Schuylkill watershed and Swatara Creek gathers up waters to the west for the Susquehanna. We are firmly in the mountains.

The boundary intersects I-81 near where Rt. 901 does and generally follows the interstate for the next 20 miles. We are now in the heart of the largest anthracite deposits in the U.S. During World War 1 anthracite production peaked at over 100 million tons per year but current production is 5 million tons a year. Two events a half century ago hastened the decline of the anthracite industry. In 1959 the Susquehanna River flooded a large underground mine near Wilkes-Barre killing 12 miners and in 1962 a fire beneath Centralia began burning. It still burns. A common use of anthracite in our business is as a filter media.

Exiting I-81, the boundary goes through Hazleton and Freeland then crosses I-80 five miles west of White Haven. Further on it crosses the Northeast Extension of the Pennsylvania Turnpike on Wyoming Mountain ten miles southeast of Wilkes-Barre. Taking an eastern course we leave the anthracite regions and head into a large forested area on our way to the Poconos. Near the nest of lakes that birth the Lehigh River, the boundary heads north again dancing through the glacial lakes of the Poconos and crests Moosic Mountain east of Scranton. It stays on this mountain until it runs out

Mount Ararat

and continues north on to Mount Ararat along the Susquehanna–Wayne County line. I'm not making this name up. While there's no ark here, at 2,656' it is the eighth highest point in Pennsylvania and the highest elevation we've reached thus far. From here the boundary meanders through the lakes of northwest Wayne County to New York.

Continued on page 18

Chesapeake Watershed

Continued from page 17

Just inside New York a hydrological rarity occurs when two large rivers that never meet come within ten miles of each other. The boundary slithers between the Susquehanna and Delaware River's intimacy, and then tracks eastward separating the Delaware's watershed coming out of the Catskill Mountains from the Susquehanna to the north. Forty miles west of Albany we turn north and begin separating Hudson River waters from the Bay watershed.

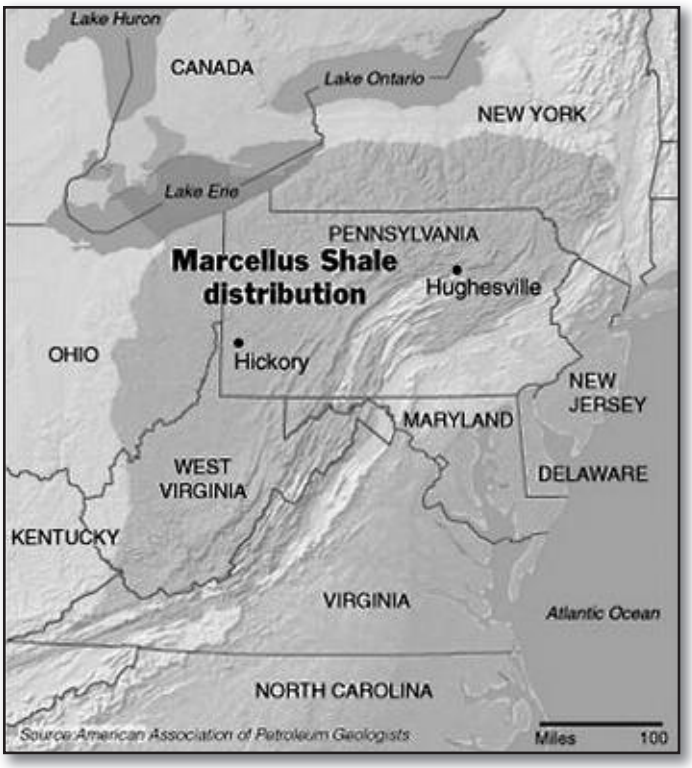
Cooperstown, New York

Cooperstown, New York at the southern end of Otsego Lake is mainly known for three things; The Baseball Hall of Fame, James Fennimore Cooper (Last of the Mohicans) and the source of the Susquehanna River. However to be more correct, the real source of the river is ten miles from the Mohawk River, in the swamps above Lake Otsego around Summit Lake, where Hayden Creek springs forth. Eight mile long Otsego Lake looks like one of the Finger Lakes but is not considered one. It is too far east and does not drain north to Lake Ontario. When the glaciers from the last ice age receded 10,000 years ago, the terminal moraines were further north here.

The Boundary is now on a western course providing a cap to the Bay's watershed. A zenith is reached at the farthest source of the Unadilla River where the northernmost point of the watershed is established at almost 43 degrees—the same latitude as Buffalo. For the next 30 miles the boundary generally follows Rt. 20 across gently rolling fields and forests representative of this region, until east of Cazenovia Lake it starts heading southwest to accommodate the Finger Lakes which begin at Otisco Lake 25 miles to the west. While we continue to go to the southwest we'll stop and pour a glass of Merlot or Cabernet—we're in the country's largest wine producing region outside the west coast. The southwest trek continues, dipping five miles below Ithaca at the southern end of Cayuga Lake, until nearly reaching Horseheads, between Elmira and Watkins Glen at the end of Seneca Lake. Next we head to the northwest and smaller lakes. Between Canandaigua and Hemlock Lakes, the source of the Cohocton River pushes the boundary to within 30 miles of Rochester and the highest ground among the Finger Lakes. We are over 2,200 feet above sea level. While the watershed stays below the main areas of Lake effect snow, substantial snow still falls up here.

From here we head to the southwest again as the boundary forms the divide between the Genesee River to the west and the Bay's Chemung watershed. We are exiting the Finger Lakes and now start taking a more southern route through Alfred, NY and continuing back to the Keystone State.

Ten miles back inside Pennsylvania again we encounter another hydrological rarity. South of the village of Gold in Potter County, the watersheds of the Bay, Gulf of Mexico and Gulf of St. Lawrence meet at a triple point. There are only four other places in North America where watersheds of comparable size form triple points. From the triple point we head southwest through the great forests of northern Pennsylvania populated by few people, many whitetail deer, black bears and the largest wild elk herd in the east. To the west lies the Clarion River watershed and to the east Sinnemahoning Creek gathers water for the West Branch of the Susquehanna. But this area and other areas of Pennsylvania's Bay watershed have begun to see significant change thanks to the mile deep Marcellus Shale Formation. Some estimates have this formation containing over 400 trillion cubic feet of natural gas, enough to fully supply the country for 14 years and the pace of well drilling is picking up. In 2009, 763 wells were drilled in Pennsylvania and the number for 2010 could be 1750. Each well site occupies 3–4 acres and the drilling process uses up to 5–6 million gallons of water that becomes laden with salt, dissolved solids and some undisclosed compounds must be recovered and treated.



Marcellus Shale map

The boundary finally comes out of the woods to jog around Saint Marys then goes back into the forest atop Boone Mountain in Moshannon State Forest. We cross I-80 five miles east of DuBois and proceed south through the more open country of Clearfield County and into another energy producing area. We are in bituminous coal country. While Pennsylvania's bituminous production peaked at nearly 180 million tons / year during World War 1, today 70 million tons / year are produced, mostly outside the Bay's watershed. However the legacy of mining persists. As far downstream as Lock Haven there are few if any aquatic species in the West Branch of the Susquehanna and the pH usually comes in at around 4.

Coal, left-Bituminous, right-Anthracite

After the boundary goes further south and dips into eastern Indiana County we enter Cambria County to pass by the West Branch's source near Carrolltown. Further to the south and east, we cross Rt. 22 at Cresson where the Allegheny Portage Railroad once connected water commerce from the Juniata River and the Conemaugh River to the west. To the southeast of Cresson the boundary crests the ridge that forms the eastern border of Cambria County. With Blue Knob four miles to the east, we pass within two miles of Beaverdam Run Reservoir, interestingly built just six miles upstream of the site of the South Fork dam failure that killed over 2,200 people in Johnstown in 1889. Further south we cross Rt. 30 at another Mount Ararat (I'm not making this up) that apparently honors the former site of the Ship Hotel that offered a view of three states and seven counties from a perch on the east side of the

The Ship Hotel in its glory days. It burned down in 2001

prominent Allegheny Front. We cross the Pennsylvania Turnpike on the ridge over the Allegheny Tunnel, and continue on the ridge to Rt. 160 which carries the boundary up to Big Savage Mountain, a ridge we will ride back to Maryland.

Approximately where the Allegany–Garrett county line meets the Mason–Dixon Line is where the boundary enters Maryland for the third time. With over half of Garrett County in the Mississippi watershed, this far western part of the county is the largest of the three pieces of the state not in the Bay's drainage basin. Shortly after entering the state we go west to Meadow Mountain where when traveling on I-68 you will see a sign for the Eastern Continental Divide. Between Deep Creek Lake and the Savage River Reservoir, the boundary crosses over to the east and takes to Backbone Mountain which separates Potomac and Youghiogheny waters for the next 20 miles to West Virginia.

Fairfax Stone, the historic source of the Potomac, also marks the boundary's entrance into the Mountain State. Showing that the people of old Virginia knew the importance of watersheds, for its entire length in West Virginia the boundary will follow county lines. First the Grant–Tucker line heads east for twelve miles then turns south near Mt. Storm Lake, separating the Black-

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Chesapeake Watershed

Continued from page 19

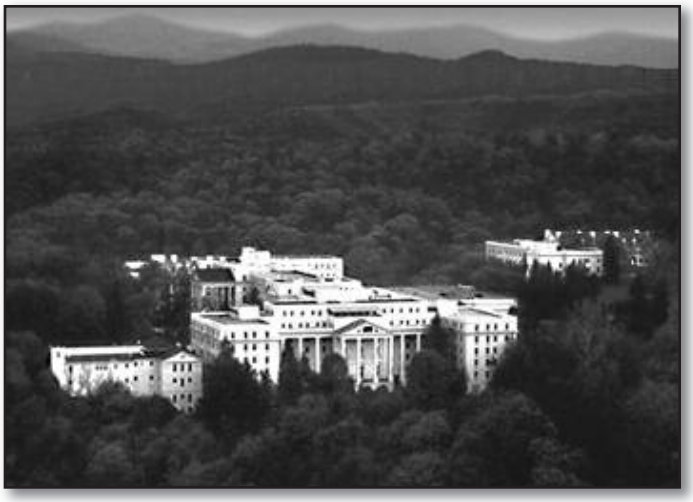
Fairfax Stone

water River slogging along the Canaan Valley swamps to the west from the Stony River to the east. Above the Stony River Reservoir, we leave coal country behind and enter the Monongahela National Forest and some of the wild and wonderful lands in the Bay's watershed. South of Dolly Sods along the Pendleton–Randolph line we scale 4,770' Mt. Porte Crayon, the highest point directly on the edge of the watershed. If you're wondering about the name, it comes from the pseudonym of 19th century artist David Hunter Strother who grew up in Martinsburg, Virginia (now West Virginia). *Porte Crayon* in French means pencil carrier.

Thirty miles south of Mt. Porte Crayon, the boundary passes one ridge west of Spruce Knob, at 4,863', the highest point in West Virginia and the highest point

Spruce Knob

in the watershed. Twelve miles further south we cross Rt. 28 along the Pendleton–Pocahontas line, the first paved road we've seen in forty miles. When the boundary reaches the northern corner of Highland County Virginia, it begins forming the border between Virginia and West Virginia. Highland County is appropriately named, for the average feet above sea level closely



Greenbrier Resort in White Sulphur Springs

matches its 2,400 residents. To the west is the Greenbrier River valley and to the immediate east the headwaters of the South Branch of the Potomac.

South of Rt. 250, Jackson, Bullpasture and Cowpasture rivers begin their flow to the James. We are still in the National Forest, with lands in Virginia called George Washington, and in West Virginia still called the Monongahela. Taking the state line to the southwest we continue on a high ridge going over 4,480' Bald Knob (not to be confused with a better known and higher mountain of the same name 12 miles to the west that the Cass Railroad goes to) and 4,477' Paddy Knob which sits on the point where the Highland–Bath County line meets the state border. Further along, the boundary goes past Warm Springs and Hot Springs, Virginia and nearby Lake Moomaw on the Jackson River, while the Greenbrier River keeps pace to the west.

The political/watershed boundary we've been following since Fairfax Stone breaks down south of I-64 and White Sulphur Springs, West Virginia (home of the Greenbrier Resort) when two creeks that feed the James watershed begin in Monroe County, West Virginia. In far northeast Giles County, Virginia, in the Jefferson National Forest the boundary crosses the Appalachian Trail twice and comes within four miles of the New River atop Butt Mountain. Hold onto your hats—we have begun a rugged, ragged, zigzag over ridges and across valleys.

We take Johns Creek Mountain north, cross a valley and turn south atop Sinking Creek Mountain. Again we cross the Appalachian Trail and follow the ridge all the way to Rt. 460, then swing around and head north on Brush Mountain, passing five miles from Blacksburg and continue on a northeast course cross the Appalachian Trail again along the Craig–Roanoke county line near Rt. 311. The boundary now begins separating the Bay's watershed from the Roanoke River, which flows into North Carolina's Albemarle Sound.

Eight miles north of Roanoke we cross I-81 then climb up the Blue Ridge and follow the Blue Ridge Parkway for 20 miles past Peaks of Otter and Falling-water Cascades. At Onion Mountain the boundary leaves the Blue Ridge and the Jefferson National Forest and heads east. For over 200 miles, since Dolly Sods, we have traveled the most natural part of the watershed and with few exceptions been in National Forest Lands.

The boundary loops south and east of Lynchburg and starts riding Rt. 460. We are out of the mountains,

Peanuts

traveling farms and forests of the fertile Piedmont passing through Appomattox, and then taking the Prince Edward County line southeast to Rt. 360, which we'll ride back to Rt. 460 at Burkeville. Rt. 460 will take us all the way to the Civil War trenches outside of Petersburg. We'll continue east in the low lying areas near the James River where the boundary begins following the river from a distance of less than ten miles. The crops grown here are different from the rest of the watershed. We will pass by fields of peanuts and cotton.

Cotton

Five miles west of Smithfield, the boundary veers away from the James and heads south to begin the final leg of our journey. After going around the Nansemond River the boundary enters the Great Dismal Swamp and loses definition. East of the swamp the Intracoastal Waterway connecting the Elizabeth and North Landing rivers punctures the boundary a second time. Proceeding through the buildup of Virginia Beach, we'll get back on Rt. 13, pay our toll and head out over the water for a crab cake at the Bay's mouth. We deserve it.

Let's have two

Back River Water Quality: Some progress, but a long way to go

—By John Martin, Baltimore City

INTRODUCTION AND PURPOSE

This paper describes the water quality conditions in Back River, a shallow tidal tributary of the upper Chesapeake Bay. Back River is located north of Baltimore Harbor on the western shore of the Bay in Baltimore County.

The purpose of this study was to track changes in water quality in Back River over time and correlate them to upgrades in treatment processes at the Back River plant. We chose to develop this in-house monitoring program rather than rely on data collected by other agencies such as the Maryland's Department of Natural Resources because we could select stations to focus on the portion of Back River surrounding the plant's outfall and could select a station that would function as a control.

Secondly, it would give us a body of data over which we maintain control and that we could share with other interested parties.

BACKGROUND

In the early 1900s, Back River was selected to receive effluent from the Back River Wastewater Treatment Plant because it was a sparsely populated area and it would function as a polishing system for the plant's effluent from its then state-of-the-art trickling filter process. By introducing sewage effluent into Back River, the Bay's oyster bars would be protected as was required by law. The Back River plant was very advanced for the time utilizing secondary treatment, sludge elutriation and other innovative processes not widely used in the U.S. at the time.

As the years went by and the Baltimore metropolitan region grew, flows increased and Back River water quality suffered. After World War II, growth in the area exploded, silt accumulated in the upper tidal portion of the river and, despite law suits and other environmental actions, water quality remained poor with odors, algal blooms, and floating solids from the plant.

Fast forward to the passage of the Clean Water Act in 1972 and public outrage at the condition of the nation's waterways. Back River was not even close to fishable and swimable. Clearly something had to be done and it was not going to be fast or cheap. Enter the construction grants program, an integral part of the Clean Water Act. Now federal and state grant funds were available to build new facilities. Around the country, over the next decade or more, hundreds of wastewater treatment plants were upgraded and expanded and Baltimore's plants were among them.

Large new activated sludge facilities were built and placed in service in 1988 allowing the trickling filters finally to be taken out of service. These had been operating since the plant first went into service in 1912 and although inexpensive to operate and excellent at working under varying hydraulic loads, they were not very efficient; removing only approximately 75 to 80% of influent organic waste.

In addition to these new activated sludge facilities, sand filters, new chlorine contact tanks, and a new outfall structure were built. With all these facilities in service, reductions in biochemical oxygen demand (BOD) and total suspended solids (TSS) were now on the order of 98 to 99 % while approximately 95% of phosphorus and 70% of nitrogen were removed. These removal rates continue today at the Back River plant.

On the solids processing side, air flotation thickeners were added to supplement the gravity sludge thickeners, large egg-shaped anaerobic digesters greatly improved volatile solids reduction and more recently, gravity belt thickeners were added to improve the performance of sludge thickening.

A byproduct of anaerobic digestion is methane gas, a valuable energy resource. This gas is used to heat the digestion process and to provide comfort heat for the plant's buildings. Those uses, however, do not consume all the gas produced so the surplus was flared. Recently, to address the energy wasted by flaring surplus digester gas, three large internal combustion engines, each turning a generator capable of producing one megawatt of power have been installed to put this surplus gas to good use.

In the early 1990s, the Wastewater Facilities Division (part of the Bureau of Waste and Wastewater which is in turn part of Baltimore's Department of Public Works) initiated a water quality monitoring program to track pollutant concentrations, *in situ* parameters (dissolved oxygen, temperature, salinity, and pH), Secchi disk transparency, and most importantly, chlorophyll concentration in the river.

Sampling started in 1993 and has continued from March through October or November each year ever since. During this span of years, the Back River plant was upgraded to biological nutrient removal (BNR). This took place in the late 1990s and lowered the effluent total nitrogen concentration by approximately 40% to 50%.

This paper will present the methods used and summaries of the water quality data spanning 1993 through 2009.

METHODS

Monthly sampling trips were made from March through October or November (depending on weather) each year to collect both water samples and field water quality data at several stations in Back River with a control station located in neighboring Middle River. Samples were collected at the surface and from just above the bottom sediment using a small electric pump mounted on a pole. Separate samples were collected for analysis of BOD, TSS, and nutrients including total Kjeldahl nitrogen (TKN), ammonia, nitrate, nitrite, orthophosphorus (OP), and total phosphorus (TP). The abbreviation NOx is used to refer to the sum of nitrate and nitrite.

Five sampling stations were visited each month starting: four in Back River and a control station in Middle River *(Figure 1)*. In Back River, stations were located 0.75 miles upstream of the plant outfall, directly off the outfall, 0.75 miles downstream of the outfall and then an additional 1.5 miles downstream. A control sample was

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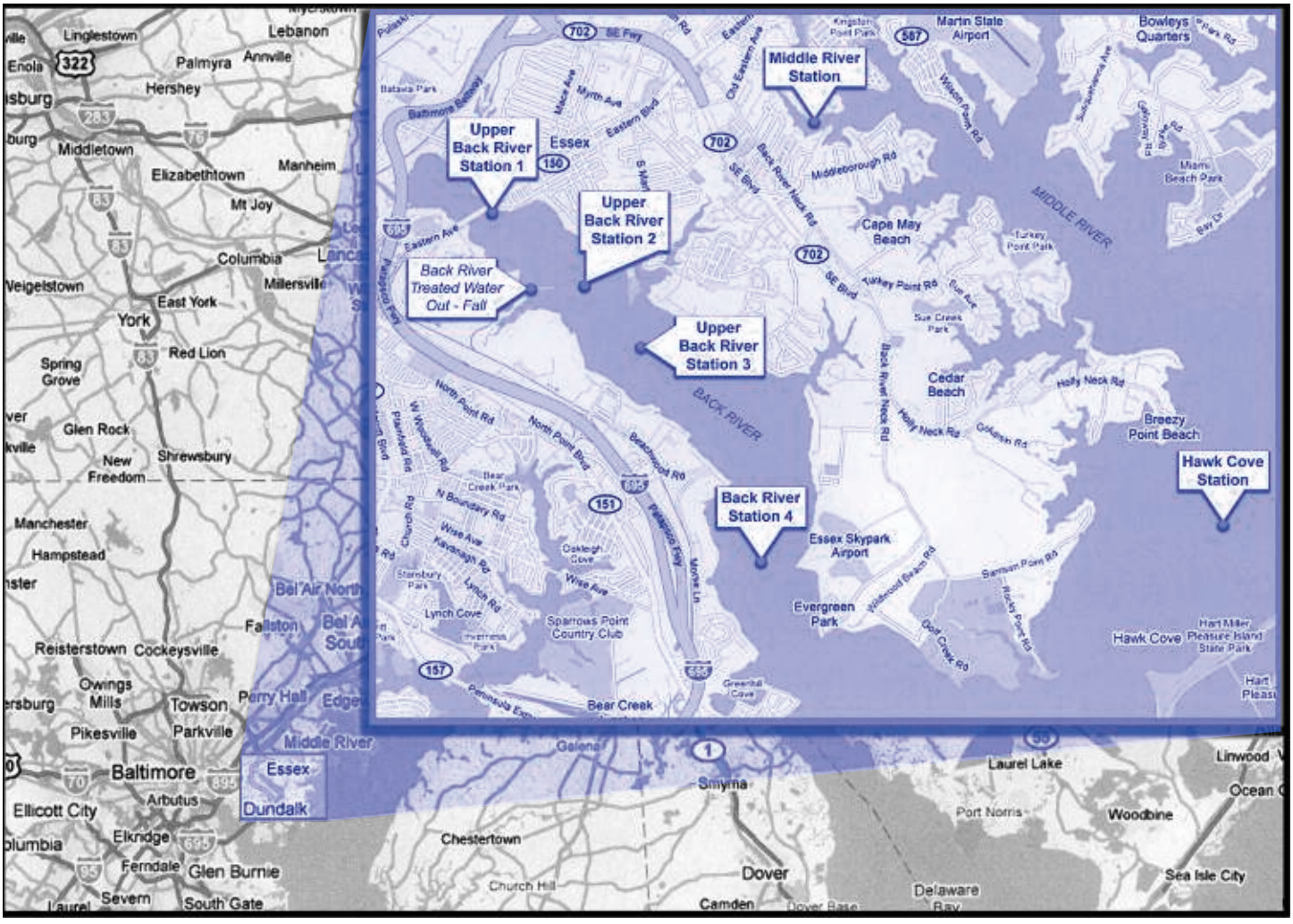
Figure 1



Back River

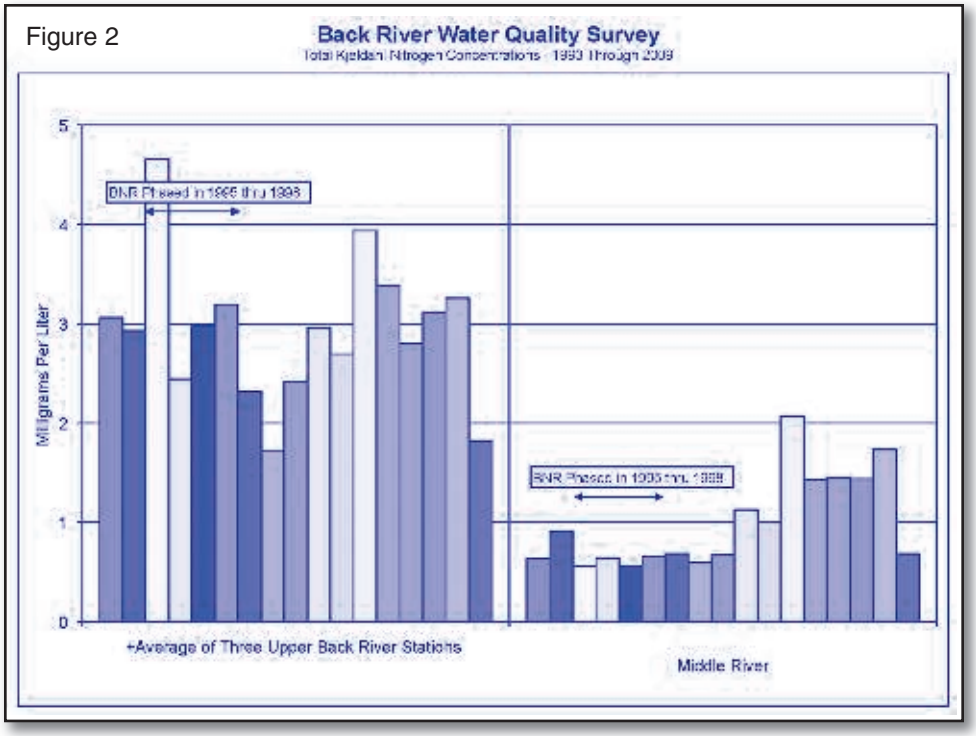
Continued from page 25

collected in the upper tidal portion of Middle River; the next river to the north and uninfluenced by a wastewater discharge. The location of the Middle River station is approximately the same distance from the main stem of the Bay as the upper Back River stations and thus is under nearly the same environmental conditions. Note that the first three stations bracket the outfall and are averaged in the presentation of the data to illustrate typical conditions found in the upper tidal portion of Back River. The fourth station is located in the lower part of the Back River estuary while the control station is in Middle River; a different tributary. *In situ* parameters were also measured at an open Bay station located off the mouth of Middle River.

In addition to collecting samples for analysis of the parameters noted above, separate samples were collected for analysis of *E. coli* bacteria, Microtox and chlorophyll *a*. Separate samples were collected for these latter analyses as they were analyzed by different laboratories.

In situ parameters were measured using a Hydorlab Surveyor 4 and minisonde. Parameters include dissolved oxygen using a luminescence probe (LDO), temperature, pH, salinity and probe depth. The unit was calibrated immediately prior to each sampling trip. Readings were taken at the surface and a few inches above the bottom at each station. As no station is deeper than approximately ten feet, no mid-depth readings were taken. Finally, at each station a standard Secchi disk was used to measure light penetration into the water.

Figure 2



RESULTS AND DISCUSSION

Although there are numerous charts plotting each parameter spatially down the river, the graphics presented in this paper are those that compare concentrations of TKN, TP, NOx, and chlorophyll over the duration of the study. In addition, rainfall at BWI Marshall Airport has been plotted illustrating the extraordinary amount of precipitation that occurred in this area during 1995 and 1996.

The trends during this period appear either to be fluctuating randomly from year to year but not establishing a trend in any particular direction (TKN and TP) or clearly declining in response to environmental conditions (NOx and chlorophyll).

The concentrations of TKN in Back River suggest a very slight downward trend over time while at the control station in Middle River, the trend was upward from 1993 through 2008 and then dropped back in 2009 to

Figure 6

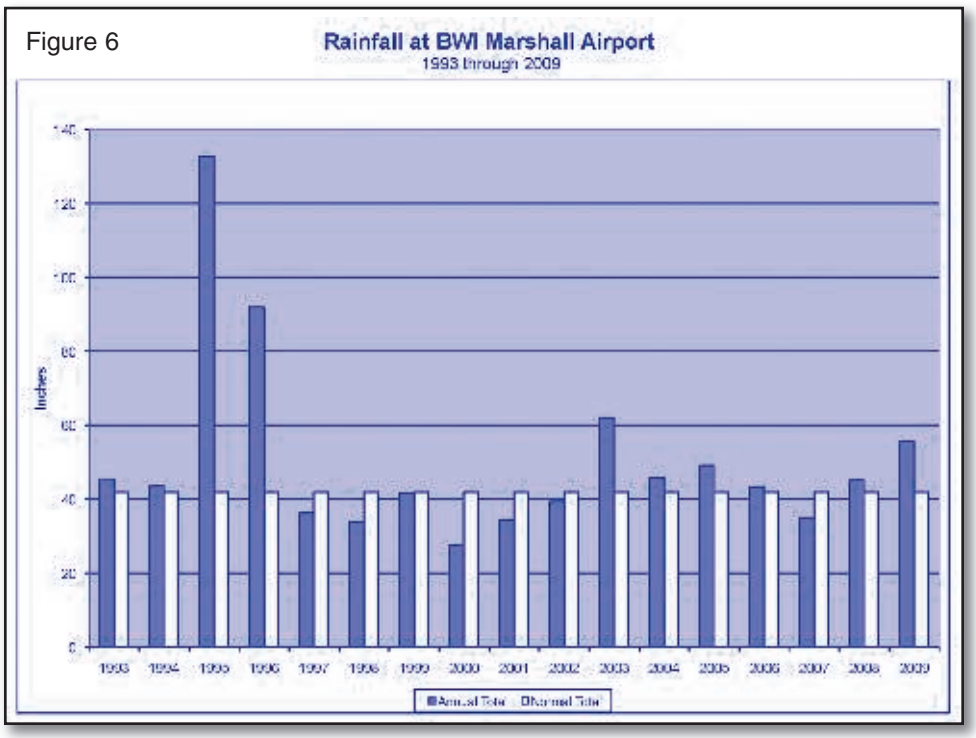
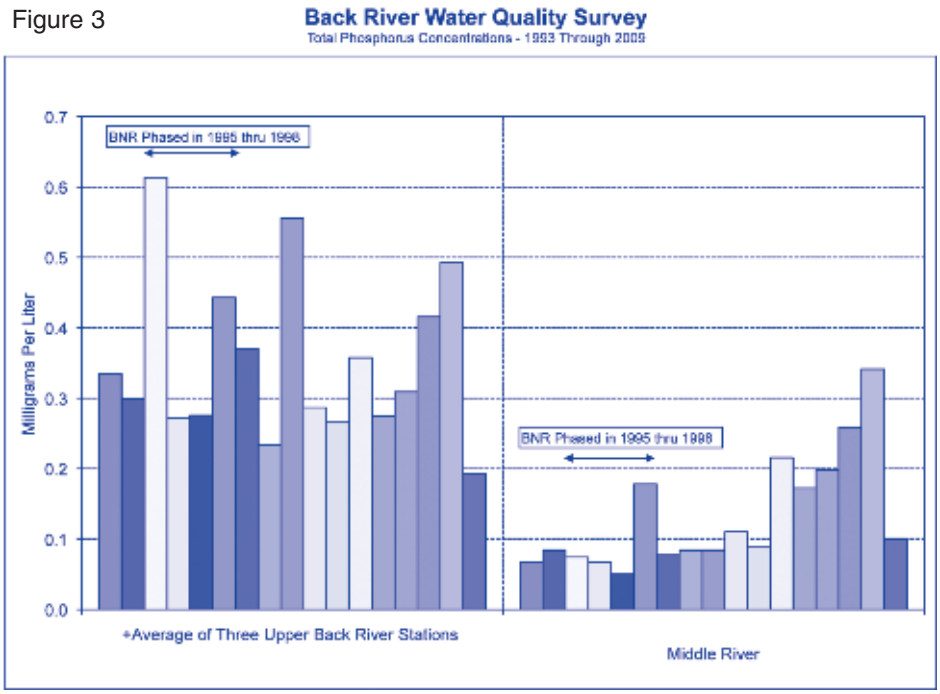


Figure 3



levels seen during the first few years of the study *(Figure 2)*. The reasons for these fluctuations are probably more related to rainfall *(Figure 6)* and more importantly, exactly when the rainfall occurred. If a very wet period follows immediately after farm fields have been fertilized, then higher TKNs would result as one of the main ingredients in fertilizer is ammonia; a form of nitrogen that is included in the TKN result.

The concentrations of TP at the Back River stations also fluctuated considerably *(Figure 3)* with a high concentration in 1995 echoing the high TKN value seen that same year. Similar also is the pattern at the Middle River station where the concentrations remained fairly constant from 1993 through 2003, then rose steadily through 2008 and then declined in 2009 back to levels seen in the first few years of the study. One can only speculate at the cause of these fluctuations but rainfall remains a prime suspect *(Figure 6)*.

Two factors influence the concentration of TP in Back River. These are the phosphorus discharged by the treatment plant and the legacy phosphorus in the river sediment. Experiments have confirmed that when pH rises, sediment phosphorous solubilizes and contributes to TP in the water column above. This is likely the explanation for the TP concentrations observed in Back River since the concentrations of TP in the treatment plant effluent are below 0.2 ppm per the plant's NPDES discharge permit while TP concentrations in the river frequently exceeded this level. Only one year (2009) was the average concentration TP in Back River less than the plant's effluent concentration.

Oxides of nitrogen (NOx), primarily nitrate and nitrite, have declined noticeably in Back River *(Figure 4)*. Concentrations between 2 ppm and 3 ppm were routinely observed during the period 1993 through 1996 with 1995 being the exception. From 1997 through 2001, the NOx concentrations declined from 1.5 ppm to 0.5 ppm and although they have risen again some, they have remained at 1.5 ppm or less through 2009. Looking at the Middle River control station, NOx concentrations have remained consistently below 0.5 ppm throughout the entire 16-year study. Since the Back River WWTP was upgraded to include biological nutrient removal during the period 1995 through 1998, the decline in NOx concentration is most likely related to these improvements.

Chlorophyll concentrations in 1994 and 1995 averaged in excess of 150 µg/L *(Figure 5)* with occasional individual samples exceeding 300 µg/L. Then, rather drastically, the concentrations declined to below 100 µg/L and in a few cases less that 50 µg/L. Chlorophyll

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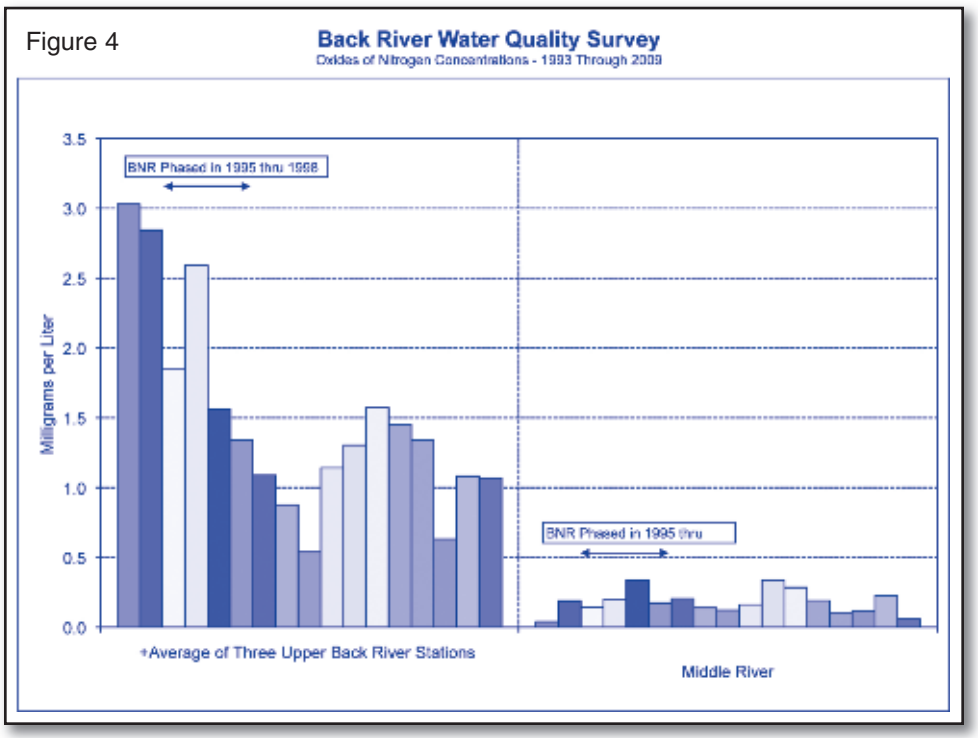
Figure 4



Back River Water Quality

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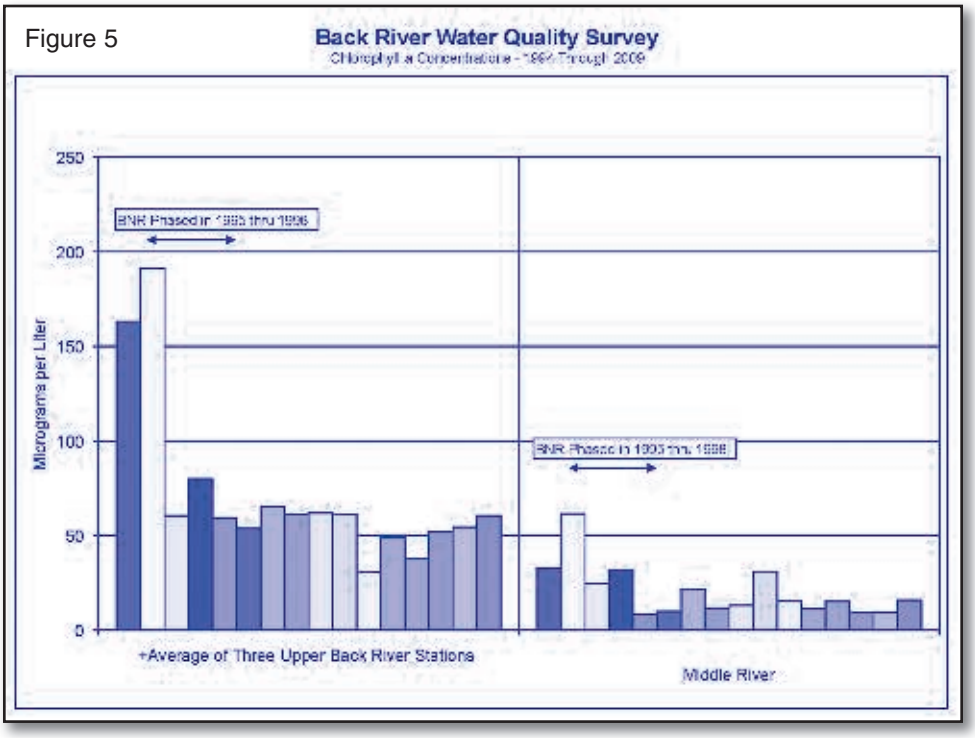
Figure 5



concentrations at the Middle River control station, except for 1995, were all less than 50 µg/L and mostly were less than 25 µg/L. Recall that the concentration of NOx also declined during the same period of time although not as dramatically as chlorophyll. The reason or reasons for the decline in chlorophyll are likely the same as the cause of the decline in NOx concentration; the Back River WWTP phased in BNR operations lowering the concentration of NOx in the effluent. Note also that in the charts illustrating both TP and TKN, concentrations were significantly lower in 2009 than they had been during the previous several years. This pattern was not observed in either NOx or chlorophyll.

The effect of rainfall is evident in the very high TKN, TP and chlorophyll concentrations observed in 1995. Note that in 1995, rainfall in the area was approximately three times the normal annual precipitation causing much erosion all across the watershed and elevated nutrient concentrations in the upper Chesapeake Bay.

CONCLUSIONS

Compared to the period prior to the late 1980s, Back River today is in far better condition than it was previously. Before the BNR upgrade was completed in 1998, algal blooms would sometimes turn the river a striking shade of iridescent green. During these blooms, as the wind swept across the river, algal cells and colonies would accumulate along the shoreline causing the water to look as though someone had poured green paint on the surface. These were the days when the chlorophyll concentration would exceed 200 µg/L and occasionally 300 µg/L. Today, algal blooms still occur but they are not nearly as severe as they were with chlorophyll concentrations now averaging 50 to 75 µg/L rather than the 200 to 300 µg/L previously seen. Although this seems like good progress, chlorophyll concentration should be more in the range of 25 to 35 µg/L.

Water quality in Back River remains impaired for nutrients for two major reasons. The discharge from the Back River WWTP still contributes significant tonnages of NOx to the river and legacy phosphorus pollution solubilizes from the sediment as the pH rises during times of peak biological activity. These two sources provide sufficient nutrients to support the algal growth still observed in Back River throughout the growing season.

These problems are being addressed as part of the overall Bay restoration strategy and also as part of the necessary steps to improve local water quality conditions in Back River. Currently under design are facilities to take the Back River Plant to enhanced nutrient removal (ENR) levels. When these facilities are competed and operating efficiently, effluent total nitrogen concentrations will be on the order of 3 to 4 mg/L rather than the 7 to 8 mg/L currently discharged. This will reduce by approximately half the concentration and therefore loadings to Back River. Several years are still needed before these facilities will be constructed and in service but when complete, reductions in nutrients, particularly nitrogen (TKN and NOx), should occur along with concomitant reductions in chlorophyll concentration and increases in Secchi disk transparency.

These improvements in water quality will likely not make the river run clear again, however, as much of the observed turbidity is due to the sediment load in the water and not to the crop of phytoplankton and associated organisms in the biological community. Until sediment and erosion controls are fully in place, water quality in Back River will continue to suffer with the river turning brown after a hard rain.

This is an on-going study and updates will be published from time to time as ENR facilities are completed and placed in service.

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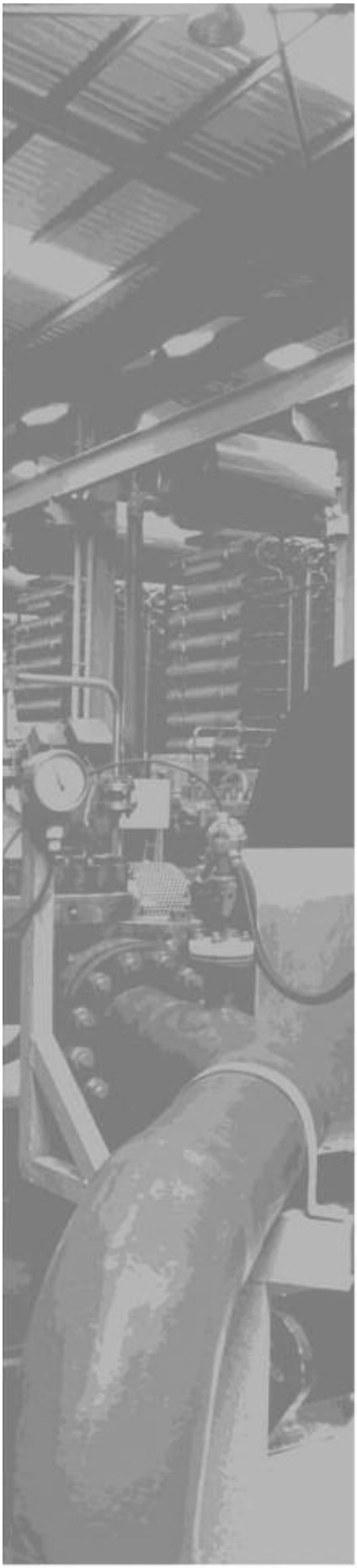

Membrane Applications 2010

Conference: June 6 – 9 | **Exhibition:** June 7 – 8
Hilton Anaheim | Anaheim, California

Register by **May 5** to receive the **Super Saver Rate!**

Join us this year in Anaheim, California, for a training opportunity that focuses on the various ways membrane technologies contribute to sustainable water management, produce high-quality effluent, recycle reclaimed water, and how new approaches reduce energy consumption. This conference will capitalize on Southern California's water reuse and membrane-orientated facilities via utility tours and shared knowledge from local experts.

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This conference is held by the Water Environment Federation in cooperation with the California Water Environment Association, and the International Water Association.

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Continuing Education Units, Professional Development Hours, and Contact Hours can be earned at this event by attending workshops, technical sessions, facility tours, and the opening general session.

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On Finding Leaders

—By Bill Bertera, WEF Executive Director

The great majority of not-for-profit organizations in North America are directed and managed by volunteers. Most associations do not have staff. In fact, most not-for-profit organizations are home grown organizations at the state and local level founded and managed to serve needs not addressed by the private sector or government; and they are run by "regular" people…people with other lives. Consequently, most associations look more like a typical WEF Member Association than they do like WEF itself.

Still, leading not for profit organizations is an increasingly difficult thing, even smaller, local organizations…and it is time consuming even if one has the interest. New and rapid communication devices require new skill sets in our leaders and place even more demands on them. Technology does not lessen workloads, it increases them. Not only do we expect our volunteer leaders to lead, we expect them to lead with some immediacy. Unreasonably, we expect them to put aside other professional and personal interests and deal with ours…NOW.

This is not a realistic expectation, and if pushed too hard, can result in discouraging otherwise willing and able volunteers. So we have to recruit and choose carefully and with the knowledge that few volunteers are without conflicts of time and interest. The constraints of diminished time and the need for new skill sets in association management make recruiting and choosing volunteer leadership an important mandate for our associations…and we have to plan for it.

The first step is to realize that not everyone with time and good intentions is automatically qualified to lead. Leadership requires skills that not all of us have…and most of us are not leaders. That is why it is important to know what we need in our leaders before we name them. These skills and talents are called "qualifications."

Qualifications are in the eye of the beholder. We all see someone different in the mirror in the morning than our good friends see when they bump into us on the street. Somehow that morning mirror vision tends to show someone younger, slimmer, and more intelligent. Perceptions, of course, are not realities…they are misguided observations. Increasingly, our organizations are less tolerant of misguided observations. We need to know what we want and we need a plan for getting it, or we will fail. Leadership is no exception.

Volunteers with the time and the desire to lead need to know this too. There is more to leading than just offering ourselves up and wielding a gavel. Leadership, even uncompensated leadership of a not-for-profit association, is an important job and not without its risks and obligations as well as rewards. Natural leaders are a rare blessing and the need for leadership is too important to leave to chance. One of the most effective strategies for addressing the leadership gap is to identify potential leaders early on and help educate them in the art of leadership itself.

Whether we find natural leaders or create our own, qualifications still matter, and topping the list are people skills…those that have to do with listening, mediating and empathizing. Volunteer organizations are just that and no one is there for much other that the satisfaction of serving. Serving should not be too much like real work. The leader's job is to make sure that it is not…to get the work done, but to make the experience rewarding.

Knowing your MA and how it works and what it needs is important. That means that service on the critical MA committees of membership, finance, and planning is important. It also helps to understand what boards do and how they are supposed to work. Setting direction and implementing are two different things. One is a board's job, the other falls to individual leaders and members. And finally, and perhaps most important of all, an open mind, an ability to work as part of a team, a willingness to make decisions…and oh, yes, a sense of humor is essential.

In most volunteer organizations the task of identifying, attracting and sometimes choosing leaders falls to a nominating committee of some sort. But nominating committees do more than just choose leaders. They also decide, implicitly or explicitly, what kind of leadership an organization needs or should have and advises the organization on how best to provide for that leadership over time. In this sense, the MA nominating committee may be the most important committee in the organization. Who sits on it, their values and their sense of the future for the organization are critical. It is not an honorary or unimportant job.

Agreement is Sometimes Hard

—By Bill Bertera, WEF Executive Director

The argument for a single voice for water in North America is compelling…and in the eye of some, obvious. What is not so obvious is why achieving such a seemingly simple unanimity of purpose, which is so clearly in the public interest, is still the topic of debate rather than implementation. The answer is uncomfortable because it is simple, plain and unadulterated; it is "self interest."

Self interest in and of itself is not a bad thing. It is anything but. When applied in a broader context of a "public interest," however, the idea of self interest can become disorienting. And that is a shame because there are self interests that are public regarding, that are good self interests, i.e., that are consistent with and supportive of public policies that serve the greater good and which are in the public interest. For example, we give up certain privileges or freedoms or short term benefits to have safe streets, or a clean environment or to have universal public education.

"Giving up"…that is a key phrase and a bit harsh and off-putting. It raises instant defenses and makes it difficult to see beyond the immediate. It causes us to put our personal and short term interests in the fore, to close off discussion. Looked at in another way, "giving up" suggests a hard, accusatory, winners vs. losers edge. It implies loss rather than gain, and while it often suggests special interests rather than public interests, the two are not mutually exclusive.

In the early days of the one voice for water conversation, the term was often interpreted solely as a call for a merger between WEF and the American Water Works Association…not a bad idea, but politically toxic in some quarters. It is unfortunate that the term acquired that narrow definition, because it was intended then as something much more and has become something much more in the years since.

Michael Read, a former president of WEF and now a public utility manager, first used the term to suggest the need for coming together within the water community and to come together on behalf of a public interest that far transcended the unimportant conflicts between two national organizations. That public interest was defined in terms of a protected environment, a strong program of public health, and a vision of a future that was sustainable. Michael wasn't just talking about WEF and AWWA, nor about the public and private sectors; not urban and rural, not small systems and centralized systems, and not even just drinking water and what we used to call wastewater…but the WHOLE of the water community.

All of this comes to mind yet again as a number of Member Associations, most recently the British Columbia Water and Waste Association, call for increased collaboration within the water community. All speak to the issue of a single voice for water in North America and do so intelligently and cogently. But talking about collaboration in the public interest and doing it are not the same. Achieving it, especially at a national level, will take something more, and so far, we have shied away from that something more because that something more is painful.

To date the industry discussion about creating a single voice for water has been about doing so without anything changing…for us, for our association, company or utility. If there is to be change, it is to take place somewhere else…by someone else…by you, in your association, company or utility. This is not a recipe for success; it is a recipe for inaction, for doing nothing while pretending to be willing to do anything. It is everyone deciding not to lead.

Negotiation is about compromise and this ball called "one voice for water" is not going to go down the field without good faith negotiation. Compromise sometimes requires "leaving something on the table" on behalf of a greater good. The greater good in this case is a water community that enjoys the kind of public respect that translates into public influence on the key water and environmental policy issues of the day…at all levels of government. The question before us is not whether to kick the ball, but who is going to kick it first and in what direction.

Editor's Corner

Continued from page 5

The wet weather thus far this year is bringing more flow into the Bay and that means potential trouble. More flow, especially in late winter and spring, means more nitrogen, phosphorus and sediment which could bring reduced submerged aquatic vegetation, more algae blooms and longer lasting dead zones. If all this comes to be, it will be a terrible harbinger to the upcoming Bay wide TMDL.

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In the last issue of the *Ecoletter*, an article on the Pocomoke River mentioned the Delmarva Discovery Center in Pocomoke City. The Center recently announced the opening of their new 6,000 gallon aquarium that will host species native to the Pocomoke, including whelks, hermit, spider, & horseshoe crabs, and longnose gar. If you're in the neighborhood check out the Discovery Center.

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