

## Scientists waiting to see if record 2018 rainfall dampens Bay recovery

≈ There are hopes that recent improvements are strong enough to offset the impact of increased nutrient and sediment flows.

By **KARL BLANKENSHIP**

For the Chesapeake, 2018 was a year of mud, trash and sewage as unrelenting rainfall washed across its vast watershed, sending unusually high amounts of freshwater runoff into the Bay month after month.

The water-fouling nutrients and sediment that were also flushed into the Bay by record-setting rainfall throughout

the region will test the staying power of recent water quality improvements to the nation's largest estuary.

At risk are improving trends for the Chesapeake's fish-stressing "dead zone," and the restoration of its vital underwater grass beds and oyster populations.

Some cleanup efforts seemed to withstand the repeated downpours, but others faltered. Farmers struggled to plant pollution-absorbing cover crops, for instance.

It'll be months before anyone can fully gauge the impact of higher-than-normal river flows that began

flooding the Chesapeake in May and persisted through the rest of the year. August, September and November all set records for freshwater flows into the Bay, and December flows were running far above normal in its three largest tributaries, the Susquehanna, Potomac and James rivers.

"It's very unusual to have seven months of above average flows," said Scott Phillips, Chesapeake Bay Coordinator with the U.S. Geological Survey, "especially during this period of time."

Extended periods of high flows are more common earlier in the year, when

winter snow melts and spring rains arrive.

Not only did the year end wet, but scientists said high flows were almost a certainty for early 2019 because the ground is so saturated that water will continue to work its way into streams for months. Further, with the onset of winter, there's little vegetation to absorb the moisture.

"Even if we don't have rain, I think we're going to have above average stream flows just because of the amount of groundwater draining after

RAIN CONTINUES ON PAGE 28

## Lawyers not cannons the big guns in latest round of oyster wars

≈ As pushback by waterfront homeowners increases, VA & MD convene workgroups to deal with aquaculture leasing backlogs and disputes.

By **TIMOTHY B. WHEELER**

As Chris Ludford sees it, the oysters he's growing in Virginia Beach's Lynnhaven River are helping to restore the Chesapeake Bay tributary, once fabled for having some of the tastiest bivalves anywhere.

"Nobody thought we'd be eating Lynnhaven oysters again," said Ludford, a part-time oyster farmer and full-time firefighter whose Pleasure House brand of bivalves are featured on the half-shell at several local restaurants.

The Lynnhaven, which extends like an osprey's claw from the mouth of the Chesapeake into Virginia's largest municipality, was closed to shellfishing off and on for decades because of pollution. Now, roughly half of the river system has been reopened.

But to John Korte, who lives on a canal off the Lynnhaven, the expansion of oyster farming there is curtailing some people's ability to enjoy that cleaner river. He contends the submerged cages used for raising oysters pose hazards to unwitting boaters, jet skiers, swimmers and waders in one of the state's busiest recreational waterways. And aquaculture gear spoils the view from waterfront homes.

"We share the water," Korte said, as he guided his powerboat slowly past houses hugging the



*Those oyster cages placed in shallow water in the Lynnhaven River could be seen at low tide. Sign warns boaters of their presence when submerged at other times. (Dave Harp)*

shoreline, with offshore signs warning boaters of aquaculture gear in the shallows. "You use it today, I use it tomorrow. But once you put stuff down, I can't do that anymore."

Conflict over oyster farming has been going on several years now in the Lynnhaven, but it's spreading throughout the Chesapeake Bay. Unlike the "oyster wars" of the late 1800s between feuding

watermen and fishery police, there's been no gunplay. The combatants this time wield petitions and lawsuits. But feelings are running high as the growing industry encounters increasing resistance from waterfront homeowners and some watermen who object to what they see as a creeping privatization

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Editor's Note

*Now's not the time to talk about the weather, it's time to act*



As 2019 begins, scientists are still assessing how much impact the unusually long period of high flows into the Bay — eight consecutive months and counting — will have on our estuary.

On one hand, one should expect it to ultimately bounce back. High flows always happen, and the Bay, after all, is an estuary, where freshwater and saltwater mix. The species that live in estuaries have adapted to a wide range of conditions.

But humans have been magnifying the impact of those high flows over time — and continue to do so. Once vast forests buffered the impact of such events, absorbing much of the rainfall and slowing the runoff of what's left. But centuries of land clearing, the addition of prodigious amounts of fertilizer and manure to fields, and the paving of huge areas of the landscape have dramatically changed the picture. More nutrients reach the Bay than was the case a century ago, and stormwater gets to the estuary in larger pulses as it runs off the land more quickly.

Precipitation is increasing as well, up 10 percent over the last century. And the amount of precipitation arriving in large storms has increased 50 percent since 1958.

The U.S. Geological Survey started estimating annual river flows into the Bay in 1937. The average flow never reached 100,000 cubic feet per second until 1972. Since then, it's hit that mark a dozen times.

It's uncertain if climate change contributed to this year's record-setting rainfall, but some scientists believe it's possible. Recent research suggests that changes in the atmosphere are causing the jet stream to behave oddly, locking weather patterns

in place for long periods, according to Michael Mann, director of the Penn State Earth Systems Science Center.

That is what happened this year, he argued in a recent *Washington Post* op-ed, noting that a high-pressure ridge was stalled over places like California and Europe, bringing extreme heat and drought. Meanwhile, a deep low-pressure trough persisted in the Eastern United States and Japan, which both saw excess rain and flooding.

This understanding of the jet stream's reaction to climate change is relatively new, Mann said, and suggests that the impact of climate on severe weather has likely been underestimated for the future. "Our study indicates that we can expect many more summers like 2018 — or worse," he wrote.

The state-federal Bay Program partnership only recently began incorporating climate-change considerations into its planning. It's not a moment too soon, as it becomes increasingly clear that climate change is already moving the Bay cleanup goalposts.

Fortunately, there is interest in dealing with this coming from the top. Maryland Gov. Larry Hogan, a Republican, and Virginia Gov. Ralph Northam, a Democrat, recently joined in writing a *Washington Post* op-ed calling on states to take the lead in tackling the problem as the Trump administration moves to reverse the nation's climate-change policies.

"For the sake of our future and the future of our children, it is time to put aside partisan interest and get to work," they wrote, also noting that in both states "we are seeing rising seas, more extreme weather events, regular high-tide flooding and a changing Chesapeake Bay."

— Karl Blankenship

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Correction

The photograph accompanying *on the Wing* in the December issue depicts a juvenile seaside sparrow, not a saltmarsh sparrow. The *Bay Journal* regrets the error.





Clockwise, from left:

Sussey, a duck tolling retriever, sniffs for pollution along Shamokin Creek in Shamokin, PA, with her handler, Carol Parenzan, the Middle Susquehanna Riverkeeper. Sussey has been trained to detect leaks, illegal discharges and broken pipes. See article on page 19.

(Ann Nowaskie / Middle Susquehanna Riverkeeper Association, Inc.)

Stephen Hobson and Tober, his duck tolling retriever, are regulars at Crispus Attucks Park, a one-acre strip of green space that has been permanently protected though a conservation easement in a DC neighborhood. See article on page 8. (Dave Harp)

Snow geese gather at Blackwater National Wildlife Refuge near Cambridge, MD. The birds overwinter along the Atlantic Coast between Massachusetts and South Carolina. They are attracted to the Bay's open waters and abundant food supply. See article on page 32. (Dave Harp)

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# 2019 conservation commitment tied to memories, plans for future

*“The vast possibilities of our great future will become realities only if we make ourselves responsible for that future.”*

— Gifford Pinchot

By KATE FRITZ

I spent the second weekend in December at the place I revere most: Beaver Run Hunting and Fishing Club in Porter Township, PA.

It was full of friends and family, my favorite stone fireplace and 875-plus acres of conserved forest in the Pocono Mountains. We hiked in the chilly gray weather, enjoying the camaraderie of catching up with longtime friends. We laughed at old memories, reflected on 2018 and shared our goals for the New Year.

I’ve been making trips to the Beaver Run Hunting and Fishing Club since I was 9 months old. More than three decades later, it is still my favorite place on Earth.

Having moved around a lot as a child, Beaver Run was the one place that was always the same every time I returned. I could expect to fish, boat, swim and hike in the summer, and ice fish and participate in snowball fights in the cold months.

In 2008, the club worked in partnership with Delaware Highlands Conservancy to put the nearly 900 acres of property that I love so dearly in a conservation easement. The club now has money to continue to invest in the management of its property for the long haul. The 70-acre lake, trout pond and miles of the Bushkill Stream that runs through the property are all used by fisher-folk and hunters of all ages.

As I sat by the warm fire in the lodge, discussing the club’s history and brainstorming New Year’s resolutions for 2019, my mind couldn’t help but wander to Gifford Pinchot. Truly a leader of his times, Pinchot is my answer to every “who do you admire most?” icebreaker I’ve ever participated in.

Nearly 75 years after his death, Pinchot is still known as one of the most influential voices of the U.S. conservation movement. He established the modern definition of conservation as the “wise use” of our natural resources.

After forming the basic concept of conservation, Pinchot became President Teddy Roosevelt’s right-hand man in the conservation of more than 230 million acres of public land during Roosevelt’s term. Pinchot was appointed the first practicing forester, served as the first chief of the U.S. Forest Service, and was governor of



*Beaver Run, and the ability to fish for trout there, was the one place that was always the same every time that the author returned. (Kate Fritz)*



Pennsylvania from 1923–1927 and 1931–1935.

Out of his many impressive achievements, the thing that connects Pinchot and myself the most is that he invented his resource management ethos on a piece of property that means the world to me — Pinchot was a member of Beaver Run in the early 1900s.

So as I sat in the common area of the Club, where Pinchot once sat as he discussed his philosophy of conservation, I had one foot rooted in the past. My thoughts began to drift to 2019 and the work ahead of us.

It has been a rainy year around the Chesapeake, with many places breaking annual rainfall records. The weather has been hard on our rivers and streams, and in turn, our beloved Chesapeake Bay. With more pulses of stormwater entering the watershed, it will likely impact the work installed in the name of restoration.

There is a lot we don’t know about how these climatic changes will impact our work over the long run, but we do know one thing — it will change it.

We could let this frustrate us and throw up our hands and say “enough.” But the truth is, we need Pinchot’s words now more than ever. His concept was simple: Conservation is the application of common sense to the common problems for the common good. He believed in the power of the many, not the few.

I’ve carried that ethos forward in my own career, as I’ve moved from working as an environmental scientist, to an environmental planner and now an executive director of a regional nonprofit organization.

The work that we do at the Alliance for the Chesapeake Bay embodies Pinchot’s ethos as well. We believe in a two-part theory of change, built first on convening voices to identify problems, and second by deploying resources to solve those problems. We believe in the power of partnerships across a diverse range of voices that the Chesapeake Bay watershed is made of. It is my belief that pioneers, like Pinchot, would still remind us today that this has always been the recipe for success over time.

As 2019 approaches, it is imperative that we continue to work together across many landscapes and sectors, finding the areas of commonalities that unite us, not separate us.

In a future impacted by a warming climate and rising waters, we must manage and restore our waters and forests for the purpose of sustaining more than 18 million people in the Chesapeake watershed.

To quote Pinchot, we must “aim for the greatest good for the greatest number for the longest time.”

Let’s start 2019 strong and focused forward for a clean and healthy Chesapeake Bay watershed!

*Kate Fritz is the executive director of the Alliance for the Chesapeake Bay.*



# Norfolk counting on flood-resiliency project to offset wetter future

≈ Millions in federal funds will be used to install tidal marsh, berm and floodwall as well as raise access road to 2 neighborhoods.

By JEREMY COX

A landmark U.S. Army Corps of Engineers report in 2017 called for \$1.8 billion in projects to protect Virginia's second-largest city from sea level rise and stronger coastal storms.

That's because Norfolk is in the crosshairs of sea level rise. It's a low-lying city at the confluence of the James River and Chesapeake Bay, just a few miles from the Atlantic Ocean. With a large population, key military installations and water problems already occurring, Norfolk has begun grappling with how it will prepare for a wetter future.

Some clues may lie in two of its most flood-prone neighborhoods, where construction is scheduled to begin in April on a flood-resiliency project whose cost and scope rival any undertaken so far in the United States.

Bolstered by an injection of \$112 million in federal dollars, local officials plan to install more than 7,000 feet of earthen berms, about 1,000 feet of floodwalls, several acres of tidal marsh, a tide gate and two pump



Joe Rieger, deputy director of restoration for the Elizabeth River Project, gestures toward the river's Eastern Branch as he discusses the planned Ohio Creek restoration project. (Dave Harp)

stations. The project also includes raising nearly a half-mile of roads by up to 6 feet above existing ground level.

"The idea is to hold the water while you can, clean it and release it slowly into the system when you can," said Christine Morris, Norfolk's chief resilience officer.

Norfolk officials have been laying the groundwork for a citywide climate overhaul since 2014, when the Rockefeller Foundation selected it to be one of 100 "resilient cities" alongside London, New York City and Paris, among others. The city put the \$1.7 million it received from the organization toward establishing

Morris' position and hosting a series of climate workshops.

But the project in the city's Ohio Creek watershed marks the first major one of its kind to move into the construction phase, said Joe Rieger, deputy director of restoration for the Elizabeth River Project. The Ohio is a tributary of the Elizabeth River's Eastern Branch.

"Here's a model that could be replicated in other neighborhoods," Rieger said. "The city is going to learn a lot from this project."

Whether the city will have the money to replicate it elsewhere is unclear. The \$112 million came largely from a \$1 billion pot of unused federal funding originally intended for Hurricane Sandy recovery efforts.

"You can't do this for every single community in Norfolk," said Josh Behr, a political scientist with the Old Dominion University research and modeling think tank that helped to write the grant proposal for the city and state. Applying a comparable level of fixes citywide would cost "hundreds of billions of dollars," he added.

"It's just not going to work," Behr said.

The flood-addled Hampton Roads region, a swath of southeast Virginia

NORFOLK CONTINUES ON PAGE 6

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## NORFOLK FROM PAGE 5

that's home to 1.6 million people and several cities, including Norfolk, is often labeled the second-most vulnerable U.S. metropolitan area to sea level rise. The only place facing a greater threat: New Orleans.

Water levels have risen by 18 inches over the last century and are forecast to go up another 4.5 feet by 2100, according to planning and engineering guidelines adopted by the Hampton Roads Planning District Commission in October. Sea level rise in the area is accelerating at nearly twice the global average, scientists say, because the land is also sinking as part of a geological process that's an artifact from the last Ice Age.

A few miles south of downtown Norfolk on the banks of Ohio Creek, water struggles aren't some future abstraction for a pair of communities — they've been happening for years. During unusually high tides, the storm sewers work in reverse, with water bubbling up instead of going down. Heavy rains regularly transform the lowest streets into canals, blocking one of the two access roads for 2,000 residents.

Without action, people and businesses will probably flee Chesterfield Heights and Grandy Village in the coming decades, Behr said. Recurring storm surges will damage homes, forcing residents to abandon them, he said. Others will simply get tired of the inconvenience caused by the flooding and leave. Property values will crash.

"If you didn't do anything, the signal to the business people would be 'This isn't going to get any better,'" Behr said. "The risk is less [farther] inland and the population is already there, so it's a reinforcing loop."

The two neighborhoods lie wedged between the Eastern Branch and a buzz saw of traffic on Interstate 264. Industrial complexes on the east and west further disconnect residents from the rest of the city. "It's not some place you encounter or wander through," Behr said. "There was not a lot of awareness this neighborhood was even there."

Cheryll Sumner grew up in Chesterfield Heights, a community of crape myrtle-lined streets and older single-family homes. She returned as an adult to raise five children there. Now the president of the Chesterfield Heights Civic League, she said she has heard little resistance from neighbors over the enormous public works project. That's because of a shared realization: "The water is coming," she said.

The first sign of trouble came during Hurricane Isabel in 2003,



*Cheryll Sumner, president of the Chesterfield Heights Civic League, helped to build support for the \$112 million project in her community and adjoining Grandy Village. (Dave Harp)*

Sumner recalled. The torrential rain and storm surge flooded the block facing the riverfront. She ended up tying her boat to a telephone pole to keep it from floating away.

Grandy Village consists almost entirely of barrack-like brick apartments operated by the city's housing authority as affordable housing. But the two communities share more than a border: Both are historically African American neighborhoods that developed in response to the need for living quarters near the river's shipyards. They were built on top of former creek beds and hastily filled-in wetlands, leaving rainwater nowhere to collect except on their roads and in residents' yards, Morris said.

The resilience plan was shaped by meetings called "Dutch dialogues" in which experts converged for

marathon strategy sessions, she said. Then, officials hosted more than two dozen community meetings to gather feedback from residents.

The plan borrows heavily from water-fighting strategies common in New Orleans and the Netherlands, but with a few Chesapeake Bay-friendly twists. The most critical feature is the transformation of Ohio Creek and neighboring Haynes Creek into large stormwater impoundments, Morris said. Berms will surround the creeks and their marshy shorelines to contain the rain water running off the surrounding land. An existing 8-acre park behind a neighborhood school will be turned into an occasional water-storage area as well.

Kimball Terrace, the community access road that routinely floods, will be rerouted to bypass the western industrial area and raised to 8 feet

above sea level. In response to community concerns, engineers sought to use as many "green" structures as possible. So, the new barrier along most of the riverfront will largely be composed of a 4-foot grassy berm.

On the river side of the berm, fresh plantings will festoon the wet landscape, creating a "living shoreline." A total of 3.5 acres of new oyster reefs will provide an ecological lift to the urbanized river. If that helps the fish bite, users of the new community pier will soon find out.

Overall, the project is "pretty impressive from our perspective and maybe the gold standard as cities and counties have to do more of this," said Lyle Varnell, associate director for advisory services for the Virginia Institute of Marine Science. He signed a letter of support of the project's design on behalf of the institute in December.

The effort packs a lot of engineering punch into a relatively small 255-acre area, raising questions about whether it can serve as a template in other communities, Varnell said.

"Of course," he said, "they had the resources to do this, which will be the challenge going forward."

The funding stemmed from a President Barack Obama era program available only to states and communities impacted by major disasters between 2011 and 2013. Awards went to places whose plans were to shown to be "embracing resilience as a way to build a better future," said Judith Rodin, then-president of the Rockefeller Foundation, which provided technical assistance to the program.

Norfolk qualified because of its tangle with Hurricane Irene. The city received the third largest amount of money after New York City's \$176 million and New Orleans' \$141 million. The Ohio Creek project can help preserve an important slice of Norfolk while positioning the city in the eyes of business leaders and others as a climate change leader, supporters say. For them, the question "How can the city afford the cost of adaptation?" inevitably raises another, "How can it afford not to?"

"It is a big investment," said Traci Munyan, resiliency program manager for the Virginia Department of Housing and Community Development, which shepherded the grant for the city. "But the alternative to this community and the information we will receive will outweigh [the cost]. These folks will hopefully not have to relocate, and they'll rebuild to higher flood standards that will keep them there not only for that big one but that day-in, day-out inconvenience they live through."



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# Small parcel could mean a lot for green space in urban DC

≈ Nonprofits using conservation easements to create permanent areas for trees to take root.

By WHITNEY PIPKIN

Protecting the District of Columbia's tree canopy — and its City of Trees reputation — is “always a moving target,” said Mark Buscaino, executive director of the nonprofit that leads the local effort. So, in addition to feverishly planting and defending urban trees, Casey Trees is taking a new tack: conserving a handful of small lots where more of them could take root in the future.

This fall, the nonprofit partnered with the District government to place four small, undeveloped properties the city owns into conservation easements. The voluntary agreements permanently limit how the properties can be used, in this case protecting them as green, “plant-able” spaces. While the amount of land included in the agreements is relatively small — measured in square feet rather than acres — the concept is notable.

“It's unique to have a municipal government putting its own lands under private easement,” said Charles Flickinger, a Casey Trees board member and attorney who documented the easements. “In this case, the city doesn't get a charitable deduction. It's just additional protection for the land.”

Alan Rowsome, executive director of the Northern Virginia Conservation Trust, is used to helping conservation easements come to fruition in rural, suburban and, occasionally, urban landscapes. In cities, he said, “measuring in square feet might not seem like it's worth doing, but it can make a huge difference.”

Seeing Casey Trees jump into easement work in the District — where larger land trusts don't often work and the nonprofit is already a steward of natural landscapes — seemed to Rowsome like a logical and innovative solution.

Owned by the District's Department of Housing and Community Development, the four properties were among 90 that the agency was in the process of auctioning off or re-imagining as part of its “Vacant to Vibrant” initiative. Polly Donaldson, the department's director, said the program's main goal is to take underused or derelict spaces the city had acquired over the years and “return them to productive use.”

Most of the properties were sold to developers to create affordable and workforce housing units. But, for a few parcels that were too small, too hilly or too close to industrial areas, for example, the agency started look-



An oakleaf hydrangea provides late fall color along a pathway in Crispus Attucks Park. (Dave Harp)



The TKF Foundation provided a memory garden inside Crispus Attucks Park. (Dave Harp)

ing for the next best thing. While the city's housing department doesn't necessarily have a goal to preserve a certain amount of natural areas in the nation's capital, the District's mayor and environmental agencies do.

The housing department saw in these small parcels the opportunity to con-

tribute to those goals while making the land more functional for both residents and the environment.

“A key part of our mission is revitalization,” Donaldson said. “The trees, neighborhood by neighborhood, are great investments for the city, and we see that as a way to preserve green

space in an urban environment.”

Casey Trees didn't need much persuading to help the city place easements on the properties, even though that conservation strategy is rarely used in an urban context. The nonprofit had already completed its first urban easement on a park in the District's Bloomingdale neighborhood a few years earlier — and had been looking for more projects like it ever since.

“It became clear that one of the best things we could do to preserve tree canopy is to preserve soil,” Buscaino said.

The opportunity in Bloomingdale came in 2015, when a community group that owns a one-acre strip of green space in the now-popular DC neighborhood reached out for help to preserve it. The block-long “oasis” —

Crispus Attucks Park — is hidden from the street by rowhouses backing up to it on every side. When renovated, the homes sell for around \$1 million.

But the out-of-sight ribbon of land wasn't always a draw for the community. Through most of the 1900s, the site was home to a telephone switching station and cable yard. When the company closed in the late 1960s, it left behind an abandoned building on an acre of asphalt and cement that would remain for decades, according to records on the park's website.

In the late 1970s, residents got the company to donate the building as a community center and formed a nonprofit that became the Crispus Attucks Development Corp., whose volunteer board manages the space to this day. In the intervening years, the community center lost its public funding for programming and the empty space became a magnet for abandoned vehicles, the homeless, drug dealing and illegal dumping until a police crackdown in the late 1990s.

Still, residents began to see potential in the underused space. Will Gomaa,

DC LOTS CONTINUES ON PAGE 9



## DC LOTS FROM PAGE 8

past president of the CADC, said that's when they began ripping up small patches of asphalt and planting gardens around the edges.

"There were still residents that cared a lot about it," Gomaa said of the park's sordid years. "Even during those difficult times, people were planting flowers behind their houses, or a tree or two."

Those piecemeal efforts turned into a broader vision for the space where the former building had burned down and a patchwork of asphalt remained. After battling through back taxes to reclaim ownership of the site, the CADC board began in the early 2000s to create a park.

They worked with the city to remove what was left of the burned-out building and brought the newly minted nonprofit, Casey Trees, in to landscape the space where clusters of trees would continue to be planted and fill in over the next 15 years. Now, Saturday morning soccer practices bring dozens of kids to the park's grassy sections, where residents walk their dogs on weekday mornings and readers find shade along the edges on slow Sunday afternoons.

Gomaa, who moved to the neighborhood in 2009, said the community finally had its green oasis and wanted to keep it that way. But the acre of land — in the midst of a city with rising populations and housing prices — was worth far more than their nonprofit's annual income from yard sales and events.

"We started thinking about ways we could make sure this land would stay a park, no matter what happened in the future," Gomaa said.

Most of the organizations that the board reached out to about conservation easements specialized in preserving historic buildings. They didn't have a rubric for protecting a park. Though the District has more green and treed spaces than most cities of its size, thanks in part to its share of national parks, few of those spaces are protected through private easements — a conservation tool more commonly used on large tracts of



Christopher Bulka, president of the board for Crispus Attucks Park, and his bernedoodle, Huckleberry, are regulars at the park, which is near his house. (Dave Harp)

*"We started thinking about ways we could make sure this land would stay a park, no matter what happened in the future."*

— Will Gomaa  
Past president  
Crispus Attucks Development Corp.

private land in rural areas.

Still, an easement seemed to be the best way for the board, which would continue to own Crispus Attucks Park, to prevent the space from being developed into another row of townhomes in the future. Even if the nonprofit went under and the park was sold to a new owner, the easement would keep it

green in perpetuity.

Buscaino said Casey Trees had been considering taking on a land trust role to participate in easements at about the time the opportunity to do so at Crispus Attucks came up.

"For us at Casey Trees, this is really a win-win in terms of our mission for the tree canopy," Buscaino said of the easements, both at Crispus Attucks and on the District-owned lots. "Even if a tree gets cut down, if there's soil [that's protected], it's going to turn into a tree sooner or later."

Flickinger, who helped craft the language for the easements, said he mimicked other land trusts' legal language while tweaking it for an urban environment. He was careful to avoid language that would merely require the land to be kept "pervious," so that water could filter through it, because paving stones and tennis courts — regardless of how well they filter water

— do not make good soil for planting trees.

For the four easements within the District, the language allows for things like park benches and small storage solutions while ensuring that about 95 percent of the land remains "plant-able."


Each of these properties protected through conservation easements in September is unique, ranging from a tiny, hilly lot of trees between houses in DC's Buena Vista neighborhood to a half-acre mini-forest nestled next to an industrial corridor and railroad tracks in Lamond Riggs, a few miles north of Casey Trees' headquarters.

Three of the four properties are located squarely in the watershed of the Anacostia

River, in east and southeast portions of the city, and one is on its edge in the District's northern corner. Two properties are triangle-shaped grassy lots at the end of residential streets, one of which has no trees — yet.

As the District nears 700,000 residents, with a growth rate of nearly 1.5 percent per year, both the city and the nonprofit said they'd be interested in finding more spaces that fit the bill for easements. Casey Trees' Buscaino said in December that he was in the process of hiring someone to pursue easements full-time, to "give it the old college try."

"I would like to see it be more than an episodic thing where somebody knocks on our door and says, 'Hey, I've got some land,'" Buscaino said. "They're not making any more land in this 60-square-mile triangle that is the city. Wherever we can preserve trees, we will."



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# Alexandria tunneling its way out of sewage overflow problems

≈ Structures will divert tainted water away from river and toward wastewater treatment facility to comply with legislators' deadline.

By WHITNEY PIPKIN

This time two years ago, officials from the historic city of Alexandria, VA, were jockeying with state legislators for more time to curb the sewage overflows that wash 140 million gallons of untreated sewage into the Potomac River and its tributaries each year. But since then, in an effort to meet the General Assembly's 2025 deadline to complete the work, the city has found a way.

Like many centuries-old wastewater treatment systems in the country, Alexandria's captures both sewage and stormwater in its pipes. To prevent sewage backups, the system was designed to divert wet-weather

with federal requirements. But when river advocates rang the alarm that Alexandria wasn't doing the work quickly enough, the General Assembly voted to speed up the time line.

Their 2017 law requires Alexandria to reduce the number of overflows into the Potomac from 60 per year to less than four — and to remove nearly all of the *E. coli* bacteria flowing from the other three outfalls into impaired waterbodies.

Overall, the planned project is expected to keep pollution from overflowing 96 percent of the time. As an added benefit, it should remove several thousand pounds of the trash that flows into the river via the sewer system.

This summer, the Northern Virginia city transferred ownership of its four outfalls — and the permits requiring expedited treatment — to the local wastewater treatment facility, Alexandria Renew Enterprises, or

certified environmental education center — the first of its kind in Fairfax County, located just southwest of the city's Old Town corridor — staff seemed more than able to tackle the project. They were excited about the challenge.

"When you say, 'You got combined sewer overflows,' that's not the most exciting thing," said Caitlin Feehan, program manager for the utility's RiverRenew project. "But we see it as serving our ultimate goal of helping the community improve water quality. We do that by treating wastewater — but also with this project."

If the plans come to fruition, Alexandria will join dozens of other cities that have curbed polluted overflows with costly projects to increase capacity at wastewater treatment facilities.

Like the District of Columbia and the Virginia cities of Richmond and Lynchburg — where projects are all

to \$555 million. Across the Potomac River, DC Water's Clean Rivers Project includes 18 miles of tunnels and an estimated cost of \$2.7 billion.

But, if Alexandria is able to complete its project by the 2025 deadline, it may be one of the fastest timeframes in which a city has addressed its overflow problems.

Adam Krantz, CEO of the National Association of Clean Water Agencies, which represents water utilities, said many such projects take 15–20 years to complete. But if anyone can get it across the finish line, he said, it's AlexRenew's CEO Karen Pallansch, who also sits on the NACWA board and previously served as its president.

"She embodies an innovative, problem-solving mentality. She's very good at completing projects," Krantz said. "AlexRenew did a remarkable thing stepping forward to do this [project] for the city."

Potomac Riverkeeper Dean Naujoks was among those pushing the city to clean up its sewer overflows much sooner than originally planned. With the state's blessing, the city had planned to leave the largest of the four outfalls — which spews tens of millions of gallons of polluted stormwater annually into the Potomac River's Oronoco Bay — untouched for the next 20 years while addressing other outfalls.

"The idea that they were still flushing their toilets into the Potomac was unacceptable to not only us but to a lot of communities downriver," said Naujoks, who has continued to participate in the plan's process to ensure overflows are reduced as much as possible. "AlexRenew, to their credit, kept picking up the capacity. Their consultants all seemed to suggest they could do this."

The project could increase residents' utility bills by \$20 to \$40 a month in the coming years, but the exact amount depends on whether the city gets grants from the state to defray the cost.

Richmond and Lynchburg each have received millions of dollars from the state for their combined sewer outflow reduction projects. Alexandria officials plan to ask the General Assembly for \$25 million this year and for more in future years to equal about 20 percent of the project's cost, according to AlexRenew staff.

The city initially planned to reduce overflows over time by building storage tanks in various places and redeveloping areas with modern stormwater controls, but the General



Participants in the Chesapeake Bay Foundation's VoiCeS (Volunteers as Chesapeake Stewards) program get an introduction to the areas served by the wastewater facility Alexandria Renew Enterprises during a tour on Nov. 28. Paula Sanjines, a process engineer with contractor Jacobs, used a map on the floor of the entryway to start a tour. (Whitney Pipkin)

overflows to the nearest water body, sending untreated sewage directly into the stream or river. This has come to be known as a combined sewer overflow system.

Now, under pressure to reduce nutrient pollution in waterways, many cities are chipping away at combined sewer overflow problems through costly long-term programs to comply

AlexRenew. Staff at the facility brought not only expertise but also a new outlook to what had been an intractable problem for a city council unaccustomed to such projects.

Can the city funnel a few million more gallons per day to the plant for treatment by 2025? Yes, said AlexRenew and its contractors. During a tour of the utility's LEED Platinum-

well under way — Alexandria plans to build concrete tunnels deep underground to divert tainted water from the overflow points away from the river and toward the treatment facility.

Alexandria's RiverRenew project entails building more than two miles of tunnels, two pumping stations and increasing treatment capacity at the plant, costing an estimated \$370 million

TUNNEL CONTINUES ON PAGE 11



## TUNNEL FROM PAGE 5

Assembly's decision sent officials back to the drawing board and led to a more holistic project.

"We already have the treatment plant and, by doing some tweaks here, we can take on additional flow and do work that's already in our wheel-house," said AlexRenew's Feehan.

The plant already provides wastewater treatment services for 300,000 residents in a tan-bricked portion of the facility that blends into its surroundings near Cameron Run, cleaning more than 13 billion gallons of wastewater each year before it is discharged into tributaries of the Potomac.

Diverting the outfalls — out of which about 140 million gallons of sewage-tainted water currently flow each year — to the plant for treatment entails a marginal increase in capacity.

The project will likely use a refurbished tunnel boring machine, which chews away at the earth and builds a concrete tunnel in its wake, to complete a pair of 12-foot-wide tunnels more than 100 feet underground. A federal environmental assessment is under way to help determine the path of the tunnels.

The National Park Service is the owner of much of the land under which tunnel construction would occur — including Jones Point Park, the George Washington Memorial Parkway and



*Kacey King-McRae, a process analyst at Alexandria Renew Enterprises, shows a tour group some of the outdoor tanks where wastewater is treated. AlexRenew is leading a project to construct tunnels from Old Town Alexandria to the plant to treat polluted water that currently overflows into the Potomac River. (Whitney Pipkin)*

the Potomac River waterfront. The service required both the assessment and public listening sessions, which took place this fall.

"We've heard from the public consistently that there's a desire to stay as far away from Old Town as possible," Feehan said, summarizing many

of the public comments about tunnel construction.

To quell concerns about a machine boring a tunnel deep under historic homes — or under the edge of the Potomac River, as one plan would entail — Feehan points to the other cities that have successfully built

tunnels with little to no interruption on the surface. An added benefit of AlexRenew taking over the project, she said, is that the utility can pull all of the earth that the boring machine removes out at its plant, leaving fewer disruptions in the Old Town corridor where the Oronoco Bay outfall is located.

As part of the process, AlexRenew has already begun collecting soil samples along the proposed tunnel routes. The plan calls for the work to take place in a deep layer of prehistoric clay where — even in a centuries-old city such as Alexandria — it would be unlikely to disturb historical artifacts. (But better safe than sorry in a town that was built in some places atop buried wooden ships. [See *Experience Alexandria's maritime past*, March 2017]).

During a boat trip with elected officials on the Potomac River earlier this year, AlexRenew's CEO Karen Pallansch thanked the state legislators among them for the funding her facility received to complete wastewater treatment upgrades in recent years. And she reminded them that more would be needed to complete a project that AlexRenew had only recently acquired.

"We're very excited, with a little trepidation around the program," Pallansch said, "because we have to do it by 2025."

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# Preserve fish or history? VA dam removal churns up debate

≈ Opponents of dam removal on Maury River say loss of historic structure and swimming site outweighs gains in safety, aquatic habitat and paddle sports.

By JEREMY COX

The Maury River appears tranquil as it glides past Lexington, VA. But the debate over its future has been anything but smooth.

The Virginia Department of Game and Inland Fisheries is working with the city to tear down a hole-ridden dam that critics say poses a drowning hazard and blocks fish and mussel movements in the Chesapeake Bay tributary.

But opponents are mounting a last-ditch effort to preserve the stone and mortar structure. They argue that the century-old dam's historic value outweighs the environmental benefits of its removal. The public would also lose a popular swimming attraction, they contend, if the 1.2-mile-long flat pond behind the dam reverts to a free-flowing stream.

Removing fish barriers has been one of the longtime goals of the Chesapeake Bay restoration. Whether dismantling dams or installing passages, officials are striving to reopen waters to fish migration and to create more habitat for important species. As of 2017, authorities across the region had already opened 1,236 additional miles, with just less than half of that amount in Virginia.

But Bay scientists caution against declaring victory just yet. Much of the mileage gain came through projects considered "low-hanging fruit," they said.

If the Lexington dam is removed, fish would still face another barrier 7.5 miles downstream at a second dam, which blocks their path to the James River and Chesapeake beyond. But it would open a network of adjoining waterways, connecting 56 miles of fish habitat downstream of the dam to 1,084 miles on the upstream portion, said Lisa Moss, a U.S. Fish and Wildlife Service biologist.

Supporters say that removing the dam also will improve water quality and the diversity of fish and insects in the aquatic food chain immediately upstream of the structure. The velocity of river flows will increase, pumping more oxygen into the water and reshaping the bottom to be more hospitable to the spawning and feeding habits of the creatures that normally live in rivers.

There are no farther dams upstream from that part of the river, which lies on a bend known as Jordan's Point.

Opponents say the increase in uninterrupted steam miles for fish isn't significant enough to justify destroying the dam, though.

"The more I looked at Jordan's Point, the more I realized there isn't going



Water pours down the Maury River and falls over a dam at Jordan's Point near Lexington, VA. Most of the 10-foot-high dam and the railroad trestles pictured here are set to be demolished as soon as flows diminish enough to enable the work to proceed. (U.S. Fish and Wildlife Service)

to be a lot of connectivity here," said Wayne Dyok, executive director of American Dams.

The group is considering a lawsuit challenging the DGIF's environmental assessment. The document, Dyok said, improperly credits the project with creating 1,140 miles of connected habitat. But 1,084 of those miles are already available to fish upstream of the dam, so the state should only credit itself with adding 56 miles, he said.

Moss defended the calculation, saying it came directly from the Chesapeake Bay Fish Passage Prioritization Tool, the protocol endorsed by the Chesapeake Bay Program.

In November, Sherry White, the USFWS assistant director for fish and aquatic conservation in the agency's Northeast region, ruled that the project would create "no significant impact" to the human or natural environment. The determination removed one of the last major regulatory hurdles facing the project.

Calls to remove the Maury River dam began in 2006, when a deceptively strong current washed a 16-year-old boy over the spillway. He drowned, unable to escape the recirculating vortex at its base.

A 2007 engineering report financed by the city called the structure "unsafe" and recommended its removal, warning it could suffer a "partial failure" during a "significant high water event." In December 2017, the state Department of Conservation and Recreation ordered the city to repair or remove the dam, citing its continued decay.

The low-head dam was constructed

some time before 1900 — no one is sure exactly when — to power a nearby mill. At the time, Jordan's Point was awash in heavy industry, serving as one of Lexington's main economic engines.

But by World War II, the mills had closed, and the dam had fallen out of use. The modern engineering report found numerous leaks as well as a crack spanning its entire 10-foot height on the upstream side of the structure.

The report estimated that rehabilitating the 10-foot-high, 185-foot-long structure would cost up to \$3 million. In the city of 7,000 residents, that total equates to an entire year's worth of spending on capital improvements, such as bridge repairs, street paving and other infrastructure upgrades.

"We don't have that kind of money to fix up a dam that doesn't really have a purpose other than increasing some recreational opportunities," City Manager Noah Simon said. "If you have somebody that's giving you a solution to a problem you can't afford, why not consider it?"

That's what happened, he said, when the USFW and the Virginia Wildlife Grant Program stepped in to fund the \$260,000 demolition. Work is set to begin in early 2019, whenever the current slackens in the rain-swollen river.

The impacts of the removal will ripple far beyond the project's footprint, said Louise Finger, a stream restoration biologist with the DGIF.

The normal high-water level will plummet as much as 7 feet just upstream of the dam site, according to the DGIF.

As officials gathered public comments

on the project, one of the most frequent concerns they heard was that the dam's absence would destroy a popular swimming hole. But the river can still be used for recreation afterward, Finger said, adding that the moving water would be good for kayaking and standup paddleboarding. Another potential benefit: Paddlers will no longer have to portage around the dam.

"I think having it be a beautiful river in its natural state will still be an asset to the city,"

Finger said. "It'll just be different."

The project includes nods toward historical preservation. Remnants of the structure and a handful of railroad piers will be left in place to give future visitors a sense of what once stood there. The project also will strive to keep water flowing down the dam's millrace, the shallow canal that diverted water from the main river channel to power the mill, Finger said.

The Virginia Military Institute, which calls Lexington home, lobbied the city to keep the dam to preserve the impoundment. Its depth allowed cadets to practice leaping into the water from a zipline.

"These activities require sufficient depth, and we are expecting that depth won't be available in the areas we do the training now when the dam is removed," said Col. Stewart MacInnis, a VMI spokesman.

The Lexington City Council reaffirmed its commitment in October to remove the dam, all but closing the door on legislative efforts to save the structure. American Dams representatives said that they can repair the dam for far less than the city's consultant estimated. Still, the state Department of Conservation and Recreation said it would require anyone who takes ownership of the dam to first obtain a \$3 million bond as financial assurance.

Dyok said his small group doesn't have that kind of money, and he questions whether the DCR has the authority to impose such a requirement. In the meantime, he hopes his group's own stability analysis can be completed before the wrecking crew arrives.



# EPA names Dana Aunkst to lead Bay Program Office

≈ Longtime PA environmental official wrote 'reboot' strategy to ramp up the state's Chesapeake restoration efforts.

By KARL BLANKENSHIP

The U.S. Environmental Protection Agency announced on Dec. 12 that it had selected a longtime Pennsylvania environmental official to head its Chesapeake Bay Program Office.

EPA Region III Administrator Cosmo Servidio named Dana Aunkst, who has held a number of positions with the Pennsylvania Department of Environmental Protection over the years and authored its Chesapeake Bay "reboot" strategy to oversee the office that coordinates the state-federal Bay restoration efforts.

"He has tremendous skill at building partnerships and creating a shared vision among geographically diverse stakeholders," Servidio said. "His experience and relationships with multiple agencies will serve us and our partners well as we accelerate efforts to safeguard the Chesapeake Bay and its living resources."

Aunkst has worked for 33 years on environmental programs in private industry as well as local and state government. Since 2002, he has worked at the Pennsylvania DEP where



*Dana Aunkst has worked for 33 years on environmental programs in private industry as well as local and state government. (U.S. Environmental Protection Agency)*

he has served in a number of positions, including deputy secretary and acting secretary.

"This is a tremendous opportunity to build upon the accomplishments to date by EPA and its partners," Aunkst

said. "I look forward to working collaboratively with our stakeholders in protecting our nation's largest estuary and the local waterways throughout the Chesapeake Bay watershed."

He also served as deputy secretary for field operations, overseeing six offices in implementing the full array of state and federal regulatory programs.

As executive deputy secretary of operations he oversaw the activities of more than 2,000 professional and technical staff engaged in all aspects of environmental protection. As deputy secretary of water, he oversaw programs for surface and groundwater quality; soil and water conservation; public water withdrawals; sewer facilities planning; and industrial discharges.

In that job, he also led efforts in 2016 to write the strategy to reboot the state's Chesapeake Bay cleanup efforts after it had fallen far behind and faced potential action from the EPA. Since

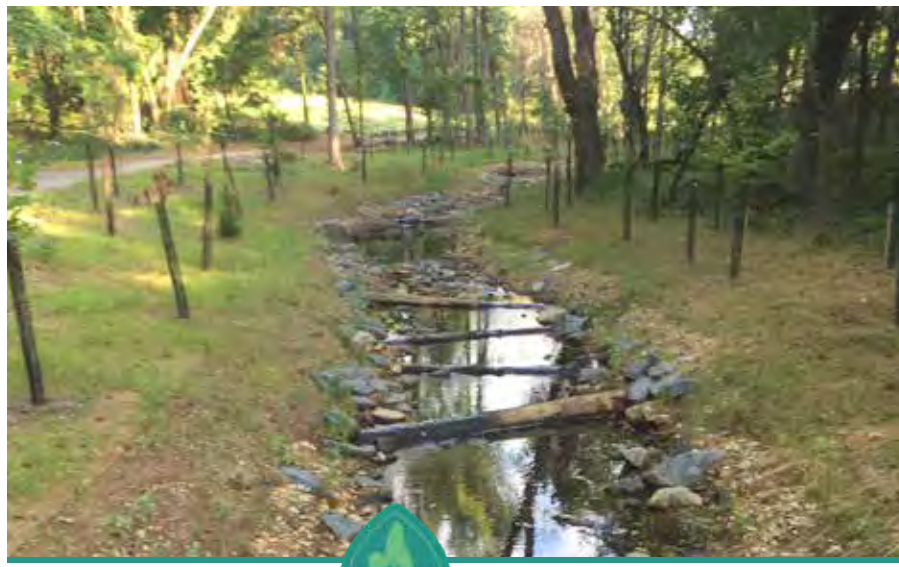
then, the department has been working to implement that strategy.

"Dana is a results- and data-driven manager of environmental programs and will be a good fit with the professional staff at EPA," said David E. Hess, former DEP secretary. "Pennsylvania is the linchpin to meeting Chesapeake Bay Watershed Agreement cleanup goals, and he knows our state well. The challenge will be to dedicate enough federal and Pennsylvania resources to the program to accomplish those goals."

Aunkst's appointment comes at a key time, as one Bay Program challenge in coming years will be working with Pennsylvania to accelerate cleanup effort. The state contributes more water-fouling nutrients to the Chesapeake than any other jurisdiction, but is far behind in its share of the cleanup effort.

As head of the Bay Program office, Aunkst will be responsible for more than just nutrient reduction efforts. The office oversees and helps coordinate activities aimed at meeting goals of the 2014 Chesapeake Bay Watershed Agreement, from environmental education and citizen stewardship to habitat restoration and fisheries management.

Aunkst started in his new position on Dec. 23.



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# Science foundation cuts 20-year-old Baltimore ecological study's funds

Stream research has made significant contributions to understanding human impacts on urban waters, including pharmaceuticals, runoff and sewage.

By TIMOTHY B. WHEELER

For two decades, scientists have been monitoring the streams that flow from Baltimore's outer suburbs through some of the city's most blighted neighborhoods on their way to the harbor.

With data painstakingly compiled from stream-sampling field trips and a network of continuously operating stream gauges, researchers involved in the Baltimore Ecosystem Study have new insights on how urban waters are polluted by sewage leaks and runoff from lawns and pavement. They've documented how pharmaceuticals and personal care products that wash down people's drains are getting into the water and into insects, frogs and fish.

But they've also found that urban streams are surprisingly resilient — and that addressing their ills can help the long-running effort to restore the Chesapeake Bay while also improving the quality of life for city dwellers.

Now, though, the future of that research is in doubt. One of just two urban-focused long-term ecological research projects in the nation, the Baltimore Ecosystem Study faces what one of its chief scientists calls a “funding crisis.” The National Science Foundation, which has provided grants to underwrite the study since its inception, is pulling the plug on its financial support.

The science foundation notified study leaders earlier in 2018 that it had denied their request for another six-year grant, which would have provided about \$1 million a year. Instead, the foundation offered the scientists a three-year grant to write up whatever results they have yet to publish, archive the data they've collected and decommission their field sites.

“It's unclear why they were unhappy with us,” said Peter Groffman, a microbial ecologist at the City University of New York and one of the Baltimore study's leaders. “The project's been very productive. We've learned interesting things, so we're a little befuddled.”

Doug Levey, an NSF program officer, said that the Baltimore ecosystem researchers “have done excellent work in the past.” But the foundation decided not to continue funding the project, he said, because of what he called “problems with the proposal” that the research team had submitted.

Levey would not elaborate on what troubled the NSF staff and said that



Chris Swan, a professor at the University of Maryland, Baltimore County, looks over a vacant lot in West Baltimore that his students seeded with native wildflowers. The experiment, part of the Baltimore Ecosystem Study, aims to convert abandoned sites into more attractive green spaces that can draw pollinators and also soak up more polluted runoff. (Timothy B. Wheeler)

confidentiality rules prevented him from doing so. The foundation also denied a Freedom of Information Act request to see any documents related to its decision, saying they are exempt from disclosure under federal laws.

Emma J. Rosi, the Baltimore study's principal investigator, said foundation staff initially rejected the research team's proposal as too complex. So, the team streamlined it, she said. An NSF advisory panel that reviewed the revised proposal found it “competitive,” meriting funding. But NSF staff rejected it again, she said, saying it was too simple.

“We believe that the BES project has been...at the cutting edge of an important area of research,” said Rosi, an aquatic ecologist at the Cary Institute for Ecosystem Studies in Millbrook, NY.

The Baltimore study is part of a network of 28 NSF-funded research projects dedicated to measuring change over a period of years or even decades in a variety of ecosystems stretching from Alaska to Antarctica. Each study engages dozens of researchers from multiple disciplines — including biology, hydrology and geochemistry, plus social sciences such as economics — and even at times artists, historians and philosophers. The University of Maryland, Baltimore County serves as the institutional home for the Baltimore study, though its researchers

hail from several states.

The Baltimore project is one of only two long-term studies of urban ecosystems. The other looks at sprawling central Arizona around Phoenix. Both were launched by the NSF in 1997, with field work beginning in Baltimore the next year.

Because those two research projects are in urban areas, they necessarily focus on the interaction between nature and people. In Baltimore, scientists have studied soil; plants and animals on both the land and in the streams; and the quality of water and air.

Steward T. A. Pickett, a plant ecologist at the Cary Institute and founding director of the Baltimore Ecosystem Study, said the NSF's steady support has been crucial to the community outreach portion of the project as well, in its work with area schools, policy makers and community groups.

“The long-term funding — to allow the really intensive data collection at scale and time — that's really important,” Pickett said. “But time is also important for building those connections with communities, building the trust, getting people to understand we're all trying to serve environmental quality and quality of life.”

Their work on urban streams has shed light on the ways that development and failing infrastructure affect water quality. They found, for instance, that

under “normal” weather conditions, urban and suburban watersheds retain an unexpectedly high share of the water-fouling nutrients they get from lawn fertilizer, air pollution and other sources, preventing them from washing downstream to the Bay.

“We have the longest, most comprehensive urban watershed data anywhere in the world,” Groffman said. Mining that 20-year data base, for instance, has shown how sewage leaks and overflows plaguing Baltimore's aging wastewater system impair local streams.

The long-term monitoring of Baltimore area streams has been a help to the Bay restoration effort, said Rich Batiuk, who retired last year as associate director of science for the EPA's Chesapeake Bay office. It furnished data that the Bay Program lacked resources to monitor, he said, and helped to upgrade and calibrate the federal-state effort's watershed modeling.

The research has yielded other insights about urban waters. A study led by Rosi found a mix of pharmaceuticals and illicit drugs in the Gwynns Falls, a tributary of the Patapsco River that flows through the city's western neighborhoods. While most of the drugs were at trace levels, they found amphetamine concentrations high enough to alter the base of the food web that supports fish and other aquatic creatures.

Urban streams also are very “flashy,” meaning they're prone to surging quickly over their banks in storms because the pavement and buildings covering their watersheds keeps rainfall from soaking into the ground. Andrew Miller, a professor of geography and environmental systems at the University of Maryland, Baltimore County, said his research has found that the built-up Baltimore metro area has many such flood-prone streams.

“Floods that would be a 100- to 200-year flood out in a rural environment might be more like a 10- to 15-year flood around here,” Miller said.

Ellicott City, a historic mill town on the banks of the Patapsco River, has been devastated twice in two years by flash flooding from severe rainstorms. Miller said his analysis suggests there are plenty of other streams prone to

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## ECOSYSTEM FROM PAGE 14

flooding, and there's been an uptick in extreme rain events, posing challenges for preventing or managing other catastrophic floods in the future.

Even though urban streams are very different from forested ones, Rosi said, the research team has found that "there's life in them....If you can restore their physical habitat, there's opportunity for them to come back."

Data from the Baltimore study have documented how repairing sewage leaks and taking steps to reduce stormwater runoff do lead to better water quality, both locally and downstream. Groffman, noting that decades-long efforts to restore the Chesapeake's water quality appear to be yielding positive results, said, "If we have turned the corner, if we've made improvements in the Chesapeake Bay, those improvements start here, in these small watersheds."

The Baltimore project also has improved the understanding of land-based urban ecological changes. One study found that neighborhoods blighted with abandoned homes, for instance, are breeding hot spots for tiger mosquitoes — making low-income residents more vulnerable to insect-borne diseases.

Chris Swan, another UMBC geography and environmental systems



*Claire Welty, director of UMBC's Center for Urban Environmental Research and Education, checks out a water sampling station on Dead Run, a stream flowing from Baltimore's western suburbs into the city. The Baltimore Ecosystem Study has gathered two decades' worth of data on urban watersheds from field sampling and a network of monitoring stations like this. (Timothy B. Wheeler)*

professor, has led a study evaluating the prospects of re-establishing native meadows in vacant lots in the city, beautifying weedy blocks with flowering plants while restoring habitat for pollinators

and improving stormwater retention.

Researchers have gone beyond the usual ecological research boundaries to examine the human environment. They've conducted public opinion

surveys, for instance, and also, by analyzing historical land use and zoning records since the 1920s, found empirical evidence of racial bias in the siting of polluting industries and facilities like landfills and incinerators.

That unusual aspect of the urban ecosystem studies apparently hasn't always sat well with some NSF staff. A couple of years ago, one retiring program officer wrote to Baltimore and Phoenix study leaders urging them to scale back their socio-ecological research, according to minutes of the research network's executive board. Study leaders were subsequently assured that was not the view of remaining NSF managers, but it demonstrated the challenges inherent in expanding the concept of ecological research.

Whatever prompted the NSF to terminate its support for the Baltimore research project, study leaders vow to carry on, saying they're working to replace the funding to be terminated, which represents about 20 percent of the study's overall budget. It receives other, usually shorter term grants from the NSF and other funders.

"The Baltimore Ecosystem Study will not go away," said Claire Welty, director of UMBC's Center for Urban Environmental Research and Education. "We've got a lot of irons in the fire. We're trying to figure out where the funding is going to come from."

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# After millions spent, MD's solution for excess manure still elusive

≈ 'Being an early adopter is very challenging and expensive,' proponents learning.

By JEREMY COX

For the last few years, Jason Lambertson's farm near Pocomoke City, MD, has been home to an expensive experiment.

The third-generation farmer received nearly \$1 million in state funding to build a giant poultry waste converter and distribute its main product: fertilizer. Inside two-story-tall gray tanks, bacteria eat tons of manure collected from four of his chicken houses. At the end of a month, Lambertson is left with nutrient-rich fertilizer products and a type of gas that powers the entire system.

The effort has had its ups and downs. Since it started operating in the spring of 2017, Lambertson's anaerobic digester has gradually ramped up production. But his company, Planet Found Energy Development, has yet to realize two key potential profit sources: selling the fertilizer or generating enough electricity to send to the local power grid.

The system is projected to lose about \$123,000 a year, rendering it "not financially feasible," according to a January 2018 report by the University of Maryland Environmental Finance Center. Lambertson and his business partners, though, argue that the technology will be profitable once it is scaled up to handle manure from multiple farms.

Planet Found's plight underscores the challenges that have befallen the projects that like it, were funded by the Maryland Department of Agriculture's Animal Waste Technology Fund.

## No breakout successes

Since its 2014 inception, the program has handed out nearly \$6 million to eight projects that promise to help farmers find uses for manure beyond fertilizing local fields. Its main target: the nearly 400,000 tons of chicken litter generated each year in Maryland, too much of which makes its way into the Chesapeake Bay.

Four projects received funding in the last two years and are still getting off the ground. But independent assessments and mandatory self-evaluations of the other four projects depict an trial-and-error environment in which equipment regularly failed and financial losses mounted.

When asked which of the projects ranks as the most promising, the MDA official who until recently oversaw the fund replied: "Unfortunately, I don't think I would point to any particular one."

All, however, have answered



Jason Lambertson, a grain and poultry farmer in Pocomoke City, MD, launched Planet Found Energy Development in the hope of finding alternative uses for the poultry litter that, when spread on cropland as fertilizer, can pollute the Chesapeake Bay. (Dave Harp)



Three 5-gallon buckets hold samples of different soil amendments produced by Lambertson's anaerobic digester. He hopes to sell the material to farmers and garden centers. (Dave Harp)

important questions about how to best operate the technologies and develop a market for their products, perhaps paving the way for the next wave of attempts, said Louise Lawrence, who retired recently as head of the MDA's resource conservation office but continues to consult on the waste-technology projects.

The funded projects represent a mix of technologies. Some churn out fertilizer coupled with methane that can be transformed into electricity for the

farm or sold to the power grid. Others simply produce compost in a relatively quick, high-tech fashion.

Stephanie Lansing, a University of Maryland agriculture researcher, has studied some of the funded projects and come to a timeless conclusion: "Being an early adopter is very challenging and expensive," she said.

Anaerobic digestion is a tried-and-true technology in Germany, for example, where there are more than 10,000 working systems, Lansing said. But in the United States, where there are fewer than 300, farmers and other users struggle to find replacement parts as well as technical support for maintaining the systems. Furthermore, because of the relative dearth of success stories, U.S. lenders are less likely to make capital available to construct the systems.

Many of the Maryland projects show that what works in a laboratory doesn't necessarily work out in the field, said Jarrod Miller, who worked with Eastern Shore farmers for years as a University of Maryland extension agent based in Princess Anne County.

"We did need to run some of this stuff to find out," said Miller, who is now with the University of Delaware. "A lot of people will learn from us."

## 'Good policy'

The waste technology fund began as an olive branch to farmers at a time when they were facing greater pressure to limit sources of nutrient pollution.

Farmers typically use poultry litter, a combination of manure and bedding, as fertilizer on their corn and soybean fields — crops that are fed to future generations of chickens.

But the agricultural sector often spreads more manure than those crops can absorb, particularly on the Eastern Shore, where Lambertson's farm is located. The resulting runoff is a disproportionate part of the Bay's overall nutrient overload — which triggers massive algae blooms in the Chesapeake Bay, creating a cascade of ecological consequences.

After decades of halting efforts to reverse pollution loads from all sources, Maryland joined a multi-state and federal campaign in 2010 to implement a Bay cleanup plan by 2025. It calls for the jurisdictions to sharply reduce the amount of nutrients — mostly nitrogen and phosphorus — as well as sediment and other pollutants that reach the largest U.S. estuary.

An important part of Maryland's effort to reduce nutrient runoff from agriculture debuted in 2015. The new regulation, called the phosphorus management tool, required farmers to measure the amount of fertilizer they spread on cropland based on the amount of phosphorus already in their soils. Fields already saturated with the nutrient are barred from adding more.

From the earliest days of the rule's development, Lawrence recalled, one question dominated: What would those farmers do with their chicken litter? In many cases, it couldn't simply be sold to farms where phosphorus values were low, because the transportation costs would make the fertilizer too expensive.

"We felt it was a good policy to try to get ahead of it and try to come up with some alternatives for folks who couldn't use poultry litter agronomically anymore," Lawrence said.

## Mixed results with livestock

The MDA began seeking proposals for waste technology projects and funded the first four in 2014. Four years later, most of the results are in, and they're not entirely what officials had predicted.

Green Mountain Technologies, based in Washington state, had some modest success with its Maryland project, Lawrence said. The company received a total of \$388,000 to install

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## MANURE FROM PAGE 16

dumpster-size composting units at two farms — a horse rescue farm in Howard County and a dairy farm in Frederick County. The technology uses a free-moving auger to stir the manure in a large bin, theoretically accelerating the natural decomposition process while providing a lighter, more usable compost material.

While the systems performed largely as expected, concerns over their financial feasibility remained, according to evaluations conducted by University of Maryland researchers.

At the horse rescue farm, they estimated, the composting unit would pay for itself within 14 years. But they cautioned that the estimate is based on a situation in which the farm formerly spent thousands of dollars a year hauling manure to a landfill. While common in the equine industry because of the low nutritive value of horse manure, landfiling is seldom practiced by cattle and poultry operations.

Meanwhile, at the dairy farm in Frederick County, researchers predicted that the original investment cost wouldn't be recovered until the 24th year of system's estimated 25-year lifespan.

Van Calvez, Green Mountain's composting systems engineer, called the Maryland results "a little disappointing."

"It's a thing we deal with," he said. "We're at the mercy of who steps up first and says, 'Yes, I want to work with this technology.'"

### A governor's praise

It was a promising day in December 2016, when Bob Murphy fired up the brand new, combustion system at his sprawling poultry farm in Dorchester County — so much so that Gov. Larry Hogan visited the farm in early 2017, eagerly touting the state's \$970,000 investment. The system, made by Ireland-based Biomass Heating Solutions Ltd., was designed to generate electricity from poultry litter.

"This really is innovative technology," said Hogan, flanked by his Agriculture Secretary Joe Bartenfelder and other dignitaries.

But the sense of promise quickly faded. While BHSL has a long track record with building and maintaining such systems in Europe, its first U.S. foray has all but failed.

The system began operating in December 2016. But it broke down repeatedly, leading to "lengthy down times," according to an MDA analysis. By March 2018, it was shut down.

Maintenance was a challenge from the beginning, because the parts had to come from overseas and required metric tools, Murphy said, adding that he thinks BHSL is "probably going to give up" on the project.



Operations manager Nick Cloyd gives a tour of the room that acts as the central nervous system of the anaerobic digester. Equipment breakdowns have been frustratingly frequent, and replacement parts are difficult to obtain, he said. (Dave Harp)



Nick Cloyd checks on a pile of poultry litter. Planet Found Energy Development is one of the few anaerobic digester users in the country that focuses exclusively on chicken waste. (Dave Harp)

The system draws manure down a conveyor belt into a chamber, where it is burned while suspended by jets of air. The roiling action leads to better chemical reactions and heat transfer, experts say. The process generates electricity as well as ash that can be sold as a soil fertilizer.

Before the breakdowns, the technology was yielding a net annual financial loss of about \$2,500, analysts found. Supporters also had hoped that its production of electricity would eliminate the farm's reliance on expensive propane and encourage more liberal use of the houses' heaters. More heat could put extra weight on the chickens — and more profits in Murphy's pockets. But the system never got a

chance to run long enough to produce a difference, the MDA found.

"We probably wouldn't continue to throw money at that," Lawrence said, "but it showed where the potentials and pitfalls were."

For his part, Murphy hopes to find another vendor to salvage the equipment, so he can give it another try.

"We're exploring other avenues," he said. "We're sitting dormant. I haven't told BHSL to get it off the farm. It's still sitting there, and I hope we can make things happen because we need to make things happen."

### Searching for answers

Lambertson said he never expected his system to make money at its cur-

rent single-farm size. His plan is to test the digester on a small scale before opening a large facility that can process litter from farms across the Delmarva region.

But even if his expansion plans don't yield financial fruit, he has a loftier ambition in mind.

"Early on, people would ask, 'What is the benefit?' and I would turn it around and say, 'What is the benefit of the Chesapeake Bay to the state?'" he said.

Lambertson received \$676,000 from the MDA manure program and \$900,000 from the Maryland Energy Administration to construct the system. Private investors have chipped in about \$1.8 million as well.

Maryland isn't the first state to subsidize animal-waste technology startups, but its focus on poultry litter is unique, Lansing said. It comes down to the nature of the manure.

Litter's dryness can defeat the microbial process inside anaerobic digesters the same way that the drying effect of the alcohol in hand sanitizers kills germs, she said. And its high nitrogen concentration can produce less-than-optimal biogas, the system's methane-infused energy component.

Lambertson said he's intentionally taking things slow. More than a year into production, his staff maintains the system at no more than one-third of its capacity for processing 3.3 tons per day.

The system occupies about a football field's worth of space on his farm. It represents far more production capacity than he needs for his farm alone. He fully expects his expenses, as calculated by the ton, to plummet once he begins trucking in manure from other farms.

In addition to the electricity he will be generating, Lambertson plans to sell three types of solid byproducts: a nitrogen-heavy soil amendment, a phosphorus concentrate and a potting soil. The MDA recently awarded him another \$220,000 to start bagging his potting soil, potentially making it available for sale at garden centers.

Lambertson plunged his hand into a 5-gallon bucket and scooped into his palm a clump of brownish dirt.

"I'm not saying you'll see that on Amazon some day," Lambertson said. "But you might."

Louise Lawrence, the consultant and former MDA official, said the program was accepting more grant applications through Dec. 28, with up to \$3.5 million to be doled out. Its value so far shouldn't be gauged by the success of the projects alone, she said, but rather the lessons gleaned from them.

"I hope it has the longevity, so we get the answers we hoped to get when we started," she said.



## Farm Bill could increase funding to control ag runoff to Chesapeake

≈ While there is more money for programs, there is also more competition from other areas.

BY TIMOTHY B. WHEELER

Farmers in the Chesapeake Bay watershed stand to get more financial help from the federal government to reduce polluted runoff from fields and feedlots under the new Farm Bill passed by Congress in December.

The legislation, which replaces the 2014 Farm Bill, tweaked funding for farm conservation programs in a way that significantly increases the pot of federal money for which Bay watershed farmers and partnering organizations can compete.

Specifically, it triples to \$300 million the funding for the Regional Conservation Partnership Program, which provides financial and technical assistance for multi-state or watershed-scale projects. It also increases from 35 percent to 50 percent the share of that funding that's available to one of eight designated "critical conservation areas," including the Chesapeake.

Those provisions track with legislation introduced in 2017 by Sen. Chris Van Hollen, D-MD, to revive federal agricultural funding for Bay restoration.

"This new investment will help ensure that our Bay economy continues to thrive and that Marylanders and tourists can enjoy this treasure for generations to come," Van Hollen said in a statement.

Nevertheless, the amount of federal funding available to the Bay watershed under the revised regional conservation program is likely to be significantly less than it had been from 2008 through 2014, when Congress funneled \$47 million a year on average to the region under a specific Chesapeake Bay Watershed initiative.

The 2014 Farm Bill replaced that Chesapeake initiative and its guaranteed funding with the RCPP, which awarded grants on a competitive basis to a much broader array of applicants nationwide. The amount of funding going to the watershed subsequently declined dramatically, to around \$13 million annually.

Bay advocates said that they're hopeful that the level of funding will rebound under the 2018 Farm Bill. But whether it comes close to replacing what was lost will depend on watershed farmers and their partner organizations submitting competitive proposals.

"It won't be as easy as it was [until 2014] because that was literally given to us," said Beth McGee, director of science and agricultural policy at the Chesapeake Bay Foundation. But she said that Congress, in addition to providing more money, changed how the regional conservation program operates in ways that she believes will encourage more and better applications for funding from the watershed.

"There is a bigger slice of the pie available to us," she said. "So, theoretically, our chances are better. But, again, it depends on the proposals going in, and it's competitive still."

The new Farm Bill tinkered with other conservation programs in ways that might help the Bay as well, advocates said. The Conservation Stewardship Program, which according to the Chesapeake Bay Commission concentrated its activities in the Midwest, was cut in favor of more broad-based efforts. Chief among those is the Environmental Quality Incentives



*Bay advocates said that they're hopeful that the level of funding will rebound under the 2018 Farm Bill. But whether it comes close to replacing what was lost will depend on watershed farmers and their partner organizations submitting competitive proposals. (Dave Harp)*

Program, which provides financial and technical assistance to install various land management practices aimed at alleviating natural resource problems.

The legislation also gradually increases the scope of the Conservation Reserve Program, which pays farmers to replace crops on highly erodible and environmentally sensitive land with more resource-conserving vegetation. The program will expand its support from 24 million acres to 27 million acres by 2023, though McGee noted that's still far smaller than the 32 million acres of past Farm Bills.

The Chesapeake watershed should benefit from yet another provision that enhances what farmers can get paid to plant trees along streams and rivers and keep their livestock out of the water.

The Conservation Reserve Enhancement Program will increase cost-shared federal payments to farmers for putting in stream fencing, water crossings and other measures to exclude animals from waterways, McGee said. It also will boost payments to farmers to cover the full cost of maintaining forested buffers along their streams. Bay states are lagging in their efforts to plant wooded stream buffers, and failure to cover maintenance costs has been a factor in keeping farmers from participating.

McGee credited Sen. Bob Casey, D-PA, with pushing for those changes and said that they "help ensure adequate and fair compensation to landowners willing to implement forest buffers — one of the most cost-effective ways to reduce pollution from agriculture."

Lastly, the new Farm Bill increased funding for purchasing conservation easements on agricultural land, including those that preserve wetlands.

## MD sea level to increase dramatically, report says

≈ Rate of rising water will depend on how well nations curb greenhouse gas emissions.

BY KARL BLANKENSHIP

A new report warns that Maryland will face a dramatic increase in the rate of sea level rise later this century, with nuisance flooding becoming a daily occurrence in many waterfront areas if nations fail to curb greenhouse gas emissions.

If emissions continue to rise, sea level in Maryland would likely increase 2.0 to 4.2 feet by 2100, which is two to four times the rate seen during the last century, according to the report from the University of Maryland Center for Environmental Science that was released in December. There is an outside chance the rise could exceed 5.2 feet, the report said.

If countries meet commitments in the 2015 Paris Climate Agreement, the sea level would still rise, but at a slower rate, with the likely increase ranging from 1.2 to 3.0 feet, with a 1-in-20 chance that the increase could exceed 3.7 feet.

"It actually has some good news and bad news," said Donald Boesch, lead author of the report and former UMCES president. "The bad news is that there's more evidence that unless we really limit warming to the Paris Agreement level... sea level rise could be higher than we thought. The good news is that if we're on the emissions pathway that get us to the Paris Agreement, it's much more manageable."

In any scenario, places along tidal waterways will become wetter. Nuisance flooding that occurred just a few times a year in places like the Annapolis city dock during the 1950s now takes place 40 or more days per year. Even under the best-case scenarios, according to the report, flooding there and in Baltimore's Inner Harbor would become a near-daily occurrence. Meanwhile, storm surges during hurricanes would become much more dangerous.

The report, which is updated every five years, represents the consensus of an expert group of climate scientists from the mid-Atlantic region. It differs from the 2013 report by including alternative future scenarios based on whether nations successfully limit temperature increases to 2 degrees Celsius, as called for in the Paris agreement. Through 2050, the report said, the most likely range of sea level rise in Maryland would be 0.8 to 1.6 feet (measured from a 2000 baseline), though there is a 5 percent chance of it exceeding 2 feet.

The extent to which emissions are reduced would begin to have a more pronounced impact in the second half of the century and become even greater after 2100, driven mostly by the loss of polar region ice, especially in Antarctica.

If no further actions are taken to curb global emissions through the end of this century, sea level rise in Maryland by 2150 would range from 3.4 to 6.6 feet, with a 1-in-20 chance it could exceed 8.5 feet. If the Paris Agreement goals are met, the likely range of increase would be kept to 1.8 to 4.2 feet.

A major uncertainty is whether warmer temperatures could lead to the destabilization and more rapid loss of major ice sheets, in which case the amount of sea level rise in the state could be even greater, exceeding 20 feet in the next century, the report said. "Back at the beginning of the 20th century, more than 100 years ago, Greenland and Antarctica, were fairly stable," Boesch said. "They were actually building ice. And now the evidence is pretty clear they're losing ice. That process is just likely to accelerate, like literally a meltdown. How fast that meltdown will be depends on how much more warming there is."



# Middle Susquehanna mascot noses around when pollution is suspected

≈ Sussey, the sewage-sniffing dog, can detect leaks, illegal discharges and broken pipes.

BY DONNA MORELLI

Carol Parenzan became the Middle Susquehanna Riverkeeper in July 2015 and was charged with protecting and improving the health of the river's watershed between its north and west branches. Shortly afterward, her first staff member came on board: a rusty-colored fluff ball of energy named "Little Keeper" Susquehanna, or Sussey for short.

Parenzan said that the dog is a great mascot for her work. "It's a connecting point. He draws more people to me when I'm out." But Sussey has work to do, too. The Nova Scotia duck tolling retriever is 3 years old and is in training to sniff out leaking septic systems, illegal discharges into waterways and broken sewer pipes — all of which can contaminate local streams and the Susquehanna River.

To train Sussey, Parenzan makes a weekly trip to the wastewater treatment plant to get a small vial of effluent, then dips a cotton swab into the vial and places the swab into a small tin with a punctured lid.

She places the tin among identical tins with a different scent or no scent at all. Sussey's job is to find the effluent — and he usually succeeds in 20–40 seconds.

In the next step, Parenzan plans on moving the practice indoors and making the task harder by using buckets of water containing small amounts of effluent.

Sussey should be offering his services to local governments or environmental groups in the near future.

"I have a pretty good feel for what is under our feet," said Parenzan, who is trained in subsurface utility and environmental engineering. "Together, we'll make a powerful consulting team."

The contamination of surface waters with raw sewage from septic or sewage systems can be a serious problem. Pathogens from fecal material contain bacteria, viruses and protozoa that can cause anything from a brief stomachache to parasitic infestations and fevers that require more care.

The problem is more common than many realize. Pathogens impair 159,425 river and stream miles in the nation, according to the Center for Watershed Protection. The U.S. Environmental Protection Agency, which oversees drinking and surface water quality, has developed more management plans for pathogens than any other pollutant.



Sussey signals a found scent through intense eye contact with his handler Middle Susquehanna Riverkeeper Carol Parenzan. (Donna Morelli)

The source of contamination, whether from a point source like a pipe or nonpoint source runoff from land, is often difficult to find and control. Traditionally, field staff go out with their maps and human eyes and can only detect contamination after sample after sample of water is pulled from stormwater drains, outlet pipes and streams suspected of contamination and sent to a lab. If a positive result comes back, there is still the work of tracing it back to its source, which could be as close as an adjacent pipe or miles away. Waiting for results can be as expensive and

time-consuming as the field work.

Enter the dog. A trained dog can visit the same spots and use its 300 olfactory receptors to quickly detect the presence of sewage, narrowing down where samples should be pulled. A dog can also sense sewage in places where it would be difficult or impossible to take a sample, like an outlet pipe or catch basin that is dry or has very low flow.

A sewage-sniffing dog can even determine whether the fecal matter is from humans or animals. Local governments, waste authorities and others who survey an area for



As part of the sniff detection training process, the search scent is placed inside tins with air holes, which are then placed within the search area. The dog is rewarded for locating and signaling the found scent. Some of these tins contain no scent to prevent the dog from searching for tins only.

(Ann Nowaskie / Middle Susquehanna Riverkeeper Association, Inc.)

sewage leaks are usually looking for human material, because that is the source of pathogens most likely to be transmitted to people.

The canine ability to sniff out even minute concentrations of substances has served humans for centuries — they've been trained to detect bombs and to search for lost humans, cadavers, drugs, bedbugs and cancer. While turning that talent toward sewage leaks is fairly new, Sussey is not the only one to be enlisted by a riverkeeper: The Savanna Riverkeeper in Georgia is training a canine for a career like Sussey's.

Environmental Canine Services, a company based in Maine, has sewage-sniffing dogs and handler teams located across the country. In 2015, the Center for Watershed Protection and the state of Vermont hired the company to see if the dogs would improve the results of the state's illicit discharge detection and elimination program.

"The dogs make the field work a lot faster," said Laurel Williamson, a stormwater and watershed planner with the center who would like to see more dogs available for such work. "It's a presence or absence situation. They get an idea at each catch basin and either bark or lay down. We record the results and use that information to prioritize the next move."

While Sussey continues his sewage sniffer training, he still fulfills his role as a mascot of the Middle Susquehanna Riverkeeper, a role for which he needs no training. His bright expressions and a downy, red-hued coat that begs to be stroked are all he needs to lure new followers to him and his mission.



# MD adult oyster numbers down by half since 1999, study finds

≈ First-ever stock assessment sees overfishing as a continued problem in half of state's waters.

By TIMOTHY B. WHEELER

Watermen overharvested oysters last winter in a little more than half of Maryland's portion of the Chesapeake Bay watershed, according to the state's first-ever stock assessment of the commercially and ecologically valuable shellfish. If those harvest rates continue, the assessment warned, the bivalve population in those areas could eventually be wiped out.

The 359-page assessment report, released in late November, estimated that Maryland's overall population of adult oysters in 2017 was half what it was in 1999.

The assessment, prepared by the Department of Natural Resources in consultation with the University of Maryland Center for Environmental Science, sets the stage for a potentially fractious debate over the state's management of the keystone Bay species, which is also a pillar of Maryland's seafood industry.

Watermen who were briefed on the assessment at a November meeting of the DNR Oyster Advisory Commission reacted skeptically to its findings. But Alison Prost, Maryland executive director of the Chesapeake Bay Foundation, issued a statement afterward saying it "confirmed some of our greatest fears about the Bay's oyster population. The state needs to develop a fishery management plan that protects existing and restored oyster reefs to significantly increase the overall oyster population."

Mandated in 2017 by the General Assembly, the stock assessment drew on DNR surveys and catch data from 1999 through the wild oyster harvest season that ended last spring. DNR and UMCES scientists used mathematical models to estimate oyster abundance, habitat availability, harvest rates and natural mortality from environmental conditions such as harsh weather and disease.

The study estimated that Maryland's oyster population plummeted from about 600 million in 1999 to around 200 million by 2002, a period that saw the Bay's bivalves ravaged by an outbreak of the oyster diseases MSX and Dermo. The harvest hit an all-time low of 19,000 bushels in 2004.

The diseases abated after that, and the study estimates that the state's oyster stock rebounded to more than 450 million by 2014, with harvests also rising that year to more than 400,000 bushels. Since then, natural reproduction has been lackluster, and the assessment estimated that the population had declined again to an estimated 300 million by the 2017–2018 oyster harvest season. Last season's



*Some oysters are harvested using hand-operated tongs like these. The assessment's estimated population of market-size oysters in Maryland in the 2017–2018 season was less than 10 percent of what was harvested annually before 1900, according to Paul Rago, a former federal fisheries scientist who reviewed the study..(Dave Harp*

harvest slipped to 180,000 bushels.

The study didn't assess whether the state's oyster population as a whole was overharvested, but rather weighed the bivalves' status in each of 36 different zones spanning Maryland's portion of the Bay and its tributaries.

"What's happening with oysters in different parts of the Bay is different," explained Mike Wilberg, an associate professor at the UMCES Chesapeake Biological Laboratory, who worked with DNR scientists to conduct the stock assessment.

Oysters tend to be less abundant in the Upper Bay and its tributaries, such as the Chester River, where lower salinity in the water tends to impede reproduction. Reproduction and abundance are better in saltier water farther south in places like Tangier Sound and the Maryland tributaries of the Potomac River, but those also happen to be the areas more affected by diseases.

For each area of the Bay, the report identified a threshold harvest rate that, if regularly exceeded, the report predicted would lead to population declines. It also set a harvest target for each area that, if the percentage of oysters taken regularly stayed at or below that level, would maximize the catch over time while stabilizing or increasing the population.

In some areas, including all of the Western Shore tributaries and Eastern Bay, the assessment found that almost any level of harvest would deplete the stock.

The assessment found that fishing pressure exceeded sustainable levels in 19 of the 36 zones into which the state's portion of the Bay had been divided. Overfishing occurred last season in most

of the Tangier Sound area, the Eastern Bay, the Patuxent River and in the Potomac River tributaries, it said.

In 14 areas, though — including most of the Choptank River and the Bay mainstem — fishing pressure last season was at or below the target for maximizing harvest and maintaining oyster abundance. And in three areas — two in southern Tangier Sound and one in the Honga River — the harvest rate was below the ceiling for sustainability but above the target for building or maintaining the population.

Wilberg stressed that the assessment only looked at the status of the oyster population, not at how it should be managed. In reporting to the General Assembly, the DNR presented, without recommendation, a list of potential measures for improving the fishery's sustainability, including gear, season and size limits, as well as reef restoration and restocking.

That report is certain to revive debate about how the state's oyster fishery ought to be managed.

Maryland expanded its oyster sanctuary network in 2010 to cover 25 percent of state waters, and watermen protested that the new harvest-free zones took three-fourths of their best oystering areas. They have pressed to get back into at least some of those areas.

In early 2017, with wild harvests on the decline, the DNR proposed to open some sanctuaries. But lawmakers blocked that move, ordering the DNR to do a stock assessment first and figure out a sustainable harvest rate.

Watermen have found fault with the assessment's methods and conclusions.

Robert T. Brown, president of

the Maryland Watermen's Association, questioned the study's focus on market-size oysters, ignoring smaller, younger bivalves, as well as its use of a mathematical model initially developed for different shellfish. He also said the reason so many areas seemed to be overfished was because watermen had been forced to work remaining areas more intensively after being forced out of the sanctuaries.

Ron Fithian, a Kent County commissioner and former waterman, put much of the blame for declines in oyster abundance on the state's abandonment in 2006 of an annual program of replenishing oyster reefs with shells. The subsequent expansion of sanctuaries has made it worse, he argued.

"There's no evidence that these sanctuaries have helped areas around it," he said. "There's no evidence that anything we've done for the last eight or nine years has helped in any way, shape or form."

But large-scale oyster restoration efforts launched in sanctuaries in Harris Creek, the Little Choptank River and Tred Avon River on Maryland's Eastern Shore do appear to be succeeding, according to a recent report by the National Oceanic and Atmospheric Administration. Monitoring in 2017 found hatchery-spawned oysters that had been planted on restored reefs were surviving and growing, and that there was evidence of natural reproduction.

The stock assessment was reviewed by a trio of independent scientists. Paul Rago, a retired federal fisheries scientist who chaired the review, said the panel found that the DNR-UMCES team assessed the state's oyster population in a "scientifically credible way."

While the Bay's oyster population can benefit from reduced diseases, better reproduction and continuing efforts to clean up pollution, Rago said, rebuilding the stock will also require the enhancement of reef habitat and control of fishing mortality.

With the assessment's findings as a guide, Rago said that "the big challenges are yet to come." It won't be easy, he said, to follow the science while balancing the competing interests of watermen, oyster farmers and those seeking to increase the oyster population because of its ecological benefits to the Bay. Oysters help to filter the Bay's water, and their reefs provide habitat for fish, crabs and other marine creatures.

DNR officials said the stock assessment would be used to update the state's fishery management plan for oysters. Chris Judy, chief of the DNR's shellfish division, said that process would begin soon, after review of the assessment by lawmakers and public feedback. He said it would be "many months down the road" before the revision would be complete.



## LEASES FROM PAGE 1

of a public resource.

In fast-growing St. Mary's County, MD — a hotbed of oyster farming — local officials responded in December to waterfront property owners' complaints by imposing a six-month moratorium on using commercial docks to work any new state leases for raising oysters in cages on the bottom or in floats at the surface.

Virginia officials tried a seven-month moratorium on leasing in the Lynnhaven a few years ago while mulling how to ease tensions there. Now, the conflicts have spread. There's a statewide backlog of 400 lease applications pending, with protests lodged against approximately 100. Most of the cases are 2- to 3 years old, though some have been held up longer.

### User workgroups formed

"Anywhere there's intense residential development, whether it's old or new, is now causing problems," said Ben Stagg, who oversees shellfish aquaculture leasing and surveying for the Virginia Marine Resources Commission.

In Maryland, with a smaller industry, the backlog isn't as great, with 125 pending applications and just 17 under official protest. But others have been held up for months as Department of Natural Resources staff attempt to iron out differences.

Officials in both states have responded to the escalating friction by forming workgroups, which met through the fall to hash out "user conflicts." Virginia's 17-member panel recommended legislative and regulatory changes intended to cure some of the chronic problems tying up leasing there.

Matthew Strickler, Virginia's natural resources secretary, said Gov. Ralph Northam supports the state's booming aquaculture industry but also "the ability of people to use the water recreationally. We're trying to balance those and keep the industry growing."

The outcome of Maryland's discussions is less clear. That 15-member

workgroup offered a multitude of suggestions for changes in leasing. DNR Assistant Secretary Bill Anderson said that officials would review them all. Without specifying, he said officials would likely tweak some policies and regulations, but didn't see the need for legislation.

That may disappoint St. Mary's County officials, who imposed their moratorium with hopes of forcing the DNR to give local officials and waterfront homeowners some control over leasing decisions.

Oyster farmers say they feel squeezed between watermen complaining they're losing clamming and crabbing sites and waterfront homeowners not wanting to see or navigate around cages and floats.

"It's really hard to site an aquaculture lease anymore," said Jon Farrington, a St. Mary's oyster farmer. "Trying to avoid all those conflicts, plus find a piece of suitable bottom, is really tough."

In a sense, the Bay's aquaculture industry is a victim of its own success. Oyster farming is enjoying a renaissance, after nearly being wiped out by disease. Its comeback was made possible by the development of "triploid" oysters, a fast-growing variant of native Eastern oysters that can reach market size before disease can kill them.

Virginia has had a long history of leasing its bottom for oyster production, and more bivalves are harvested from "private grounds" than are gathered in the wild by watermen. The advent of cage and float aquaculture, which can raise shellfish more intensively, has helped make Virginia the top oyster-producing state on the East Coast. Statewide, there are more than

statistical evidence to prove that there is a negative effect of construction of oyster farms on housing sales prices."

"It wasn't that long ago we had fish weirs up and down the Bay. People got used to it," Rheault said. "Now people want to get back into oystering, and about the only way to do it sustainably is through aquaculture. Raising oysters in cages or floats is "tremendously



"Hobbyist" oyster gardener Chris Schellhammer holds the shell of a large bivalve from the Lynnhaven River, where he has two leases off his waterfront home. "When people buy on the water, there needs to be more disclosure" about aquaculture, he says. (Dave Harp)

5,700 leases to raise clams or oysters on nearly 132,000 acres, according to VMRC data.

In Maryland, private oyster cultivation traditionally was more limited and was even barred in some counties. But the state revamped its laws in 2010 to allow leasing statewide and offered financial assistance for startups.

Though hampered at first by rigid regulation, Maryland oyster farming is now on the rise, with more than 400 leases covering 6,800 acres. Aquaculture yielded 74,000 bushels last year, compared with a wild harvest of 180,000 bushels.

The clashes flaring in Maryland and Virginia are happening in virtually every coastal state, said Bob Rheault, executive director of the East Coast Shellfish Growers Association.

"This is the new normal," he said. "Permitting was going along swimmingly everywhere, and now it's not. There are lawsuits and people are screaming."

The only study he's seen of aquaculture's impact on property values, he said, was in Rhode Island a few years ago. Its conclusion: While owners of large waterfront properties do care what happens off their shore, it found "no

efficient," he said, "but people have to let us do it."

### Requests for applications soaring

Both states have struggled to cope with the increased interest in aquaculture — and with the pushback.

In Virginia, the number of applications filed annually surged from 150 in 2012 to 338 in 2014. The pace has slowed since, with nearly 160 last year, but Stagg said he's only had enough staff to survey about 125 proposed leases a year.

"Five years ago, certainly 10 years ago, we didn't have more than a handful get protested per year," Stagg said.

The VMRC staff try to resolve protests, but contested cases often go to the marine resources commission, a nine-member body appointed by the governor.

The commission generally approves contested leases, though it has denied some. But in hearing only two or three cases per month, the commission isn't making much headway in reducing the backlog. Applicants denied a lease can appeal to court, and increasingly, frustrated lease opponents are also

Development hugs the Lynnhaven River shoreline in Virginia Beach. Oyster farming thrives there as long-running cleanup efforts have succeeded in reopening half the Bay tributary to shellfish harvesting. (Dave Harp)







*John Korte, who grew up living along the Lynnhaven River, says the proliferation of oyster leases has impaired recreation in one of the state's most heavily used waterways. "We share the water," he says, but cages in the water limit where one can boat, ski and swim. (Dave Harp)*

## LEASES FROM PAGE 21

filing lawsuits.

Some of the fiercest disputes in both states have erupted over proposals to raise oysters at the water's surface. Though still relatively rare, floating aquaculture operations are drawing more industry interest.

In September, the VMRC held a three-hour hearing on whether to permit 700 floating oyster cages in 5.5 acres of water in Milford Haven, a waterway that separates Gwynn's Island from the mainland at the mouth of the Piankatank River.

"None of us are against aquaculture — it's just the placement," said David Judson, who lives with his wife Rosalie and three dogs in a waterfront home overlooking the proposed operation.

Judson and other waterfront residents worry that the cages, along with 1,400 buoys and cables attached to the bottom, will hurt Bay grasses and entangle boaters, kayakers and even a pod of dolphins that visits in the summer.

Kevin Wade, the longtime seafood dealer who applied for the permit, said he was too busy to talk when reached by phone. He didn't return a follow-up call and email.

At the hearing, Wade said he and two partner wants to try floating cage aquaculture to raise more lucrative half-shell oysters. He said they chose Milford Haven because he has a seafood processing facility there.

The commission voted 4 to 2, with two abstentions, to approve the permit. But opponents have gone to court in a bid to block it — arguing, among other things, that Wade's Maryland partner violates Virginia law.

Virginia's Lynnhaven poses par-

ticularly thorny challenges. Nearly half of its 5,100 acres of water have been leased, though not all leases are workable because of water quality. Some claims have been held for decades by those hoping to work them again — or to cash in by selling them if the water is deemed safe for shellfish harvesting again.

State and local officials, along with environmental and community groups, have been working for decades to clean up the Lynnhaven. The U.S. Army Corps of Engineers has \$34 million to spend on ecological restoration there, and the river has been selected as one of 10 Bay tributaries targeted for large-scale oyster restoration.

### Resistance to leases building

Meanwhile, bids for new leases are facing stiff resistance. Of 16 leases pending, 11 are under protest. Ludford has managed to acquire rights to 75 acres, but a tract he applied for in 2014 that triggered an uproar is still pending.

Even veteran Lynnhaven oyster farmers like John Meekins, who's been at it three decades, said he finds it hard to hang onto his leases. He said he has 500 acres under lease, but five applications have been protested including one applied for in 2011.

"It's the neighborhoods. They want to control their view, not just their yard," Meekins said, as he and his helpers tended cages in a cove bordered by homes.

The river is prone to silting in, which poses another challenge. Virginia Beach dredges channels for homeowners' boats. But when the city needs to dredge through a leased area, it has had trouble getting the holder to move oysters or agree on compensation for the disruption.

"It needs to be dredged for the

good of the locality," said Bob Livengood, a marine business owner. "I don't think the people understand that this is a lease — you don't own this property. It belongs to all of us."

Ludford pointed out that the region's development, not oyster farming, is driving navigation problems. The Lynnhaven and other major rivers in the area are "on average 15 feet shallower than they were 400 years ago, because of the sediment [runoff] and the fill-in," he said.

Cruising through Broad Bay, a Lynnhaven tributary, John Korte highlighted homeowners' concerns about

aquaculture. Coming to a leased shoal area with cages visible at low tide, he said, "This is a nice little sandbar. Before that was there, everybody on kayaks and the neighbors would get out and basically use it as a park."

In Maryland, leases can be no closer than 50 feet to the shore, unless the landowner agrees. In Virginia, there is no setback requirement, but homeowners with at least 105 feet of waterfront have the right to a half-acre "riparian lease" that can extend up to 210 feet from shore.



*Oyster farmer Chris Ludford lifts a mesh bag of shells planted by students on a lease he acquired in the Lynnhaven. The shells provide a home for baby oysters to grow, helping to clean up the water and protect a nearby patch of marsh from erosion. (Dave Harp)*

Chris Schellhammer, a Lynnhaven waterfront homeowner and self-described "hobbyist" oyster gardener, said riparian leases give landowners first refusal on raising oysters in near-shore waters. He's raising some just offshore for water quality and habitat value and has another lease farther out, where he's cultivating bivalves for his own consumption.

Schellhammer, a workgroup member, said he believes homeowners need to be better educated about leasing and aquaculture. "When people buy on the water, there needs to be more disclosure," he said. "It's an emotional thing, and I get that. But if people knew about this situation, then the user conflict would go down."

Virginia, like Maryland, requires leases to be worked, but the rule is not enforced, and many leases sit dormant. That adds to the competition and conflict in the Lynnhaven and elsewhere.

Virginia's workgroup recommended legislation to help Virginia Beach dredge boating channels across leased areas. It also called for increasing the application and transfer fees, to give the VMRC more resources to handle applications and possibly deter speculative leasing from tying up productive bottom.

Strickler, the natural resources secretary, said the group also recommended procedural changes to address complaints about float and cage aquaculture. The changes are intended to make such applications "more open and intuitive" and "more transparent," he said.

Aquaculture produced nearly 40 million oysters statewide last year worth nearly \$16 million at the dock, and it provided around 200 jobs, according to Virginia Sea Grant.

Karen Forget, executive director of Lynnhaven River Now, a watershed advocacy group, and another workgroup member, said "There's no simple answer to these issues." But getting more water-filtering oysters in the Lynnhaven will be good for its ecological health, and for the state's seafood industry.

If leases sitting dormant are put to active use and the river becomes clean enough to open more areas to shellfish harvests, Forget suggested that could ease some of the pressure to place cages so close to shore — and reduce conflicts with boaters and homeowners.

"I firmly believe there are ways to work these things out. Everyone has to compromise a little bit," she said, but "we can have a healthy river, happy watermen, happy boaters and homeowners. It can work for everybody."





NFWF



# Chesapeake Bay Stewardship Fund

www.nfwf.org/chesapeake

January - February 2019

## Record \$35 Million for Bay Recovery Announced in Lancaster

The National Fish and Wildlife Foundation (NFWF) and the U.S. Environmental Protection Agency (EPA) announced late last year more than \$13.1 million in grants to support the restoration and conservation of the Chesapeake Bay watershed in six U.S. states and the District of Columbia. The 49 grants will generate nearly \$21.9 million in matching contributions for a total conservation impact of nearly \$35 million.

The grants were awarded through the Chesapeake Bay Stewardship Fund (CBSF), a partnership between NFWF and the EPA's Innovative Nutrient and Sediment Reduction Grants Program (INSR Program) and Small Watershed Grants Program (SWG Program). Additional support is provided by the U.S. Department of Agriculture's Natural Resources Conservation Service, the U.S. Forest Service, the U.S. Fish and Wildlife Service, the Altria Group Restoring America's Resources partnership and CSX.

Grant recipients were announced at the Cork Factory Hotel in downtown Lancaster on December 3 with over 150 grant

recipients and friends in attendance. The ceremony and press conference was conducted in conjunction with the NFWF-hosted, biennial Chesapeake Ag Forum, a conference that brings together the best practitioners and partners advancing agricultural conservation practices across the Chesapeake Bay watershed.

"The Commonwealth of Pennsylvania plays a significant role in the health of the Chesapeake Bay watershed," said Senator Bob Casey. "But more importantly, actions taken in Pennsylvania to improve the Bay begin with efforts to restore clean water to the Conestoga, the Susquehanna, and the thousands of miles of rivers and streams right here in the Commonwealth. Financial resources, beginning with our Federal agency partners like the U.S. Environmental Protection Agency, are critical to these ongoing collaborative local efforts."

The projects supported by the 49 grants announced at the Ag Forum will support methods to improve waterways, restore habitat and strengthen iconic species in Delaware, Maryland, New York, Pennsylvania, Virginia, West Virginia and the



**Bob Fox of Fox Meadows Farm participated in the Lancaster-area farm tour program and showcased stream bank stabilization and buffers in Lancaster County**

District of Columbia. The funds will engage farmers and agricultural producers, homeowners, churches, businesses and municipalities in on-the-ground resto-

ration that supports quality of life in their communities, improving local waterways and, ultimately, the health of the Bay.

"EPA is pleased to support innovative  
(Continued on page 3)

## Pamunkey Tribe & VIMS to Restore Eroding Shoreline

When Kathryn MacCormick moved to the Pamunkey reservation in 2011 to care for her aging grandmother, a member of the tribe who was born there and lived there all her life, she didn't envision that she would also be instrumental in bringing valuable expertise that will help save tribal lands.

With a bachelors in biology from Arizona State University, MacCormick was working on her master's in biology at William & Mary when Dr. Robert Hale from the Virginia Institute of Marine Science (VIMS), the graduate school in marine science for William & Mary, asked MacCormick to participate in a seminar.

"I really didn't have scientific research to present, but I did have a lot of ideas about the Pamunkey tribe," MacCormick said. So she based her talk on the history of her tribe as well as her perspective as a biologist. That included some of the urgent environmental concerns for the 1,200 acre reservation which sits on the shores of the Pamunkey River, a tributary of the York River in King



Photo by Kathryn MacCormick

William County.

"Anyone who lives on the reservation has known that erosion is an issue; everyone there is concerned about the shoreline, which has been disappearing for some time. There is the case of Joyce Krigsvold's front yard, where

40 years ago there was enough space to play flag football in between her house and the river," said MacCormick. "Now it's about 20 feet. That is serious visible erosion within half a lifetime."

"Folks at VIMS are so great and wanted to help when they heard my talk," said MacCormick. Scott Hardaway, Marine Scientist Supervisor, was motivated by their predicament and echoed the consensus that the shoreline was the most important priority to tackle. With that collaboration came help in the form of a grant award of \$199,544 in funding by the National Fish and Wildlife Foundation to create a plan for 13 miles of shoreline as well as construct a living shoreline to reduce sedimentation to the Pamunkey River and restore freshwater marsh habitat. Ultimately, this reduces the load of sediment to the Chesapeake Bay.

The restoration work will provide a natural buffer to decrease the erosion that threatens the reservation's homes

(Continued on page 4)



# Crops Planted for Rain Gardens to Control Anacostia Stormwater

## *Capitol Heights Urban Ag Center Using “Food” Plants to Create Rain Garden Buffers That will Help Protect the Anacostia River*

The Urban Ag Center, a highly visible and very popular space across from the Capitol Heights Metro stop, is helping to meet the fresh produce needs of the Anacostia community while simultaneously addressing stormwater runoff.

The three-acre East Capitol Street Urban Agricultural Center is getting its own garden thanks to the work of young men from the surrounding neighborhood who are gaining new skills as NGIP certified gardeners in the process. The University of the District of Columbia (UDC) and Seeds for Success, a partnership between Maya Angelou Young Adult Learning Center, Department of Public Works, and the Department of Employment Services, is training them in all the steps of how to create a rain garden which is currently being installed on the site. Work should be completed before the first snowfall.

Low Impact Development and UDC received a grant from the National Fish and Wildlife Foundation to construct and plant an urban stormwater control rain garden in the middle of the planted farming space. Low Impact Landscape Architect Suzy Cho believes this is the first time (in her design experience) that farming crops will be used to create a buffer to mitigate runoff into storm sewers in a city environment.

“Low Impact is a non-profit that is primarily focused on green infrastructure within urban and nearby areas,” said NFWF Chesapeake Bay Program Grantee Cho. “We do design concepts for green streets work and to retrofit rain gardens, bioswales and simple, low impact practices in communities. I am fairly sure this is the first combination of urban agriculture and green infrastructure and this garden work in Anacostia may be one of the only such projects that uses food crops for stormwater management.”

Cho said she believes many lessons will be learned and “hopefully we can replicate some of our findings and best practices into other urban spaces.”

Tyrone McNeal is a co-operative student working with University of the District of Columbia and Seeds for Success to become a National Garden Industry Professional (NGIP) certified landscaper. He hails from Marshall Heights, the public housing area bounded by Southern Avenue and East Capitol St., NE in Washington and has lived just over the fence line from the Urban Ag center.

“I live in the Public Housing Projects overlooking the urban Ag center,” said McNeal. “I have been looking out at these gardens and watching them develop and grow for all of my teenage years. I thought maybe someday I could be a master gardener and help with that planting and cultivation of these crops for families in my own community. Maybe in a year or two I can have my own landscaping business.”

Harris Trobman, project specialist in green infrastructure at UDC, hopes to help McNeal and two other hard-working adult students become certified with NGIP sanctioned classes he is teaching at Maya Angelou High School.

Trobman has provided classroom instruction including lessons on pervious rock and in hydro and aquaponics. The lessons come from the District of Columbia’s Department of Water and UDC curricula which together include programming on such topics as how storm sewers and combined sewer overflows work. Understanding stormwater management using green infrastructure is part of becoming NGIP certified.

“We are presently excavating the raingarden which will reduce over 770 pounds of sediment run-off from the land and over 7 pounds of unwanted nitrogen annually from fertilizer or other wastewater going to the Anacostia River nearby,” said Trobman. “We are really dealing with what used to be a vacant lot so the excavation takes time. The workers here who are part of my UDC class and other youth volunteers are going to re-use the soil to create some berms along the fence line. They really enjoy going from the classroom to real-world experience and building a bioswale is a very important hands-on training for our gardeners.”

Kerry Harrington, with Seeds for Success, is a hands-on expert partnering with Trobman on the project. They are currently overseeing the excavation needed to establish the urban stormwater raingarden which is situated on the East Capitol Street side of the Ag center. Harrington himself works the backhoe to make way for the foundation.

The group he manages has already learned how to grow wonderful tomato plants in the aquaponic garden which has produced some vines that are now mature enough to plant in the urban Ag farm.

“We try to minimize the use of all chemicals in growing these plants so starting in the greenhouse works best,” said Harrington. “It is also great to teach my class how

their skills can move to a job in the community for gardening and landscape construction work.”

“All three of my men are hard workers and want to have a better way of life in the Capitol Heights community,” said Harrington, who notes the students must also be able to interpret the landscape architect’s plans and implement design work.

“You can really tell the difference when you eat fresh vegetables off the plants that you have grown yourself versus something from a convenience store or with processed green foods,” added Cho. She points out that is understandably also a big part of the attraction.

“It is wonderful that several of our students found a love of fresh veggies and can say they actually grew it themselves!”

## Urban Ag and Seeds for Success



Photos by Geoffrey Livingston

Harris Trobman of UDC, Tyrone McNeal (center with other students), and Kerry Harrington at Seeds for Success leave UDC Campus at the Maya Angelou School to walk to the Urban Ag Garden to plant a new raingarden comprised of leafy vegetables. The garden is located at Capitol Heights Metro on E. Capitol Street and Southern Avenue, NE.

UDC Students are working at the Urban Ag Garden to help qualify for NGIP Master Gardener Certifications.



## Prescribed Fire Creates Perfect Ecosystem & Buffers the Nanticoke

The Nature Conservancy (TNC) in Milton, Delaware will be working to reforest 22 acres of land it owns at the Middleford North Preserve using prescribed fire to ultimately restore the type of young forest and shrub land that is favorable for unique bird species like kestrel and the Delmarva fox squirrel.

TNC will also be providing assistance to the agricultural community in Delaware's portion of the Nanticoke River area watershed.

The project is supported in part by funding from the National Fish and Wildlife Foundation's (NFWF) Chesapeake Bay Stewardship Fund which includes plans to increase forest habitat as well as improve water quality by reforesting the 22-acre farm field. Habitat specialists are implementing reforestation and habitat enhancement work on a total of 45 acres at the Middleford North Preserve.

Those 45 acres are being restored to "early successional scrub-shrub habitat" on the Hurley tract, which abuts the Gravelly Branch River, a tributary of the Nanticoke River. TNC is employing controlled or prescribed burns to help restore this unique type of habitat which is also of conservational concern in Delaware.

The Nature Conservancy spearheaded a prescribed burn this past spring on part of the tract which is not far from Seaford. The fire program was only the second planned burn conducted on TNC property. Because of its many benefits to wildlife and relative low cost, fire is one of a land manager's best tools to improve wildlife habitat.

"The early successional scrub-shrub habitat is a landscape in decline but is essential for many species like the American woodcock and the Northern bobwhite," said Natasha Whetzel, land steward with TNC. "The other locations that provide this unique environment are along right-of-ways that are maintained because those have to be grassy and open for the power lines and then along roadsides. Other than those areas, we don't have much of this habitat left in the state."

These projects together comprise approximately 73 acres of lands that are ranked as "high priority areas for both water quality and wildlife habitat under the Nanticoke River Watershed Restoration Plan." A 64 mile long river, the Nanticoke flows directly into the Chesapeake Bay.

It doesn't take long for the burn to produce results. Just days after the prescribed burn on the Hurley Tract, Whetzel observed a pair of kestrels, which are endangered in Delaware, stop in to hunt the newly burned area and the more open land they prefer.

Staff from Delaware's Division of Fish & Wildlife had previously installed a kestrel nesting box which the pair deferred on this year, but the sighting is very encouraging. A pair of pretty eastern bluebirds raised their brood in the roomy box this summer instead.

Just a month later, the entire area was recovering well with common milkweed growing back in abundance. By early summer the area surged back to life, fill-



**Natasha Whetzel, land steward with TNC, checks new shrubs near the Gravelly Branch River, a sub-watershed of the Nanticoke.**

ing in quickly with native grasses including the beautiful "purple love grass" as well as lots of wild turkey.

Remediating the land is also important as it serves as a conservation buffer, increasing otherwise scarce habitat and increasing the presence of natural pollution filters along the waterways.

Local business owner Matt Carter of Quest Kayaks said, "It's vital to us as humans and as a community and as a business to keep our waters clean. We can all help by doing little things that add up like avoiding putting chemicals on our

lawns and being aware of issues around stormwater runoff, and maintaining buffer zones around waterways like the one maintained by The Nature Conservancy in Middleford."

"Every waterway leads into the next ecosystem," said Carter. He traverses so many of Delaware's waterways—seeing them up close and personal. "I know many farmers who also recognize the value of waterway buffers, purposely keeping a couple acres of woods between river and farms."

### Lancaster From Page 1

and sustainable approaches to improving the health of our rivers and streams," said EPA Regional Administrator Cosmo Servidio at the event. "These investments in partnerships with states and local organizations encourage community stewardship of resources that will help preserve and enhance healthy waterways throughout the Chesapeake Bay watershed."

Other Pennsylvania state leaders on the rostrum included Secretary of the Department of Environmental Protection Patrick McDonnell and Assistant Secretary of Agriculture Greg Hostetter. Jake Reilly, director of the Chesapeake Bay program at NFWF, served as master of ceremonies.

"Today we are here with the National Fish and Wildlife Foundation announcing 49 grants, 12 of which are right here in the Commonwealth of Pennsylvania supporting farms, stormwater management and conservation for the Bay," said Secretary McDonnell. "The foundation has been a great partner for us as we've been conducting our Bay watershed planning for Phase 3 implementation in order to meet our Chesapeake Bay watershed goals by 2025. The foundation participation on our state steering committee and NFWF's on-the-ground support with these grants has been supporting us in meeting our agriculture and stormwater obligations including our pollution diet for the entire watershed."

"The U.S. EPA provides these guidelines for us including six other states and the District of Columbia, and we have the big-

gest part of the Bay watershed obligation in terms of the commitment; but this is also about local water quality and cleaning up streams here in Pennsylvania," he added.

The INSR Program awarded more than \$7.3 million to eight projects, with recipients providing more than \$10.4 million in match. The program provides grants to accelerate the implementation of water quality improvements specifically through the collaborative and coordinated efforts of sustainable, regional-scale partnerships with a shared focus on water quality restoration and protection in local waterways and the Chesapeake Bay.

"The grants announced today will empower communities and businesses throughout the Chesapeake Bay watershed to become better stewards of natural resources," said Jeff Trandahl, executive director and CEO of NFWF. "In many cases, these grants fund voluntary efforts to decrease sedimentation and runoff from farms and businesses, which boosts water quality throughout the 64,000-square-mile watershed and advances long-running efforts to improve the overall health of the Chesapeake Bay."

Jake Reilly said at the event people will "see real changes on farms across the entire Bay watershed from NFWF grantees including planting trees near streams, fencing along cattle pastures, making barnyard improvements to reduce runoff, and changing cropping and agronomic practices to help reduce nutrients and sediment coming in to the Bay."



**Baby calf at Fox Meadows Farm in Lancaster County looks curiously at Ag Networking Forum visitors.**



## Interfaith Partners: Faith communities embrace environmental stewardship

Faith communities in the Chesapeake region looking to fulfill the call to care for the earth have an ally and leader in Interfaith Partners for the Chesapeake (IPC). Originally conceived in 2004, the group educates and supports faith communities in taking steps that best fit their congregation's needs and desires in helping to protect their portion of the Chesapeake watershed so "all our communities, and future generations, may thrive."

In the Jones Falls region, a sub-watershed that extends from Baltimore county down into the Baltimore harbor, "over the course of two years we engaged 39 congregations to get involved either through educating members or doing a variety of activities including picking up trash or labeling storm drains in their communities," said Jodi Rose, executive director, IPC. The work was funded by a

grant from the National Fish and Wildlife Foundation (NFWF) in 2016.

"We are a series of personal trainers for the congregations—to help them change behavior and meet their own congregants' vision for addressing environmental concerns," said Rose.

"We have learned that no two congregations are the same; they all have different capacities and different strengths so we provide a menu of ideas and they choose what works best for them. We provide direction but we understand they know best what their membership will be inspired by," Rose said.

IPC works to engage the faith community through One Water Partnership—which oversees the process and provides resources through many partners like Blue Water Baltimore, which helps implement and locate funding for projects.

Odette Compton, a member of Mount Lebanon Baptist Church said "going on the bus tour of churches with green practices really opened my eyes to the need to take care of the environment."

"That congregation has since really embraced this program tremendously," said Bonnie Sorak, outreach coordinator at IPC. "Like many congregations, they didn't understand the connection between what happens on their property and stormwater—often churches are understandably focused on other priorities."

"We are the only ones doing this kind of thing—getting into the trenches with congregations and helping them implement projects on their grounds," said Rose. There are different levels of commitment that begin with a covenant signing outlining actions the congregation will take that might include holding a



**Faith communities are a vital part of Interfaith Partners for the Chesapeake. Mt. Lebanon Baptist Church is providing support.**

"green day" to educate the congregation, evaluating energy use, planting a rain garden and more.

In early December, IPC received a substantial new grant for \$1 million from the National Fish and Wildlife Foundation to mobilize 100 new congregations across Maryland and Pennsylvania.

### Pamunkey From Page 1

and land, which happens to be almost completely flat. The terrain is only nine feet above sea level at its highest point, and the tract is nearly surrounded by the river sharing the Pamunkey tribal name.

MacCormick, now project manager for the Pamunkey Living Shoreline Project, is staying on the reservation even though her grandmother, Jeanette Bush, passed away two years ago at the age of 86. "While I'm here, I want to try to do something good," she said. "Marsh is insurance against flooding, a living buffer. We want to preserve the swamp and the marsh we do have and we want to add some marsh habitat as well."

The plan is to build a rock breakwater to slow down the

wave energy hitting the shore, primarily from recreational boat use and increased storm frequency. The living shoreline will preserve plants that are already there and encourage additional growth on the shoreline side of the breakwater.

Scott Hardaway explained, "We work off the eroding bank about 10 to 20 feet and put a stack of rock, then bring sand in behind that, which becomes the marsh planting substrate. The elevation of that fill is on a ten-to-one slope and that goes up to the bank giving you a planting terrace."

The terrace will be planted with freshwater species including three-square bulrush and a type of panic grass (large, annual or perennial grasses, growing to 1–3 m tall).

This will restore and enhance the marsh that is there.

"We're preserving and/or establishing the marsh fringe which is also good for the fishes and the water quality. Some of the rock will allow shelter for the smaller fish and algae will attach to the hard substrate—functioning like a little reef," said Hardaway. This in turn will provide additional habitat for birds and other native species.

Assessing the land for its historical value prior to disturbing it was an important step. Hardaway said, "Another concern is that the high waters and wave action that are causing the land to erode means that artifacts can be lost. The archeologists at William & Mary have been all over the Pamunkey land to make sure we don't damage them."



Altria



### [ About NFWF ]

The National Fish and Wildlife Foundation (NFWF) protects and restores our nation's wildlife and habitats. Chartered by Congress in 1984, NFWF directs public conservation dollars to the most pressing environmental needs and matches those investments with private contributions. NFWF works with government, nonprofit and corporate partners to find solutions for the most intractable conservation challenges. Over the last three decades, NFWF has funded more than 4,500 organizations and committed more than \$4.8 billion to conservation projects. Learn more at [www.nfwf.org](http://www.nfwf.org).

*"The U.S. Environmental Protection Agency's (EPA) Chesapeake Bay Program (CBP) has a long-standing partnership, through a cooperative agreement, with the National Fish and Wildlife (NFWF) to provide direct financial support to accomplish both:*

- The Small Watershed Grant (SWG) program that promotes community-based efforts to develop conservation strategies to protect and restore the diverse natural resources of the Chesapeake Bay.*

### [ Program Partners ]

NFWF's Chesapeake Bay Stewardship Fund works with government agencies and private corporations, awarding \$8 million to \$12 million per year to help local communities clean up and restore their polluted rivers and streams. Major funding is provided by the U.S. Environmental Protection Agency, Altria Group, the USDA's Natural Resources Conservation Service and Forest Service, CSX, the National Oceanic and Atmospheric Administration and the U.S. Fish and Wildlife Service.

- The Innovative Nutrient and Sediment Reduction (INSR) grant program that supports efforts with the Chesapeake Bay watershed to accelerate nutrient and sediment reductions with innovative, sustainable, and cost-effective approaches.*

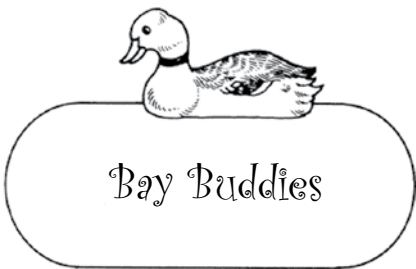
*This insert was developed under Assistance Agreement No. CB 96331001 awarded by the U.S. Environmental Protection Agency. The views expressed in this insert are solely those of the National Fish and Wildlife Foundation, its grantees and partners and EPA does not endorse any products or commercial services mentioned in this publication."*



Oysters, which grow on reefs, play an important role in filtering the Chesapeake Bay's water. But oyster reefs also provide habitat for a large variety of marine life. Here are seven of the more unusual creatures that are found on oyster reefs. Can you match them up with their descriptions and photos found on this page? Answers are on page 44.

- GHOST ANEMONE
- HOOKED MUSSEL
- OYSTER PEA CRAB
- REDBEARD SPONGE
- SEA SQUIRT
- SKILLETFISH
- WHIP CORAL

1. This common, 3-inch-long creature gets its name from its shape. Its other name, oyster clingfish, refers to the large suction disc on its underside, which the animal uses to attach itself to oyster shells and rocks. There, it waits for its food — amphipods and isopods (small crustaceans) as well as bristle worms — to pass by. Its mottled pale gray to dark brown coloring camouflages the creature amid the reef, which provides small crevices for the animal to hide in when predators are lurking nearby.



# Reef Sweet Reef

2. This creature grows in thick bunches on oyster reefs in the Mid and Lower Bay's deeper waters. It is a filter feeder and sucks in water, while hair-like cilia in the creature's pores capture food particles. Waste and unused water are ejected through another hole at the top of the creature. The animal's holes are, themselves, home to tiny crabs, worms and shrimp.

3. This small (less than half an inch long), white to translucent creature lives in the gills of an oyster and is considered a delicacy, should one crack open the oyster and find this animal there. Its legs are not well-developed, and the creature has limited mobility. Thus the oyster provides this animal with shelter from enemies and a source of food: It takes its pick of food

that the oyster draws in for itself.

4. Look, but don't touch! This jellylike creature, a relative of sea nettles, has 40–60 stinging tentacles that encircle its mouth. These petal-like appendages stun passing plankton and fish, which they then push into its mouth. This round, pinkish to whitish transparent animal's "face" is at the end of a 1.5-inch-tall stalk attached to a hard surface; even so, it is able to move several inches in just a few hours.

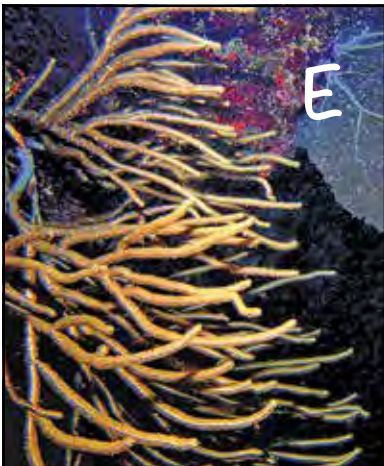
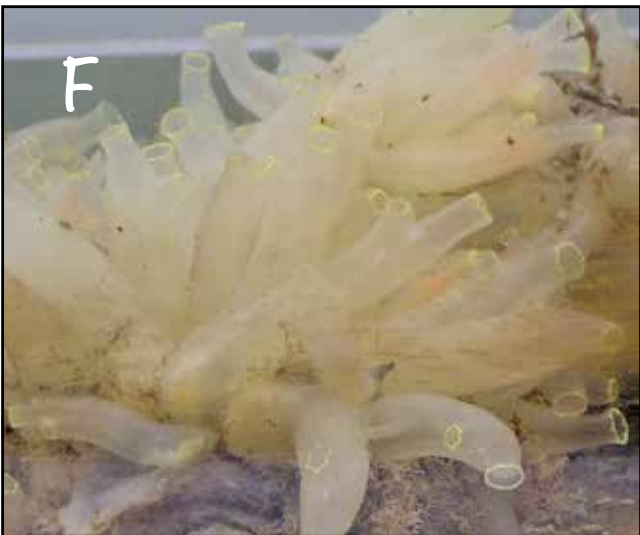
5. Clumps of this leathery, yellow to greenish brown creature are sometimes called sea grapes, because that is what they look like. This 2-inch-long filter feeder has two siphons, one to draw in water and food, the other to eject unused water

and waste. This creature is found in the Mid to Lower Bay and is tolerant of water pollution.

6. You might be fooled into thinking that this creature, which can grow 3 feet tall, is a plant. Its stalk of many slender branches range in color from yellow and orange to red and deep purple. These long branches are covered with rows of translucent white polyps. Each of these polyps has eight feathery, jagged tentacles that pop out to capture plankton and other food bits floating by. It is found in the Bay's brinier waters, where it provides shelter and protection for such marine life as sea bass, gobies, seawhip shrimp and nudibranches.

7. Research suggests that this filter feeder can more than double the overall filtration capacity of a reef, where it can sometimes greatly outnumber the oysters. It is also twice as effective as oysters when it comes to filtering picoplankton — the tiniest of marine plankton. It can grow 1–2 inches long, with a ridged gray to dull black exterior and a shiny interior of pinkish brown to purple. It attaches itself to hard surfaces using thin "byssus" threads. It also moves, albeit very slowly, by releasing some of these strong threads, reattaching them to a hard surface and pulling itself forward.

— Kathleen A. Gaskell



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## RAIN FROM PAGE 1

almost year-long high precipitation,” Phillips said.

Rainfall — and the associated increase in river flows — is often bad news for Bay water quality because it washes large amounts of nutrients and sediment from fields, parking lots and lawns that foul water quality.

The ensuing cloudy water can cause dramatic diebacks for underwater grass beds, and the sediment can bury bottom-dwelling creatures, while nutrients fuel algae blooms that draw oxygen out of the water, which leads to “dead zones.” Prolonged spells of freshwater inputs can also kill oysters and other salt-loving creatures that cannot move.

How many nutrients reached the Bay last year won’t be known for some time. But more than 500 million pounds of nitrogen were washed into the Chesapeake in other years with similarly high river flows, Phillips said. That’s more than two-and-a-half times the region’s cleanup goal for an “average” year.

Last year’s deluge will be the greatest test to the staying power of Bay restoration efforts since flooding associated with Tropical Storm Lee in late summer 2011. Since then, the Bay has experienced six years of normal or below average river flows. That led to noticeable improvements in its health, including the near-disappearance of anoxic water — areas with no oxygen at all — and a widespread comeback in underwater grasses.

Bay advocates point to such improvements as evidence that the multibillion-dollar cleanup effort is producing tangible results. They are optimistic that a healthier Chesapeake is better able to withstand periodic high-flow events, which inevitably leave the Chesapeake awash with pollutants.

“The Bay is resilient,” said Bruce Michael, director of the resource assessment service for the Maryland Department of Natural Resources. “We’ve made tremendous progress and success in reducing our nitrogen and phosphorus.”

Rainy as it was, 2018 could have been worse. Very high flows on the Susquehanna River — source of half of the Bay’s freshwater — can scour sediment that has built up behind Conowingo Dam and send it into the Chesapeake, adding even more misery to the ecosystem.

But flows at Conowingo peaked at 375,000 cubic feet per second in July — less than half of the highest flow caused by the 2011 tropical storm. USGS scientists said they saw little evidence last year of significant sediment scouring from behind the dam.



*The Susquehanna River, laden with debris, overflows its banks at Port Deposit, MD, during a high flow period in September 2018. By early December, 3,400 tons of debris were collected upriver at the Conowingo Dam, ranging from beverage containers to floating docks. That haul dwarfs the 600 tons normally gathered there. (Dave Harp)*

Although flows weren’t extraordinarily high, they were unusual in that they remained higher than normal for months at a time, including when it is usually dry. Those conditions are making it hard for scientists to predict their impact.

Not only were high river flows prolonged, but rains were so pervasive that they soaked the entire watershed — from southern Virginia to New York, and from West Virginia to Delaware. The District of Columbia’s record wet year resulted from measurable rain falling on more than one in three days throughout 2018.

The rain flushed huge volumes of debris off the landscape, in addition to the nutrients and sediment. By early December, Exelon Corp., operator of Conowingo, reported that it had collected 3,400 tons of debris at the dam, ranging from beverage containers to floating docks. That haul dwarfs the 600 tons normally gathered there. But it wasn’t the only place awash with junk: The updated stormwater management system in the District captured more than 700 tons of trash and debris flowing off streets last year.

Still, a lot of debris went uncollected, creating a hazard for boaters during much of the summer. The waterborne clutter was so bad at times that charter boat captains canceled fishing trips.

Chronic downpours caused a rash of sewage spills throughout the watershed, releasing hundreds of millions of gallons of wastes into rivers and streams.

The downpours posed other challenges as well for restoration efforts. Here are brief reports on some of the bigger issues the drenching of 2018 posed for the Bay:

### Underwater grasses

One of the biggest concerns is how submerged grass beds fared. These underwater meadows provide important habitat for juvenile fish and crabs, plus many types of waterfowl.

Because they, like all plants, depend on sunlight to survive, their abundance is considered a prime indicator of the Bay’s overall water quality. After six “normal,” or low-flow years in a row, grass beds passed the 100,000-acre mark in 2017, the most seen in decades.

But heavy rains can turn water cloudy with sediment, blocking the sunlight the plants need to grow. But scientists are cautiously optimistic many beds were large and robust enough to survive a setback, though they may be smaller next year. “We had so much grass in 2017, that you kind of reach the points of resilience,” said Brooke Landry, a biologist with the Maryland DNR.

Grass beds survived an initial

test early last year when, after a wet spring, many beds appeared to be in good condition. “We had probably the best water clarity that we’ve ever seen in the Tangier-Smith Island area since we started the imagery,” said Bob Orth of the Virginia Institute of Marine Science, who has overseen an annual aerial survey of underwater grasses since it started in 1984.

But after river flows picked up in mid-July, much of the Bay couldn’t be surveyed because of rain and clouds. On days when the sky was clear, the water was often too murky to spot grass beds. “All you would see is mud,” Orth said.

Still, the aerial survey yielded glimpses of robust grasses surviving even late into the summer in places such as the upper Chester, the Severn, the upper Patuxent and the Pamunkey rivers, Orth said. In other places, photos showed patches of grass still popping up through expanses of muddy water.

The massive grass beds in the Susquehanna Flats, where the river empties into the Bay also seemed intact. Landry said satellite photos showed a plume of muddy river water splitting when it reached the underwater meadow there.

Cassie Gurbisz, an assistant professor of environmental studies at St. Mary’s



# Climate change poses a challenge for Bay cleanup goals

≈ Trend toward more and heavier rainfall and warmer weather in region threaten to overwhelm current actions.

By KARL BLANKENSHIP

This year's persistent high river flows into the Bay prompted many of those working on Chesapeake issues to ask the question: "Is this the new normal?"

The good news is that this year's extreme precipitation is not likely to become "normal" anytime soon. But it does highlight an inconvenient truth: When it comes to the weather, the future won't be like the past.

It most likely will continue a trend that's been going on for decades: wetter weather in general and heavier rain in extreme storms.

That has ramifications for meeting Bay nutrient reduction goals. When it comes to runoff, "flow is fate," said Lewis Linker, modeling coordinator with the state-federal Bay Program partnership. More rain moves more nitrogen off the landscape and into the Bay, while heavier storms dislodge sediment particles — and the phosphorus that binds to them — and moves them downstream as well.

When they reach the Bay, nitrogen and phosphorus contribute to cloudy water, algae blooms and oxygen-starved "dead zones."

The Bay Program is taking its first steps toward addressing how Chesapeake-related cleanup actions will adapt to climate change, which is critical as some runoff control actions implemented now may be in place for decades.

States have until April to provide the U.S. Environmental Protection Agency with written descriptions of how they will address climate as part of their updated Bay cleanup plans. In 2021, they will be required to adopt additional measurable nutrient reduction goals needed to offset the impact of climate changes expected through the 2025 cleanup deadline.

For the Bay, climate change isn't a future concern. Monitoring shows rainfall in the watershed has increased about 10 percent over the last century, though the changes have differed from place to place with precipitation in the northern part of the watershed increasing faster than in the southern portion.

There's also been an increase in the number of severe storms. The National Climate Assessment released by the federal government in October said the amount of precipitation during heavy rainfall events has increased by about 50 percent since 1958 in the nation's Northeast region, which includes most of the Bay watershed.

But the computer models the Bay Program used to estimate the necessary nutrient reductions were based on precipitation observed in the 1990s, and did not account for the gradual rainfall increase when Bay nutrient reduction goals were set in 2010. Based on past trends, average precipitation from the 1990s to 2025 would be expected to increase by a bit more than 3 percent.

With that factored in, the models now show that further nutrient reductions would be needed to offset the increased flows — 9.1 million more pounds of nitrogen and 490,000 more pounds of phosphorus. That would be a 19 percent nitrogen reduction, and a 73 percent phosphorus reduction beyond what the region already needs to accomplish between now and 2025.

Those figures represent an "initial estimate," Linker cautioned, and may be refined in the coming year based on new information.

Further complicating cleanup efforts, the changing climate conditions will also hamper the effectiveness of practices commonly used to manage runoff. Manure storage facilities on farms and stormwater detention ponds in cities — all designed to manage "typical" rainfall events of the past — will increasingly be overwhelmed as rainfall increases, especially as more arrives in storms.

"I've been hearing from some of the conservation districts that we're seeing erosion in areas where we never previously saw it," said Mark Dubin, agricultural technical adviser with the Bay Program. "That's an indicator that the rainfall we're getting is challenging our previous standards for, and designs for, conservation practices, whether it be tillage or crop residue management or water control structures."

Investments being made today in things like costly stormwater control systems need to anticipate the impacts of more severe storms in the future.

"We have a lot of investment in stormwater management that is designed for a particular capacity and inflow amount," Linker said. "And as the

inflow amount is increasing, we need to essentially protect our investment."

Mark Bennett, director to the U.S. Geological Survey's West Virginia and Virginia Water Science Center and co-chair of the Bay Program's Climate Resiliency Workgroup, cautioned that it will be a daunting task to re-examine the effectiveness of the dozens of best management practices implemented in the region to meet Bay goals under future climate scenarios.

Not only will increased rainfall compromise the effectiveness of some

David Flores, a policy analyst with the nonprofit Center for Progressive Reform who has been tracking the Bay Program's efforts to incorporate climate change, acknowledged that the science is too incomplete in many cases to know how specific control practices should be modified to adjust to climate change. But, he said, he would like the upcoming state plans to make firm commitments to help fill that knowledge gap.

For instance, he said, states could pledge to evaluate and monitor how



*The weather trend from previous decades is expected to continue: wetter, with more rain coming in extreme storms. (Dave Harp)*

control measures, but changes in temperatures and growing seasons could also reduce the effectiveness of buffers, cover crops and other practices that rely on vegetation. In some cases, the types of plants or trees being used may need to be changed to get optimal results under future conditions.

In their updated cleanup plans, states are supposed to explain how they will plan for the future, as well as how they can promote nutrient control practices that offer dual benefits by helping to address problems caused by climate change. For instance, streamside forest buffers that help reduce runoff can also help control flooding during heavy rains.

different stormwater and other runoff control practices are performing during storms and to commit to incorporate that information into new design standards.

"The plans should really lay out, in detail, certain things that set up some accountability," Flores said.

Other ways the plans could factor in climate change, he said, would be to avoid putting runoff control practices in places likely to be inundated by sea level rise in the next few decades, and to prioritize those that would also help mitigate damage in flood-prone areas.

"I am optimistic in that I think that

CLIMATE CONTINUES ON PAGE 30





*Stormwater overwhelms a leaf-choked drain near the Choptank River in Cambridge. (Dave Harp)*

## RAIN FROM PAGE 28

College, was doing field work in the flats when the river ran high in August and said, “the water was crystal clear in the middle of the flats. It was just amazing. It was like there was no flood at all.” On the outer edges of the grass bed, she added, “I couldn’t even see my hand in front of my face underwater.”

But even where the beds persisted, there is a danger they may not bounce back next year. In late summer and fall, many underwater grass species found in the Bay typically use photosynthesis from the sun to build up energy reserves, which are stored in tubers and rhizomes in the bottom sediment. They need that stored energy to survive winter and start growing in spring.

“If there is chronic light limitation from all of this flooding, then those tubers and rhizomes are not going to be as big and robust,” Gurbisz said. “So, you might have problems the following year where the grasses might not come back in certain places.”

### Oxygen levels & ‘dead zones’

Dissolved oxygen levels in deep waters of the Bay were poor during much of the summer, but not record-setting, despite the massive input of nutrients delivered by the rains. Strong winds accompanying some of the midsummer storms helped by mixing oxygen-rich freshwater on the surface with oxygen-starved saltwater on the bottom.

But the chronically high flows and murky water reduced algae growth, which also helped. Algae blooms deplete oxygen levels when they die and sink to the bottom. They decompose there in a process that draws the oxygen out of the

water, leading to so-called dead zones.

Strong flows dispersed algae blooms before they could grow large, while murky water blocked the sunlight that microscopic aquatic plants need to grow.

“We didn’t have as many significant algae blooms this last year because the algae basically didn’t have time to set up with prolonged periods of sunny, warm conditions,” said DNR’s Bruce Michael. “They need light, and there’s not a lot of light with all that runoff.”

While oxygen levels have been worse in other years, poor conditions persisted longer into the fall than is typical, with a near-record amount of low-oxygen water — 1,200 cubic meters — reported in Maryland’s portion of the Bay in October, Michael said. Only October 2011 had more, in the wake of Tropical Storm Lee.

Normally, the Bay has little “memory” from year to year when it comes to nutrients. Those that enter in a given year are usually either used up, buried or washed into the Atlantic Ocean, and do not feed water quality problems the following year.

With so many nutrients continuing to pour into the Bay late in 2018, though, scientists say it could promote an unusual growth of algae blooms this winter, and possibly into the spring, which could affect conditions this summer.

At a monitoring site near Annapolis, nitrate concentrations in the Bay in late October were nearly six times the normal levels, said Jeremy Testa, an assistant professor at the University of Maryland Center for Environmental Science.

“It suggests that the nitrate out there is really high right now, and having those concentrations is what can help support the bloom in the spring if they persist,” Testa said.

Scientists usually predict the amount of low-oxygen water they expect in the Bay each summer based on the amount of water that flows in from January through May. But the unusual nutrient spike late in 2018 may fuel an earlier-than-normal onslaught of hypoxia — or low oxygen — in the spring.

There’s not much precedent for this situation, but in 2012, the year after Tropical Storm Lee hit the Bay in late summer, hypoxic conditions did show up earlier than expected, Testa said.

### Struggles for farmers

Besides causing problems for the Bay, the wet weather made it difficult for the region’s farmers to help reduce the flow of nutrients and sediment. Growers had to work in the mud to get smaller yields, and sometimes poorer quality crops as well. In some instances, fields couldn’t be harvested at all.

The ruts left in fields from working in the mud need to be addressed, or else erosion and runoff could increase next year, said Mark Dubin, agricultural technical adviser with the Bay Program. “It just touches every aspect of the agricultural industry,” he said.

The muddy fields that delayed harvests and ongoing rain also made it difficult for farmers to plant cover crops, Dubin said. Cover crops are a widely used practice that helps absorb excess nitrogen left on fields after crops are harvested.

Even where cover crops did get planted, they probably won’t soak up as much nitrogen as they would in a typical year, Dubin said. Heavy rains can push nitrogen deeper into the soil and beyond the root zones of the cover crops, so they

## CLIMATE FROM PAGE 29

there will be jurisdictions that step up and adopt a serious scope of work to address climate as part of their respective implementation plans,” Flores said.

One already has. The District of Columbia has agreed to go beyond the written explanations required in new cleanup plans and is adopting numeric nutrient reduction goals for 2025 — three years earlier than required. That means an 6,000 additional pounds of nitrogen and an additional 1,000 pounds phosphorus reductions by 2025.

The district has already exceeded its existing 2025 goals, in large part because of better-than-expected performance by the Blue Plains Regional Advanced Wastewater Treatment Plant. But it has committed to not count the Blue Plains overachievement toward its additional climate reduction goals. Instead, it will achieve them by putting more actions on the ground, said Katherine Antos, chief of the Partnering and Environmental Conservation Branch of the district’s Department of Energy & Environment.

She said the district will target additional efforts, largely through incentive programs, in watersheds that have their own local water quality problems and in areas that are more vulnerable to climate impacts — such as flood risks or urban heat island impacts.

That means promoting actions that provide multiple benefits, like increasing tree canopy cover, increasing stormwater retention and doing more stream restoration in those areas.

“These are not only going to improve our local waters and the Chesapeake Bay, but they’re also going to help us be more resilient to those changing weather conditions,” Antos said.

The district is also revisiting whether stormwater design standards are adequate to handle more frequent or more intense rainfall events in the future.

“It’s only going to become more difficult to achieve water quality standards in the Bay over time,” Antos said.

Not only will more precipitation and severe storms drive more nutrients into the Bay, she noted, but rising sea levels will drown tidal wetlands at an increasing rate, eliminating their ability to absorb nutrients and mitigate some of the impacts.

“That means that much more nitrogen and phosphorus is going to need to be reduced from the watershed. We need to start planning for that now, because what we need to do by 2025 is small compared to the impacts by 2050 or 2080, so let’s start putting ourselves on the right path now,” Antos said.

“And while the district is doing our part,” she added, “we’re only going to be successful as a watershed if the partnership does its part.”

RAIN CONTINUES ON PAGE 31



## RAIN FROM PAGE 30

can't absorb the nutrient, he explained.

Farmers also had trouble installing new pollution controls such as stream-side buffers, Dubin said. Some existing controls may have been washed away by flooding, or else didn't perform as expected because of the sheer volume of rain. In some cases, he added, manure storage facilities are maxing out because farmers have had little opportunity to spread the animal waste as fertilizer on the fields.

"I don't think its catastrophic, but I think it's definitely stressing the system," Dubin said.

### An 'awesome' success

Not everyone was disappointed by the rain. "It was awesome!" exclaimed Carlton Ray, director of the Clean Rivers Project with DC Water, which manages stormwater and sewage in and around the nation's capital. "We were hoping for wet weather, you know?"

Ray oversees a \$2.7 billion effort aimed at capturing and treating effluent from the District's antiquated combined sewer system, built more than a century ago, in which storm drains funnel rainfall runoff into sanitary sewers. In wet weather, the system typically overflows, sending diluted but raw human waste, into local rivers.

In a partial fulfillment of a federal consent decree to stop the overflows, seven miles of tunnels went online in March to capture and hold most of the stormwater and sewage that would normally spill into the Anacostia when it rains. After the storms pass, the stored wastewater gets treated at the Blue Plains Advanced Regional Wastewater Plant before being discharged into the Potomac.

Officials hoped the tunnel would capture and temporarily store 80 percent of the stormwater that normally flowed in the Anacostia. As of mid-December, it was outperforming that expectation, Ray said, capturing 89 percent, despite record rainfall in the District.

"This large source of pollution that's been going on for years and years and years is now being taken off the table," he said.

From March 20 through mid-December, even though the system captured 4.48 billion gallons of stormwater and sewage, 540 million gallons still went into the Anacostia, Ray said.

But that should change when another tunnel segment is completed in 2023. Then, nearly all of the stormwater-diluted sewage that once went into the river will get treated. A future expansion will capture other overflows that now go into the Potomac.

"My neighbors probably didn't want to see so much rain, but it was good for me because we got to test the tunnel, and the whole system," Ray said.



*A torrent of rainwater from a parking lot and highway courses its way to a stormwater outfall pipe at Woods Road and Route 50 in Cambridge, MD. (Dave Harp)*

### Oysters take a hit

Oyster surveys in much of the Bay were still going on in December. But in the Potomac River, where they were complete, the news was bad.

Oysters on bars in low-salinity areas of the Potomac suffered mortality rates upward of 90 percent, and on one bar "they didn't find a living oyster," said Martin Gary, executive secretary of the Potomac River Fisheries Commission.

"The Potomac has a history of freshets, but this was a bad one," Gary said. Bars farther downstream took hits as well, he said.

High flows can sometimes be good for spat sets — when oyster larvae settle on the bottom and begin growing. Good spat sets usually yield abundant oyster harvests a few years later.

But that wasn't the case this year, at least not in the Potomac. Gary said oyster reproduction there last summer was "dismal."

But oysters that survive the freshwater will face less of a chance of dying from two lethal oyster diseases, MSX and Dermo, which have devastated the Bay's oyster population in the past, but prefer high salinities.

Ryan Carnegie, an oyster disease researcher with the Virginia Institute of Marine Science, said he is seeing "very low levels" of MSX, and infections by Dermo are the lowest observed since 1989.

"We've seen the parasites being basically knocked back," Carnegie said. "So, if there is a silver lining, that's one. If [oysters] can survive the freshwater, they are going to gain an added benefit from reduced disease pressure."

### A mixed bag for other species

The surge of freshwater lowered salinities throughout the Bay, essentially pushing stinging jellyfish out of most areas last summer — a relief for anyone trying to swim or work in the water.

"There have been some years where we had to go and get wetsuits," said Dave Secor, a professor with the University of Maryland Center for Environmental Science. "But this year, it was an absolute zero. I've never encountered that before."

Strong flows can also be beneficial to anadromous fish, which live in the ocean but return to freshwater to spawn. Maryland DNR surveys showed striped bass, American shad and blueback herring all had good reproduction and survival this year.

The status of blue crabs won't be known until the annual winter dredge survey is complete, but fishery managers said some strong blue crab catches were reported in early fall, especially in the lower Bay. They think high flows may have pushed the crustaceans down the Chesapeake and helped to concentrate them.

But lower salinities associated with strong river flows could have other implications as well. Gary said fishermen were catching blue catfish, a nonnative species that doesn't like high salinities, at the mouth of the Potomac late in the fall, when salinities were just 7 parts per thousand — less than half of what's normal.

That's bad news because the high freshwater flows may have enabled the blue catfish to escape the Potomac, where they are normally trapped by higher salinity water near its mouth, and spread throughout the Bay and

into rivers where it hasn't previously been reported.

Biologists have been concerned that the voracious predator could disrupt the Bay's food chain. With salinities low almost everywhere last year, Gary said, "blue catfish have gone pretty much anywhere they wanted to go."

Meanwhile, populations of dark false mussels, a native species that likes lower salinities, surged in several Western Shore rivers in Maryland. Clearer water was also reported in some of the areas where robust numbers of the water-filtering bivalves were found.

"In the past, when we've seen these mussel blooms in response to freshwater events, it has actually spurred underwater grass recoveries in a lot of cases," said the DNR's Landry.

That could help grasses bounce back in places like the Magothy, Severn and other rivers where the mussels were reported, she said.

Scientists say they aren't surprised that last year's deluge seems to have produced a mixed bag of results in the Bay.

"That's the really interesting part," said Peter Tango, monitoring coordinator with the state-federal Chesapeake Bay Program. "Estuaries by their nature are dynamic and experience these sorts of fluctuations."

Indeed, estuaries are places where freshwater and saltwater meet and mix so the species that live in them tend to tolerate a range of conditions. Some fare better than others whatever the natural conditions, but most eventually bounce back from weather-related setbacks.

"It is going to be interesting in 2019, because it will be the test case of how resilient the Bay was with all of this fresh water runoff," VIMS' Bob Orth said.



# A cabin waits for you along the Appalachian Trail



*The Robert Humphrey Cabin, nestled among Virginia mountains, is one of many cabins available for rent from the Potomac Appalachian Trail Club.*

STORY & PHOTOS BY  
WENDY MITMAN CLARKE

For years, my friend Alison has been telling me, “You’ve gotta rent a Potomac Appalachian Trail Club cabin! You’ll love it!”

So here we were, my husband and I, on a late winter afternoon so dank and foggy we could have driven into the side of a mountain without knowing it. We were following the west branch of the Naked River, a tributary of the Shenandoah, traveling up a dirt road in what seemed like the Middle of Nowhere, VA, until we rounded a slight bend, and there in the woods was the unmistakable outline of a small, old log cabin.

This was it: the Robert Humphrey Cabin, built in the late 1700s and one of 42 dwellings that the Potomac Appalachian Trail Club maintains along and near the trail from southern Pennsylvania to Charlottesville, VA. From completely primitive one-room cabins that require a vigorous hike-in to the beautiful and commodious Highacre House in Harper’s Ferry, WV, where Presidents Grover Cleveland and Bill Clinton have visited, the club’s cabins are an extraordinary collection of dwellings that tell stories of the Chesapeake Bay’s headwater region in a completely unique and personal way.

Some were built by Prohibition Era moonshiners, and others by the Civilian Conservation Corps, forest rangers, farmers, and even PATC members. They range in era from the late 1700s to the 1970s and encompass styles from one-room log or stone structures to traditional frame farmhouses. Some are nestled deeply in the woods along tumbling creeks; others, perched in high mountain meadows, offer stunning views.

Each has its own story and features, such as “an active and reliable spring that feeds into a cast-iron bathtub, which, according to legend, T. S. Eliot, W. H. Auden, Winston Churchill and Bertrand Russell bathed in when it

was located at a guesthouse at the University of Virginia.” That’s at the Morris Cabin, according to the club’s helpful guidebook, which provides a history of the cabin network, photos and details about each cabin, as well as practical information such as how to operate a woodstove, and certain caveats, all delivered through clear and occasionally wry prose.

For example: “Most bathrooms are outside and don’t flush. They don’t smell like the toilet at home.” And, “There will be games, but the deed for Park Place may be missing.” And, “Those who fear snakes should not rent a cabin. Renters are not allowed to harm or kill snakes.” (Snakes are not the only potential wildlife encounter. According to the history book in our cabin, a mountain lion was frequently sighted at dusk at the local spring in 1999 and 2000.)

Included in a \$40 annual membership fee, all of the cabins are available to rent year-round to PATC members, while 17 of them are open to the public. Many are pet-friendly. The cost varies from cabin to cabin and depends on several factors, including how far in advance you make the reservation and whether it’s for a weekend or week-day. Typically, the cabins cost from \$35 to \$65 per night, although some are more expensive (up to \$155 per night).

My friend Alison, who is a member, takes her family off the grid every year to spend several days over Thanksgiving in one of a range of their favorite cabins in and near Shenandoah National Park. They schlep pounds of food and gear through the woods, sometimes through snow, to bunk together, play board games by candle and oil lamp, go hiking and exploring, blissfully ignore the “real” world, (there’s no electricity or cell-phone coverage), and prepare a Thanksgiving meal using an open fire and, on occasion, a traditional cast-iron cookstove.

I was not so ambitious. I wanted a taste, not a full immersion, without extensive planning. And when I called the club’s cabin coordinator, she agreed that the “semi-primitive” Robert Humphrey was a great choice.

“I call it a starter cabin,” she told me. “It’s great for first-timers, because it has electricity and a driveway.” We wouldn’t have to hike in, although, as at the majority of the cabins, we would need to provide our own water or purify water from a local source — in this case, the spring — use a privy and heat the place with the woodstove.

I made the reservation for a December weekend and about 10 days before the date, a packet arrived with my renter’s form, the key, written directions, pertinent details about the cabin and a return envelope in which I would



*A sign points the way to the spring at the Humphrey Cabin.*





*The Humphrey Cabin, named in honor of a longtime member and cabin volunteer with the Potomac Appalachian Trail Club, has electricity and a warm-weather, spring-fed sink, but guests need to heat with a wood stove and use a privy. The cabin was built in the late 1700s, and the adze marks made when the logs were first shaped are still visible..*



send back the key and my renter's report once we were back home.

All of this organization (42 cabins are rented year-round by hundreds of people) and maintenance is handled by the PATC, an all-volunteer organization formed in 1927 to build and maintain the Appalachian Trail from central Pennsylvania through West Virginia, Maryland and into Virginia. All told, the PATC oversees more than 1,000 miles of trails in all four states, including 240 miles of the AT, and more than 80 shelters and cabins.

According to its website, the club has more than 7,000 members, around 2,000 of whom volunteer annually for all kinds of work, from maintaining trails to repairing shelters, building or upgrading cabins, writing guidebooks and staffing desks.

The name and contact information of Dave Jorgensen, an Annapolis-based volunteer who tends the Robert Humphrey cabin, was provided in my packet. Jorgensen has stayed in nearly every cabin in the network. "Each one has its own special ambiance, which is the cool part," he said.

Jorgensen has been a PATC volunteer since he was a teen. He and his father, Thomas, now a regional supervisor for the club, worked for years to repair and restore the Humphrey cabin, which was "a complete mess"

when they started.

"We've redone all the chinking, all the exterior wood on the front deck, built a new outhouse and the walkway to the outhouse," Jorgensen said. "The old chimney fell down. That's what the outdoor kitchen is pretty much built of. We redid the stone hearth inside."

Actually, that was a very short list, which I learned once we settled in to the cabin, lit the woodstove (no problem, because a primary rule is to leave a full wood bin and some kindling for the next renter), and dug into the treasure trove of history in the cabin's logbook and a couple of binders that Thomas Jorgensen had put together.

Made of chestnut, pine and oak (chestnut on the lower beams, to resist termites), the cabin has wooden-peg construction for its roof beams and dove-tail notches at the log ends. The adze marks made when the logs were first shaped are still plainly visible. Its original chinking was made with mud mixed with hogs' hair.

Sometime after the Civil War, the cabin was moved from a nearby original site to where it sits now, hard by the Naked River's west branch and sheltered under the shoulders of the surrounding mountains. For 140 years, it was the homestead of the family of Joe Lamm, who filed as a settler there in 1880, and the Weaver family.

After some restoration work in the 1980s, the PATC had been using the cabin for storage when Thomas Jorgensen arrived in 1995 with his then 13-year-old son, Dave, and found "the porch roof off its supports, rotten porch boards, snake heaven from the chimney rocks in the yard...birds, squirrels, and a raccoon (go figure) living on the second floor and five years of accumulated dust. Over the next 3 years, Dave & I became best friends for life ... PATC and [this] cabin have provided a bond between my son and I that will go on for eternity."

Over time, they and a small army of volunteers have steadily worked to maintain and upgrade the cabin, working on projects ranging from the mundane — such as ongoing mouse battles and sweeping up ladybugs upstairs — to the complex, including building an excellent walkway to the privy (by far one of the nicest privies I have visited), an outdoor kitchen and a clever outdoor sink at the end of the porch with running water that in warm months is plumbed from the spring.

Tucked by the fire, we cooked our homemade tomato soup and grilled cheese sandwiches on the stovetop and read aloud from the cabin's logbook, to which each renter is encouraged to contribute.

Here, we learned about a nearby

year-round neighbor who owns roosters and has a penchant for nonstop loud classic rock (we only heard the creek running during our visit), where to find good pie (at the IGA supermarket in the town of Shenandoah), the ongoing battle against mice ("P.S. There is mouse poop in the red kettle"), and what renters did for fun, which included hiking in Shenandoah National Park, tubing on the river, visiting neighboring Mountain Top Ranch to go horseback riding, touring Luray Caverns, fishing in Naked Creek, playing games, eating (lots of eating and drinking) and stargazing.

Entries ranged from short and businesslike to full-blown narratives, but one written in January 2016, by someone who seemed to be channeling their furry canine friend, seemed to sum it all up: "I rode in the back seat, staring at the deep vast of wilderness in the Shenandoah Mountains. I explored the Robert Humphrey cabin grounds, and I spied on the classic rock/rooster neighbors. I chased the mice in the cabin, peed on the trees, and enjoyed the roaring wood burning stove. When it snowed on Sunday, I ice skated on the Appalachian Trail. I wish I could live here forever."

For information about the PATC cabin network, visit [patc.net](http://patc.net).





*Snow geese take flight over the water at the Blackwater National Wildlife Refuge on Maryland's Eastern Shore. The geese migrate south from the Canadian Arctic to spend the winter along the coast between Massachusetts and South Carolina.*

STORY BY JEREMY COX  
PHOTOS BY DAVE HARP

## Snow geese extravaganza hits home

When birdwatchers flock to Blackwater National Wildlife Refuge on Maryland's Eastern Shore this winter, they are likely to witness one of the most dramatic sights nature has to offer in the Chesapeake Bay region.

Snow geese will gather by the thousands in marshes and farm fields and on the water. Then, it will happen: an explosion of noise and color as the birds honk in unison and dart into the air at once.

"If you've seen them in a large flock in an agricultural field, they fly in unison like blackbirds do. When they're swirling and shimmering on a field, it's an amazing sight to see, a pretty large group of birds working together like that," said Josh Homyack, waterfowl program manager for Maryland's Department of Natural Resources.

"You tend to hear them before you see them," said Matt Whitbeck, a U.S. Fish and Wildlife Service biologist based at Blackwater.

There's a story behind the abundance of snow geese at Blackwater and other sites across the mid-Atlantic, one that casts the species' showy displays in a different light. To understand how there came to be so many, it helps to start at Blackwater itself.

The refuge lies about 12 miles south of Cambridge along a swath of low-lying, soggy land dominated by tidal marsh and loblolly pine forests. Coupled with its proximity to corn and winter wheat farms, Blackwater is a prime resting and feeding area for winter waterfowl, such as

Canada geese, tundra swans and, of course, snow geese.

One of the biggest attractions at Blackwater is its 4-mile Wildlife Drive, a two-lane road that bisects the most avian-populated portions of the refuge.

On any given day from October to April, visitors might see up to 11,000 snow geese (*Anser caerulescens atlanticus*) inside the southern Dorchester County refuge. The federal government established Blackwater in 1933 as a sanctuary for waterfowl like the snow goose, and that mission continues more than eight decades later.

Many of the management decisions made by the Fish and Wildlife Service, which operates the refuge system, revolve around rolling out the welcome mat for those birds. About 800 of the refuge's acres are designed and maintained specifically to make those birds feel at home, Whitbeck said.

That acreage includes land where crops such as corn, clover and winter wheat are grown but not harvested — so they can become food for the birds. And it includes water impoundments, which are drawn down in the summer to encourage the growth of marsh plants for the birds to eat in the winter. The refuge's workers also keep the area clear of phragmites, a stalky nonnative plant that chokes out nutritious natives.

"We think of it as setting the table for these waterfowl," Whitbeck said.

White-bodied with black wing tips, snow geese cut a distinctive figure whether flying or foraging along the ground for tubers or roots. They spend their winters in a strip near the coast between Massachusetts and South



Carolina. Come spring, they migrate to the Canadian Arctic, where they breed.

The dominant species in this Atlantic flyway is the greater snow goose. But sometimes birdwatchers may spot its cousin, the lesser snow goose, which is more common in the middle of the continent and in the West. Indeed, they are smaller, but the difference in size is nominal, Whitbeck said. The tell-tale sign of a lesser snow goose flock is the presence of a blue or dark version of the species sprinkled in with its otherwise white mates.

The snow goose population at Blackwater varies substantially from year to year, he added.

"They can be very hit-or-miss," Whitbeck said. "Some years, we have 5,000 or 6,000 snow geese that will be present all season on the refuge, and other years we have zero."

As of mid-December, Blackwater was still awaiting the full-scale seasonal return of its snow geese. Whitbeck recalled glimpsing a couple of flocks roosting on the water around sunrise for a few mornings in late November or early December. After dawn, they'd be gone, off to gobble up spilled corn in agricultural fields north of the refuge. But the birds soon disappeared as suddenly as they had appeared.

Weather seems to dictate where these nonhuman "snowbirds" settle for the winter, experts say. During warmer years, they may "short-stop" in southern Quebec. Colder temperatures may send them winging deep into the Carolinas.

"A lot of these birds, they'll only come as far south as they have to," Whitbeck said.

The time they spend in the southern portion of their range is no winter vacation, he said. Because the nesting season is so short, snow geese begin bonding into pairs before heading north. They also use the time to pack on as much fat as possible. The energy they store up over the winter enables them to complete the long trip back north and to concentrate on nesting preparations once they get there.

"The birds are exploiting the productivity of the Arctic, but it's only available for a short period of time," said Kevin McGowan, a bird expert with the Cornell University Lab of Ornithology in New York.

By the 1930s, many waterfowl species were spiraling toward extinction. Without action, conservationists feared that the Canada goose, the snow goose and other water birds would soon go the way of the passenger pigeon, which was hunted out of

existence in 1914.

Commercial hunting was taking a heavy toll on snow geese numbers in Canada and the Eastern United States. In the early 1900s, researchers estimated their population to be little more than 3,000 birds.

A snow goose hunting ban went into effect in 1931. Within a few years, the federal government began setting aside more than a dozen refuges, including Blackwater, to preserve marsh and farmland feeding grounds for the snow goose and other wintering waterfowl species.

The creation of the refuges triggered a chain of events that, slowly at first and then accelerating toward the end of the 1900s, brought snow geese back from the brink of extinction, researchers say. The result was the kind of turnaround that conservationists dream about, Homyack said.

But there was a problem: The actions worked too well.

"Eventually, it hit a certain point where [the snow goose population] just exploded," he said.

The refuges and hunting prohibition stabilized the snow goose population, setting the stage for it to surpass 100,000 birds by the 1970s. During that decade, snow geese began changing their behavior in a way that ignited a gosling boom, Homyack said. They increasingly began feeding on the harvested cropland adjacent to the refuges instead of the marshes inside. That coincided with a sharp increase in corn production, giving the geese more opportunities to forage.

Wildlife managers responded to the snow goose's growing numbers by reinstating hunting for the species. But the effect on the U.S. population was muted, according to background information in a Canadian Wildlife Service report. By then, warmer winters had driven flocks farther north in the winter, where hunting is less prevalent.

During the 1980s and '90s, the population was doubling every eight years. In 1998, Canadian and U.S. wildlife officials jointly declared that the species had become "overabundant." Today, there are up to 1 million snow geese criss-crossing the flyway, according to the Canadian Wildlife Service.

The snow goose's comeback has been so pronounced that scientists are now concerned that the birds may be setting themselves up for ecological disaster. For the last two decades, their habitat in the Canadian tundra has been showing signs of exhaustion under the stress of so many geese.

For now, though, these are heady times for snow goose fans at Black-



*The snow goose population in Canada and the Eastern United States has rebounded from a low point in the early 1900s to approximately 1 million today.*

water and beyond. Their arrival draws birdwatchers and wildlife photographers from near and far. Unlike bald eagles and resident Canada geese, which live in the Chesapeake region year-round, the snow goose's presence is fleeting.

"If you want to go out and see the snow geese in all their glory, there's no better time than now to do it," Homyack said.

### Where the snow geese are

Here are some prime places to spot snow geese in the Chesapeake Bay region:

✦ **Back Bay National Wildlife Refuge**, 4005 Sandpiper Road, Virginia Beach, VA: A 10,000-acre barrier island on the Atlantic Ocean, the refuge abounds with winter waterfowl. The population peaks in December and January.

✦ **Blackwater National Wildlife**

**Refuge**, 2145 Key Wallace Drive, Cambridge, MD: Visitors can drive, bike or walk the length of the approximately 4-mile Wildlife Drive, as well as hike on the associated trails, dawn to dusk every day. The road offers stunning vistas of waterfowl roosting on water impoundments and the Little Blackwater River.

✦ **Middle Creek Wildlife Management Area**, 100 Museum Road, Stevens, PA: A 5,000-acre tract that's home to tens of thousands of snow geese in February and March. Record numbers of geese have arrived in recent years.

✦ **Prime Hook National Wildlife Refuge**, 11978 Turtle Pond Road, Milton, DE: More than 100,000 snow geese are at the refuge during peak migration. The refuge hugs Delaware Bay on the opposite side of the Delmarva Peninsula from the Chesapeake Bay.



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Snow falls on Beaverdam Creek along the Tubman Trail at Blackwater National Wildlife Refuge. (Dave Harp)

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*A skein of geese flies over Eastern Bay near its confluence with the Wye River at Bennett Point in Maryland. (Dave Harp)*

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A ring-billed gull hunkers down during a cold, windy January morning. (Dave Harp)

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# FORUM

## COMMENTARY • LETTERS • PERSPECTIVES

### Don't let the bounty of the Chesapeake become only a memory

By **BILL BARTLETT**

You get to a certain point in your life and you know that your days are numbered. You have a lot of years to look back and reflect on the parts that you enjoyed the most. One of those things for me is the Chesapeake Bay.

I have traveled all around to different parts of the Bay. I have swam and fished in many areas, but most of my memories are on the lower Potomac River, about 18 miles up from the Bay.

I was born and raised in Washington, DC, for my first 9 years, a big city boy. I didn't know about the Bay or any of its tributaries.

My first trip to Southern Maryland was for a week's vacation on the Patuxent River. My first fishing attempt was with a hand line; a piece of wood with the line wrapped around it with one hook and a lead sinker. It didn't matter because there were so many fish that you were always catching something. Sometimes it was fish you didn't want to catch like eels and toadfish, but mostly it was spot and croaker. My first fishing trip and I was hooked (pun intended).

The spot were small and bony but I liked the taste after having eaten only frozen fish from the grocery store. The croaker were big enough to be filleted and my mother fried them in bacon grease. Yum yum! I learned that I really liked to fish and eat them, too.

Somebody suggested that I try to catch some crabs. What were crabs and how would I catch them? There was an old wooden row boat where we were staying. I placed a basket on the front seat, tied the rope around my waist, and waded into the water. I was given a crab net and told to scoop up the crabs with the net.

Of course, all of my first efforts were for naught. The grasses kept getting stuck between my toes and the crabs were pretty fast.

Eventually, I got the hang of it and caught a few crabs. The water was to my chest, about 4 feet deep and I could still clearly see the bottom. When I talked to old-timers, they said that you used to be able to see 12 feet down. The grasses are mostly gone from where I remember them.

The crabs were steamed in a big pot with what I learned later was Old Bay seasoning. Eating crabs was another thing I had to learn. I think most people did what I did and started eating the



*Will the youth of tomorrow be able to wade into the Bay and scoop out blue crabs using only a net? (Dave Harp)*

claws first. They were the easiest. You just had to whack them with a wooden hammer. Then you had to open the crab up to get to the chunks of good crab meat. I just watched others who knew what they were doing remove the dead man's fingers. That term might be enough to turn some people off from eating crabs. They are the lungs, which just do not taste good.

After my first time experiencing what the Chesapeake Bay had to offer, I told my mother that one day I would have a place on the river. I had a friend whose parents bought a place on the Potomac River. I used to come down with them

on weekends and vowed that one day I would have a place of my own.

I came to know a farmer who used to farm a long strip of shoreline that he had decided to sell as lots. I was only 19 at the time and could not afford a lot on the river but there was one lot on a tidal pond. The lot on the tidal pond had a patch of land with trees and brush that separated the pond from the river. He said that all I had to do was to pay him the interest, which I did until I went into the military service, at which time I made my final payment. (He knew that he could not hold me to a contract because I wasn't 21. Thank

you, Mr. Ernest Lane.)

In 1954, Hurricane Hazel came right up the river and tore down the trees and brush and killed all of the freshwater fish in the pond. The river then flowed into the pond at high tide and went out with the low tide. There was one good thing: I could pull my 12-foot aluminum boat out to the river.

One of my greatest experiments was raising oysters in floats off the end of my pier. When the pond was open to the river, it stayed salty. I bought floats with oyster spat that were about the size of the end of my thumb. I even got a break on my taxes by buying these floats.

I asked when the spat was set so I could gauge how long it would take for the oysters to get to 3 inches, the legal size. I was completely amazed when I found that some of my oysters had reached 3 inches in 14 months. It usually takes about three years in the river. When I contacted my supplier about this he said that was about right.

It was such a great convenience to get oysters out of the float any time I wanted. On one occasion when my sister and her daughter-in-law came to visit from Minnesota, I told them about my oyster operation and showed them how to shuck an oyster. They asked what I did with it after it was shucked. I picked up the shell and slurped the oyster into my mouth. They were not very receptive.

Things were great for a couple of years and I bought more floats. Then the little creek that ran in and out with the tide closed off. As the rains came, the pond became fresher and fresher. All of my oysters died.

As I got older, I learned to do things better. I got some nice fishing gear. I learned to troll for rockfish and how to use artificial lures to catch white perch. I enjoyed catching perch on light tackle as much as I did catching big fish on heavy tackle. I used to walk the beach early in the morning with a bucket and a crab net. I could usually catch all the crabs I needed this way.

As the years passed, the crabs became more scarce. I had to look on the jetties and the pier poles. Now I don't see any crabs when I walk the beach.

I used to fish for perch at just about any place on the beach. I used to get just enough for a meal because I knew I could always get fish any time I wanted. Not so any more.

Once in a while I get lucky and

**BOUNTY** CONTINUES ON PAGE 41



## FORUM

## COMMENTARY • LETTERS • PERSPECTIVES

## Bay crossing study needs to consider importance of Shore farms

By JOHN PIOTTI

Some might not think of it this way, but farmland is critical infrastructure akin to roads and bridges.

It is the source of the food that sustains us. In addition, farmland provides open space, areas for recreation and habitat for wildlife. It also controls floods, suppresses fires, filters water and represents a vast carbon sink to mitigate and even help reverse climate change. Think Maryland's Eastern Shore.

As Americans — blessed with a remarkably productive agricultural landscape — we need to take a holistic vision of the future: one that acknowledges farmland as irreplaceable infrastructure we cannot afford to lose, supports environmentally sound farming practices and views farmers as the stewards of that land, worthy of our fervent support — because, at heart, what farmers do is for all of us.

That's why we are asking the Maryland Department of Transportation to consider farmland among the impacts in the Chesapeake Bay Crossing Study, which is exploring the feasibility of a third span across the Chesapeake Bay.

Farmland is essential infrastructure for Maryland's economy and efforts to combat climate change.

Farmland contributes a trillion dollars a year to the U.S. economy — more than \$8.25 billion from Maryland's agricultural land, and \$3 billion of value add. Farming is a critical economic engine for The Shore. Queen Anne's County alone boasts the most farmland acres and the largest farming economy in Maryland. Kent is the county with the largest percentage of land — 76 percent — devoted to agriculture. Talbot and Caroline counties are similarly reliant on farming and farmland.

Importantly, well-managed farmland is a one-of-a-kind-tool in the fight



Farmland contributes a trillion dollars a year to the U.S. economy. (Dave Harp)

against climate change and can help Maryland meet its 2020 goal to reduce greenhouse gases by 34.66 million tons. According to the 2017 annual report of the Maryland Commission on Climate Change, "Land conservation and sustainable management offers an important mechanism for mitigating and adapting to climate change...[helping] to avoid or diminish additional greenhouse gas emissions which would be associated with development."

Farmland loss is serious and accelerating. In May 2018, the American Farmland Trust released the most comprehensive assessment undertaken on the loss of U.S. farmland, *Farms Under Threat: The State of America's Farmland*.

Key findings include:

Between 1992 and 2012, almost 31 million acres of farmland were lost, 3 acres a minute, 175 acres per hour no longer available to produce food, fuel and fiber.

Nearly twice the area of farmland was lost than was previously shown.

Development disproportionately occurred on agricultural lands, with 62 percent of all development occurring on farmland.

Expanding urban areas accounted for 59 percent of the loss. Low-density residential development, or the building of houses on 1- to 20-acre parcels, accounted for 41 percent.

A subsequent report will analyze state-level data on past farmland conversion and the effectiveness of state-level farmland protection policies,

including a state policy score card.

We must protect our most productive, versatile and resilient farmland.

*Farms Under Threat* identified that only about 17 percent of all the land in the continental United States is suited for intensive food and crop production. Maryland's Eastern Shore is blessed with a high percentage of prime farmland and must be protected — as much as 77 percent for counties like Kent and 55 percent for Queen Anne's counties.

Highway expansion is a significant driver of farmland conversion.

While establishing a new bridge corridor or expanding a current one followed by the expansion of necessary highways may be the most obvious approach to addressing traffic congestion, there is growing consensus that this approach is ineffective.

Alternative solutions to traffic congestion have been proposed and should be considered — a regional transportation authority and system, managed demand strategies, and land use policies that promote compact growth and walkable communities to name just a few. These alternatives are in line with the Maryland Commission on Climate Change's recommendations, which emphasize the need to avoid or reduce future growth in vulnerable coastal areas (like the Chesapeake Bay region).

In the trust's analyses, development has been shown to follow highways and thus is a significant driver of farmland conversion. Development has unintended and often unobserved consequences on farming. It uproots farmers, pushes food production to more marginal lands and hampers the ability of remaining farmers to do what they do productively.

We need to save the land that sustains us. No farms, no food, no future.

John Piotti is president and CEO of American Farmland Trust.

## BOUNTY FROM PAGE 40

come across a school and catch enough for a meal. People today catch a few fish and are satisfied that they have accomplished something.

When I started my family, I had the opportunity to share all of the good things about the Bay with my wife and two daughters. They learned to swim in the river. They did crab and fish some but never with the enthusiasm that I had. They liked to eat crabs but

protested loudly about the spot and perch that they had to debone.

It is very sad for me when I look back at how things have changed. The water is not as clear and clean as it used to be.

We used to head over to the Ragged Point lighthouse to fish. There would be many boats there on weekends along with the marine police checking them out. We always wondered if they would get to us, but they never did because there were so many boats.

Today there are few to be seen.

There is less wildlife in and around the Bay. I used to see large flocks of seagulls waiting on piers to watch rockfish and bluefish feeding on menhaden before flying out to pick up the scraps.

In the fall, there were many schools of menhaden all over the river, now they are mostly gone. It is said that the reduction fleet that catches millions of pounds of menhaden is not hurting the Bay. That is just not possible. Those

fish are filter feeders scooping up phytoplankton and zooplankton by the ton and they are food for many other fish and birds.

I am thankful for the time that I have had on the Chesapeake Bay and all of the food that it has provided. I only wish that many more people would have the same opportunities I had.

There are people working to make things better. I hope they succeed.

Bill Bartlett, a longtime Bay observer, lives in Valley Lee, MD.



# FORUM

## COMMENTARY • LETTERS • PERSPECTIVES

### Trickle up effect: Reducing Bay's nitrogen will lower greenhouse gas level

By TOM HORTON

A tale of two gases: both colorless, odorless and essential to life; now also both imperiling life as humans boost them to unnatural levels.

Carbon dioxide (CO<sub>2</sub>) gets the most press, though it's a mere trace of Earth's overall atmosphere, at about .04 percent. But that's now around 40 percent higher than natural, enough to risk calamitous climate change if we don't soon change our habits.

Nitrogen virtually is the atmosphere, some 78 percent of it. Humans have dramatically increased the amount that is biologically available to Earth's lands and waters by 100 percent higher than the natural level, overfertilizing and degrading the Chesapeake Bay and other coastal waters worldwide.

If there's good news here, it's that resolving our excesses of these two very different elements often involve similar actions. So a climate change denier bent on restoring the Chesapeake Bay would almost have to support big reductions in CO<sub>2</sub>. Climate warriors who wouldn't know a sook from a jimmy crab will nonetheless be helping to revive our oxygen-poor estuary.

The most straightforward synergism with CO<sub>2</sub> and nitrogen is the burning of fossil fuels to power our industries, run our vehicles and heat and cool our homes.

It's the biggest driver of climate change, releasing CO<sub>2</sub> that traps the planet's heat and destabilizes climate. It's the second biggest source of excess nitrogen, stripping it from its inert, harmless dinitrogen (N<sub>2</sub>) form in the atmosphere to create the nitrogen oxides that poison the Bay — and our lungs.

Burning coal in particular is also a major source of the mercury that has led to so many health advisories on eating everything from crappie to largemouth bass and walleye around the Chesapeake region.

Reject fossil fuels, save the Bay, save the world — same same.

"Trees are the answer," my forester friend Larry Walton always said. Indeed, they sequester carbon, buffering the Bay against nitrogen. And they are way better looking and more full of life than parking lots.

So plant and protect trees Baywide/worldwide for those reasons — and increasingly to solve another problem of climate change. Our weather is projected to become "flashier," meaning with more intense rainfalls (Maryland's



Planting trees not only helps the Bay, but the world as well. (Dave Harp)



### Chesapeake Born

Ellicott City comes to mind) and more intense droughts.

Forests let the rains soak in and meter them back through groundwater during droughts, in effect stabilizing the Bay against flashy weather better than any other land use.

Agriculture is the Bay's leading source of polluting nitrogen, covering about a third of the watershed. It was the invention of industrial processes a century ago to pull unlimited nitrogen from the atmosphere for fertilizer that made farming a major source of excess nitrogen in coastal waters worldwide.

The way we manage ag land can have significant, positive benefits for keeping nitrogen out of the water and CO<sub>2</sub> out of the air — minimal plowing, winter plantings of cover crops after the harvest, vegetated buffers between farms and waterways can help with both.

Online calculators are a good way to see the carbon/nitrogen overlaps. Many are familiar with the ones that let you plug in your lifestyle and tote up your individual CO<sub>2</sub> "footprint." Recently,

the University of Virginia and the Chesapeake Bay Foundation have devised the first nitrogen calculators (go to n-print.org or the CBF website).

A cautionary note: My students at Salisbury University figured out that a very low-nitrogen, Bay-healthy diet would be vodka and french fries three times a day.

That is so bad for human health that it might actually solve the biggest and least talked-about way we can get CO<sub>2</sub> and nitrogen reductions: stabilizing and reducing population.

Deciding to have one fewer child cuts CO<sub>2</sub> by 60 tons a year, versus about 2.5 tons saved by going car-free, one ton by going veggie and a quarter ton by recycling, according to a 2017 *Science Magazine* study.

I haven't seen similar numbers done for population and nitrogen. But people have to eat, and given agriculture's big contribution to excess nitrogen, I'd expect an impact similar to CO<sub>2</sub>.

In fact, a critical difference between our two chemicals of concern is that we can legitimately strive for a prosperous society that is virtually carbon-free, but we will always need lots of nitrogen to feed ourselves, maybe more than we use now, given hundreds of millions of people who are malnourished now and a population projected to add billions more.

Next there's heat — not just the hotter days that climate change predicts, but hotter water already witnessed in places like the Chesapeake Bay. Hotter water is already threatening eelgrass, a valuable aquatic habitat. It's also going to make oxygen depletion in the Bay worse and toxic algae blooms more likely — all this in combination with excess nitrogen.

Back on land, hotter weather means more heat-related deaths, particularly in cities. Stepping up urban tree planting both cools cities and absorbs CO<sub>2</sub> and nitrogen.

Finally, there's a lot we don't know about the combined effects on the nature of more CO<sub>2</sub> and hotter weather — the two may offset one another in some cases. Throw nitrogen into the mix and calculating impacts can get even more complicated.

Generally though, the message is clear: Healthy Bay, healthy planet — two for the price of one.

Tom Horton has written about the Chesapeake Bay for more than 40 years, including eight books. He lives in Salisbury, where he is also a professor of Environmental Studies at Salisbury University.





## VOLUNTEER OPPORTUNITIES

### Paradise Creek Nature Park

*Volunteer Service Days* at Paradise Creek Nature Park in Portsmouth, VA, are scheduled 9–11 a.m. Jan. 19 & 26, Feb. 16 & 23 and March 16 & 30. Help pull invasive species and care for edible plants or maintain trails and recreation amenities. All ages are welcome, ages 11 & younger must be accompanied by an adult. Dress to get dirty; closed-toe shoes and long-pants are recommended. Bring insect repellent and water bottle. Registration is required. Info: Kat Fish at [kfish@elizabethriver.org](mailto:kfish@elizabethriver.org), 757-392-7132.

### Annapolis oral history project

The Annapolis Maritime Museum is looking for volunteers to help archive and expand its *Oral History Project*. Twenty-five years of more than 200 interviews of Eastport residents collected by local historian Mike Miron were donated to the museum upon his death. Miron's recordings focused heavily on the stories of local boat builders. The museum's project is designed to more fully preserve his contributions while also adding to it. New interviews focusing on the area's broader maritime history are being conducted by museum volunteers. Each new interview is recorded using digital technology, then archived. The museum posts audio and word searchable versions of transcripts on its research portal, [amaritime.org](http://amaritime.org). Info: Caitlin Swaim at [museum@amaritime.org](mailto:museum@amaritime.org).

### Oregon Ridge guide training

The Oregon Ridge Nature Center in Cockeysville, MD, needs adult volunteers to help with school field trips, Tuesday through Thursday, year-round. Volunteers lead small groups of

elementary students around the park for a hands-on nature experience. There is no minimum time commitment. Training is scheduled 10 a.m.–1 p.m. Feb. 5–8. This season's topics include maple sugaring, butterflies, reptiles and nature apps. The fee is \$20 for first-time attendees. Info: 410-887-1815, [info@OregonRidgeNatureCenter.org](mailto:info@OregonRidgeNatureCenter.org).

### CBL Visitor Center

Volunteer docents, ages 16 & older, are needed at the Chesapeake Biological Laboratory's Visitor Center on Solomons Island, MD. Volunteers must commit to a minimum of two, 3– to 4-hour shifts each month in the spring, summer and fall. Training sessions are required. Info: [brzezins@umces.edu](mailto:brzezins@umces.edu).

### Adopt-a-Stream program

The Prince William Soil & Water Conservation District in Manassas, VA, wants to ensure that stream cleanup volunteers have all of the support and supplies they need for trash removal projects. Participating groups receive an Adopt-A-Stream sign from the PWC Public Works Department in recognition of their stewardship. To learn more, adopt a stream or get a proposed site, visit [waterquality@pwsacd.org](mailto:waterquality@pwsacd.org). Groups can also register their events at [trashnet-work.fergusonfoundation.org](http://trashnet-work.fergusonfoundation.org).

### Little Paint Branch Park

Help the Maryland-National Capital Park and Planning Commission remove invasive species 11 a.m. to 3 p.m. the last Saturday in January, February and March at Little Paint Branch Park in Beltsville. Learn about native plants. Sign in for a safety orientation. Gloves and tools are provided. Info: Marc Imlay at [Marc.Imlay@pgparks.com](mailto:Marc.Imlay@pgparks.com), 301-442-5657.

### Cromwell Valley Park

Cromwell Valley Park near Towson, MD, needs volunteers for *Habitat Restoration Team / Weed Warrior Days*: 2–4 p.m. Jan. 16, 26 & 30 and Feb. 6, 9, 23 & 27. All ages (12 & younger w/adult) are welcome. Remove invasive species, install native plants and maintain restored habitat. Service

## WORKDAY WISDOM

Make sure that when you participate in cleanup or invasive plant removal workdays to protect the Chesapeake Bay watershed and its resources that you also protect yourself. Organizers of almost every workday strongly urge their volunteers to wear long pants, long-sleeved shirts, socks and closed-toe shoes (hiking or waterproof). This helps to minimize skin exposure to poison ivy and ticks, which might be found at the site. Light-colored clothing also makes it easier to spot ticks. Hats are strongly recommended. Although some events provide work gloves, not all do; ask when registering.

Events near water require closed-toe shoes and clothing that can get wet or muddy.

**Always bring water.** Sunscreen and an insect repellent designed to repel both deer ticks and mosquitoes help.

Lastly, most organizers ask that volunteers register ahead of time. Knowing how many people are going to show up ensures that they will have enough tools and supervisors. They can also give directions to the site or offer any suggestions for apparel or gear not mentioned here.

hours are available. Meet at Sherwood House parking lot. No registration is required. Info: Laurie Taylor-Mitchell at [ltmitchell4@comcast.net](mailto:ltmitchell4@comcast.net).

### Magruder Woods

Help Friends of Magruder Woods 9 a.m. to 1 p.m. the third Saturday in January, February and March remove invasive plants in the forested swamp in Hyattsville, MD. Meet at farthest end of the parking lot. Info: Marc Imlay at [Marc.Imlay@pgparks.com](mailto:Marc.Imlay@pgparks.com), 301-283-0808, (301-442-5657 the day of event); or Colleen Aistis at 301-985-5057.

### American Chestnut Land Trust

The American Chestnut Land Trust in Prince Frederick, MD, needs volunteers for invasive plant removal workdays 9–11 a.m. Thursdays and 10 a.m.–12 p.m. Wednesdays. All ages (16 & younger w/adult) are welcome. Training, tools and water are provided. Preregistration is required. Info: 410-414-3400, [acltweb.org](http://acltweb.org), [landmanager@acltweb.org](mailto:landmanager@acltweb.org).

### Anita Leight Estuary Center

Anita C. Leight Estuary Center in Abingdon, MD, is looking for volunteers, ages 14 & older, to become *Invasinators* 1–3 p.m. Jan. 13. Participants will remove invasive species and plant native ones. Dress for the weather and be prepared to work at either Leight Park or Bosely Conservancy. If there is frozen ground or snow accumulation, the workday is canceled. This program is for ages 14 to

adult. Info: 410-612-1688, 410-879-2000 x1688, [otterpointcreek.org](http://otterpointcreek.org).

### Ruth Swann Park

Help the Maryland Native Plant Society, Sierra Club and Chapman Forest Foundation 10 a.m. to 4 p.m. the second Saturday in January, February and March remove invasive plants at Ruth Swann Park in Bryans Road. Meet at Ruth Swann Park-Potomac Branch Library parking lot. Bring lunch. Info: Marc Imlay at [ialm@erols.com](mailto:ialm@erols.com), 301-283-0808, (301-442-5657 day of event). Carpoolers meet at the Sierra Club MD Chapter office at 9 a.m. and return at 5 p.m. Carpool contact: Laurel Imlay at 301-277-7111.

### Floatable monitoring program

The Prince William Soil & Water Conservation District in Manassas, VA, needs volunteers to help assess and trace trash in streams as part of an effort to reduce nonpoint source pollutants in urbanized and industrialized areas in relation to the County's Municipal Separate Storm Sewers (MS4) permit. Cleanup supplies are provided. Info: [waterquality@pwsacd.org](mailto:waterquality@pwsacd.org).

## RESOURCES

### Creek Critters App

The Audubon Naturalist's *Creek Critters App* empowers people to check on the health of their local streams through finding and identifying the small organisms — or creatures — that live in freshwater streams, then generating stream health reports based on what they find. The free app can be downloaded from the App Store and Google Play. Info: [anshome.org/creek-critters](http://anshome.org/creek-critters). To learn about partnerships or host a Creek Critters event, contact [cleanstreams@anshome.org](mailto:cleanstreams@anshome.org).

### Watershed education capsules

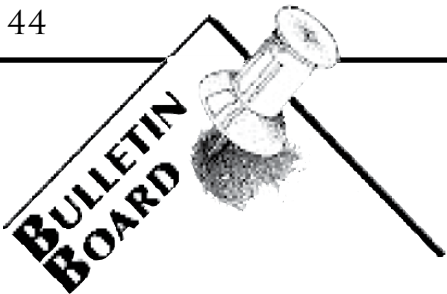
Prince William (VA) Soil and Water Conservation District's *Watershed Capsules*, which teach students about the important functions of watersheds, are available, first-come, first served. Info: [pwsacd.org/educators](http://pwsacd.org/educators), [education@pwsacd.org](mailto:education@pwsacd.org).

### Park passes for 4th graders

The Maryland Department of Natural Resources is partnering with the U.S. Department of the Interior's *Every Kid in a Park* program to provide fourth-grade children and their families free admission to national public lands and state parks. The Maryland Park Service will honor the federal passes, valid through Aug. 31, 2019, at all 75 state parks. The passes are also valid at 16 national parks, six national natural landmarks, five national wildlife refuges and two federal heritage areas in the state. The program's goal is to increase access to public lands and facilities







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for children at an impressionable age to ignite their interest and love for the outdoors. It also offers teachers resources for planning field trips, including free access for classes and eligibility for federal transportation funding. In addition, the DNR offers educational resources for teachers. The pass covers admission, but does not cover amenities and services, such as boat rentals, camping or staff-led tours. For details or to print a pass for this year, google *Every Kid in a Park* and follow the directions on the website.

## Wildlife education trunks

The Maryland Department of Natural Resources is offering a variety of wildlife education trunks for use by teachers, homeschool educators, naturalists, scout leaders and other instructors. These free, interdisciplinary tools are designed to interest students in local wildlife while building on disciplines like art, language arts, math, physical education, science and social studies. Each trunk contains an educator guide with background information, lesson plans and hands-on K–12 activities, as well as activity supplies, books, furs, replica tracks and videos. Trunk subjects include aquatic invasive species, bats, black bears, furbearers, white-tailed deer and wild turkeys. Trunks are available at seven locations around the state and can be borrowed on a first-come, first-served basis for up to two weeks. Info: Google Wildlife Education Trunks.

## Marine debris toolkit

The National Oceanic and Atmospheric Administration's Office of National Marine Sanctuaries and the NOAA Marine Debris Program have developed a toolkit for students and educators in coastal and inland areas to learn about marine debris and monitor their local waterways. This toolkit is a collaborative effort to reduce the impact of trash on marine ecosystems through hands-on citizen science, education and community outreach. Info: Google marine debris monitoring toolkit for educators.

## Bilingual educator resources

Bilingual lessons are available in English and Spanish for Interstate Commission on the Potomac River Basin educational programs. Info: [potomacriver.org/resources/educator](http://potomacriver.org/resources/educator).

## Bay Backpack

Provided by the Chesapeake Bay

Program's Education Workgroup, the Bay Backpack is an online resource for educators with information about funding opportunities, field studies, curriculum guides and lesson plans related to the Chesapeake. Contact: [baybackpack.com](http://baybackpack.com).

## VA water monitoring test kits

The Virginia Department of Environmental Quality is distributing a limited number of water monitoring kits to test for dissolved oxygen, pH, turbidity and temperature. These kits are available for free to schools and organizations that do not have water-monitoring equipment. The DEQ requests that participants use these kits as part of the *EarthEcho Water Challenge* (formerly known as World Water Monitoring Challenge. See [worldwatermonitoringday.org](http://worldwatermonitoringday.org)). Groups with their own monitoring equipment can also participate in the event. Teachers, or those who work with a large number of students, can request a free kit. Contact: Stuart Torbeck at [charles.torbeck@deq.virginia.gov](mailto:charles.torbeck@deq.virginia.gov) and provide a mailing address, the number of monitoring locations and the number of participants from the organization or school expected to participate in the *EarthEcho Water Challenge*. This information helps to determine how many kits a group needs. The Virginia Water Monitoring Council provided the kits for this effort.

## Baltimore biodiversity toolkit

The *Baltimore Biodiversity Toolkit* addresses the need for high-quality and accessible green space in the city, not only for native plants and animals, but for residents as well. It helps communities identify a suite of ambassador animals that represent habitat types within, and historic to, this area; shares practical resources for supporting specific wildlife needs; monitors and encourages the collection of citizen science data; and develops a culture of conservation and stewardship. The toolkit highlights 20 ambassador wildlife species from four different habitats. These animals represent a variety of conditions that are present in high-quality environments for human, plant and animal health. The multi-platform toolkit is designed to help partners prioritize community greening projects based on representative species, citizen science data and spatial analysis that includes social, economic and ecological indicators. Info: [fws.gov](http://fws.gov).

## MD 2019 state park passes

The Maryland Department of Natural Resources' *2019–2020 Annual State Park and Trail Passport*, which provides unlimited day-use admission and boat launching at state parks, and a 10 percent discount on state-operated concessions and boat rentals is available. The annual passport is valid for a full year from the month of purchase, instead of by calendar year. (For example, a passport purchased in April 2019 will expire in April 2020. It

## NEW SUBMISSION GUIDELINES

The *Bay Journal* regrets it is not always able to print every notice it receives because of space limitations. Priority is given to events or programs that most closely relate to the preservation and appreciation of the Bay, its watershed and resources. Items published in *Bulletin Board* are posted on the online calendar; unpublished items are posted online if staffing permits. Guidelines:

✉ **Send notices to** [kgaskell@bayjournal.com](mailto:kgaskell@bayjournal.com). Items sent to other addresses are not always forwarded before the deadline.

✉ *Bulletin Board* contains events that take place (or have registration deadlines) on or after the 11th of the month in which the item is published through the 11th of the next month. Deadlines run at least two months in

advance. See below.

✉ Submissions to *Bulletin Board* must be sent either as a Word or Pages document, or as simple text in the body of an e-mail. PDFs, newsletters or other formats may be considered if there is space and if information can be easily extracted.

✉ Programs must contain all of the following information: a phone number (include the area code) or e-mail address of a contact person; the title, time (online calendar requires an end time as well as a start time), date and place of the event or program. Submissions must state if the program is free, requires a fee, has age requirements, has a registration deadline or welcomes drop-ins.

✉ **March: February 11**

✉ **April: March 11**

comes in a self-contained packet with a detachable hang-tag for use in any vehicle. Proceeds from passport sales fund the operations and maintenance of state parks, including conservation, education and interpretation of cultural, historical and natural resources. Maryland's 75 state parks include more than 900 miles of trails for biking, hiking and horseback riding, water access and camping facilities. The cost is \$75/MD residents and \$100/non residents.

## FORUMS / WORKSHOPS

### MD Master Naturalist Training

The University of Maryland Extension invites adult volunteers interested in becoming a Maryland Master Naturalist to attend a training program 9 a.m. to 3:30 p.m. Mondays, March 18 through May 20 at Oregon Ridge Nature Center in Cockeysville, MD, a host site for the Piedmont Region Program. Participants will complete 60 hours of hands-on learning in natural history, environmental interpretation and conservation stewardship with expert instructors. Final certification is awarded after 40 hours of volunteer service at Oregon Ridge. The fee for the program is \$250. To apply, stop by the Nature Center for an application or visit [extension.umd.edu/masternaturalist](http://extension.umd.edu/masternaturalist).

### Watershed Moments workshop

The Carroll County Forest Conservancy District Board invites the public, ages 16 & older (18 & younger w/adult) to its *Spring Thaw Workshop - Watershed Moments*, 8 a.m. to 3 p.m. March 23, at Wesley Freedom United Methodist Church in Sykesville, MD. Experts from private, state, federal and local government agencies will present topics covering flood risk management; the Ellicott City floods; stormwater

implementation strategies to improve water quality; rain gardens and other homeowner-scale stormwater management techniques; riparian forest buffer restoration; stream health and local trout waters; tree care and pruning for storm resilience; an overview of the USDA Areawide Tick Integrated Pest Management Project; the interrelation between bees and trees; choosing the best trees for pollinators and tips on how to protect bees and other pollinators when applying pesticides. Several breaks throughout the day will provide an opportunity for meeting the speakers and visiting exhibitor tables. Morning coffee and pastries, snacks, a hot lunch and workshop materials are included in the registration fee of \$50/individual or \$75/couple. Register at: [carrollcountyforestryboard.org](http://carrollcountyforestryboard.org) by March 15. Info: Donna Davis at 410-848-9290, [donnal.davis@maryland.gov](mailto:donnal.davis@maryland.gov).

### Native Plant Symposium

The Prince William County (VA) *Native Plant Symposium for Beginners* takes place 9 a.m. to 2 p.m. Feb. 23 at the McCoart County Administrative Building in Woodbridge. Participants will learn about landscaping with native plants and creating habitat for birds and pollinators as well as why native plants help to save money on fertilizers and pesticides, improve water quality and curb erosion. The fee of \$15 includes coffee, donuts, lunch and materials. Preregistration is required. Info: [pwcgov.org](http://pwcgov.org).

## EVENTS / PROGRAMS

### RVA Environmental Film Fest

The *2019 RVA Environmental Film Festival* takes place Feb. 4–13 & 16 at various sites in the Richmond area, including Lewis Ginter Botanical

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Gardens; public libraries in Chesterfield and Henrico; the Science Museum of Virginia, University of Richmond, Virginia Commonwealth University; and WCVE Studios. The festival showcases local and national films for all ages that raise awareness of issues relevant to Richmond, the United States and Earth. Attendees can see the premiere of *The Swamp*, the story of both the destruction and possible resurrection of the Everglades. Other feature films include *Hometown Habitat*; *Stories of Bringing Nature Home*, which explains why native plants are critical to the survival and vitality of local ecosystems; *Minimalism: A Documentary About the Important Things*; *A Man Named Pearl*; and *The Devil We Know*. While the Festival is free, attendees may need to download tickets for some films to ensure seating. For film titles, detailed synopses, dates and venues, google RVA Environmental Film Festival.

**Annapolis Museum lectures**

The Annapolis Maritime Museum invites the public to its Winter Lecture Series. Lectures take place at 7 p.m. in the museum's Bay Room. The schedule is:

- ☞ *Memoir of a Skipjack*: Jan. 17. Author Randolph George will discuss how these vessels are a window into Bay heritage.
- ☞ *Exploring the Water Trail of Capt. John Smith - 1,800 Miles in Capt. Smith's Wake*: Jan. 24. John Page Williams of the Chesapeake Bay Foundation.
- ☞ *Human Impacts on the Chesapeake - Smithsonian Environmental Research Center Studies of the Rhode River Ecosystem*: Jan. 31. James G. Gibb of the Smithsonian Environmental Archaeology Laboratory will speak.
- ☞ *Island Life - Chesapeake Bay*: Feb. 7. Photographer Jay Fleming will speak.
- ☞ *Submerged Aquatic Vegetation*

**Chesapeake Challenge & Bay Buddies**

Answers to  
**Reef Sweet Reef**  
quizzes on page 27.

Ghost anemone: 4 & D  
Hooked mussel: 7 & C  
Oyster pea crab: 3 & G  
Redbeard sponge: 2 & A  
Sea squirt: 5 & F  
Skilletfish: 1 & B  
Whip coral: 6 & E

- *Restoration Strategies for the Chesapeake Bay*: Feb. 14. M. Stephen Ailstock, director of Anne Arundel Community College's Environmental Center.

☞ *Maritime Annapolis - A History of Watermen, Sails & Midshipmen*: Feb. 21. Journalist & author Rosemary Williams will share local lore about the birth of the grittier side of Annapolis.

☞ *Restoring Spa Creek*: Feb. 28. Donna Jefferson of the Spa Creek Conservancy will discuss taking an urban creek from endangered to swimmable.

Admission is \$10 per lecture. Registration is not required; pay at the door. Info: amaritime.org.

**CBEC School's Out Camp**

The Chesapeake Bay Environmental Center in Grasonville, MD, invites children to its *Winter Wonderland School's Out Camps* 9 a.m.-3:30 p.m. Jan. 21 (*Hibernation Heroes*); Jan. 31 (*Wonders of Fire*); Feb. 1 (*Feathered Friends*); and Feb. 18 (*Up in the Air*) for a day of hands-on nature exploration and play. Activities include environmental lessons and games, hiking trails and exploring the woods, arts & crafts and healthy snacks. Participants must bring a lunch and water bottle and dress for the weather. Dress in layers and bring a change of clothes in case your child gets muddy. Details will be sent by email to all registrants a few days before the camp. Fee: \$45. After-care, which is available until 5 p.m., is an extra \$10. Preregister at bayrestoration.org/schools-out-camp. Info: email knelson@bayrestoration.org.

**Mix art, science at CBMM**

The Chesapeake Bay Maritime Museum in St. Michaels, MD, invites young mariners, ages 4-9, to participate in its *Winter STEAM (Science, Technology, Engineering, Art, Math) Team*. Two sessions take place each Saturday in February. The first, which meets 10 a.m. to noon, is for ages 4-6; the second, from 1-3 p.m., is for ages 7-9. Program themes are *Digging Down & Digging it Up - Practicing a Little Archaeology!* (Feb. 2); *Star Power—Astronomy Is Looking Up!* (Feb. 9); *Rock-ing it with Geology!* (Feb. 16); and *Build a Boat & Make it Float!* (Feb. 23). The fee is \$15 per class. Need-based scholarships for individual classes are available. Advance registration is required. Info: cbmm.org/steamteam.

**Paradise Creek Nature Park**

Upcoming events at Paradise Creek Nature Park in Portsmouth, VA, include:

- ☞ *Guided Ranger Walks*: 2-3 p.m. Jan. 19 & 26 and Feb. 16 & 23. All ages (11 & younger w/ adults) Learn about native plants and wildlife, look for signs of winter wildlife. Free.

- ☞ *Trees of Virginia*: 2-3 p.m. Jan. 13. All ages (11 & younger w/ adults) Workshop begins in the new River Academy classroom, ends with a short

walk to put new skills to the test. Free.

- ☞ *Winter Bird Walk*: 9-10 a.m. Feb. 2. More than 150 species have been spotted at the park. Bring binoculars, or borrow a pair. Free.

- ☞ *Beginner Winter Wilderness Survival for Children*: 9-11 a.m. Feb. 9. Learn how to build shelters, find your way, leave trail markers, basic wilderness first aid. Supplies provided. Will meet some Girl Scout and Boy Scout wilderness survival badge requirements. Cost: \$10.

- ☞ *River Star Homes Workshops*: 9-11 a.m. March 2. Residents in the Elizabeth River area who commit to seven steps at their homes to help the river can join the group's Project's River Star Homes program. Free. Info: riverstarhomes.org.

Preregistration is required for all program. Info: Kat Fish at 757-392-7132, kfish@elizabethriver.org.

**MD Arbor Day poster contest**

The Maryland Department of Natural Resources and Forest Conservancy District Boards invites all Maryland fifth-graders students to compete in the 2019 Arbor Day Poster Contest, "*Trees Are Terrific...and Forests are Too!*" They must be drawn in acrylic, crayon, ink, marker, paint pens, regular or colored pencils, tempera paint or watercolor. All entries must be delivered to a local Maryland Forest Service office by noon Feb. 1. Poster sizes must be no smaller than 8.5 by 11 inches and no larger than 22 by 28 inches. Posters will be judged on a county level and then submitted to the Maryland Urban and Community Forest Committee to compete at the state level. The top three posters will receive tree plantings at the artists' schools: first place wins 15 trees; second place, 10; and third place, five. Info: Anne Gilbert at 410-260-8510.

**Eden Mill Nature Center**

Upcoming events at Eden Mill Nature Center in Pylesville, MD, include:

- ☞ *DIY Winter Wreath*: 9:30 a.m. Jan. 12. Hike to collect evergreens, pinecones to create a wreath. Ages: 5+ Fee: \$8. Preregister by Dec. 29.

- ☞ *Winter Wildlife Hike*: 10-11:30 a.m. Saturday, Jan. 12. All ages. Explore park habitats, search for signs of activity. Dress for weather. Fee: \$5.

- ☞ *Preschool Nature Series*: 10-11 a.m. Jan. 15 (*Winter Adaptation - Here to Stay*); Jan. 29 (*Hibernation - Where Have the Groundhogs Been?*); Feb. 12 (*I Heart Nature*); Feb. 26 (*Special Snowflakes*). Ages 2-5 w/adult. Nature games & activities, story, craft hike. Fee: \$10 per date.

- ☞ *Winter Foragers*: 3:30 p.m. Jan. 15. Ages: 5+ Short hike, learn how animals survive in winter. Fee: \$5.

- ☞ *Winter Hiking Series / Animal Detectives*: 3:30 p.m. Jan. 23. All ages. Learn how to find, identify animal tracks. Fee: \$3.

- ☞ *Winter Tree ID*: 3:30 p.m. Jan. 24.

Ages: 6+ Learn to identify trees without leaves during hike. Fee: \$5.

- ☞ *Winter Wonderland Hike*: 9:30 a.m. Jan. 26. Ages: 5+ Fee: \$3.

- ☞ *Spring or Snow? The Groundhog Knows!* 4-5 p.m. Jan. 31. Ages: 6+ Learn about Punxsutawney Phil, PA's legendary weather forecaster. Make a top hat to wear on the big day. Fee: \$8. Preregister by Jan. 17.

- ☞ *JR Scientist / Homemade Ice Cream*: 4:30 p.m. Feb. 1. Ages: 5-14. Learn about the freezing temperature of water during homemade ice cream experiment. Preregister by Jan. 18. Fee: \$4.

- ☞ *Fly Tying for Fly Fishing*: 7-8:30 p.m. Feb. 5. A local fly fishing group will offer instruction, guidance on popular fly patterns to people of all experience levels. Materials, tools provided for those who don't own them. Ages: 8+ Fee: \$5.

- ☞ *Nature Storybook Art*: 12:30-2:30 p.m. Feb. 6, 13 & 20. Ages 6-12, parents do not attend. Art techniques include drawing, painting, collage, crafting/constructing. Fee: \$44 for the series.

- ☞ *Track & Trails*: 10:30 a.m. Feb. 7. Ages: 6+ Look for animal tracks, signs on short hike. Fee: \$5.

- ☞ *Snake Board*: 9:30 a.m. Feb. 9. Ages: 5+ Help build a snake board for the center's corn snakes to get some exercise. Free.

- ☞ *Nature's Sweet Treat*: 10:30 a.m. Feb. 21. Ages: 6+ Fee: \$5. Learn how maple syrup is harvested, made and what weather's role is. Make a treat.

- ☞ *Paracord Crafts*: 9:30 a.m. Feb. 23. Ages: 5+ Create survival crafts with paracord. Fee: \$6. Preregister by Feb. 9.

- ☞ *Cabin Fever Hike*: 10:30 a.m. Feb. 28. Ages: 6+ Learn how trees prepare for spring. Fee: \$8.

- ☞ *Skull Detectives*: 3 p.m. Feb. 15. Ages: 5+ Learn about animal skulls, how to identify predator from prey, the many uses of teeth. Fee: \$5.

- ☞ *Winter Hiking Series / Nature Journalist*: 3:30 p.m. Feb. 20. All ages. Create a drawn or written journal entry while hiking. Fee: \$3.

Except where noted, minors must be accompanied by an adult. Preregistration is required 24 hours in advance for all events; except where noted otherwise. Weekend program registration closes at noon on the prior Friday. Info: 410-836-3050 edenmillnaturecenter@gmail.com.

**Oregon Ridge Nature Center**

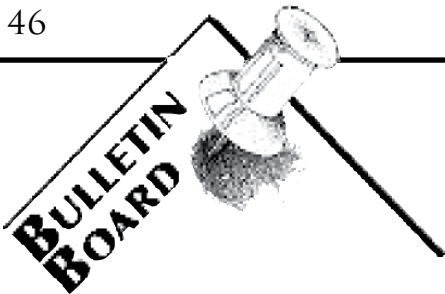
Upcoming programs at Oregon Ridge Nature Center in Cockeysville, MD, include:

- ☞ *Critters Up Close*: 1-2 p.m. Jan. 12, 13, 19, 20, 26 & 27. All ages Naturalist's choice animal encounter, activity such as story, craft or related outdoor exploration. Free; no registration.

- ☞ *Shoots & Letters*: 10-11 a.m. Jan. 17 (*Foxes & Coyotes*); Jan. 24 (*Beavers*);

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Jan. 31 (*Groundhogs*); Feb. 7 (*Rocks & Minerals*); Feb. 14 (*Fossils*); Feb. 21 (*Maple Sugaring*); Feb. 28 (*Winter Scavenger Hunt*). Ages 3+ Activities, outdoor adventures. Fee: \$2 per child. No registration.

☞ *Owl Prowl*: 6–8 p.m. Jan. 19. Adults, ages 6+ Learn about native owl species & how to recognize their calls, meet a resident barred owl, dissect an owl pellet (one per family), head outside to see if we can call in any owls. Fee: \$5.

☞ *ORNC Council Speaker Series / Hopkins Hydrology Research at Oregon Ridge*: 7–8:30 p.m. Jan. 21. Adults. Ciaran Harman, assistant professor & Russell Croft Scholar at Johns Hopkins University will discuss studies by her research group on how rain travels underground and in streams; how that water shapes the surface topography; hidden topography below ground; how rain becomes streamflow, how land preserves the memory of the rain that fell. Free; no registration.

☞ *Nature Book Club / The Inner Life of Animals*: 7–8 p.m. Jan. 28. Adults. Peter Wohlleben's book shows that animals think, feel and know in much the same way as humans do. Light refreshments provided, feel free to bring a snack to share. Free, preregistration appreciated.

☞ *Bookworm Story Time*: 11–11:45 a.m. Feb. 1, March 1. Toddlers to age 6. Nature story & activity. Dress for brief outdoor experience. Free; no registration.

☞ *Wake Up Groundhog!* 1–3 p.m. Sunday, Feb. 3. Adults, ages 5+ Learn lore, natural history of groundhogs. Dress for a short hike to look for animals. Fee: \$3.

☞ *Woolly Bear Club*: 10–11:30 a.m. Feb. 6, March 6, April 3, May 1, June 5. Ages 3–5 (non-mobile siblings only, adult is an active participant). Explore seasonal topics, outside adventures, crafts, theme-related snack. Fee: \$20 for series.

☞ *Fall in Love with Snowflakes*: 1–3 p.m. Feb. 9 & 10. Adults, ages 5+ Learn how snowflakes form, Snowflake Bentley's snowflake research. Make a snowflake. Fee: \$3.

☞ *Maple Sugaring Weekends*: 11 a.m.–4 p.m. Feb. 16, 17, 23 & 24. All ages. Learn about how maple syrup is made. Hike to the sugar bush to tap a tree, see how the sap is processed with current & antique technology, taste maple syrup, sugar. Watch *The Maple Sugaring Story* (20-minute film); *Sugar on the Snow* demos (12:30 & 3:45 p.m.); In the event of inclement weather, call

the center or check website, Facebook page for updates. Free, no registration required for individuals, families. Groups of 10 or more must preregister.

☞ *Annual Pancake Fundraiser Breakfast*: 8 a.m.–12 p.m. March 2 & 3. All ages. Menu includes hotcakes drizzled with maple syrup, grilled sausage, orange juice, milk or coffee. Raffles, live music, sales of flower, honey and maple syrup. Fee: \$8/adults; \$4/ages 2–8; free/ages 1 & younger.

Children 12 & younger must be accompanied by an adult. Except where noted, preregistration is required for all programs and payment must be made within five business days of registration. All programs take place rain or shine. Programs are designed for individuals and families, not groups. To arrange a program for a group, contact the park office. Info: 410-887-1815, info@OregonRidgeNatureCenter.org. For disability-related accommodations, call 410-887-5370 or 410-887-5319 (TTY), giving as much notice as possible.

### Patuxent Research Refuge

Upcoming events at the Patuxent Research Refuge's National Wildlife Visitor Center in Laurel, MD, include:

☞ *Screech & Kestrel*: 12:15–12:45 p.m. Jan. 12, 19, 26. All ages. Meet two of North America's smallest birds of prey. Learn how the American kestrel uses its acrobatic prowess to hunt, while the eastern screech owl is a stealthy silent hunter. No registration.

☞ *In the Theater - Green Fire*: 11 a.m., 12 p.m., 1 p.m., 2 p.m. Jan. 11 & 12. All ages. One-hour film, *Green Fire*, explores the life, legacy of famed conservationist Aldo Leopold, the ways his land ethic philosophy lives on. No registration.

☞ *Tiny Tots*: 10:30–11:15 a.m. Jan. 13 & 14. Ages 16–48 months w/ participating parent. Learn about the refuge's wildlife through interactive songs, stories, activities.

☞ *Family Fun: Winter Wonderland*: This drop-in program (come & leave as you wish) takes place 10 a.m.–1 p.m. Jan. 25 & 26. All ages. Learn about ice, snow, wintry weather through hands-on activities, crafts, games. No registration.

☞ *Bicycle Ride on Patuxent Research Refuge's North Tract*: 1–3:30 p.m. Jan. 27. Ages 10+ Experience the natural area's local wildlife, plants and historical sites. Learn the importance of reducing your footprint and leaving no trace on this 12-mile guided bicycle ride. Bring your own bike, snack, water bottle and helmet. Ride is weather dependent.

Except where noted, all programs require preregistration. They are also free; donations are welcome. Programs are designed for individuals/families. Adverse weather may cancel or change a program. Notify the refuge of any special needs. Info: 301-497-5887, fws.gov/refuge/Patuxent.

### Cromwell Valley Park

Upcoming programs at Cromwell Valley Park's Willow Grove Nature Center near Towson, MD, include:

☞ *Night Hike*: 6–7:30 p.m. Jan. 18. Ages 8+ Hike to the old stone shelter to listen for "Mr. Hooty." Fee: \$4.

☞ *Edible Greens & Pizza in Winter*: 1–2:30 p.m. Jan. 19. All ages. Head out outside to find natural toppings for a pizza. Fee: \$6.

☞ *Dead Leaves, Cheese, Butter & Kimchi*: 1–2:30 p.m. Jan. 20. Ages 8+ Learn how fermentation allows the planet to work, make kimchi. Bring a Mason jar if possible. Fee: \$7.

☞ *Gourd Bowls with Stone Tools*: 1–3 p.m. Jan. 26. This event takes place in the Primitive Tech Laboratory. Adults. Gourds were some of mankind's earliest containers. Use flint to open, shape containers. Decorate them with ocher. Fee: \$7.

☞ *Where Do They Go?* 1–2 p.m. Jan. 27. Adults. Streams, rivers seem devoid of fish in the winter. Learn what happens to them, where they go. Dress for weather. Free.

☞ *Whistle Pigs*: 1–2:30 p.m. Feb. 2. All ages. Whistle Pigs, pasture poodles, land beaver, woodchuck and groundhog are all the same animal. Learn about this animal, look for a den. Free.

☞ *Visit the Nature Center Day*: 11 a.m.–3 p.m. Feb. 3. All ages. Visit the animals, have a free cup of hot chocolate or coffee. Free. Drop-in program; no registration.

☞ *Happy Hearts!* 1–2:30 p.m. Feb. 10. Ages 3–10. Make heart-shaped pizzas, heart-shaped bird feeders for our feathered friends. Fee: \$6.

☞ *Full Maple Moon Night Hike*: 6–7:30 p.m. Feb. 15. Ages 5+ Native people made sugar during this moon. Hike to the sugar bush, then head back to the center for maple-flavored hot chocolate. Fee: \$5.

☞ *Fat Lamps*: 1–3 p.m. Feb. 16. Event takes place in the Primitive Tech Laboratory. Adults. Make a soapstone lamp that burns deer tallow fuel. Fee: \$5.

☞ *Nature Quest Winter Hike*: 1–3 p.m. Feb. 17. All ages. Pick up a Nature Quest Passport at the center, then join a naturalist to find the markers. Dress for the weather. Free.

☞ *Maple Sugaring Weekend*: Drop-in program takes place 11 a.m.–3 p.m. Feb. 23 & 24. All ages. Tap a tree, boil some sap, make a pancake. Free.

Ages 12 & younger must be accompanied by an adult. Except where noted, preregistration is required for all programs. Info: cromwellvalleypark, campbrainregistration.com, info@cromwellvalleypark.org, cromwellvalleypark.org, 410-887-2503. For disability-related accommodations, call 410-887-5370 or 410-887-5319 (TTY), giving as much notice as possible.

### Anita Leight Estuary Center

Programs at the Anita C. Leight Estuary Center in Abingdon, MD, include:

☞ *Critter Dinner Time*: 1:30 p.m. Jan. 26. All ages. Watch turtles, fish, snakes eat while learning about them. Free. No registration.

☞ *Meet a Critter*: 3:30 p.m. Jan. 27. All ages. Meet a live animal up close, learn what makes it special. Free. No registration.

☞ *Let it Snow!* 10:30 a.m.–12 p.m. Jan. 12. Ages 3–6. Stories, crafts, walk in the woods celebrate snow. Includes hot chocolate, treats. Fee: \$3/child.

☞ *Dugout Canoe Workshop*: 1–3:30 p.m. Jan. 12. Ages 13+ In three-part series, participants will carve a dugout canoe out of a tree for the center using Native American methods. Fee: \$3.

☞ *The Mystery of John Smith's Chesapeake Cross Markers*: 3–5 p.m. Jan. 13. Ages 13+ Capt. John Smith, on his 1612 map of the Chesapeake Bay, marked the extent of his explorations with 27 Maltese crosses. Ed Haile and Connie Lapallo, with the Chesapeake Conservancy, have embarked on a project to pinpoint and mark the cross locations in today's landscape. The pair will weave a tale of exploration, geography, research, cartography, Chesapeake mystery. Free; donations welcome.

☞ *All About Owls*: 1–2 p.m. Jan. 19. Ages 4+ Learn what makes owls such successful predators, craft a snowy owl from pinecones. Fee: \$3.

☞ *Owl Prowl*: 5–6:30 p.m. Jan. 19. Ages 8+ Meet at Bosely Conservancy to listen, look for owls. Fee: \$5.

☞ *Bosely Winter Wonders Photography Hike*: 1–2:30 p.m. Jan. 20. Ages 10+ Search the woods, waters of Bosely Conservancy for flora, fauna. Capture those images on camera using tips, techniques shared by photographer/author Dave Gigliotti. Fee: \$3.

☞ *If a Woodchuck Could Chuck...* 10:30 a.m.–12 p.m. Jan. 26. Ages 3+ Learn about groundhogs through story, play, craft. Fee: \$3.

☞ *Family Paint Night*: 6–7:30 p.m. Jan. 26. Ages 5+ Guided paint night includes hot drinks, cookies, creatures, firelight. Fee: \$10.

☞ *Hibernation Hideaway*: 1–2 p.m. Jan. 27. Ages 5–9 w/adult. Find out which animals make a nice comfy bed to sleep away the winter and what those hideouts look like. Later, build a cozy fort to curl up in and read a story while inside the center. Hot chocolate included. Fee: \$3/child.

Ages 12 & younger must be accompanied by an adult for all programs. Events meet at the center and require preregistration unless otherwise noted. Payment is due at time of registration. Info: 410-612-1688, 410-879-2000 x1688, otterpointcreek.org.



# Black scoter's secretive ways part of this sea duck's mystique

By MIKE BURKE

Sandy Point State Park sits at the northwestern foot of the Chesapeake Bay Bridge. It was nearly deserted on a clear, cold morning last January when we arrived to view some of the area's bountiful winter bird life. We weren't disappointed.

At our first stop, we set up the spotting scope to scan the open Bay waters for waterfowl. Thirty yards offshore, a dozen black (male) and brown (female) ducks bobbed in the gently rolling waters. I focused the scope on a black one first, but it immediately dove underwater. My attention shifted to another nearby male. It was compact and all black except for a butter-yellow knob at the base of its shortish black bill. There was no mistaking what it was: a black scoter (*Melanitta americana*).

The second bird quickly dropped out of sight. These birds were actively feeding. Although the flock was composed primarily of males, a trio of females was included. They are brownish overall with pale cheeks and a clearly defined dark cap. No tell-tale yellow bulb on the bill, though.

In flight, black scoters show a very dark wing lining with silvery pale gray outer feathers. They appear plump, almost pot-bellied, as they furiously flap by.

This small raft was typical of black scoters in the Chesapeake. They tend to keep to themselves, not joining the big mixed flocks of waterfowl that are common in the winter.

Black scoters start to arrive in the Chesapeake region in mid-October, but the biggest groups show up a bit later. They'll stay until late March.

There are three scoters that inhabit the Chesapeake Bay waters: white-winged, surf, and black. Although their plumages vary, these similarly shaped sea ducks are all diving ducks.

Only a few nests of this little-studied bird have been analyzed. The nests appear to consist of a hollow in the ground, lined with grass and down. The nests rest atop grassy areas near small ponds and lakes.

Scoters are born with full feathers and an impressive appetite. As soon as the natal feathers dry, these chicks are busy eating insects. Within minutes, they will be diving underwater for their dinners.

Because of their diet, the birds are looking for rocky bottoms where the substrate is home to aquatic invertebrates.

Black scoters are excellent divers. The birds we were watching were most likely feeding on clams in water that was probably more than 30 feet



Black scoters start to arrive in the Chesapeake region in mid-October, but the biggest groups show up a bit later. They'll stay until late March. (Howard Wu / travelerathome.com)



deep. They also take mussels, razor clams, scallops, the occasional semi-submerged crab and even a small amount of Bay grasses.

There are two populations of black scoter in North America.

Most of the Atlantic population winters in New England waters, but small groups will spread out sporadically all the way down to northern Florida and the upper Gulf Coast. They breed in the tundra

of northern Quebec. In the West, black scoters primarily inhabit the Pacific coastal waters down through Washington. But as is the case with their Atlantic relatives, small flocks will continue well down the coast, including Baja, Mexico. They breed in the arctic tundra of northern and western Alaska.

The black scoter has a cousin in Europe. Known as the common scoter (*Melanitta nigra*), it appears to be descended from the same ancestral species. They have become geographically isolated for so long that they are considered a separate species. A remote Russian arctic bay appears to have some overlap between the black and common, but it is not known for sure if they interbreed...just one of the many questions that scientists have about this enigmatic waterfowl.

Over the smooth waters of the Chesapeake, we could hear the plaintive whistles of the males. The ethereal tones seemed a perfect match for this little-understood visitor from the north.

A slight wind was stirring and we were beginning to feel the cold

standing by the open waters. Although most people know Sandy Point because of its inviting beaches and picnic areas in the summer, the park covers 800 acres. Heading inland a bit would get us out of the wind without diminishing our bird watching.

In addition to the open Bay, habitats here include jetties, sandy and rocky beaches, a marina, meadows, fields, marshes, ponds and an extensive forested tract.

More habitat means more birds. In fact, the park has hosted more avian species than any other Maryland location: 294!

We folded up the spotting scope and headed ashore for a little more warmth, hopeful that we would see a lot more birds.

Out on the Bay, the black scoters continued to dive and call. As they disappeared into the inky waters, I thought about how these mysterious birds continued to hide most of their secrets. Like the beckoning environs behind us, they hold avian wonders still to be discovered.

Mike Burke, an amateur naturalist, lives in Cheverly, MD.





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# Cry Fowl!

Winter months may seem devoid of wildlife, but each year thousands of swans, geese and ducks leave northern breeding grounds and migrate south to the Chesapeake Bay region. Birds from Alaska, Canada, north central United States, and New England are lured here as they seek out the open water of the Bay, its rivers,

and wetlands for habitat and food critical to their survival.

You may be familiar with mallard ducks and Canada geese that are at home in cities, suburbs and farms. But you may not be aware of the vast variety of wintering waterfowl here. Venture out to a park, wildlife management area or wildlife refuge and you will likely be rewarded



with a day full of beautiful birds.

— Kathy Reshetiloff /  
Chesapeake Bay Field Office,  
U.S. Fish and Wildlife Service



*The surf scoter will dive to capture its food, such as bivalves or slow-swimming crustaceans. It can eat its prey underwater. (Gary Kramer / USFWS)*



*The canvasback is the largest diving duck in North America. (Eugene Hester / USFWS)*



*The bufflehead, left, is small enough to nests in cavities created by northern flickers. (Donna Dewhurst / USFWS)*

*Green-winged teals (pair below) are frequently found among other dabbling duck species. (Tom Koerner / USFWS)*

*The long-tailed duck uses its wings when diving. This helps the bird to dive into deeper water than many other ducks. (Glen Smart / USFWS)*

