CHESAPEAKE
BAY JOURNAL
September 2023 Volume 33 Number 6
Independent environmental news for the Chesapeake region

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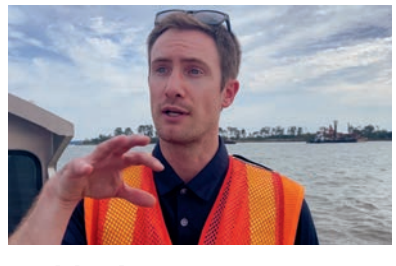
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Volunteers plant trees in Harrisburg as part of the Keystone 10 Million Trees Partnership. Will the statewide project meet its goal by 2025? Read the article on page 20. (Chesapeake Bay Foundation)

ON THE COVER

September blooms lend color to a marsh on the Chesapeake Bay's Eastern Shore. (Dave Harp)

Bottom photos: Left by Aaron Haines, center by Dave Harp, right by Jeremy Cox

CORRECTION

An article in the July/August issue about "forever chemicals" in wells near a W. L. Gore & Associates plant in Maryland misstated the company's explanation for how PFOA got into the material used in its products. A Gore spokesperson said the company did not use PFOA itself but that the compound was a "trace residual" in material supplied to it. The Bay Journal regrets the error.

EDITOR'S NOTE

Do you have our survey?

Hopefully, most of you have received the *Bay Journal* readers survey in your mail. We've been conducting this survey annually in recent years because it is the best way that we can collect feedback directly from large numbers of readers. Thousands of you have replied!

We compile the responses, generate charts to show what we've learned and share the results with our board of directors and staff. Throughout the year, as we consider story possibilities, I find myself saying, "Remember, readers told us they are really interested in that topic..." and explaining to grantmakers the ways you report using the information we produce.

I hope you'll return your completed survey to us as soon as possible. You can also complete the survey online at www.surveymonkey.com/r/bayjournal.

This year, I'd especially like to learn about your level of interest in big picture news and analysis — for the Bay region as a whole — compared to your interest in more localized issues that affect your state, county or community.

Closely related to that: You'll find survey questions asking what local environmental news coverage is like in your area. We operate the Bay Journal News Service, which distributes our articles for free use by other media, and we would like your help in identifying places where reporting gaps are strongest.

And with the survey, if you can, please consider donating to support our work. As a nonprofit news organization, it's a constant challenge to fund our reporting and take advantage of the many opportunities to increase our audience. Your help really does make a difference — and so does your feedback! I look forward to an overflowing mailbox and the opportunity to read your comments.

— Lara Lutz

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BY THE numbers

52
Number of years that it's been illegal to swim in the Anacostia River without special permission

40
Depth in feet of the Anacostia River at Bladensburg, MD, in the 1700s, when the town was an active port

3–15
Current depth in feet of the Anacostia River at Bladensburg after farming and development filled it with silt

1/3
Proportion of nitrogen pollution reaching the Chesapeake Bay that comes from air pollution

1,000
Estimated number of mosquitoes that a little brown bat can eat per hour

40
Number of states where white nose syndrome is known to be killing millions of hibernating bats

Wild rice: an autumn bounty for wildlife

Wild rice is an annual flowering aquatic grass, native to the Chesapeake Bay region. Both people and wildlife eat its seeds, which are full of protein and low in fat. It grows up to 10 feet tall and can be found along fresh and slightly brackish marshes, streams and other shallow waters of the Bay watershed.

- Few plants provide wildlife with as much food per acre as wild rice.
- Stands of wild rice provide shelter and food for various animals, from migrating shorebirds and waterfowl, such as sora rails, to wetland birds, such as red-winged blackbirds.
- Muskrats eat the tender stalks and use them to build lodges.
- In fall, the female flowers mature into seed heads full of rice grains. The plants spread only by dispersing seeds.
- Wild rice was a staple food source for Native Americans, who would shake the stalks and let mature seeds fall into their canoes. They also used the rice to make bread.
- Wild rice was once plentiful in Virginia and Maryland but is declining due to invasive plants, water pollution and grazing by large numbers of Canada geese. It's also vulnerable to climate change because it has a low tolerance for salinity and scientists predict that low-lying areas of the Bay region will be increasingly inundated with saltier water.

— A. Crable

(Background and top photos by Dave Harp, middle and bottom photos by Lara Lutz)

bayjournal.com/podcast

LOOKING BACK

30 years ago

Low eagle reproduction

A Maryland survey of bald eagles found the lowest number of young produced per breeding pair since 1983. ■

— Bay Journal, September 1993

20 years ago

Bay hammered by high flows

The Bay's summer "dead zone" was the largest in 20 years, stretching from Maryland's Bay Bridge to the York River in Virginia. ■

— Bay Journal, September 2003

10 years ago

Bay cleanup on track

The U.S. EPA said that Bay states were on track to meet their two-year milestones toward the 2025 Bay cleanup goals. ■

— Bay Journal, September 2013

ABOUT US

The *Chesapeake Bay Journal* is published by Bay Journal Media, an independent nonprofit news organization dedicated to environmental reporting in the Chesapeake Bay region. *Bay Journal* reporting reaches well over 250,000 people each month through news articles, columns, films and the *Chesapeake Uncharted* podcast.

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BAY JOURNAL NOTEBOOK

This image of oysters being harvested with a dredge was captured while producing the upcoming Bay Journal film, A Passion for Oysters. (Dave Harp)

Do you have 'a passion for oysters'? Join us!

A new *Bay Journal* film is coming soon. *A Passion for Oysters,* by Dave Harp, Tom Horton and Sandy Cannon-Brown, debuts in October. You'll be able to watch it at BayJournal.com — or, better yet, join us in Cambridge, MD, on Oct. 26 from 5-8 p.m. for a reception, screening and panel discussion. Tickets are $50 each. Registration and event details are at bayjournal.com/events. (Or see page 6 of this issue.) You'll learn a lot, have fun and support the *Bay Journal*! We'd like to extend a special thanks to our wonderful sponsors: Environmental Quality Resources, Froehling & Robertson, HD Squared Architects and Maryland's Best.

Over the summer months, vacations scattered our staff in all directions. Some went west, some east and some found diversions close to home.

Staff writer **Ad Crable** journeyed to Iceland, where he marveled at how his hostel room was heated by hot water pumped from the ground many miles away. Nine out of 10 homes in Iceland are heated via geothermal energy, and 99% of the electricity there comes from hydro and geothermal energy.

Writer **Whitney Pipkin**, meanwhile, took her family of five to the 98th annual pony swim on Chincoteague Island on Virginia's Eastern Shore. Her oldest daughter waded far into the marsh for the best view of the swim. "Also memorable," she added, were "the post-rain mosquitoes."

Writer **Jeremy Cox** took his 13-year-old daughter to Crisfield, MD, in August to goggle at the world's largest rubber duck (actually an inflatable). It towers more than six stories high. And it is very, very yellow. What was the point of all this? Jeremy isn't quite sure. The duck's website says it aims to be "an inspiration to enjoy the world's waterfronts and conserve our natural resources."

Editor **Lara Lutz** rafted the lower Youghiogheny River in western Pennsylvania in a two-person "ducky" with her husband, navigating most rapids successfully but with one crash into a stalled raft that sent them both flying.

Photographer **Dave Harp** managed to grab some down time at the Outer Banks, but he spent a lot of the summer putting finishing touches on *A Passion for Oysters.* You'll see the results of that work soon!

— T. Wheeler

NEWS briefs

LOCAL
REGIONAL
NATIONAL

Shenandoah Mountains could get scenic designation

U.S. Senators Tim Kaine (D-VA) and Mark Warner (D-VA) are working to create a Shenandoah Mountain Scenic Area to protect the region's headwaters and access to outdoor recreation. If approved, the Shenandoah Mountain Act would create a nearly 93,000-acre scenic area in the state's Rockingham, Augusta and Highland counties.

The scenic area would include four wilderness areas with 10 peaks higher than 4,000 feet and 15 miles of trails for hikers and other recreational uses. The area also includes the headwaters for the Potomac and James rivers, which supply drinking water to residents throughout the region. The cold mountain waters are a stronghold for native brook trout and at-risk species, including the Cow Knob and Shenandoah Mountain salamanders.

Many tourism and outdoors groups support the legislation. The Southern Environmental Law Center said a scenic designation would protect the area's recreational assets while prohibiting logging and industrial development like gas drilling and pipeline construction.

— W. Pipkin

Emergency size limit extended for striped bass

The striped bass management board of the Atlantic States Marine Fisheries Commission, which regulates in-shore catches of migratory fish, agreed on Aug. 1 to extend the 31-inch size limit it had imposed in May.

That limit, originally scheduled to expire on Oct. 28, will remain in effect for another year or until the board has replaced it with other conservation measures.

The commission has imposed tighter catch rules the last few years after scientists warned that striped bass, also known as rockfish, are being overfished and that the number of adult female fish had fallen too low. Scientists say catch-and-release fishing is killing many fish in summer when they are weakened by warm water temperatures and lower oxygen levels.

The 31-inch limit mainly affects anglers along the Atlantic coast because striped bass of that size spend most of the year roaming the ocean. They only enter the Chesapeake Bay in spring, and most have returned to the ocean by May, when anglers can begin to catch striped bass in the Bay.

— T. Wheeler

PA study finds link between fracking and cancers, asthma

Living close to hydraulic fracturing operations in western Pennsylvania elevates the risk of some forms of childhood cancer and worsens asthma in both children and adults, concludes a three-year health study commissioned by the state.

But the study by researchers at the University of Pittsburgh School of Public Health found no link between fracking and childhood leukemia or rare brain and bone cancer.

Researchers examined the medical histories of tens of thousands of people from 2010 to 2019 in seven counties surrounding Pittsburgh with fracking operations. They looked at the proximity of residents to gas wells, as well as compressor stations, wastewater impoundments and facilities that accept fracking waste.

The Marcellus Shale Coalition, an industry group, criticized the research as "inherently flawed" because it relied on medical records without measuring actual emissions or exposure data from fracking facilities.

— A. Crable

MD Supreme Court backs chicken farms in ammonia case

Maryland's highest court has reversed a lower court ruling that would have required state regulators to clamp down on ammonia emissions released into the air outside chicken farms.

The case, *Maryland Department of the Environment v. Assateague Coastal Trust*, hinged on whether the state's controls were adequate to address the potential threats to human health and water quality.

A 6–1 majority of the state Supreme Court ruled in an Aug. 9 opinion that regulators are addressing the air concerns through the state's 2019 stormwater discharge permit. Although the permit mostly seeks to rein in pollutants in waterways, MDE acknowledges and has used its authority to curb ammonia emissions on a case-by-case basis, Justice Brynja McDivitt Booth wrote.

The decision marked the third time since 2009 that Maryland's court system has rejected a challenge by the Assateague group to the state's general stormwater permit.

— J. Cox

This September, a rare chance to swim in the Anacostia

Polluted stormwater runoff delayed public event originally scheduled for July

By Whitney Pipkin

Parts of the Anacostia River are getting ever-so-close to the water quality standards needed to render it officially swimmable. But it's not quite there yet.

It's generally been illegal to swim in the Anacostia for more than 50 years. But an event planned for July 8 would have made it legal — for one day — for more than a hundred people to jump into a stretch of the river along Kingman Island. That spot is one of three that passed recreational water quality standards more than 90% of the time during weekly water quality monitoring in 2022.

So far this year, the site off Kingman Island was passing 83% of the time. The selected Saturday in July offered a good combination of high tide around noon, space on busy summer calendars and warm water.

"We didn't want people to jump in and it be freezing cold," said Anacostia Riverkeeper Trey Sherard, whose organization planned the event with the District of Columbia's Department of Energy and Environment.

But then, on the afternoon of July 6 — despite clear forecasts — it rained.

The river's drainage area got a quick dousing, with more than an inch of rain falling in a half-hour in one location. That was enough to cause the city's combined sewer system, which mixes raw sewage with stormwater, to overflow in two places into the Anacostia.

The water would no longer be safe for a swim. The "Splash" event was quickly rescheduled for Sept. 23.

A nearly $3 billion project to curtail overflows has been in the works for more than a decade and was, on July 8, just weeks away from preventing the kinds of overflows that washed out the swim event. DC Water's Clean Rivers Project has been building 18 miles of massive underground tunnels to store polluted stormwater runoff until it can be treated, ending nearly all of the overflows that have fouled the Anacostia for decades.

The first Anacostia tunnel came online in 2018, curbing overflows by 90%. The utility plans to bring a second tunnel online in September that will reduce total overflows to the river by 98%.

Construction on the second tunnel, though, may have played a role in one of the overflows that stopped the July swim. One of the outfalls was disconnected from the existing tunnel the day of the unexpected rain as part of the work to bring the new tunnel online, DC Water spokeswoman Pamela Mooring said. But the same "very intense rain" caused another outfall to overflow at the same time, she said, which may have been enough to stop the swim on its own.

"The timing was unfortunate," said Quinn Molner, director of operations for the Anacostia Riverkeeper, "but this Clean Rivers Project is going to undoubtedly do good things for water quality on the Anacostia."

Because of the impending progress on the new tunnel, organizers of the swim decided to postpone it until September. People wishing to participate in the rescheduled event will need to register at anacostiariverkeeper.org.

Sherard said plans for a one-off swim event have been in the works for at least two years. In 2018, as water quality in both the Potomac and Anacostia rivers began to improve, the DOEE issued an amendment to its 1971 swimming ban that allowed for permitted swim events to take place in District waters.

Holding a one-day swim event does not mean the river is open — or safe — for swimming. It will remain illegal to swim in District waters outside of permitted events like these, organizers were careful to point out. But the events could help get people ready for a day when that's no longer the case, Molner said.

"Obviously, the goal is an Anacostia that is fully swimmable," she said. But "these safe swim spots allow us to wade into the idea." ■

Baltimore Blueway plan aims to expand paddling in harbor

Advocates say water quality has improved enough to promote increased recreation

By Timothy B. Wheeler

Paddling Baltimore's urban waterways soon won't be just for the intrepid. The nonprofit Waterfront Partnership of Baltimore recently unveiled a "blueway" plan for developing a network of eight water trails to encourage more paddlers to get out on the Inner Habor and the adjoining Middle Branch of the Patapsco River.

The plan marks a milestone for the partnership, which launched a Healthy Harbor Initiative in 2010, aiming to make it safe for swimming and fishing.

It's taken longer than the group anticipated to clean up floating litter, chronic sewage overflows and industrial pollution. The group's leaders have yet to jump in the Inner Harbor, as they once vowed to do by 2020. But they say the time is ripe now for encouraging more people to get on if not in the water.

"After years of restoration, the Harbor has reached a tipping point where it can now be managed as a recreational resource," partnership vice president Adam Lindquist said in a release announcing the Baltimore Blueway plan.

City and state officials joined paddling enthusiasts at the Inner Harbor Aug. 3 to tout the Baltimore Blueway plan, saying that they hope it will spur tourism and business development, bring communities together and promote healthy lifestyles. Mayor Brandon Scott even kayaked in from a nearby marina with a group of youth to demonstrate his support.

"I saw things kayaking the Inner Harbor today that you didn't see when I was these young people's age," Scott said. "I saw jellies, I saw fish, we saw things that we want to see continuously coming back, and one day we'll be able to swim in the harbor — not most days, but every day of the year."

Scott credited the more than $2 billion overhaul of the city's leaky sewer system over the past two decades for making the harbor a safer place to recreate. The work, required by a 2002 federal consent decree, is still underway, but it has sharply curtailed

Baltimore Mayor Brandon Scott embarks from the Inner Harbor promenade after paddling in for the unveiling of the Baltimore Blueway plan on Aug. 3, 2023. (Timothy B. Wheeler)

the volume if not the number of sewage overflows that occur after significant rain.

The Waterfront Partnership says its water testing indicates the harbor is safe enough for kayaking most of the time, though it advises avoiding contact with the water for at least 48 hours after heavy rainfall.

But water quality sampling in 2022 by the nonprofit Blue Water Baltimore found that while bacteria levels were below the safety threshold most of the time in the Middle Branch, they were excessive half the time or more in places in the Inner Harbor.

Even so, Alice Volpitta, the Baltimore Harbor Waterkeeper with Blue Water, welcomed the plan to promote water recreation, suggesting it will build public appreciation of and support for clean water.

But she said it needs to include giving prospective paddlers up-to-date information on bacteria levels in the water and the impacts of recent rainfall so they can make an informed decision about whether to go out that day. While that can be found online, Volpitta suggested it should be readily available at the water's edge through signage posted at every launch site.

"People are already paddling in the harbor," Volpitta noted. They need to have that information and understand, she added, that "there's no such thing as a risk-free environment."

Stand-up paddleboarders join the festivities at the Baltimore Blueway event in August. (Timothy B. Wheeler)

Water quality aside, access for water recreation is limited. The city's Department of Recreation and Parks offers an assortment of paddling tours in the Inner Harbor and Middle Branch. The private Canton Kayak Club has more than 120 kayaks dispersed at waterfront launch sites around Central Maryland, including three in the city, but those are only for use by its 700 members.

The plan proposes expanding public access by upgrading eight existing launch sites and creating seven new ones, plus four "rest stops" where paddlers can dock to visit Fort McHenry national park and nearby Inner Harbor attractions, shops and eateries.

The trails would take paddlers mostly around the periphery of the Northwest and Middle branches of the Patapsco, steering clear of channels used by ships, water taxis, tour boats and other motorized vessels in what is still a working harbor.

Developing the entire blueway would cost an estimated $3.5 million, the plan says. As a first small step, a $125,000 grant from the Baltimore Tourism Improvement District will pay to install a floating dock and kayak launch at the Inner Harbor by next spring.

In the audience for the announcement was Bill Reuter, a downtown resident who said he and his wife are avid kayakers who have paddled all around Baltimore's waterfront.

"I think it's a good idea getting people out on the water," he said. But he added that "some of it's going to be a hard sell" unless or until more launch and docking sites are developed.

The harbor is a more inviting place to paddle now, according to Reuter. "It's significantly cleaner than it was eight or 10 years ago," he said. Paddlers can encounter wetlands and wildlife more typically found in rural settings, including bald eagles and muskrats, especially in the Middle Branch and around Masonville Cove.

Even so, when asked if he worries about possibly getting sick from splashing about in the harbor because of the city's continuing sewage issues, Reuter said he and his wife shower after their paddling excursions. ■

Advocates say MD's climate plan could help the Bay, too

Analysis calls for 'all-of-society' approach to reach 60% goal in 2031 and net-zero in 2045

By Jeremy Cox

Advocates of Maryland's efforts to curb greenhouse gas emissions have mostly touted the potential benefits of fighting climate change, improving air quality and boosting public health. But a newly released working draft of a plan to reduce those emissions acknowledges that some of the gains could spill over into another one of the state's top environmental missions: cleaning up the Chesapeake Bay.

The Moore administration in June unveiled a wide-ranging plan to achieve a 60% cut in the state's greenhouse gas emissions by 2031. And it is possible for the state to reach its far more arduous net-zero target by 2045, the report's authors suggest, but only by incorporating efforts to produce "negative" emissions.

Such reductions will require an "all-of-society" effort, according to the 118-page analysis led by the University of Maryland's Center for Global Sustainability. Suggested actions include increasing the state's reliance on renewable energy sources, supporting the transition to electric vehicles, requiring higher efficiency standards in new buildings and expanding the state's cap-and-trade market for carbon emissions.

The report, *Maryland's Climate Pathway*, isn't formally connected to the multi-state and federal Bay restoration effort, known as the Chesapeake Bay Program. It owes its existence instead to the Climate Solutions Now Act of 2022, which, among other things, required the Maryland Department of the Environment to adopt an emissions-reductions plan by the end of this year.

Yet, the climate report demonstrates that the work to limit emissions intersects with improving the health of the Bay on several fronts.

"There are a lot of places where those could overlap and support each other," said Kathleen Kennedy, a University of Maryland professor and lead author of the report.

Take agriculture. Farmers have "already taken significant action" to reduce emissions by following the state's Bay-related protocols, according to the report. These actions produced a 5% emissions reduction in the sector from 2006, Maryland's starting point for all emission calculation, through 2020.

Some of those cuts, for example, involve improving soil health. Under the Bay clean-up, practices such as limiting the use of fertilizer in the winter and planting cover crops have been encouraged to reduce the amount of excess nitrogen and phosphorus in the soil. Rains can wash those nutrients into the Bay, where they fuel algae blooms that cause oxygen-starved "dead zones." Rain can also cause nitrogen to be released into the atmosphere as nitrous oxide, a potent greenhouse gas.

Jennifer Laszlo Mizrahi, a member of the Maryland Commission on Climate Change, shares her opinion during a public input session at Bowie State University for the state's proposed "climate pathway" for meeting its greenhouse gas-reduction goals. (Jeremy Cox)

> *"The rapid, clean, affordable and just energy and economic transition needed to achieve these goals will be challenging, but it is possible."*
>
> — *Maryland's Climate Pathway* report

Forests also play a key role in both the Chesapeake and climate campaigns. The Bay Program has set goals for increasing forest buffers along waterways to help filter silt-laden stormwater and expanding urban tree canopy to improve air quality and wildlife habitat.

Meanwhile, forests represent the state's largest carbon sink — meaning that they absorb more greenhouse gas than they release.

"If a tree is growing, it's building carbon in its bark, and that carbon comes from carbon dioxide it brings in from the atmosphere," Kennedy said. "Basically, you're storing that carbon in the plant."

The report cites coastal wetlands and underwater grasses for their potential to store carbon as well. "Protecting coastal ecosystems [will] not only promote ecosystem health, but can also achieve emissions reductions," the authors wrote.

The computer modeling conducted by Kennedy and her team suggests that the net-zero target for 2045 will have to incorporate more of these "natural" sinks. In fact, they account for nearly half of the 20 million metric tons of "negative" emissions — greenhouse gases saved from the atmosphere — needed to reach that goal.

Environmentalists have long advocated for the "synergies" between a healthy Bay and climate-friendly policies. Doug Myers, a Maryland-based scientist with the Chesapeake Bay Foundation, said that meeting the tandem goals will be difficult because the state is behind on fulfilling several of the Bay-related goals in the report, including planting trees and expanding forest buffers.

He urged the state to take a page from the Bay Program's playbook by requiring progress reports every two years or so. Without those, "you could go all the way to 2031 before you find out if you made it or not," he said.

Under existing policies, the climate pathway report forecasts that Maryland will cut 62 million metric tons of greenhouse gas emissions by 2031, falling about 11 million short of its goal. To close that gap, the report suggests making the biggest additional cuts in the transportation, electric generation and building sectors.

The report makes a case for benefits extending beyond the environment. Cleaner air will result in up to $2.4 billion in health benefits, it suggests. The policy actions will also create approximately 16,000 new jobs, yielding about $1.5 billion in personal income gains by 2031.

The "climate pathway" remains a work in progress. The state Department of the Environment is hosting five in-person workshops and two virtual meetings before Sept. 26 to gather public feedback on the plan.

At the initial hearing at Bowie State University, about 50 people listened to a presentation about the plan before some took turns at microphones to share comments. Most said they supported the broad outlines of what was proposed, but they had other ideas to share.

Jose Coronado-Flores, a research and policy analyst with CASA, a Latino advocacy group, said he is concerned that the adoption of electric vehicles will create equity challenges. In Langley Park, where four-fifths of the 20,000 residents are Hispanic, vehicle chargers are few and far between, he told the officials.

"If everyone starts to transition to electric vehicles, four chargers aren't going to be enough," he said.

If policymakers enact new smart-growth land-use policies and carbon cap-and-trade programs, the report projects that vehicle miles traveled, a measure of car usage, will grow at a slower rate — at 0.6% annually instead of 2%. That's not enough, said Brian O'Malley, head of the nonprofit Central Maryland Transportation Alliance.

"We need this decade to make more progress," he said, "not go further into the hole."

For information about the public listening sessions, visit the state website at marylandsclimatepathway.com. ■

VA compressor project raises environmental justice questions

Critics say upgrade of gas pipeline facility would increase pollution in low-income communities

By Jeremy Cox

Several environmental and civic groups are calling for a natural gas giant and federal regulators to rethink a project that could increase air pollution near one of southeast Virginia's most vulnerable communities.

Canada's TC Energy, the firm behind the contentious Keystone Pipeline, wants to upgrade a compressor station near Petersburg, adding 2,700 horsepower to its capacity. The work would remove controls that currently limit the horsepower of existing equipment.

To push that gas to the energy-hungry Hampton Roads region, the company also proposes doubling the diameter of nearly 50 miles of existing pipeline through Sussex, Surry, Southampton and Isle of Wight counties as well as the cities of Suffolk and Chesapeake.

The expansion and modifications along the Columbia Gas Transmission line have generated nowhere near the amount of outcry as the Mountain Valley Pipeline in the western part of the state. But both battles have raised environmental justice concerns over their potential impacts to nearby communities.

The compressor facility lies a few hundred feet outside the Petersburg city limits in Prince George County. It can be found along a two-lane, residential road, across from a subdivision of about 50 homes. The main office is a ranch-style house. Most of the industrial buildings are obscured behind a fence.

The census block that is home to the station doesn't qualify as an environmental justice community, according to TC Energy's analysis. But in two other census blocks within a 1-mile radius, minority residents represent 92% and 80% of the population, well above the 50% threshold. Those figures mirror the 85% minority population in the city of Petersburg.

"You're talking about a majority Black and Brown community being impacted," said Pat Hines, president of Petersburg's NAACP chapter. "They can minimize it and say it's safe. But we call Petersburg a sacrifice city because in more affluent places they at least have some emergency brakes."

The plant's nitrogen dioxide and sulfur dioxide emissions, according to TC Energy's computer modeling, will exceed the U.S. Environmental Protection Agency's "significant impact level," an indicator that new emissions have the potential to tip a community's air quality above the healthy level, known as the National Ambient Air Quality Standards, or NAAQS. Crossing that threshold leads to a higher level of analysis to determine if the new emissions, when mixed with existing background levels, will lead to unhealthy air.

TC Energy's natural gas compressor station is on state Route 603 just outside of Petersburg, VA, fenced in behind an office that looks like a ranch-style house. (Jeremy Cox)

Despite triggering that process for the two pollutants, the company said that its modeling further shows that the air quality will remain below the NAAQS threshold for each.

TC Energy, meanwhile, has committed to installing "mitigation measures," although it is unclear what those would be.

In response to questions from the *Bay Journal*, a TC Energy representative issued a statement pointing to the determination that the Petersburg modifications would meet federal air protocols. The modifications, the company says, would be made to controls on the compressor motors, which it says were installed in 2019 to replace older units with greater emissions.

"We have prioritized community engagement throughout this process, including environmental justice communities. Our robust community outreach program provides project information and invites dialogue with local residents and businesses that may be impacted by VRP construction," the company said, using the acronym for the project's official title, the Virginia Reliability Project.

A coalition of regional environmental groups has joined the local cause.

"If there's a project that does not need to be approved, it's this one," said Lynn Godfrey of the Sierra Club Virginia Chapter. "It's massive. As soon as you walk out of the car, you smell the gas."

Her group put its concerns on the record in June with 47 pages of comments submitted to the Federal Energy Regulatory Commission, which is reviewing the Environmental Impact Statement (EIS) for the project. The Southern Environmental Law Center drafted the letter on behalf of the Sierra Club, Chesapeake Bay Foundation and Chesapeake Climate Action Network.

In it, the groups call on TC Energy to upgrade the compressor units at the Petersburg station from gas to an emissions-free alternative, such as electric power. If other compressor facilities along the pipeline route are getting such upgrades, the critics ask, why is it not an option for Petersburg?

FERC faces more pressure than ever to consider environmental justice in its reviews. In one of his first acts as president, Joe Biden issued an executive order in January 2021 requiring federal agencies to give more weight to equity considerations. In response, FERC adopted an "equity action plan" that, among other priorities, singled out natural-gas decisions for deeper analysis.

The environmental groups told FERC and TC Energy in their letter that they don't accept the finding that air pollutant levels will remain safe, calling the modeling method "improper and insufficient."

"The methodology included in the [draft EIS], while sufficient for assessing generalized air quality impacts in a particular region, fails to adequately account for localized human health concerns," the groups said in their letter. They pointed to research suggesting that there is no safe level of another pollutant: soot.

They added, "Fundamentally, it shows a lack of concern for the health of the communities that are burdened by pollution from the Petersburg Compressor Station and will be even more burdened if the VRP is approved as proposed."

If the project is approved, TC Energy estimates that construction will begin between April and June 2024 and be completed by November 2025. ■

Bill could bring Chesapeake National Recreation Area to a vote

Designation could increase flow of federal funds for Bay conservation, water access

By Whitney Pipkin

A Chesapeake National Recreation Area — a federal designation that would unite many of the region's parks and resources under a common heading — is one step closer to reality.

U.S. Sen. Chris Van Hollen and U.S. Rep. John Sarbanes, both Democrats from Maryland, introduced a bill in late July that, if approved, would create the recreation area under the operation of the National Park Service. Parks throughout the coverage area could voluntarily participate in the program, which the bill says will provide additional federal resources to conserve the environment, increase equitable access to the Bay and celebrate the cultural and historical resources scattered throughout the region.

The concept is not new. An opinion article in the *Capital Gazette* in the 1980s floated the idea, which Sarbanes' father, Sen. Paul Sarbanes, and others began pursuing in the 1990s. The National Park Service conducted a special resource study in 2004 that found the Chesapeake Bay to be "unquestionably nationally significant and a major part of the nation's heritage," according to a press release from the bill's backers.

The recreation area has gained momentum and bipartisan support in recent years. A July 2022 public opinion poll found that 83% of respondents from Maryland, Virginia and the District of Columbia were in favor of establishing a Chesapeake National Recreation Area. A congressional working group was formed around that time and a draft version of the bill was released in November for public comment and stakeholder discussion. Hundreds of public comments have been received since then and considered in crafting the final bill, a press release stated.

If approved, the Chesapeake National Recreation Area would become the 41st place in the country with the designation and the 19th to be managed by the Park Service. Notable others include Lake Mead, the reservoir created by the Hoover Dam; the islands of Boston Harbor; and Mount Rogers, Virginia's highest point.

Under the proposed legislation, the Chesapeake unit would, despite its estuarine name, center on land-based sites in Maryland and Virginia, officials say. The proposed area runs from just north of Annapolis to Hampton Roads in Virginia, including parts of the Eastern Shore and extending west slightly beyond Richmond.

The historic Thomas Point Shoal Lighthouse stands near the mouth of Maryland's South River as it flows into the Chesapeake Bay. (Will Parson/Chesapeake Bay Program)

A few things were changed in the final version of the bill introduced to both chambers of Congress on July 27. The bill now includes language requiring the Park Service to conduct transportation planning assistance on the initial sites included in the national recreation area. This is intended to reduce the potential burdens of traffic on surrounding communities, a release stated.

The bill lists four initial sites that would be centerpieces of the new program, with other parks and resources permitted to join the effort. Those four include a former waterman's cottage and a 1700s-era manor, both in Annapolis; the distinctive Thomas Point Shoal Lighthouse near the mouth of Maryland's South River; and the North Beach of Fort Monroe in Virginia.

The bill also directs the park service to prioritize water and trail access as it develops programming. Advocates for the Chesapeake Bay cleanup say having a national recreation area will only aide the cause.

"Promoting and expanding public access to this national treasure is critical to meeting our clean water goals," said Mariah Davis, director of the Choose Clean Water Coalition. "Future generations cannot save what they don't know."

Davis also said in a statement that she is encouraged by the program's focus on expanding water access to underserved communities throughout the Chesapeake region and to better communicating the contributions of Black, Indigenous and People of Color that have lacked recognition throughout history."

In addition to the initial four sites, the recreation area would link up with the Park Service's existing Chesapeake Gateways program, a network of more than 150 refuges, museums, historic communities and other resources throughout the Bay's 64,000-square-mile watershed. The bill proposes increasing the permanent allocation for the Gateways program from $3 million to $6 million annually but doesn't specify other costs.

For some advocates, the creation of a Chesapeake National Recreation Area would be the culmination of decades of slow work. Joel Dunn, president and CEO of the Chesapeake Conservancy, one of the leading advocates for the program, called it a "30-year-long dream come true."

Creating the designation not only "expands resources for environmental protection," Dunn said, it also "makes it clear that the United States cherishes the Chesapeake, the birthplace of American identity." ■

Green roofs serve up bug buffet for small-city bats

Study in Lancaster, PA, shows another benefit from green roofs in urban landscapes

By Ad Crable

For the past two summers, a handful of college students scurried around the rooftops of landmark buildings in Lancaster, PA.

They were not up to mischief.

They were studying bats — joined by two professors, from the city's Franklin & Marshall College and nearby Millersville University. And they appear to have found a glimmer of good news for city residents and the bats that dart around above their heads in the dark, gobbling insects.

So far the research seems to show that "green roofs" — vegetated strips crowning the otherwise bare tops of buildings — attract bats and help them thrive in small urban areas.

Researchers have studied how green roofs might support bat populations in a few large cities, such as New York and London, but not on a smaller municipal scale, said Aaron Haines, a biology professor at Millersville.

The findings may provide ammunition to help city planners, residents, urban architects and bat conservation groups bolster the night armada of insect eaters and pollinators in urban areas throughout the Chesapeake Bay region.

"Our goal is to get what they call reconciliation ecology," Haines said, "where wildlife strategies are incorporated into human landscapes."

Last summer, Haines and fellow biology professor Dan Ardia, from Franklin & Marshall, recruited their students to investigate five green roofs and four conventional roofs on city buildings, including the historic Fulton Theatre, city hall and fire and police stations. The largest green roof was about half the size of a football field.

There, amid the plants, they placed small but sophisticated recording devices that "listened" from dusk to dawn for several weeks at a time. The students then ran the nighttime sounds through computer software that deciphered which sounds came from bats, then identified the species.

What they found was the consistent use of green roofs for insect-eating hoary bats, big brown bats and myotis (mouse-eared) bats.

Bats, which provide many benefits, could use any hopeful sign lately. White-nose syndrome, a deadly fungal disease, has wiped out an estimated 99% of Pennsylvania's bats since 2008.

Millersville University student Darian Hauf places a recording device to pick up bat vocalizations on a green roof at the city hall in Lancaster, PA. (Aaron Haines)

Of the nine types of bats found in Pennsylvania, five are on the state's endangered or threatened list — mostly because of the fungus, but also from habitat loss.

The fungus is devastating colony bats: those that mass together, often in caves, mines and rock crevasses to hibernate in winter. Their close proximity enables the fungus to spread easily.

With the demise of colony-dwelling bats, the big brown bats that the student researchers are recording on urban green roofs are now the most common species in Pennsylvania. Hoary bats, the state's largest bat, with a wingspan of up to 16 inches, migrate in winter, returning in spring to nab moths, beetles and mosquitoes. Myotis bats are the longest-living bats and can survive 20–30 years.

Big brown bats and myotis bats ride out the winter in tree holes, under bark and in attics and sheds, while hoary bats avoid colder temperatures and head for warmer climates.

The research found that bats were especially attracted to green roofs when a few other elements were nearby: water, robust tree canopy and streetlights.

"We found that when we have increased light, there are more moths and insects," Haines said. "The tree canopy also harbors insect diversity and numbers. In addition, many of the bats will sometimes use trees to have young under the bark."

The team conducted a second round of recordings this summer to verify the preliminary findings, this time on an expanded sampling of green roofs and bare roofs throughout the city.

Other benefits of green roofs in cities are well-established. The plants help to purify the air and reduce ambient noise. They absorb up to 65% of the pollutant-laden stormwater that would otherwise run off roofs toward waterways. They can cool roof surfaces 30–40%. Plus, they attract birds, bees and other pollinating insects.

Now, as a magnet for bats, green roofs' environmental value has gone up even more. In rural areas, bats pollinate many crops, disperse seeds and eat agricultural pests. In cities and suburbs, they pollinate flower beds and food gardens and control populations of biting insects. A single small bat can eat 1,000 or more flying insects in one night.

Many of the oft-cited concerns about bats living near people are untrue. They typically don't carry rabies or attack people, and their droppings don't transmit tuberculosis to humans.

If this summer's findings underpin the first round, the researchers want to start spreading the news across the country about how green roofs can both help bats and increase the quality of people's lives in smaller cities.

While the study is investigating whether urban bats are attracted to green roofs, it is not looking at whether green roofs increase bat populations. But Haines said that he thinks that having more green roofs with nearby tree canopy may do that. ■

The big brown bat is the most common bat in Pennsylvania now that white-nose syndrome has wiped out an estimated 99% of the state's bat population. (Michael Durham/Illinois Department of Natural Resources)

For better or worse, invasive phragmites is here to stay

Researchers consider potential benefits of nonnative marsh plant as coexistence becomes reality

By Jeremy Cox

Serina Wittyngham of the Virginia Institute of Marine Science examines one of her phragmites research plots in Dorchester County, MD. (Dave Harp)

Few phenomena of the past century have altered the landscape and the ecology of the Chesapeake Bay, experts say, as much as the invasion of a straw-like saltmarsh weed from the opposite side of the world.

Its Latin name, *Phragmites australis*, presents something of a geographic misnomer. Australia is where the species was first fully described in scientific literature. But the genetic strain that now pervades the Bay area originated in Europe, Asia and North Africa, researchers say.

As far as scientists can surmise, the now-dominant variety probably crossed the Atlantic Ocean in a ship's ballast water in the 1800s. Surveys began finding it in marshy patches in Maryland beginning in the 1910s.

Now, phragmites (pronounced "frag-MY-teez") can be found just about anywhere the soil is typically wet: waving in the breeze along the Bay's shoreline, engulfing abandoned homes on the rural Eastern Shore, sprouting in ditches outside suburban strip malls.

The last major survey of phragmites in the Bay region, led by College of William and Mary researchers in 2008, found that the weed covered 15% of shorelines in Maryland and 2% in Virginia. The highest coverage — encompassing 30% of a 200-mile stretch of serpentine coastline — was in an area along the middle Eastern Shore, above and below the Chesapeake Bay Bridge.

Land managers and researchers have long regarded the phragmites takeover as a negative change for the Bay. The plant grows in claustrophobic thickets too dense for most local wildlife. It easily crowds out native grasses. And its tall stalks are a scourge to waterfront property owners trying to preserve their views.

But as P. *australis* has gained an all but permanent foothold, that hardline consensus has softened. In perhaps the latest environmental exemplification of the phrase "if you can't beat them, join them," longtime phragmites critics are grudgingly acknowledging its positives.

"It's a mixed bag," said Dennis Whigham, a senior botanist at the Smithsonian Environmental Research Center in Edgewater, MD, who has published several studies on ways to fight phragmites. "You can look at it positively, and you can look at it negatively."

To be sure, no one in the scientific community is advocating for surrendering to the plant's spread. But recent developments, including a surge in research on potential environmental benefits and a shift toward less-ambitious management methods, signal a new chapter in the phragmites saga.

"In the Chesapeake Bay, it's too late," Whigham added. "There's already so much phragmites that it's not possible economically to eliminate it. It's here to stay."

A 'perfect storm' for phragmites

Also known as common reed, phragmites grows on every continent except Antarctica. There are native North American species, including in the Bay region. But before the introduction of the Eurasian variety, they were a rare sight around the estuary, scientists say. Today, the native varieties remain few and far between, nowhere near as prevalent as P. *australis*.

Phragmites belongs to the grass (*Poaceae*) family. It can grow up to 13 feet tall. Usually, where there is one plant, there are many, forming tightly packed walls of green wisps in the summer that fade to yellow in the fall.

The species prefers fresh to brackish wetlands — partially accounting for their higher abundance in Maryland's portion of the Bay versus Virginia's — but can survive surrounded by waters saltier than the ocean. It spreads either by seeds or rhizomes, underground shoots from existing plants.

It's no coincidence that phragmites have accelerated in lockstep with the human population around the Bay, said Serina Wittyngham, a post-doctoral research associate with the Virginia Institute of Marine Science. The reed is especially good at establishing itself in spots where the installation of bulkheads or other human disturbances have left behind bare earth.

"As soon as it ends up somewhere, it takes over," she said. "It has a real competitive ability, and it outcompetes anything native."

The intensification of farming in the region also has been a boon to phragmites. For decades, farmers spread more fertilizer on their fields than their crops could absorb, leaving behind nitrogen to nourish fledgling phragmites nearby. In the William and Mary study, researchers found that 17% of the phragmites-dominated shoreline in Maryland occurred adjacent to farmland even though that land accounted for just 11% of the total shoreline surveyed.

Whigham said research shows that phragmites is quicker to take up nitrogen than most marsh plants, providing it with a competitive advantage. High-nitrogen environments promote more-robust growth, including the production of more flowers (and, therefore, more seeds), he added.

"Humans have created a perfect storm for phragmites," Whigham said.

Management strategies shift

The collective approach toward managing phragmites has shifted in recent years, expert say.

"I think a few decades ago, the standard response was all invasive species are bad, and there's nothing good about it," said Matt Whitbeck, a wildlife biologist at the phragmites-plagued Blackwater National Wildlife Refuge on the Eastern Shore. "But I think our understanding of phragmites has evolved since then."

In 2001, the Chesapeake Bay Program — the multi-state and federal partnership overseeing the Bay's cleanup since the early 1980s — drafted a questionnaire for state and federal government experts. It asked them to rank the invasive flora and fauna

A stand of phragmites nearly obscures a stop sign along a road in Dorchester County, MD. (Dave Harp)

causing the biggest threats to the Bay's aquatic ecosystem.

Only the top six would move on to the next stage: getting individualized management plans. Phragmites was selected as one of them.

After two years of drafting and discussions, the phragmites plan was ready. The report's authors, a team of state, federal and academic wildlife and plant experts, set an ambitious goal of no net gain in phragmites acreage.

But instead of being held in check over the past two decades, phragmites has continued to spread like a wildfire across most of the region's tidal marshes — and beyond.

Management efforts have typically ended in frustration. One of the most aggressive control attempts took place in conservation areas on the Atlantic side of Virginia's Eastern Shore. Between 2004 and 2008, land managers conducted a vast aerial spraying campaign, typically followed by applications at ground level. To get the most bang for the buck, the effort mostly targeted stands of phragmites covering 5 acres or more.

The result: Phragmites abundance fell by 34%, shrinking from 706 to 468 acres, in treated areas.

But in the smaller patches that didn't receive aerial control, the plant's coverage increased from 657 to 805 acres, a 22% jump, during the same span. Factoring in those gains, the net reduction in phragmites acreage was a disappointing 4%.

State land managers concluded in a status report that eradicating all phragmites at such sites "is neither feasible nor probable." But keeping the plant at controllable levels while staving off its invasion of native marsh spans, they added, "is completely feasible and very possible."

The treatment usually involves repeated applications of herbicides, such as Roundup. Even then, success has been limited across larger areas of infestation.

Tree swallows swarm over a stand of phragmites along Maryland's Choptank River. (Dave Harp)

"We're not even attempting to control it on the broad scale," Whitbeck said. "We're just trying to keep it out of certain areas."

Researchers consider benefits

Phragmites research in the United States used to concentrate almost exclusively on exploring ways to control its spread. There is still plenty of that. But a new strain of inquiry has emerged over the past decade or so with a decidedly different outlook: If phragmites is here to stay, as it appears, perhaps the benefits can be maximized.

"When you hear [the term] 'invasive,' you immediately go to, 'Oh that's bad,'" said Daniel Coleman, a post-doctoral fellow and wetlands scientist at the University of Georgia. "But phragmites, in particular, offers ecosystem services that can benefit marshes, and it does some things really well.

"It's hard to imagine a Chesapeake Bay without phragmites at this point," Coleman added. "So, if we're stuck with it, let's look at these ecosystem services we want for marshes."

While at Virginia's George Mason University, Coleman led a study analyzing how well phragmites can prevent erosion caused by waves and storm surge. "If you've ever walked through a patch of phragmites, it's tough going," he said. "I thought a wave would have a difficult time moving through it."

Using sensors placed in the Chesapeake's waters off Franklin Point State Park in Anne Arundel County, MD, he and his team found that the native marsh grass *Spartina alterniflora* is better at knocking down waves. During the fall, when the differences between the two species were most pronounced, the spartina, likely because of its thicker stems, reduced wave heights by an average of 73%. Phragmites only mustered a 36% reduction — but Coleman said that's better than no vegetation at all.

Phragmites also appears to be somewhat resilient when it comes to climate change, but that has a downside, too. With sea level expected to rise another 2 feet by 2100, according to some projections, the Bay region might lose as much as 167,000 acres of low-lying coastal marshes. The only hope for native marsh plants is to reestablish themselves on higher ground, researchers say.

Phragmites literally stands in the way of that happening. Their highly invasive ways are giving them a strong competitive advantage in these areas. If the weed takes over, the region stands to lose the wildlife that relies on native marsh habitat, particularly two rare bird species: black rails and saltmarsh sparrows.

"If we accept phragmites as the future [marsh grass] species of the Chesapeake Bay, we're going to lose native wildlife because of that," Whitbeck said. "I could see black rails disappearing from the Chesapeake Bay in my lifetime, unless we find a way to mitigate those changes."

Wittyngham is leading a study at Blackwater trying to determine which management method works best: herbicides, controlled burns or salt. Her goal is to "hold that line" against the ongoing spread of phragmites into the pine-dominated forests as those forests give way to marshland, she said.

Nevertheless, she doesn't see herself as completely anti-phragmites. "It still has ecosystem benefits, even if it's not supposed to be here," Wittyngham said. "My gut reaction when I started doing this work was, 'Absolutely, get it out of here.' But when I started digging into the literature and learning about it, I decided it has some benefits that shouldn't be overlooked. And in some places, we should just let it stay."

She pointed to research that has shown that phragmites can help slow erosion in places where nothing else is growing, even helping to raise the height of the land by trapping sediment. But again, a positive effect is accompanied by a negative one: Phragmites-invaded areas may not be as suitable as nursery grounds for young fish, as shown by reduced counts of juvenile and larval fish in their midst, according to a growing body of research.

Phragmites also has been shown to have some worth in capturing and storing carbon (a major greenhouse gas) and nitrogen (a nutrient that fuels harmful algae blooms). But in both cases, it is a poor substitute for native plants and trees.

Keryn Gedan, a coastal ecologist with George Washington University, has spent as much time as anyone in the Chesapeake region thinking about and studying phragmites. Her work on the Eastern Shore concentrates on the fate of marshes.

"I lost a student once in phragmites," she said, with a quick pause before adding, "Not permanently."

Gedan admits that phragmites have benefits to offer. But she hopes that her work and that of others help to save some native marsh for future generations.

"I'm just suggesting we're not going to drive phragmites extinct. It's going to be part of the future, and I accept that. And the people who say there are advantages to phragmites, I agree with them," she said. "What I'm promoting is keeping some areas for biodiversity, which is something we don't get from heavily invaded phragmites areas." ■

Wildfire haze focuses attention on regional air quality

Experts explain the causes, impacts of recent health alerts

By Whitney Pipkin

Residents in the Chesapeake Bay region and across the country added another item to their checklist for heading outdoors this summer: How's the air?

Wildfires burning across Canada combined with atypical weather patterns to deliver dense doses of smoky haze to the region on two occasions in June. Bay states were among those exposed to such poor air quality that it was considered unhealthy for most people to spend time outdoors.

We talked to local air quality experts to try to put these "bad air" days into context and to better understand their impact on human health, wildlife and the environment.

Dan Salkovitz is a meteorologist who's been forecasting air quality for the Virginia Department of Environmental Quality for 40 years. He said the poor air quality numbers the region saw on June 7–9 and again on June 27–29 were "among the highest ever recorded" in the area for some pollutants.

Salkovitz remembers wildfire haze from Quebec making its way to the region in the early 2000s and the Great Dismal Swamp fire in 2011 causing localized haze in southeast Virginia. Still, the situation we've seen this summer, he said, is far from typical.

Referring to overall air quality, compared with 20 years ago, he said, "It's unequivocal that trends are phenomenally better."

In 1998, for example, Virginia had 108 days in which the air quality index exceeded the standard for ozone, the major pollutant that the U.S. and much of the developed world was working to reduce at the time. Pollution controls for industry, vehicles and energy efficiency standards have all made an impact since then. Last year, there was one such day. By midsummer this year, there were five of them linked to wildfire smoke.

Jeremy Hoffman, director of climate justice and impact at Groundwork USA, began studying local air quality and its impact on human health when he was a scientist at the Science Museum of Virginia. He agreed that the trends are headed in the right direction, something he saw on the ground when he began installing air quality monitors in Richmond.

Smoky haze from Canadian wildfires fills the air above Warrenton, VA, on June 8, one of the worst air quality days for particulate matter the region has seen in a long time. (Hugh Kenny)

"We're actually living in the best air quality in the observable time period," Hoffman said. "So when something like [the wildfire haze] happens, it's so much more noticeable."

Meanwhile, he said, hotter and drier conditions brought on by a changing climate "are promoting these more intense and larger fires."

When it comes to wildfire smoke, the most direct health threat is particulate matter. Air monitors that track this pollutant measure two sizes of it, which you might see labeled on tracking maps as PM2.5 and PM10.

PM2.5, referring to particles of 2.5 microns or less, are the smaller of the two. They are microscopic, inhalable particles that can contribute to cardiac and respiratory issues. Even in healthy individuals, these tiny particles in the air can irritate eyes, noses and throats, causing coughing, phlegm and tightness of breath, according to the federal government's air quality tracking website, AirNow.gov.

Under the Clean Air Act, the U.S. Environmental Protection Agency regulates five major air pollutants, including particulate pollution, ground-level ozone, carbon monoxide, sulfur dioxide and nitrogen dioxide. All of these pollutants are measured to determine the "air quality index," or AQI, on a given day. The AQI runs from 0 to 500, with values of 50 or below representing good air quality.

On some days in June, the air quality index for the region climbed over 200, rendering the air in some portions of the watershed "very unhealthy." In July, that index again reached into the orange and red zones of "unhealthy" as Canadian wildfires persisted.

Even when the air quality is known, it can be hard to decide how to act — especially in a region where wildfire haze is relatively new.

AirNow.gov offers guidance for how to act on the warnings they issue, based on a person's health, age and other risk factors. People with heart and lung disease, older adults and children (who breathe more air per pound of body weight than adults), as well as pregnant women, should pay closer attention to the warnings and reduce their time outside. Other groups should also choose less strenuous activities, which increase inhalation of pollutants, during poor air quality days.

But staying indoors isn't always an option. Outdoor workers and those who rely on public transportation or walking do not always have the luxury of reducing time outdoors, regardless of the day's air quality. Hoffman found in his research in Richmond that people living in certain neighborhoods near industrial corridors and arterial roads already experience significantly worse air quality than those living on streets lined with more trees several blocks away.

Wildlife and pets are also impacted by wildfire haze. The Smithsonian National Zoo in the District of Columbia closed its doors on June 8, the region's worst air quality day to that date, and brought animals indoors as much as possible.

Wildfires can also be a major source of nitrogen pollution in the atmosphere, which eventually settles on the ground and washes into local waters. Air pollution is already the source of up to a third of the nitrogen that enters the Chesapeake Bay. One study found that wildfires in California increased nitrogen deposition by an estimated 78% in 2020.

Although wildfires are expected to continue increasing in scale and frequency, it's not clear if the unique weather patterns that brought Canada's smoke to the Chesapeake Bay region will continue. But the smoky summer can remind residents of the ongoing impacts of an increasingly erratic climate, Hoffman said.

"When we think about the impacts of climate change, here they are at our front door. What do we do now?" he said. "We continue along with our lives as though this extreme air is normal, but it's not." ■

In the Chesapeake, an island is reborn, one stone at a time

Restoration of Barren Island will create wildlife habitat and help keep shipping channels safe

By Jeremy Cox

Stone sills rise from the Chesapeake Bay as part of the Barren Island restoration project in Dorchester County, MD. (U.S. Army Corps of Engineers)

It's hard to imagine that Barren Island was once inhabited by more than a dozen farmsteads, a church, a schoolhouse and a handful of stores.

Now that the island has dissolved into a few dollops of land along the eastern edge of the Chesapeake Bay, it truly lives up to its name: Barren. The last residents fled to higher ground more than a century ago. Even the hunting lodge that was established in their wake has long since disappeared.

And yet, beginning last March, the remote archipelago has been a hive of construction equipment, barges and hard hats. Boulder by boulder, a new shield of defense is taking shape from one end of Barren Island to the other.

The project is about two decades in the making. It had been sidelined for years by a lack of funding from Congress. If the wait had gone on much longer, there might not have been much left to save, said Trevor Cyran, project manager for the U.S. Army Corps of Engineers.

"Climate change is a big driver of erosion here, which drives increased wave energy," he said during an inspection of the work's progress in mid-August. "This will establish and stabilize the island much better, as well as create additional acreage of wetlands."

Barren isn't unique. (And it's not the only island in the area getting the restoration treatment.) Across much of the Chesapeake Bay, sea level rise and the sinking of land caused by the retreat of glaciers during the past Ice Age have helped to drown thousands of acres of islands.

The phenomenon threatens to depopulate Maryland's Smith Island and Virginia's Tangier Island, the last of the Bay's remaining inhabited islands with no bridge connecting them to the mainland.

Barren Island lies just west of Upper Hoopers Island in Dorchester County, MD. The only way on and off it is by boat — and even that is tricky because there are no docking facilities. Instead, there is acre upon eroding acre of marsh and pine woods.

The Army Corps estimates that Barren is shedding 3–4 feet of land per year to erosion. Over the past two decades, more than 40 acres of Barren's land mass has been lost to the Bay, representing nearly one-fourth of its 2003 footprint.

The $43 million first phase of Barren's restoration, now underway, includes the construction of about 2 miles of new or refurbished stone barriers, mostly along the island's western flank. A 4,600-foot-long breakwater will also be raised to about 8 feet above the average water level, adding further protection.

The work is about 25% done, said Richard Gunn of Coastal Design and Construction, the project's Gloucester, VA,-based contractor. Completion is expected by October 2024.

The next two phases would pipe in muck from the bottom of federal navigation channels in local waterways — Slaughter Creek and the Honga River — to create up to 83 acres of wetlands behind the new barrier walls. Engineers also plan to create two "bird islands," totaling nearly 9 acres of new land, behind the extended barrier, just south of Barren.

Additional Congressional approval is needed to fund the final two phases, Cyran cautioned. The cost of all three phases is forecast to be around $200 million.

One of the project's main goals is to provide additional erosion protection to the fishing village of Hooper's Island to its east, Cyran said. Another is to help replace rapidly vanishing wildlife habitat. The U.S. Fish and Wildlife Service owns most of the island as part of the Chesapeake Marshlands National Wildlife Refuge Complex.

"When this project is complete, it's for the birds, the fish and the reptiles," he added. "The intent is to give it back to nature."

Barren Island itself is a small first step in a larger effort. Dubbed the Mid-Chesapeake Bay Island Ecosystem Restoration, the $2 billion project is primarily focused on rebuilding James Island, in the mouth of the Choptank River about 13 miles north of Barren.

As measured by acres, the James Island restoration is 25 times the size of the new land footprint at Barren Island. Mud dredged from the approach channels leading to the Port of Baltimore and the Chesapeake and Delaware Canal will transform 2,100 acres of open water into dry land. The construction will take place next to — but will not physically impact — the remnants of existing James Island, which is privately owned.

The federal government is shouldering 65% of the project's cost, with the state of Maryland picking up the remaining 35%.

The muck from those channels is currently offloaded at Poplar Island, about 15 miles north of James. Since the 1990s, that island, further north off Talbot County, has grown into the Army Corps' largest dredged material "beneficial use" project undertaken on the East Coast.

But Poplar is expected to reach its 1,715-acre capacity around 2030, necessitating a move to James, said Amanda Peñafiel, project manager for the Maryland Port Administration.

"The Port Administration feels like this project is a win-win for the state of Maryland," she said. "We are beneficially reusing dredge material to restore remote island habitat while keeping federal navigation channels clear, which ultimately keeps the port open for business." ■

Video online at bayjournal.com

Bay Program ponders what's next for the Chesapeake

A changing world, new science challenge old assumptions

By Karl Blankenship

Shallow water and shoreline edges are vital for crabs, fish and other aquatic life in the Chesapeake Bay watershed, but cleanup policies tend to emphasize actions that improve oxygen in the Bay's deepest channels. (Dave Harp)

As the Chesapeake Bay Program turns 40 this year, with a history that includes both significant achievements and outright failures, it faces one of its biggest challenges ever: What comes next?

The Bay Program is a partnership between Chesapeake states and the federal government that has driven the regional restoration effort since 1983. Now, it is rapidly approaching 2025, a self-imposed deadline for meeting numerous goals set out in a 2014 agreement.

It can tout major accomplishments on some fronts, such as oyster restoration, land preservation and improving public access to waterways.

But other efforts are lagging badly, including its cornerstone goal to reduce nutrient pollution, which triggers oxygen-starved "dead zones" in the Bay. Goals for wetlands and streamside buffers are far behind, and progress toward the urban tree canopy goal is going in the wrong direction.

Layered on top are challenges posed by a changing climate that guarantees the future Chesapeake will be significantly different than the Bay of the past. That makes it difficult to envision what to expect, and strive for, in coming decades.

Historically, many Bay Program goals, including its water quality objectives, aimed to restore the Bay to past health. Its water quality standards, for instance, were roughly based on mid-20th century conditions. But the future Chesapeake will be warmer, with higher water levels and fewer tidal wetlands.

Partly because of that, a recent report from Bay scientists cautioned that some of the Bay Program's longstanding water quality goals are likely unattainable. Another warned that rising temperatures threaten to permanently alter habitats in the Bay and its tributaries in ways that may be difficult to predict.

Meanwhile, the Bay's watershed is losing forests and gaining impervious cover like roads, roofs and parking lots — exactly the opposite of what's needed for cleaner water. In a recent four-year period, impervious cover increased by 50,651 acres (an area larger than the District of Columbia), while tree cover decreased by more than 25,000 acres, according to a recent assessment.

At age 40, are the Bay Program's best days behind it? Or can its leaders craft a path forward that builds on lessons of the past and rises to meet the challenges of a world and watershed that are changing faster than ever before?

"We really feel that it's the vision for the future that's been missing, and something that we all need to come together around," said Hilary Falk, president of the Chesapeake Bay Foundation, the region's largest environmental advocacy group.

Often, Bay goals have not been designed in ways that produce tangible results that people can see. "We need to focus on people and get the benefits of clean water closer to where people are, and making sure that there are not barriers to enjoying the Bay and its rivers and streams," Falk said. "And we have an opportunity as a community to come together and build a vision for the future."

The challenges of goal setting

The Bay Program has created two committees to begin tackling the issue. One outlined the path from now to 2025, and another is looking at what comes after that.

The Reaching 2025 committee has produced an 85-page draft report highlighting progress toward meeting the 31 outcomes of the *2014 Chesapeake Bay Watershed Agreement* and some of the lessons learned.

Of those outcomes, 17 are on track or achieved. That includes goals to restore oysters in 10 rivers, protect an additional 2 million acres of land, improve fish passage, and add 300 public access sites along the Bay and its tributaries. And the number of streams deemed to be in good health is increasing.

But 12 goals are far off track. Some are especially critical to water quality, such as those aimed at reducing nutrient pollution, creating wetlands and streamside buffers, and restoring underwater grasses. Also on the list are goals for black ducks; brook trout; tree canopy; and diversity, equity and inclusion.

The review found that successful outcomes tend to have clear lines of responsibility within agencies and states, and the costs are generally known. Often there is an agency or nonprofit organization that champions the work. And the goals also tend to have clear geographic and numeric targets.

Sean Corson, director of the National Oceanic and Atmospheric Administration Chesapeake Bay Office and co-chair of the Reaching 2025 group, said unmet goals are sometimes too ambitious and costly to reach in the established time frames.

He pointed to the oyster restoration goal as an example of an alternative approach to goal setting. It set quantifiable restoration objectives within a set number of rivers and is widely viewed as a success. They make up the largest oyster habitat restoration projects in the world, and studies are closely monitoring their ecological impact.

Still, they cover only a small portion of the Bay's historic oyster habitat. But had a bigger, more aspirational goal been set — say, restoring 30% of the population — the job would have been "overwhelming," more difficult to fund and likely produced dispersed efforts around the Bay with less collective impact, Corson said.

"If we were evaluating our progress at the scale of restoring oysters Baywide, the message might be, 'this is an abject failure,' " Corson said. Instead, the success has created momentum for more projects in the future. "So, some of it is framing and setting expectations."

Corson said the time is right to consider a new Bay agreement that builds on those lessons. New goals should include more targeted and achievable objectives with strong potential to deliver tangible results.

"Some people believe that we should have an aspirational document that sets really big ambitious goals that we can drive toward over 10 years or so," he said.

"While I appreciate that, if you have set goals that are so ambitious — and in the absence of clear commitments and mechanisms and infrastructure to achieve them — it can become demoralizing."

The Bay effort has been guided by a series of agreements since Maryland, Pennsylvania, Virginia, the District of Columbia, the Chesapeake Bay Commission and U.S. Environmental Protection Agency signed a one-page document in 1983, creating the Bay Program and pledging to work together to restore the nation's largest estuary.

There have been three longer, more detailed agreements since then — in 1987, 2000 and 2014. They have helped propel many efforts forward, including nutrient reductions. And they boosted other initiatives, such as land conservation and Bay education programs.

But some goals have not just been missed; they've flopped — such as efforts to reduce the rate of growth and produce a Bay "free of toxics."

Whether there will be a new agreement is unclear. The Beyond 2025 committee is tasked with making recommendations by fall 2024.

It could recommend writing a new agreement or refining and extending goals of the last agreement. Or anything in between.

The committee will tackle the major question of how new science should help guide the future. It will also consider how broad goals regarding diversity, equity and inclusion, as well as the big picture implications of climate change, should be incorporated into Bay Program decision-making.

"We're going to have different values and interests pulling us in every direction on this conversation," said Anna Killius, executive director of the Bay Commission and co-chair of the committee. "So, it will be challenging for all of us. But it's about time to have those conversations."

Deep water, shallow water

A backdrop to those conversations is a recent report from the Bay scientific community that challenges long-held assumptions about cleanup efforts and their impacts. The Bay Program's Scientific and Technical Advisory Committee says in its report, the *Comprehensive Evaluation of System Response*, that nutrient reduction efforts may not be as effective as thought and the Bay Program may be overestimating progress.

While significant progress has been made in reducing nutrients from point sources, such as wastewater treatment plants, the report says existing programs to control nonpoint source runoff from farms and developed lands are unlikely to achieve goals.

The Chesapeake region is on track to meet the 2025 goal for increasing public access to waterways, but some say that the next era of Bay restoration should aim to deliver even more tangible benefits to people and communities. (Will Parson/Chesapeake Bay Program)

Further, the report says it is unclear how much nutrient reductions — by themselves — will benefit aquatic life.

The report suggests testing new approaches that combine nutrient reductions with habitat improvements in small tributaries, with the aim of getting more tangible improvements — more quickly — for both water quality and aquatic creatures.

That's difficult because, while other Bay goals are voluntary, the nutrient reduction goals are driven by the federal Clean Water Act, which requires states to achieve water quality standards.

Water quality is only one of many factors that affect the abundance of aquatic life, but the report notes that the regulatory requirement means nutrient reduction is prioritized over more direct habitat improvements such as restoring wetlands, streamside buffers, oyster reefs and underwater grasses.

Further, nutrient reduction goals are largely based on eliminating the dead zone in the deepest part of the Bay. That might not be possible, the report says, and the deep trough is not as important for aquatic habitat as the shallow edges of the Bay and its tributaries.

But Bay Program policies tend to focus on nutrient reductions that have the most impact on deep areas. Other actions might better improve nearshore habitats but "don't necessarily have a big nitrogen or phosphorus bang for the buck," said Kurt Stephenson, an agricultural economist with Virginia Tech and one of the co-authors of the report.

While people have begun talking about putting more emphasis on shallow water, they are more reluctant to discuss whether the goal for deep water is attainable. "People want to cherry-pick the things that don't have tradeoffs, that are easy and convenient," Stephenson said.

In a recent four-year period, impervious cover in the Bay watershed increased by 50,651 acres, an area larger than the District of Columbia. (Dave Harp)

Denice Wardrop, executive director of the Chesapeake Research Consortium and co-author of the report, said the message of the analysis is not that past efforts were misplaced but that it's time to assess whether other approaches would produce better results for living resources.

"I think we ought to be doing well-designed pilots and trying out stuff on a small scale," Wardrop said. "I say, rock the boat, but not so hard that people fall out."

Maryland steps forward

Maryland is testing the application of these ideas. Democratic Gov. Wes Moore announced in July a new strategy that will coordinate some restoration efforts in targeted areas to deliver faster, more tangible improvements for water quality and wildlife.

As part of that, state agencies are reworking some of their grant programs to encourage organizations and communities to develop projects that promote multiple, and measurable, benefits. That would include not only nutrient and sediment reductions, but also improved habitats.

Instead of conducting a stream restoration in one watershed, a wetland project in another and an oyster reef someplace else, the idea is to bundle them within a single small watershed and measure the impact through ramped-up monitoring, said Josh Kurtz, secretary of the Maryland Department of Natural Resources. The lessons learned could then be applied to other projects.

"The goal here is to think at the scale of the Bay to some extent, but really act in those [subwatersheds] where we're going to get the highest rate of return," Kurtz said.

The projects would likely include a mix of highly degraded streams in historically underserved areas, as well as areas in better condition that might be near a tipping point, where lower levels of investment may produce significant habitat benefits.

"The other piece here is starting to build a vision for the Bay for the future that incorporates more people," Kurtz said. "We want everybody in the state of Maryland to see themselves in the restoration effort."

Details should be available in the coming months, he said, with the hope that projects could begin next year.

"We really do have an opportunity to harness what we've learned and reapply it in a way that gets a lot more benefit for folks, and better defines what a restored Bay means," Kurtz said. "And I think this also gives us the time to hear from our constituents and really build what that vision is post 2025." ■

PA's goal of 10 million new trees by 2025: Can it be done?

Second largest tree planting project in state history is halfway to its goal

By Ad Crable

During the Great Depression, long after Pennsylvania's virgin forests had been logged, leaving eroded mountainsides behind, the federal Civilian Conservation Corps planted 60 million trees to heal the landscape.

Beginning in 2018, in what is likely the largest tree-planting initiative since the CCC program, thousands of volunteers and property owners have rooted millions of trees as part of a public-private venture — the Keystone 10 Million Trees Partnership, or K10 for short.

The goal is simple: Plant 10 million trees throughout Pennsylvania by the end of 2025. That would create the equivalent of a 50,000-acre forest. And it would establish about two-thirds of the forested streamside buffers called for in the state's plan to help clean up the Chesapeake Bay.

To date, 5.7 million native trees and woody shrubs of roughly 70 species have been installed along streams and streets; in parks, neighborhoods and backyards; around schools and churches; and on abandoned mine land.

There are priorities. Getting 70% of those trees planted in Pennsylvania's portion of the Chesapeake watershed — about half of the state — is one of them. So is greening environmental justice communities and putting more trees in headwater areas, which benefits everything downstream.

Despite COVID setbacks in tree supplies and tree-planting events, officials with the Chesapeake Bay Foundation, which is spearheading the project along with nearly 300 partners, say the goal will be met on time.

But they admit momentum, energy and effort will have to swell even more. The group budgeted $6.9 million for the project in fiscal year 2022.

"Absolutely," replied Joe Hallinan, the foundation's K10 manager, when asked if planting 4.3 million trees in less than three years is realistic. "The way we are further expanding partnerships is growing exponentially because we're out there and people are seeing it. People see their neighbor doing it and get involved."

In a scene repeated several thousand times since 2018, volunteers from organizations and communities converge to plant hundreds of trees in a single day. A homeowner, on the other hand, may plant just a single tree.

Aniya Robinson plants a tree on a farm near Marietta, PA, as part of the Keystone 10 Million Trees Partnership. (Chesapeake Bay Foundation)

Many benefits

The K10 initiative casts a wide net for public support by espousing trees' broad range of benefits. The massive planting, partners maintain, improves not only Pennsylvania's environment and ecology, but also its economy and communities.

Trees intercept stormwater runoff from urban and suburban areas, as well as farmland, filtering the water and stabilizing banks. That improves water quality in streams and helps everyone, from residents who swim and fish in local streams down to the Chesapeake Bay itself.

The canopies of leaves filter the air and store carbon, the main greenhouse gas causing climate change. Their shade is a vital refuge for those caught in increasing urban heat waves. It can also lower a home's air conditioning demand.

Trees filter dust, increase property values and reduce stress. Humans seem to be hard-wired to find beauty and solace in trees and forests; more than one study has suggested that being among trees improves people's moods.

Trees also have been shown to reduce health care costs, and multiple studies have found that crime rates go down in cities where there is tree canopy.

"We really like to focus on economic and community benefits. People learn better around trees. People heal faster. Families and friends gather under our trees," Hallinan said.

"Ten Million Trees has been really wonderful to raise awareness," said Teddi Stark, watershed forestry program manager at the state Department of Conservation and Natural Resources, one of K10's biggest partners. "Before, not many people were aware of all the benefits of planting trees and how important it is."

"We're really excited," Hallinan added, "to see how we're not just planting forests, [but] also normalizing a culture of conservation. We are allowing people to rethink how they are managing their properties."

While mass community plantings are important for the program's numbers game, one of the K10 partners — Pennsylvania Interfaith Power and Light — is focused on citizens who want to do the right thing but, for any number of reasons, can only add a few trees to their own yards or neighborhoods.

"We try to meet that need and are committed to working with our environmental justice communities," said Katie Ruth, the faith-based group's executive director. "The value of the program extends well beyond the environmental benefits. I've seen community-building."

Making up for losses

While the project plows ahead, the state continues to see a net loss of tree cover each year. Pennsylvania lost 37,500 acres in 2022 alone, according to Global Forest Watch.

In response, Harry Campbell, the Bay Foundation's science policy and advocacy director in Pennsylvania, points out that while tree loss on private land is concerning, K10 is planting trees where science shows they have the greatest impact on water quality, urban heat islands, abandoned mine land and other areas of concern.

But getting volunteers to show up and spend a day putting trees in the ground does not a buffer make. In recent years, research has shown that new trees have low survival rates if they are not properly planted or well maintained in their first several seasons.

Aware of this, K10 has partnered with the National Aeronautics Space Administration, which uses sensitive satellites to track individual tree and canopy heights. The K10 team analyzes the findings to determine if their plantings are indeed growing and find spots where they may need to troubleshoot.

Every tree is staked for stability, and its narrow trunk is covered in a protective tube to prevent bark damage from wildlife. For people who want to plant trees in their yards or communities, the Pennsylvania Horticultural Society has groups of "Tree Tenders" around the state that offer classes on tree care and guidance on organizing neighborhood plantings.

To request trees, organize a community planting or learn about the Keystone 10 Million Trees Partnership, visit tenmilliontrees.org. To find a local Tree Tenders group, visit phsonline.org. ■

Study seeks to get to bottom of mysterious oyster die-offs

Oyster farms in lower Bay, Gulf of Mexico seeing large losses

By Jeremy Cox

For several years, an unexplained die-off of farm-raised oysters from the Chesapeake Bay to the Gulf of Mexico has perplexed industry members and the scientific community alike.

What they do know: The bivalves tend to die between May and early July. Most of the victims are market-size oysters or nearly there. And it mainly lays waste to triploid oysters, the type favored by farmers — and many diners, whether they realize it or not — for their faster growth and higher meat quality.

Researchers with the Virginia Institute of Marine Science are trying to uncover the cause before it seriously disrupts the state's burgeoning $60 million oyster aquaculture sector. (Episodes have been reported in Maryland waters as well.) Responding to the industry's growing calls for answers, the National Oceanic and Atmospheric Administration has awarded $300,000 to the institution to sift through clues turned up by fresh field surveys and lab experiments.

"There's a lot about oysters we don't know yet," said Bruce Vogt, president of Big Island Aquaculture, an oyster farm based in a creek near the mouth of Virginia's York River. He estimated that he loses 30–40% of his triploids annually to the mysterious die-off. "It's critical we get an understanding of this."

Between 2013 and 2018, the number of active oyster farms in Virginia more than doubled, from 60 to 134, according to newly released U.S. Department of Agriculture data. The businesses lease plots of the bottom of the Bay and tidal rivers from the state, typically raising the oysters in cages or in bags on floating racks until they're ready to be harvested.

Supporters say the industry's benefits extend beyond pure economics. They point to research showing how the bivalves filter out nutrients and silt, the two main drivers of water-quality declines in the Bay.

The phenomenon was first reported in 2012. Most aquaculture operations reported mortalities of around 30% of their oyster stock, but some in the lower Chesapeake saw losses of 50–85%.

Such die-offs aren't out of the ordinary for oysters, said Hamish Small, who is heading the VIMS study. The bottom dwellers are known to succumb in large numbers to insults such as diseases, toxic algae blooms, sudden drops in dissolved oxygen, and too much or not enough salt in the water.

Clockwise from top left, Hamish Small, A.J. Verderame, Leslie Youtsey and Hannah Brown, researchers with the Virginia Institute of Marine Science, sort through farm-raised oysters at Cherrystone Aqua-Farms near Cape Charles, VA. The commercial farm is visible in the background as floating cages, some of which are upside down to reduce barnacle growth. (Jeremy Cox)

"Much like us, they're constantly dealing with stress of some sort," Small said.

But the die-offs that began in 2012 were different, he explained. Growers couldn't connect it to any of the typical causes. VIMS researchers were similarly confounded when they conducted their own analysis of oyster health at five sites in the Virginia portion of the Bay in 2014–15. Nothing fit.

The Chesapeake region isn't alone. Significant losses at oyster farms in the Gulf of Mexico have also sparked extensive research efforts, but there have been few answers to show for it.

VIMS is no stranger to triploids. In fact, their existence can be traced to the work of now-retired VIMS researcher Stan Allen, who first selectively bred oysters to have three sets of chromosomes instead of two (hence the "tri" in triploid). The innovation rendered the bivalves sterile, tamping down concerns that they might overpower native oysters. And with reproduction removed from the equation, triploids are free to spend most of their energy on growth, resulting in more meat inside the shell.

Hamish Small of the Virginia Institute of Marine Science is the lead researcher in a study that aims to shed light on an unexplained annual die-off of farm-grown oysters in the Chesapeake Bay. (Jeremy Cox)

Today, the extra-chromosome invertebrates are the backbone of the aquaculture industry, representing about nine out of 10 oysters in the farmed marketplace, Small said.

There is no evidence that surviving triploids present any danger to people who consume them, experts say.

To get to the bottom of what's behind the die-offs, Small and his team are casting a wide net. They plan to dig deeper than the 2014–15 study, "looking under the hood of the gene expression" for clues, said fellow VIMS researcher Ryan Carnegie.

The lab work will test one of the leading theories: that something has gone awry with the oysters' genetic lines. Triploids are typically produced at hatcheries from bivalves bred and reared especially for the task of making more oysters. If the research indeed uncovers a hitch in the code, then researchers could use those findings to build up greater resistance in the breeding program, Small said.

Another possibility is something in the environment tripping genetic switches. The only way to test that, Small said, is to observe oysters growing on real-life, tidewater farms. So, since March, VIMS researchers have been raising their own oysters at two locations: Big Island on the Bay's Western Shore and Cherrystone Aqua-Farms on the Eastern Shore.

"Comin' in hot!" A.J. Verderame, a field manager, called out as he dumped a bag of oysters onto a table perched on the deck of a small workboat, making a noise like dozens of dice being rolled at once.

He was joined by Small and two fellow researchers, Hannah Brown and Leslie Youtsey. Each had their own task: slicing up samples of oyster meat, measuring shell widths, gathering water salinity and temperature readings, counting live and dead oysters. (The dead are often slightly open or, if still shut, make a hollow sound when tapped against a hard surface.)

The oysters are reared in the mesh bags enclosed in floating cages, just beneath the water's surface. In the beginning, each bag contained 250 oysters. During a midsummer visit by the researchers to Cherrystone, some of the bags had lost a couple dozen or so besides those culled for lab work.

In other words, it was shaping up to be another typical season on a Virginia oyster farm. But, of course, the study's goal is to improve on that. ■

Lack of people power is barrier to reducing farm runoff

Ag & the Bay
Sowing a Conversation

Editor's Note: This article is the third in an ongoing series that looks at water quality goals for the Chesapeake Bay and the fundamental challenges, which have persisted for decades, in reducing nutrient pollution from agriculture.

Policy and science leaders have said that the Chesapeake region will not meet its 2025 nutrient goals for the Bay, largely because of an inability to sufficiently reduce nutrient pollution from farms in Maryland, Pennsylvania and Virginia.

The reasons are complex. But it's important to explore those challenges as the region begins a vigorous conversation about the future of the Bay restoration effort beyond 2025.

Top left photo: Manure from a small feedlot and barn is collected in this storage facility on a farm in Narvon, PA. (Dave Harp)

Top right photo: Tim Rosen (left) of ShoreRivers meets with Tony Riggi, district manager for the Queen Anne's Soil Conservation District, to discuss a wetland restoration project on a farm in Centreville, MD. (Dave Harp)

By Karl Blankenship

A few years ago, the Culpepper Soil and Water Conservation District board took a gamble. Based on rumblings that more money might be on the way from the Virginia General Assembly, they decided to bolster their staff.

"We went out and hired a couple of people on hope," said Lynn Graves, chair of the district's board of directors. "We basically told them, 'This might be a one-year term. We don't know.'"

Fortunately, the gamble paid off. Over the last three years, state money going to conservation districts doubled to $145 million to work with farmers to reduce pollution in local streams and the Chesapeake Bay. Federal money has sharply increased as well.

Even with beefed-up staff, it was more money than the Culpepper district could spend. Last year, it ended up giving a portion of its $8.3 million back to the state. "That looks bad, like you're not doing your job," Graves said. "But it takes time to do this stuff."

It's a symptom of a long-recognized problem. Nutrient runoff from farmland — manure and fertilizer — is the largest source of water quality problems in the Chesapeake Bay and many of its rivers. Meeting Bay cleanup goals hinges on persuading farmers to participate in conservation projects, and to put their time and money on the table to do so. With 83,000 mostly small farms in the watershed, the outreach job is daunting.

Conservation districts, along with the U.S. Department of Agriculture's Natural Resources Conservation Service, are the major gateway for farmers wanting to learn about conservation programs and seek assistance. But state agencies, university cooperative extension offices, nonprofit organizations and private consultants all play a role.

Yet even with record amounts of money available, there are not enough trained people to help farmers who want to take on such conservation projects: installing streamside buffers, planting cover crops, constructing manure storage facilities, fencing cows out of streams, and dozens of other practices.

As far back as 1990, a report from the Chesapeake Bay Program, the partnership between states and the federal government that guides the Bay cleanup, warned that enhanced agricultural outreach was "essential, not peripheral."

A 2017 report from the Chesapeake Bay Commission, a Bay Program partner consisting of state legislators, reached a similar conclusion. It called the dearth of agricultural technical support a "red flag" for the Bay cleanup.

"Unless we address this issue, we will never be reaching the landowners and farmers who are the decision makers on these properties," said Ann Swanson, the former commission director who oversaw the *Boots on the Ground* report. "And therefore, the Chesapeake can never be saved."

The Bay Program has acknowledged that its 2025 goal for nutrient reductions will not be met. While progress has been made, reducing farm runoff remains an enormous challenge. According to computer models, the current pace will not achieve goals for many decades. Many doubt the goals can be achieved at all without a breakthrough in technology or putting huge numbers of farms out of business.

All states have ramped up funding in recent years, and the federal government — through last year's Inflation Reduction Act, the 2021 bipartisan infrastructure bill and COVID relief funding — is poised to spend several hundred million dollars over several years to control farm runoff.

Yet that doesn't solve the shortage in staffing to deliver those programs. Nor is there assurance that the increased funding or newly hired staff will be sustained.

A Bay Program analysis last year said that such problems impact the ability "to spend the new funding in an effective and efficient manner."

A need for people power

Farm conservation projects in recent decades have focused more on putting conservation practices on the ground than building the human infrastructure to work with farmers. Program restrictions have sometimes limited the amount of conservation money — if any — that can be used for staffing.

The drive to get practices on the ground stems from the need for Bay states to show progress in meeting nutrient reduction goals. In the Bay Program system, progress is counted by the number of best management practices, or BMPs, that are implemented.

"None of these funding sources want to pay for just staff time," said Kevin Lutz, agricultural program manager with the Lancaster County Conservation District in Pennsylvania. "It's not a tangible thing that you're producing when you're saying, 'I'm using this to build relationships.'"

Yet building trusted relationships is critical. Technical support is time-consuming because it's not simply a matter of contacting farmers but persuading them to take stewardship actions that might not be in their best economic interest.

Most programs require farmers to pay a portion of the cost. Historically, that's been about 25%, though the percentage has been dropping in some cases as more money flows into the system.

Some practices may benefit farmers by reducing operating costs, such as fuel and equipment savings through conservation tillage. But many incur costs without producing benefits, at least in the short term. Buffers take land out of production, fencing needs to be maintained and other practices take more time and management.

"It just takes a long time to do this work. There's no one easy, quick pill to make this happen," said Denice Coleman, Pennsylvania state conservationist with the NRCS. "It's building relationships. Every farm is different."

It's not unusual, she said, to have seven or eight visits before a farmer signs off on a practice, especially an expensive one like a manure storage facility that can cost $120,000 or more.

There are other challenges as well. Some farmers don't want to be involved with government programs. Others worry that outsiders on their property may find problems they don't want to deal with. Some, nearing retirement age, don't want practices that must be maintained for a decade or longer.

Also, many farmers rent their land. They have little incentive to invest in conservation practices on property they don't own. The owners, in many cases, have little knowledge or interest in farm programs.

"We've been working with some farmers for 10 years, and finally they decided to do it," said Graves of the Culpepper district. "It takes time, and it takes a lot of work."

Hiring backlogs

There is some good news. All Bay states have begun providing more money for technical support. Still, it will take time to train new hires, and concerns remain about the stability of new funding. And hiring is increasingly difficult.

Maryland has historically had the best-funded technical assistance program, and the General Assembly recently authorized 53 new positions. But hiring was delayed because of COVID, and the state had to go through a half-dozen rounds of recruiting to fill the positions, said Hans Schmidt, assistant secretary for conservation with the Maryland Department of Agriculture.

By that time, other people had retired, opening new vacancies.

Part of the problem, Schmidt and others say, is that fewer people have agricultural backgrounds and the skill set to do the job. "More and more people are becoming further and further removed from farming," Schmidt said.

In a recent round of hiring that sought to fill 20 positions, they had 100 applicants who appeared to be qualified on paper but only about 10 with the skills for the work.

New staffing doesn't immediately help with the current influx of funding. It takes 18–24 months to train new hires.

That creates another uncertainty, many say, because districts trying to hire with today's record funding levels often have little idea what their funding will be two years from now, when those people are trained.

"It definitely weighs heavily in our minds," said Lancaster program manager Lutz.

Also, districts are getting new responsibilities. In Pennsylvania, for instance, many help the state oversee compliance programs, which takes time away from technical assistance.

And the Bay Program now requires verification that older BMPs still exist and function correctly; otherwise, the states lose credit for those practices. District officials throughout the Bay watershed say that significantly adds to their workload and detracts from working with farmers.

Shared obstacles

Others, including nonprofit organizations, have joined farmer outreach efforts in recent years, putting more "boots on the ground."

Many are trying to increase farmer participation by covering all, or nearly all, costs of on-farm conservation projects. The record new funding helps make that possible. But new pots of money come with their own timelines, as well as rules and procedures for how money is spent and tracked.

Those are problems for everyone, but when trying to cover all costs for multiple projects on a farm, which can total hundreds of thousands of dollars, it can be a daunting administrative challenge. A single project may require multiple funding sources. One may fund a buffer, another a manure storage facility and so on.

It's an added staffing challenge. "You're already doing the outreach, you're doing the project coordination and, in our instance, you're doing all the planning on the project and all of the design of the project," said Tim Rosen, director of agriculture and restoration with the nonprofit ShoreRivers. "And on top of that, you're asking us to figure out all the financial structures that the state and federal government have."

Another staffing bottleneck: Many BMPs require specially trained technicians or engineers who can design projects to meet standards set by the Agriculture Department's Natural Resources Conservation Service. There are relatively few of them.

At ShoreRivers, that created a years-long backlog for some projects. "We have plenty of civil engineering firms across the Bay, but only a handful might actually understand NRCS guidelines and specifications for projects," Rosen said.

Finally, with partial funding from the Maryland Department of Agriculture, ShoreRivers hired an engineer with NRCS certification to design and approve projects. "We like things to be as turnkey as possible," Rosen said.

Federal officials say they are trying to streamline new funding programs to make them easier to use.

But when a project drags on or looks cumbersome, some landowners or farmers back away from a project, which could have a ripple effect.

"All it takes is one bad experience and that farmer tells all his friends and now everybody believes that the system is very inefficient and you just shouldn't bother with it," said Gordon Hoover, agricultural outreach coordinator with the Lancaster Farmland Trust.

Reaching every farm

For the last several years, Hoover has spent a lot of time knocking on doors. A farmer and member of the Salisbury Township board in Pennsylvania's Lancaster County, Hoover set out to contact each of the roughly 400 farmers in the township.

It's a slow process. Hoover said only about 10% of farms are initially interested in a program. It's a decision that takes time.

"The first time you go out there, you may just have a pleasant chat," Hoover said. "And you may be able to help him with his plan, update his plan, but you're maybe not going to solve the problem on the farm."

It is a throwback to the earliest days of conservation work, when districts had the staff and time to visit and work with farmers. Today, with limited staffing, they often rely on farmers coming to them.

Hoover thinks conservation is best promoted through ongoing conversations, and he'd like to see emphasis placed on reaching each farm on a regular basis, rather than focusing strictly on BMP implementation.

Those visits allow Hoover to share tips about ways farmers can improve operations at little or no cost while learning about what each farmer is doing, including conservation measures they are taking on their own. (A common complaint in the ag community is that people don't always get credit for their actions.)

Gordon Hoover of the Lancaster Farmland Trust discusses improvements on a dairy farm where he worked with the owner to install a suite of runoff control practices. (Karl Blankenship)

Ultimately, Hoover said, such conversations build more trust in the system and win over reluctant landowners.

One of those is Reuben King, a Plain Sect farmer, who took about two years from Hoover's initial contact to take on projects for his 55-cow dairy operation.

"The biggest debate was, 'Am I sacrificing the freedom of my operation?' " he said. But King knew he had a problem: A stream crossing was degrading, creating a pathway for manure to flow into a stream.

Ultimately, King signed onto a project that cost more than $300,000, mostly funded through various conservation programs. It fixed the stream crossing and built a facility that can store manure up to six months, which gives more flexibility on the timing of field applications. It upgraded a high-use area for the cows and made other improvements.

King thinks the project will benefit not only him but his children, who he hopes will someday take over the operation. "That was another part of this decision," he said. "They won't have to spend a half-million dollars to have a very operational facility. I imagine just about every farmer that allows something like this to happen on his farm is hoping for the same thing." ■

Localities look to shore up water supplies in the Bay region

Work underway to prepare for increased droughts, demand

By Whitney Pipkin

The Chesapeake Bay region is generally considered rich in water supplies, with rivers that are more likely to flood than to run dry. But with growing industrial and residential demands, combined with the potential for contamination, no water source is immune from crisis.

The issue has recently bubbled to the surface in the Washington, DC, area and in Virginia, where plans are underway to better prepare for an unpredictable future.

Take the Potomac River. An average of 486 million gallons of water is withdrawn from the river daily to supply drinking and other water needs, according to the Interstate Commission on the Potomac River Basin.

Those withdrawals supply about 86% of the DC area's population. Another 100 million gallons of water are pulled from the groundwater in the surrounding rural areas of the Potomac's basin, the commission found. The commission completed a study in 2020 looking at water resource and demand forecasts for the year 2050 and found a need for some contingency plans.

If the water intakes from the Potomac River needed to be shut down for some reason, many communities would be out of an ongoing water supply within a day. The 2020 study found a need for an additional reservoir to be constructed to shore up the area's water supply.

"The time to start planning for such a facility is now," a summary of the 2020 study states.

Cherie Schultz, director for co-op operations at the commission and one of the study's authors, said adding a reservoir is just one of many options on the table as part of a much broader study of the issue.

The Water Resources Act of 2022 authorized the U.S. Army Corps of Engineers to study what might be the best options for a secondary water source for the region should the Potomac River be taken out of commission for any length of time. That study, which still needs funding, would look at options to create an additional drinking water source or storage solution in the case of a spill or severe drought in the Potomac River.

Little Seneca Reservoir in Boyd, MD, could serve as an emergency water source for the DC metropolitan area. (Renee Bourassa)

Schultz said the Potomac commission and other partners are trying to get the word out about this particular vulnerability for the region and the need for a secondary source before it's too late to act. Droughts across the Western U.S. plaguing the Colorado River, for example, have made these scenarios more plausible than before, with climate scientists suggesting that both flooding and droughts could worsen in the future.

The region is no stranger to significant drought conditions, either.

Virginia started its Office of Water Supply in the early 2000s after a historic drought ushered in water restrictions and policy changes. Twenty years later, "we have more folks and more demand, and it would be a lot more difficult to provide adequate water for all the uses," said W. Weedon Cloe III, who manages the office.

For that reason, the Virginia General Assembly passed a law in 2020 directing regional planning areas to assess potential risks to their local water supplies. Many of the regional planning areas in the state are based around river basins, drawing water from the Rappahannock or the James rivers, for example.

But another Virginia bill in 2022 added a provision that would allow local governments to request to be assigned to a neighboring planning area, factoring in not only river basin boundaries but also where localities are seeing the most population growth and water demand.

Brent Hunsinger, river steward and state policy coordinator for the Friends of the Rappahannock, said water supplies and allocations top his list of concerns. Where the water goes is driven by so many of the same factors that impact water quality and living organisms.

"Going forward, how do we make sure people have water and we have the baseline flows [in the river] to support fish and ecology?" he said.

Hunsinger is particularly concerned about the potential, under the 2022 provision, for water to be drawn from one river basin and discharged into a different one. This sort of reallocation sends water where it's needed for growing populations and industrial needs, such as cooling systems for data centers.

But it could also alter natural systems in a way that would lower their flows and impact their functions over time. One particular concern is that advocacy groups like Hunsinger's can't always know how much water a new data center is proposing to use for cooling purposes because the details are often protected by nondisclosure agreements.

Cloe said that all of the public comments on the amendment are being taken into consideration, and the public will have the chance to comment again before the measure is finalized. He also said DEQ conducts a "cumulative impact analysis" that takes into account the total volume of withdrawals from a river when deciding whether to grant permission for a new withdrawal.

Predicted water needs also don't always pan out the way experts expect. Water demand in the DC metro area, for example, remained about the same from 1990 to 2020 despite a 41% increase in population, the commission report found.

"We try to forecast water use in 20 years, but we always get it wrong," Schultz said. "We have models that try to account for the increasing efficiency, but we underestimate it." ■

Promising feed supplements could squelch the belch in cows

Two potential candidates are emerging to reduce methane emissions in dairy industry

By Ad Crable

You may have heard about this research challenge in recent years: Scientists are looking for ways to reduce the amount of methane that cows release into the air through burping and flatulence. You probably chuckled as you read it.

But it's a serious matter and a national environmental priority. The nation's 89 million cows — along with a much smaller number of sheep — are responsible for 25% of the nation's yearly methane emissions, second only to oil and gas production, according to the U.S. Environmental Protection Agency. That's equivalent to the amount of greenhouse gases emitted by 650 million cars.

Carbon dioxide is the most prevalent greenhouse gas contributing to the climate crisis and stays in the atmosphere for thousands of years. Methane, on the other hand, usually breaks down in about 12 years, but its warming power is much more potent — about 25 times that of carbon dioxide — during that relatively short time frame.

The United States is among more than 150 countries that have signed the United Nations' Global Methane Pledge to reduce methane emissions by at least 30% by 2030. Reducing emissions from cows and other livestock is considered crucial to meeting that goal.

Of the estimated 350 pounds of methane a single milk cow releases in a year, flatulence accounts for only a tiny fraction of it — 3.5%, or about 12 pounds. The rest comes from belching as the cow chews.

"Basically, everyone now is on the methane bandwagon," said Alexander Hristov, a Penn State University distinguished professor of dairy nutrition and one of the world's leading researchers into reducing methane emissions from livestock.

"If you commit to being carbon neutral, then you have to look at livestock operations. There's no other way. If you want an immediate effect on greenhouse gases, you want to target methane, not carbon dioxide," said Hristov, who is the editor of a new book, *Advances in Sustainable Dairy Cattle Nutrition.*

After nearly two decades of experimenting with feed supplements that alter the fermentation process inside cows' four-chambered stomachs, the federal government is spending millions to wrap up proof on a couple of promising solutions.

Penn State researcher Alexander Hristov is studying diet changes for cows that could reduce the amount of methane they burp into the air. (Michael Houtz/Penn State)

The finalists: a synthetic feed supplement known as 3-NOP that studies have found to reduce methane emissions in cows 25-29%, and a red seaweed found in tropical oceans that studies have shown can reduce methane by as much as 63% — though in some studies, the seaweed-eating cows ate less feed overall and produced less milk.

If either or both of these methane inhibitors are embraced by the government, the dairy industry and consumers, the focus will be on integrating them with the nation's 9.4 million dairy cows — because feed additives would be impractical with pasture-grazing beef cattle. Roughly 1.2 million of those milk cows are in Chesapeake Bay watershed states, primarily New York and Pennsylvania.

Over the last decade, scientists have searched far and wide for natural and synthetic feed additives that could inhibit microbial methane production in cows' complex stomachs. The tinkering included plant extracts, vegetable oils, flax seeds, linseeds and oilseeds, garlic and capsaicin from chili peppers. Researchers have also experimented with chemically treated forage grasses and different grass species, as well as the selective breeding of cows that produce lower methane amounts, and even a one-time vaccine.

Hristov is intimately familiar with most of that research. Since 2005, he and his Penn State cohorts have explored those

3-NOP is a synthetic compound that can be fed to dairy cows to reduce their emissions of methane, a global-warming gas. (Royal DSM)

avenues on lactating cows at the university's 500-head livestock farm.

Through repeated testing, almost all of the ideas were found to have drawbacks, such as digestive side effects, reduced milk production, lower fat content in milk, inhibited weight gain and costliness.

Now, the U.S. Department of Agriculture has awarded Hristov and his team a $2 million grant for a three-year study of whether the red seaweed and 3-NOP supplement can be continuously effective in bringing down methane emissions.

The proposed methane-reduction options also are part of a larger $25 million grant to Penn State from the USDA to help Pennsylvania dairy farmers use more climate-smart practices while also boosting the value of their products.

How might the added cost of feed supplements offer financial benefits to dairy

Red seaweed from tropical oceans has been found to reduce methane from cows, though early studies suggest they don't like the taste. (Penn State)

farmers already struggling to make a profit?

For one thing, the 3-NOP feed additive was found to increase fat in milk, which is desirable for making cheese and butter. Also, because producing methane is a biological waste of energy in a cow, inhibiting it enables cows to gain weight faster, studies showed — and heavier cows produce more milk. Dairies also might be able to sell carbon credits for reducing methane emissions.

And, at the other end of the supply chain, consumer surveys have shown that the public is willing to pay more for milk, cheese and butter if they know they are aiding the environment.

Hristov said that the 3-NOP compound he helped develop will likely be the most effective weapon for reducing methane from cows.

The feed additive is already being produced by a Dutch company, Royal DSM, under the brand name Bovaer. It has been approved for use in 42 countries, though not yet in the U.S.

Bovaer can be a game-changer, Hristov said, but he has two lingering concerns. One is that some studies suggest a cow's stomach may adjust over time and scale down the additive's ability to reduce methane.

The other is that consumers may be wary of a synthetic compound finding its way into their milk, cheese and butter, no matter how safe it is found to be.

He thinks red seaweed is a far less likely solution. For one thing, cows don't seem to like the taste, he said. And there's not enough of it for wild harvesting to be practical. Widespread use would require large aquaculture operations.

"But [that drawback] flies under the radar because it's a catchy thing," he observed. "Feeding seaweed to cows. That resonates with some people very well." ■

A ferry, art-nature center, quaint town – all in a day's visit

By Ad Crable

The Ned Smith Center for Nature and Art near the historic Susquehanna River town of Millersburg, PA, is not entirely a museum, nor an art gallery, nor exactly a nature center. It melds elements of all three into a unique destination.

Since 2004, the $10 million modern complex overlooking Wiconisco Creek, and surrounded by 535 acres of publicly accessible mature forest, has been attracting growing and diverse legions of visitors. The organization, founded in 1993, is celebrating its 30th anniversary.

Visitors are attracted to its vision of honoring the beloved hometown wildlife artist, writer and naturalist Ned Smith by celebrating the arts and natural world through education, exhibition and experiences.

On any given day (except Sunday and Monday), you can admire Smith's original wildlife paintings (valued at $4 million), see his typewriter, his weathered shotgun (named Elsie), his rucksack and his journal notes. You'll also see the wooden canoe he used to ply the Susquehanna while fishing, hunting ducks and collecting Native American artifacts.

You can walk outside and take a footbridge across the creek to a network of trails, including a 2-mile section of the Lykens Valley Rail Trail. That trail was built on the bed of an 1834 railroad that used gravity to roll coal cars down to the Susquehanna, where their contents were dumped into canal boats.

You can drive into Millersburg to see a New England-style town, founded in 1807, with a quaint commons, shops and Victorian homes. There you can walk several blocks to the riverfront, where as many as 100 canal boats once jockeyed for loading — but is now a quiet promenade along the wide river that cuts through Berry's and Mahantango mountains. It's a place to sit and take it all in.

A portion of the Wiconisco Canal, built along the Susquehanna in the mid-1800s, is still intact here, filled with soupy green water. The canal's towpath, used by mules and horses to lug the barges downstream, is now a walking trail. The stone remnants of a series of locks rise from the undergrowth.

And you can take yourself and your car on the Millersburg Ferry. It's a 20-minute, 4 mph unhurried boat ride across the mile-wide Susquehanna. You'll travel on either the *Roaring Bull V* or the *Falcon III*, said to be the last two wooden double-sternwheel paddleboats operating in the United States. A ferry has operated here continuously since 1817, even as bridges put all of the river's other ferries out of business.

If you take the ferry back to Millersburg, you might have time to catch a concert by, say, the 1990s rock band Spin Doctors, in an outdoor amphitheater among the trees at the Ned Smith Center for Nature & Art. A full day, to be sure. Let's break down the attractions.

Ned Smith

Ned Smith

The first commercial artwork by E. Stanley "Ned" Smith, a self-taught painter and ardent naturalist, was an amalgam of birds one might see along the local streams for a 1939 cover of *Pennsylvania Angler* magazine. But his most famous works were the 121 wildlife

"Waiting for Dusk" is one of Ned Smith's most popular wildlife paintings. (Both images courtesy of the Ned Smith Center for Nature and Art)

Photo: The Ned Smith Center for Nature and Art in Millersburg, PA, merges the worlds of art and the outdoors. (Ad Crable)

One of two paddleboats on the Millersburg Ferry unloads vehicles and passengers after crossing the Susquehanna River in Millersburg, PA. A ferry has run continuously at the spot since at least 1817. (Ad Crable)

paintings that, over 35 years, graced the cover of *Pennsylvania Game News*, the monthly magazine of the Pennsylvania Game Commission.

There are always a rotating number of originals on display at the Ned Smith Center. Although the detail, beauty, complexity and accuracy of Smith's wildlife renderings are evident, his growth as an artist over time
is noticeable.

Smith died of a heart attack in his Millersburg garden at the age of 65 in 1985.

Ned Smith Center

Determined to keep the hometown hero's legacy and work in the community instead of being divided among various museums, Smith's wife, Marie, and supporters worked tirelessly to build support for a suitable venue. They were also determined to make the facility more than just a museum. The public responded.

The center building opened in 2004 with a gallery, gift shop, offices and classrooms. Additions since then have included a 240-foot arched footbridge across the creek to access about 9 miles of trails, another gallery for traveling exhibits, a second-story deck, a Nature's Discovery Play Area and the Desoto Amphitheater for the Performing Arts, which hosts musical concerts outdoors.

The center also stages a nationally popular online wildlife art auction. This year it takes place Oct. 1–14.

Millersburg Ferry

Part of the fun in going to the Ned Smith Center is getting there from the other side of the Susquehanna — by way of a paddlewheel ferry.

Passengers follow the same path across the water that ferries at this site have made for centuries: along a zig-zagging rock wall built more than 100 years ago to raise the water level. Mountains and bends in the river are visible on the mile-long crossing.

A ferry has been operating here continuously since at least 1817 when the first written accounts are recorded, but it's believed the crossings go back as far as the 1750s.

Riding one of the two ferries operating today is a relaxing glimpse into the past.

"People leave their troubles behind most of the time when we're traveling," said Thomas Mallonee, who has piloted the vessels back and forth across the river for 25 years. "They are usually driving on congested roads with danger and accidents. You leave behind that congested world that we live in when you come on the boat. You step back in time. There's history and a nostalgia of seeing something still there.

"Nature adds to that," he said. "We often see eagles flying overhead, and you can see fish in the river when you look down."

Sometimes, travelers blithely following their GPS directions are shocked to find themselves at one of the ferry landings. Often, they give in to serendipity and make the crossing.

Both paddleboats were built for the ferry service in the early 1920s and are powered by diesel engines. The first ferry boats were open skiffs poled across the river. Steamboat ferries came later.

The heavy metal steering wheel on the *Roaring Bull V* was likely scavenged from an old coal barge. The ship horn was originally on an aircraft carrier.

Since the early 1990s, the ferry service has been run by a nonprofit organization with many volunteers who are preserving the historic passage for future generations.

Millersburg Borough

In the spring of 1790, brothers Daniel and John Miller were traveling alongside the Susquehanna River when they came over the ridge known as Berry's Mountain and were enraptured by the bucolic view of the wide valley stretching across to the next ridge.

Daniel bought 979 acres and built his first cabin in 1794. Then he began to form a town. After securing exclusive shad-fishing and ferry boat rights, he laid out a town with the foresight to set aside a New England-style commons and a portion of the riverfront for public use. Miller's second home, built in 1805, still stands on the northeast corner of Pine and Walnut streets.

Later, Millersburg became a thriving industrial town, serving as a nexus for two railroads and a canal system that moved coal from nearby mines. The town's Queen Anne-style passenger railroad station, at 127 W. Center St., is on the National Register of Historic Places.

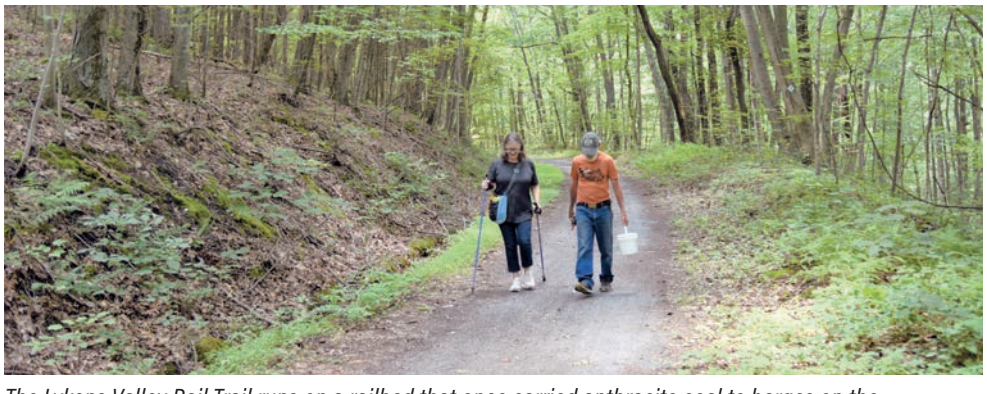
The town's population doubled by the Civil War. In the decades that followed, railroads gradually made the canal obsolete, and coal production in the area has long since declined. Today, Millersburg has about 2,500 residents. Many of the homes and buildings from its golden age remain. A smaller unincorporated community, Lenkerville, is located on the south side of Wisconisco Creek.

If you go

The Ned Smith Center for Nature and Art is open year-round 10 a.m. to 4 p.m. Tuesday through Saturday at 176 Water Company Road, Millersburg, PA. In addition to the permanent Ned Smith collection, an exhibit, *Looking for Trouble: The Unseen Photography of Ned Smith*, runs through mid-October. An exhibit featuring selected moths and butterflies from the center's 18,393-specimen collection begins in October. Admission to the galleries is $7 for adults, $2 for seniors and $2 for students. On Fridays, entry is by voluntary donation. A 9-mile trail system begins at the center. For information, visit nedsmithcenter.org, call 717-692-3699 or email info@nedsmithcenter.org.

The Millersburg ferry service operates continuously, weather permitting, from about 9 a.m. to dusk, Friday through Monday from May into October or November. On the Millersburg side of the river, the ferry landing is at the foot of North Street. On the west side of the river, the landing is at the foot of Ferry Lane at an RV and camping area south of Liverpool, PA. Weather and water levels can affect operation. Check the Millersburg Ferry Facebook page to see if the boats are running. The cost is $15 one way for a vehicle and driver, plus $5 per passenger; $10 for a motorcycle and driver; $5 one way for a walk-on passenger. For information, visit millersburgferry.org, email info@millersburgferry.org or call 717-692-2442.

The center hosts the annual Ned Smith Center Nature and Art Festival on the waterfront in Millersburg. It's held on the last Saturday of July at Myo Park, on the south side of the Wiconisco Creek. ■



The Lykens Valley Rail Trail runs on a railbed that once carried anthracite coal to barges on the Susquehanna River to be loaded onto barges. (Ad Crable)

Great egrets explore a patch of native sunflowers on Conejohela Flats in the Susquehanna River above Safe Harbor Dam. (Dave Harp)

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An afternoon thunderstorm rolls through farm country in Saltillo, PA, a borough of Huntingdon County. (Michele Danoff)

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The world's largest rubber duck, a six-story tall inflatable known as Mama Duck, made an appearance at the Little Big Townfest in Crisfield, MD, in August. (Michele Danoff)

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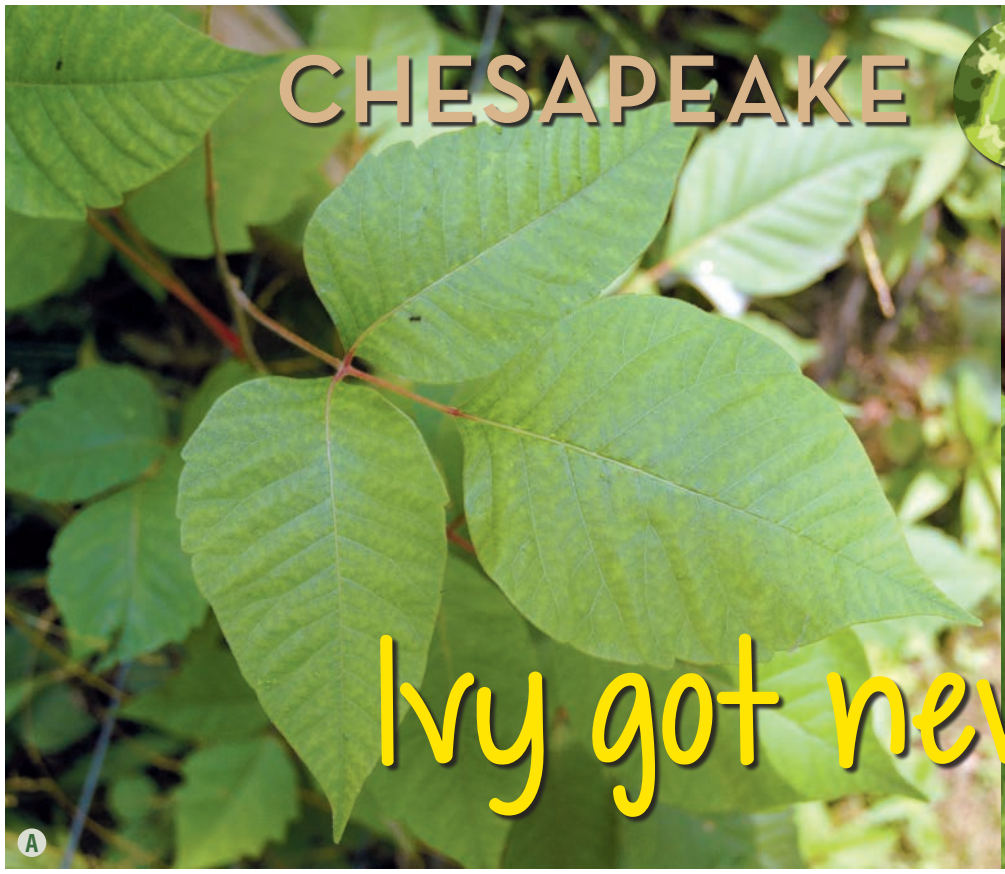
CHESAPEAKE CHALLENGE

— Kathleen A. Gaskell

Ivy got news for you!


A


B

In praise of poison ivy

The natural world's opinion of poison ivy is vastly different from that of people. In fact, animals might consider people's minds poisoned against what to them is a valuable resource. How well do you know this plant's merits? Answers are on page 36.

1. Which of these animals make a meal out of poison ivy's leaves and stems?
   A. Deer & raccoons
   B. Chipmunks & muskrats
   C. Insects
   D. All of the above

2. Birds that eat poison ivy's waxy white berries include the Eastern bluebird, wild turkey, American robin and crow. Why are the berries particularly important in the diets of birds and other animals? (two answers)
   A. They are rich in fat, nutrients and vitamins.
   B. They have antibacterial properties.
   C. They are available starting in midsummer and persist through winter, when other food is less available.
   D. They have pain-relieving properties.


C

3. Botanists suspect that poison ivy's urushiol may defend it against:
   A. Acid rain
   B. Drought
   C. Invasive plants
   D. Microbial infections

4. Poison ivy helps to heal landscapes in which ways? (two answers)
   A. It is one of the earlier plants to take root in disturbed areas.
   B. Its roots fix nitrogen in the soil.
   C. Its roots are tenacious and prevent erosion, especially on coastlines in the East.
   D. It has been found to remove heavy metals from the soil.

5. Why is poison ivy better than English ivy?
   A. Poison ivy doesn't strangle trees.
   B. Poison ivy is a native plant; English ivy is not.
   C. Poison ivy is not invasive.
   D. All of the above

6. You've learned about poison ivy's roots, leaves and berries. What are the colors of this perennial's small flowers, which bloom in clusters April through June?
   A. Deep reddish petals with brown centers
   B. Pale pink petals with white centers
   C. Off-white to green petals with orangish centers
   D. Dark green petals with yellow centers


D

Vitamin CO2: Poison ivy exposed to greater amounts of atmospheric carbon dioxide grows faster and larger — and produces a greater volume of urushiol, an oily substance that triggers itching, burning and rashes on human skin. Another gift from climate change.

Will the real poison ivy raise its leaves? The leaves of poison ivy can be shiny or matte; various shades of green (except when they are reddish in spring or red, orange or yellow in autumn); smooth, toothed or deeply lobed; and found as a tree-climbing vine, or a short or bushy groundcover.

"Leaflets three, let it be." It's a good memory aid. Look for three fanned out leaflets, with a notably longer stem on the middle one. That said, if you are in Massachusetts or Texas, also be on the lookout for rare five-leaflet plants.


E

Bitter fruit: In addition to poison sumac and poison oak, poison ivy is in the same plant family, *Anacardiaceae,* as cashews and mangos. Those who chew the mango flesh from its skin risk getting blisters on their lips.

Avoid a dog-gone cat-astrophe: Poison ivy's urushiol oil won't affect your pet, but if you suspect it's been exposed, wash it with grease-cutting soap and cool water. Don't forget to wear rubber gloves, a long-sleeved shirt and long pants.

Title image: *Poison ivy flower. (Michele Danoff)*

A *A trio of poison ivy leaflets with mostly smooth edges. (James St. John/CC BY 2.0)*

B *Poison ivy leaflets of the lobed variety. (Susy Morris/CC BY-NC 2.0)*

C *Poison ivy vine. (Michele Danoff)*

D *In spring, young poison ivy leaves are shiny with a reddsih color. (Michele Danoff)*

E *Poison ivy flower. (Michele Danoff)*

If you point the finger at PA, the other three point at you

By Tom Horton

Portions of a forested area were cut down to begin work on a development project in Harford County, MD, as shown here in August 2022. (A.J. Metcalf/Chesapeake Bay Foundation)

If I were the state of Pennsylvania, I'd hope to heed the upstream finger-pointing from Maryland and Virginia on my enduring failure to meet my share of the Chesapeake Bay cleanup goals.

As the jurisdiction containing about 40% of the Bay watershed, my fertile farms leak enough pollution down the mighty Susquehanna, source of nearly half of the Bay's river inflows, that the region won't achieve its current goals if I don't step up.

But if I were Pennsylvania, I'd be tempted to point out a Susquehanna's-worth of downstream hypocrisies — like adding 10 times more people in Maryland and Virginia, like Maryland and Virginia degrading critical habitat along nearly 2,000 miles of Bay shoreline, like the downstreamers losing forests to development nearly three times faster than Pennsylvania.

Also, there's the introduction of those invasive blue catfish in Virginia, which has led to Maryland seeking federal disaster assistance. And by the way, Virginia, you're still taking menhaden away from larger fish and ospreys to please one very specialized fishing industry.

The point of all my pointing is not pointing for pointing's sake. Rather, it is to suggest rethinking the current Bay cleanup goals — goals that Maryland and Virginia are much closer to meeting than Pennsylvania.

Those goals, in place for 40 years, focus tightly on reducing nitrogen, phosphorus and sediment to un-murk Bay waters and allow oxygen back into deepwater "dead zones."

These will always be valid goals, and we can never back off on cleaning up all of their sources, which include dirty air, sewage and agriculture; or on protecting forests and wetlands that absorb such pollutants; or on minimizing pavement, which sends pollutants merrily along to the nearest waterbody.

But there's more to the Chesapeake ecosystem than nitrogen, phosphorus and sediment. And there's more to people's enjoyment of the iconic estuary than stimulating oxygen in deep channels in the summer.

Increasingly, the science is suggesting we focus more on overlooked aspects of Bay health, like shallow water habitats. The armoring of nearly a fifth of the Bay's 11,000 miles of shoreline with bulkheads and rock is a huge despoiler of shallow water habitat — which is so important to little crabs and fish, as well as beach nesters, from terrapins and horseshoe crabs to royal terns and black skimmers.

Not so scientific, but no less important, is the public's access to the shores of the Chesapeake — currently only a few percent of its enormous shoreline. Ask yourself this, downstream states: Would it be better to have a perfect Bay, inaccessible to most, or a fairly healthy Bay, with most of its shores in public ownership?

As Pennsylvania, I might venture that none of the above relates much to what I do or don't do on my upstream farms. Also note: I just added three new state parks upstream of the Bay, which include miles of shoreline along rivers and creeks.

The science is also showing that to truly make modern agriculture cease "leaking" fertilizers is going to be a taller order than we thought — well beyond fanciful win-win scenarios in which farmers who do right by the Bay also save money on fertilizer, fuel and other expenses.

It could mean taking 44% of the region's farmland out of production — an impossibility — to seriously improve the dead zones, according to the U.S. Geological Survey (as reported in the May 2023 issue of the *Bay Journal*).

Climate change, with its more intensive rainfalls and runoff of pollutants from the land, is going to make reducing ag runoff that much harder. Insane national energy policies that use more than 40% of the nation's corn crop for ethanol — which takes as much energy to make as it saves — also drive more intensive, polluting farming.

Bay cleanup goals pay lip service to population growth, but essentially accept it. Maryland and Virginia absolutely embrace it. Between 2010 and 2020, Maryland added 385,000 people to the Bay watershed and Virginia a whopping 630,000. And a lot of Virginia's people boom occurred on forested lands, with 60,000 acres lost in the most recent four years of record. I added only 85,000 people and lost 24,000 acres of forests.

Population growth is listed almost nowhere officially as a source of pollution or as a threat to Bay health. Almost everywhere, governments treat only its symptoms: sewage, paving, the loss of wetlands and forest, and air pollution.

As with climate change, population growth is going to undermine virtually every aspect of regaining a healthy Chesapeake. A recent widely read book, *Drawdown,* offers the "top 10" best ways to reduce the carbon buildup causing global warming. Population stability or reduction is listed nowhere. But if you made numbers six and seven a single item, it would be close to number one. Six and seven are "family planning" and "educating women and girls," both among the best ways to reduce births worldwide.

I'm not expecting sympathy from downstream, but most of my voters don't live in the Chesapeake watershed (Philly is on the Delaware River and Pittsburgh drains to the Mississippi). And I wonder sometimes, if the Bay watershed were one state, where would government put its pollution fighting dollars — more upstream maybe?

Farmland aside, I know I've got work to do. I'm ill-prepared for the population growth that will come from Marylanders seeking affordable land and homes. (My zoning, stormwater rules and forest protections are among the watershed's worst.)

But after some 40 years of pursuing current goals and missing deadlines and the Bay still ailing, doubling down on business as usual isn't going to work any more than continuing to act as if population doesn't matter, as if we can grow our way to a healthier Bay. ■

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.

Focus on the real culprit in Bay pollution: fertilizer overkill

By Lynton S. Land

Liquid manure is spread on a farm field in Mercersburg, PA. (Will Parson/Chesapeake Bay Program)

A pile of manure awaits spreading on a farm in Montgomery County, MD. (Will Parson/ Chesapeake Bay Program)

Former Maryland State Sen. Gerald Winegrad contributed yet another excellent commentary in the *Bay Journal* earlier this year (*Don't fall for the happy talk, Bay leaders have failed us*, January/ February 2023). In it he expands on his equally insightful essay published in January February 2020 (*36 years after first Bay Agreement, its restoration is still a pipe dream*). If only society would elect more politicians as knowledgeable and realistic as he is!

To improve Bay water quality, the problems must be identified, agreed upon, and then solved. The biggest problem has been identified unequivocally for many decades. Inefficient agricultural crop fertilization is responsible for most anthropogenic nutrient pollution. Let's not mince words. *Most of the nutrients that pollute the Bay now come from fertilizers intended to grow a crop but not consumed by the crop.*

According to a published study from Virginia Tech (confirming many others), "Nitrogen use efficiency [the percentage of applied nitrogen sequestered in the crop] is normally 50–60% but can be as high as 75% with proper N timing and placement."

If we accept the high number of that "normal" range — 60%, because higher than that is rare — it means about 190 million pounds of nitrogen is lost to the environment every year. That's 40% of the 475 million pounds of chemical fertilizer purchased annually in Maryland, Pennsylvania and Virginia, according to the U.S. Environmental Protection Agency. And it is a significant portion of the roughly 240 million pounds of nitrogen, from all sources, entering the Bay watershed every year, according to computer model estimates from the Chesapeake Bay Program.

Farmers are not penalized for their contribution to Bay pollution, but this is nevertheless a classic "externality," where the real cost to society is ignored. The inefficient nature of chemical fertilization is understood by agronomists, but not widely communicated to the public.

What are the solutions? The only certain solution is to significantly reduce the pollution at its source, as is true for any pollutant. More forests, riparian buffers and oyster reefs won't solve the problem, nor will dredging behind Conowingo Dam. Yes, "every little bit helps," but only by significantly addressing the major source of pollution — inefficient crop fertilization — can Bay water quality improve meaningfully.

How do we do it? One possibility for chemical fertilizer is to use slow-release products that cause far less pollution. But they currently cost more. It is doubtful that a pollution tax on conventional fertilizer could ever be enacted, but perhaps more efficient fertilizers can be subsidized or produced less expensively.

Controlling the land application of animal waste (poultry litter, manure and sewage sludge) is the lowest hanging fruit. It causes about 20% of Bay nutrient pollution, and it benefits very few farmers. That pollution can be eliminated easily, unlike the pollution from chemical fertilizer. Existing government regulations, written to supply sufficient nutrients for crop growth, must be replaced with regulations that prevent massive nutrient pollution.

Consider a prospective cornfield receiving the maximum amount of sewage sludge allowed by Virginia regulations (which are not much different for poultry litter or manure). To supply 150 pounds of nitrogen per acre needed by the crop at the mandated nitrogen-use efficiency of 30% (for sludge), the grower must apply 500 pounds of nitrogen. That leaves 350 pounds per acre not consumed by the crop and eventually released to the environment. To picture this, imagine a pile of 87 of the typical 40-pound bags of 10-10-10 fertilizer you might buy at a store dumped on every acre of crops in the Bay watershed fertilized with animal waste.

Because of this uptake inefficiency, massive nitrogen pollution is guaranteed as long as nitrogen content determines the application rate. Phosphorus will be vastly overapplied under these regulations. If application rates were determined by phosphorus, pollution would be greatly reduced, but additional nitrogen fertilizer would need to be applied.

How else, other than by land application, could the animal waste be disposed of? Anaerobic (in the absence of free oxygen) digestion to produce methane (CH_4) is the obvious solution, either in facilities designed for it or in landfills designed to harvest the methane (landfill gas or LFG) and use it as fuel, or at least flare it and keep it out of the atmosphere. The Blue Plains wastewater treatment plant, for instance, harvests enough of its own methane emissions to provide about one-third of the plant's energy needs.

Improvement in Bay water quality has resulted mostly from the reduction of point-source pollution from wastewater treatment plants. Funding has come in part, from small increases in fees charged to a great many customers. That same strategy could be applied to finding alternatives to sewage sludge disposal by land application.

We all have to eat, but society must agree that agricultural fertilization is the problem and focus on it. We can easily eliminate 20% of agricultural pollution by replacing verbose, permissive regulations for disposing of animal waste by land application with a few simple words: "The land application of poultry litter, sludge and manure shall be limited to the amount of phosphorus necessary to support growth of the next crop, based on a soil analysis for phosphorus."

Eliminating the pollution from animal waste will result in a water quality improvement of about the same magnitude that resulted from upgrading wastewater treatment plants. Society must demand that elected and appointed officials require more efficient crop fertilization. Nutrient pollution's cost to society must be honestly cost-accounted. Failure to improve the efficiency of crop fertilization will just lead to continued pollution ... and more happy talk. ■

Dr. Lynton S. Land is emeritus professor of geological sciences at the University of Texas in Austin and lives in Ophelia, VA. His website is www.VaBayBlues.org.

Chesapeake recreation area would help close the 'nature gap'

By Shanna Edberg

I grew up in the Los Angeles area, a 45-minute drive from the beach. The salt smell of the ocean, the sounds of seagulls and the cool ocean breeze will be forever associated with my childhood memories. I grew up under the assumption that visiting the coast was my right.

When I left California as an adult, I made Maryland my new home, trading the Pacific Ocean for the Chesapeake Bay — just as beloved. But living here has made me realize that coastal access is not enshrined in the law in the Chesapeake region, as it is in California. According to a report published by Hispanic Access Foundation and the Center for American Progress, *How to Fix Americans' Diminishing Access to the Coasts,* of the 30 U.S. coastal states, including those on the Bay, Great Lakes and Gulf of Mexico, only six have strong public access laws. Maryland and Virginia are not among them.

Now, of course, I recognize that my childhood memories rest on a foundation of privilege. I grew up in a family with the time to make the trip, money for gas, an appreciation for time spent in nature and the internalized confidence that our whiteness would not present an obstacle to feeling like we belonged in that space.

While coastal access in California is by no means perfect (see again: privilege), fostering improved access to the coast is a goal to which Chesapeake lawmakers should aspire. Spending time in blue spaces like ocean and bay coastlines, lakesides, riversides and anywhere else with a view of the water — even urban water fixtures like canals and fountains — is associated with improved mental and physical health, including lowered stress, anxiety and cardiovascular disease.

A lack of public access to these spaces means the health benefits are reserved for those with the privilege of already living there: predominantly wealthier and whiter communities. Across the country, Latino, Black, Asian, Indigenous and other communities face what is called the "nature gap" — a disproportionate lack of green and blue space in neighborhoods of color, compared with predominantly white neighborhoods. This means that communities of color are less likely to have nature and coastal access, and therefore miss out on the benefits these spaces bring.

Anglers try their luck off a fishing pier near Fort Monroe's North Beach, at the mouth of the James River in Virginia. North Beach is one of four initial sites listed in the bill that aims to establish the Chesapeake National Recreational Area. (Will Parson/Chesapeake Bay Program)

There is an immediate opportunity for Maryland and Virginia, and all of us who love the Bay, to help correct this injustice and increase public access to this treasured place.

In July, U.S. Sen. Chris Van Hollen and U.S. Rep. Paul Sarbanes released a bill that would designate the Chesapeake National Recreation Area. This would add parts of the Chesapeake to the National Park System, providing more resources to these scenic places and allowing more opportunities for recreation and to remember Bay history. It would also be a solid step forward to increase coastal access for Maryland and Virginia residents.

Visitors enjoy the water at Sandy Point State Park in Maryland. (Steve Droter/Chesapeake Bay Program)

Unusual for Congress, Van Hollen published the draft legislation in November 2022, several months before introducing the bill in Congress. His team and Sarbanes' then held a six-month public comment period on the bill's text that allowed the public to provide comments. This feedback was used to improve the bill and address concerns and suggestions.

This process also gave underrepresented communities, like the Latino communities I serve in my work at the Hispanic Access Foundation, a fairer chance to weigh in on the legislation — an exciting step for democracy and civic engagement.

To bridge the nature gap and enable access to our coast, we must create more parks and protected nature areas. The Chesapeake National Recreation Area would do just that. The resources of the National Park system would be used to honor this beautiful landscape and its history as it deserves to be celebrated — and all of us would have more opportunities to experience it. ■

Shanna Edberg is the director of Conservation Programs for the Hispanic Access Foundation.

SHARE YOUR THOUGHTS

The *Bay Journal* welcomes comments on environmental issues in the Chesapeake Bay region. Letters to the editor should be 300 words or less. Submit your letter online at bayjournal.com by following a link in the Opinion section, or use the contact information below.

Opinion columns are typically a maximum of 900 words and must be arranged in advance. Deadlines and space availability vary. Text may be edited for clarity or length. Contact T. F. Sayles at tsayles@bayjournal.com, 410-746-0519 or at P.O. Box 300, Mayo, MD, 21106. Please include your phone number and/or email address.

BULLETIN BOARD

VOLUNTEER OPPORTUNITIES

WATERSHEDWIDE

Project Clean Stream
The Alliance for the Chesapeake Bay, through its *Project Clean Stream,* provides supplies for stream cleanups anywhere in the watershed. To volunteer, register an event, report a site needing a cleanup: Lauren Sauder at lsauder@allianceforthebay.org.

Citizen Science: Creek Critters
Use Nature Forward's *Creek Critters* app to check the health of local streams by identifying small organisms living in them and reporting your findings. Download the free app from Apple App Store or Google Play. Info: natureforward.org/creek-critters.

Potomac River watershed cleanups
Learn about shoreline cleanup opportunities in the Potomac River watershed. Info: fergusonfoundation.org. Click on "Cleanups."

Citizen science: butterfly census
Friend of the Earth's *Global Butterflies Census* raises awareness about butterflies & moths, their biodiversity. Collect data to participate: See a butterfly or moth? Take a close picture without disturbing it, then send it by WhatsApp message to Friend of the Earth along with your position's coordinates. The organization will reply with the species' name, file the information on the census' interactive map, database. Info: friendoftheearth.org. Click on "Projects."

PENNSYLVANIA

Tree plantings
The Alliance for the Chesapeake Bay needs volunteers to plant trees in riparian buffers. Events are rain or shine. Wear long pants that can get dirty, closed-toe shoes (boots best), hat, gloves (if you have them). Bring bug spray, water for yourself. The exact address, reminders will be sent upon registration.
- 10 am–1 pm Oct. 7. Pine Grove in Schuylkill County. Info: https://htru.io/SElG.
- 4:30–7:30 pm Oct. 13. Manheim in Lancaster County. Info: https://htru.io/SElH.
- 10 am–1 pm Oct. 14. Manheim in Lancaster County. Info: https://htru.io/SEII.

State park, forest projects
Help with Department of Conservation and Natural Resources' projects at state parks and forests: clear & create trails, habitat; repair & install plants, bridges, signs; campground hosts; interpretation programs & hikes; technical engineering, computer database assistance; forest fire prevention programs; research projects. Web search: "PA DCNR conservation volunteers."

PA Parks & Forests Foundation
The Pennsylvania Parks and Forests Foundation, a Department of Conservation and Natural Resources partner, helps citizens become involved in parks and forests. Volunteers learn about park or forest needs, then join or start a friends group. Info: paparksandforests.org.

VIRGINIA

Strange green organisms in ponds?
Those with concerns about strange greenish organisms in Prince William Conservation Soil & Water Conservation District ponds or lakes should email: waterquality@pwswcd.org. To learn about green algae, cyanobacteria, visit vdh.virginia.gov.

Prince William Bandalong
Help to empty trash out of Bandalong, Prince William County's trash trap on Neabsco Creek, every Friday. Participants also collect data. Info: Tim Hughes at thughes@pwcgov.org.

Reedville Fishermen's Museum
The Reedville Fishermen's Museum needs volunteers for docents and in the gift shop, boat shop, research collections/library. Info: office@rfmuseum.org, rfmuseum.org.

Goose Creek Association
The Goose Creek Association in Middleburg needs volunteers for stream monitoring & restoration, educational outreach, events, zoning & preservation projects, river cleanups. Info: Holly Geary at 540-687-3073, info@goosecreek.org, goosecreek.org/volunteer.

Check out cleanup supplies
Hampton public libraries have cleanup kits that can be checked out year-round, then returned after a cleanup. Call your local library for details.

Virginia Living Museum
Virginia Living Museum in Newport News needs volunteers ages 11+ (11–14 w/adult) to work alongside staff. Some positions have age requirements. Adults must complete background check ($12.50). Financial aid applications available. Info: volunteer@thevlm.org.

Chemical water monitoring teams
Help the Prince William Soil and Water Conservation District and Department of Environmental Quality by joining a *Chemical Water Quality Monitoring Team*. Training provided. Monitoring sites are accessible. Info: Veronica Tangiri at waterquality@pwswcd.org or waterquality@pwswcd.org, pwswcd.org.

Pond cleanup programs
Join a Prince William Soil & Water Conservation District's *One-Time Pond Cleanup* in the fall or spring. The district needs kayaks to support this effort. Volunteers are also needed to take on longer-term commitments on a variety of waterways. Info: waterquality@pwswcd.org.

MARYLAND

Lower Shore Land Trust
The Lower Shore Land Trust in Snow Hill is looking for volunteers to help with their events. Info: Beth Sheppard at bsheppard@lowershorelandtrust.org.

Severn River Association
Volunteer at the Severn River Association. Visit severnriver.org/get-involved, then fill out the "volunteer interest" form.

Delmarva Woodland Stewards
Maryland property owners on the Delmarva Peninsula who are interested in changing their forest management practices to increase species diversity, eliminate invasives, improve forest health are encouraged to contact *Delmarva Woodland Stewards*. Web search: "Delmarva Woodland Stewards."

Annapolis Maritime Museum
The Annapolis Maritime Museum & Park needs volunteers. Info: Ryan Linthicum at museum@amaritime.org.

Patapsco Valley State Park
Volunteer opportunities include: daily operations, leading hikes & nature crafts, mounted patrols, trail maintenance, photographers, nature center docents, graphic designers, marketing specialists, artists, carpenters, plumbers, stone masons, seamstresses. Info: volunteerpatapsco.dnr@maryland.gov, 410-461-5005.

Oyster growers sought
The *Marylanders Grow Oysters* program is looking for waterfront communities or property owners to grow oysters. Participants must own an existing pier or wharf with at least 4 feet of water at low tide and enough salinity to support oyster survival in one of the selected creeks, coves, inlets. They will provide maintenance for up to four cages of oysters for up to 12 months. Once oysters grow to about an inch, they will be planted on local sanctuaries to filter water; enrich aquatic ecosystems; provide habitat for fish, crabs. There is no cost to participate. Web search "Marylanders Grow Oysters."

National Wildlife Refuge at Patuxent
Volunteer in Wildlife Images Bookstore & Nature Shop with Friends of Patuxent Research Refuge, near Laurel, for a few hours a week or all day, 10 am–4 pm Saturdays; 11 am–4 pm Tuesdays–Fridays. Help customers, run the register. Training provided. Visit the shop in the National Wildlife Visitor Center and ask for Ann; email wibookstore@friendsofpatuxent.org.

Ruth Swann Park
Help the Maryland Native Plant Society, Sierra Club and Chapman Forest Foundation remove invasive plants 10 am–4 pm the second Saturday in September. October and November at Ruth Swann Memorial Park in Bryans Road. Meet at Ruth Swann Park-Potomac Branch Library parking lot. Bring lunch. Info: ialm@erols.com, 301-283-0808, (301-442-5657 day of event). Carpoolers meet at Sierra Club Maryland Chapter office at 9 am; return at 5 pm. Carpool contact: 301-277-7111.

Invasive Species Tool Kit
The Lower Shore Land Trust is offering a free, online *Invasive Species Tool Kit* to identify, remove weeds on your land. Residents can also report invasive clusters in their neighborhood, parks, public lands. Info: lowershorelandtrust.org/resources.

Submission Guidelines

SUBMISSIONS
Because of space limitations, the ***Bay Journal*** is not always able to print every submission. Priority goes to events or programs that most closely relate to the environmental health and resources of the Bay region.

DEADLINES
The ***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 issue. Deadlines are posted at least two months in advance.
October issue: September 11
November issue: October 11

FORMAT
Submissions to ***Bulletin Board*** must be sent as a Word or Pages document or as text in an e-mail. Other formats, including pdfs, Mailchimp or Constant Contact, ***will only be considered if space allows*** and type can be easily extracted.

CONTENT
You must include the title, time, date and place of the event or program, and a phone number (with area code) or e-mail address of a contact person. State if the program is free or has a fee; has an age requirement or other restrictions; or has a registration deadline or welcomes drop-ins.

CONTACT
Email your submission to kgaskell@bayjournal.com. Items sent to other addresses are not always forwarded before the deadline.

Answers to CHESAPEAKE CHALLENGE on page 32

1. D
2. A & C
3. D
4. A & C
5. D
6. C

BULLETIN BOARD

Chesapeake Bay Environmental Center
Volunteer at the Chesapeake Bay Environmental Center in Grasonville a few times a month or more often. Volunteering more than 100 hours per year earns a free one-year family membership. Info: volunteercoordinator@bayrestoration.org.

Maryland State Parks
Search for volunteer opportunities in state parks at ec.samaritan.com/custom/1528. Click on "Search Opportunities".

WORKSHOPS

WATERSHEDWIDE

Watershed Forum RFP
The Alliance for the Chesapeake Bay is accepting proposals for the poster session 7:30 pm Nov. 4 at *18th Annual Chesapeake Watershed Forum* Nov. 3–5 at the National Conservation Training Center in Shepherdstown, WV. Categories include: *Environmental Education; Diversity, Equity, Inclusion & Justice; Outreach (Community Engagement, Stewardship, Volunteerism); Restoration/Conservation; Science (Methods, Monitoring, Evaluation); Advocacy; Professional Development (Holistic Well-being); Organizational Development.* Poster presenters must register for the forum. Proposals are due Sept. 29. Questions: chesapeakeforum@allianceforthebay.org. For guidelines/submission form: Visit allianceforthebay.org, click on "Get Involved/Events" and look for the forum under Annual Events.

MARYLAND

Free UMCES online courses
Registration is open for the University of Maryland Center for Environmental Science's free, online courses: *Strategic Communication for Sustainability Leaders; Innovative Environmental Management Models: Case Studies & Applications; Storytelling with Data using Socio-Environmental Report Cards;* and *The Science Advisory Toolbox for Environmental Management.* Courses can be taken independently or together as part of a Professional Certificate (nominal fee). Maryland teachers can take an on-line, self-paced MSDE-approved continuing professional development courses in both *Science Communication* and *Socio-Environmental Report Cards* (lesson plans included). Courses begin Sept. 18. Info: umces.edu/professional-studies.

EVENTS / PROGRAMS

MARYLAND

MSRA scholarship fundraiser
The Maryland Stream Restoration Association's fundraising golf outing to support the *Jim Gracie Memorial Scholarship* takes place 9 am–5 pm Sept. 22 at The Preserve at Eisenhower Golf Course in Crownsville. The scholarship aids students who demonstrate a passion for streams and the natural environment. Preference is given to disadvantaged applicants. Gracie, a pioneer in stream restoration and coldwater conservation, pursued ecologically sound legislative policy initiatives, established monitoring criteria for restoration projects and prioritized educational outreach highlighting watershed protection and conservation. Register/info/sponsorship/donations: Web search: "MSRA 2023 golf fundraiser" or email Shannon Lucas at marylandstreamrestoration@yahoo.com. Scholarship application is currently closed; it reopens in 2024.

Fall Green Fest
Beaverdam Green Team's *Fall Green Fest* takes place 12–3 pm Oct. 8 in the Sherwood Episcopal Church parking lot in Cockeysville. A *Blessing of the Animals* is scheduled at 11:30 am. The event features free pumpkins, native plant and other giveaways, information tables, vendors. Learn about the church's stormwater remediation project and Faith Lutheran Church's new rain garden. Admission is free. Info: interfaithchesapeake.org/baltimore_fall_fest_102023. The Beaverdam Green Team is sponsored by Interfaith Partners for the Chesapeake's One Water Partnership Program.

Home energy workshop
The University of Maryland Extension is offering a free *Home Energy Workshop* 5:30–7:30 pm Oct. 4 at the Ruth Enlow Library in Oakland. Extension specialists and industry representatives will present cost-effective and innovative strategies to improve a home's energy performance or design a solar power system. Explore financial resources. Participants receive fact sheets, informational resources. Registration required. Info: go.umd.edu/HomeEnergy. Need reasonable accommodations to participate? Contact Drew Schiavone at dschiavo@umd.edu, 301-432-2767.

St. Mary's City Riverfest
The 18th annual *RiverFest,* takes place 11 am–4 pm Sept. 23, rain or shine, at Historic St. Mary's City. This St. Mary's River celebration features ways to protect waterways, live music, kayaking, seining, boat rides, exhibits on local flora & fauna. Come face-to-face with birds of prey, snakes, oysters. Join the ceremonial *Wade-In* at 2 p.m. Free admission. Info: Emma Green at emmasmrwa@gmail.com or 301-395-5757.

Ghost leaf rubbings
The U.S. Colored Troops Interpretive Center in Lexington Park invites the public to take part in *Ghost Leaf Skeleton Rubbings* 1–2 pm Oct. 14. This activity encourages participants of all ages to discover nature through hands-on, tactile, "no right or wrong way to play" experiences. Free. Rain or shine unless there are safety concerns. Registration required. Info: 301-994-1471, Facebook.com/USCTCenter.

Patuxent Research Refuge
Patuxent Research Refuge's National Wildlife Visitor Center's South Tract [S], and the refuge's North Tract [N], both in Laurel, offer free public programs. Preregistration required, except where noted. Note special accommodation needs when registering. Registration (except for KDC): 301-497-5887. Info: 301-497-5772; https://fws.gov/refuge/patuxent-research/visit-us, timothy_parker@fws.gov.

- *Kids' Discovery Center (KDC) Squirrels & Chipmunks:* 9 am–12 pm (35-minute time slots, on hour) Tuesday–Saturday [S] Ages 3–10 w/adult. Crafts, puzzles, games, nature exploration; free booklet. Group special arrangements possible. Registration recommended: 301-497-5760.
- *Monarch Magic Center:* 9 am–4:30 pm Tuesday–Saturday [S] All ages. Sign up in person at Info Desk for noon butterfly releases (call ahead to check). See all monarch butterfly life stages, live. No registration.
- *Night Hike:* 8–9:30 pm Sept. 15 & 29 [N] All ages. Learn about bats, owls, coyotes.
- *North Tract Bicycle Trek:* 10 am–12:30 pm Sept. 16 [N] See wildlife, plants, historical sites on 12-mile guided ride. Weather-dependent. Road may be unsuitable for narrow tires. Bring bike, snack, water bottle, helmet.
- *Family Fun/TREE-mendous Trees!* Drop in 10 am–1 pm Sept. 22, 23 [S] Activities, crafts, games. Learn how trees help wildlife, people, Earth. No registration.
- *Photo-Adventure Scavenger Hunt:* Drop-in program 9:30 am–1 pm Oct. 7 [N] All ages. Use clues to hunt for objects, plants, animals. Bring camera or cell phone to record observations. Requires driving 1–2 miles, walking short distances. No registration.
- *Hollingsworth Art Gallery / Quilting*: 9 am–4:30 pm Oct. 3–31. All ages. Wildlife & nature-themed quilt art of the Southern Comforters Quilt Guild of Bowie. No registration.
- *Winterize Your Butterfly Garden:* Oct. 7 [S] All ages. Learn native seed collection, storage methods to grow next year's plants, how to make seeds available for wildlife in winter. Take home free native plant.

Anita C. Leight Estuary Center
Meet at Anita C. Leight Estuary Center in Abingdon. Ages 12 & younger w/adult. Registration required for all programs; payment due at registration. Info: 410-612-1688, 410-879-2000 x1688, otterpointcreek.org.

- *Introduction to the Estuary:* 10 am–12 pm Sept. 12 & 26, Oct. 10 & 24. Ages 55+ Moderate activity levels. Explore Otter Point Creek with a new activity each session: hiking, fish seining, paddling, creek wading. $5/session.
- *Our Littlest Nature Explorers:* 9–10 am, Mondays Sept. 25–Nov. 20 (not Nov. 20) Ages 1–5 w/adult. Stories, songs, movement, up-close animal experience. $50 for series.
- *The Wonders of Water Homeschool:* 2–3 pm Sept. 25–Nov. 20 (not Nov. 20) Ages 8–12. Learn about water's chemical, physical properties; solutions chemistry; water within organisms; what makes water a valuable habitat. Extensive lab work, water habitat exploration. $100/series.
- *Kayak Cruising on the Creek:* 10 am–12:30 pm Sept. 15. Adults. Explore Otter Point Creek, upper Bush River. $15. Register by Sept. 14.
- *The Fall of Summer Canoe*: 11 am–1:30 pm Sept. 17. Ages 8+ $15.
- *Kids-n-Kayaks:* 1–3 pm Sept. 23. Ages 5+ (first time paddlers). Paddling safety, basic instruction covered before venturing out on water. $15. Register by Sept. 22.
- *Wonderful Wildflowers Canoe:* 2:30–5 pm Sept. 24. Ages 8+ What marsh flowers are still blooming? $15.
- *Full Harvest Moon Kayak:* 6–8:30 pm Sept. 29. Ages 10+ Paddle under light of fall's first full moon. $15. Register by Sept. 28.
- *Migration Madness Kayak:* 10 am–12:30 pm Sept. 30. Ages 8+ Look for birds ready to migrate. $15. Register by Sept. 29.
- *Critters of the Creek Canoe:* 8:30–11 am Oct. 1. Ages 8+ Look for creatures in marshes, lagoons. $15.
- *Fantastic Fall Float Kayak:* 1–3:30 pm Oct. 7. Ages 8+ Paddle amid early fall foliage. $15. Register by Oct. 6.

Win cash for snakeheads
The Maryland Department of Natural Resources and U.S. Fish and Wildlife Service are continuing a northern snakehead tagging program to spur the removal of this invasive fish. Up to 500 snakeheads will be tagged in the Gunpowder River, upper Chesapeake Bay tributaries, and Mattawoman and Nanjemoy creeks of the Potomac River. Harvest a yellow-tagged snakehead to receive $10, or $200 for a blue tag. Report the tag number to the phone number on the tag, then email a picture of the harvested, tagged snakehead to DNR. Only harvested snakeheads (those removed from the water & not returned) with a tag number reported by the end of 2024 qualify for rewards. Info: web search "DNR snakehead incentive."

Free museum passes at libraries
In a partnership with the Annapolis Maritime Museum, each of the 16 branches of the Anne Arundel County Public Library have added family admission passes to their *Library of Things* catalog. The passes, good for the general admission for up to four people during regular museum public hours, can be checked out for free with a library card for seven days and can be picked up or returned at any Anne Arundel County public library.

Fishing report
The Department of Natural Resources' weekly *Fishing Report* includes fishing conditions across the state, species data, weather, techniques. Read it online or web search "MD DNR fishing report" to sign up for a weekly email report.

Local officials learn stormwater solutions during WV tour

By Kayli Ottomanelli

The role of local elected officials in the Chesapeake Bay watershed is a big one. Not only must they address the needs of their constituents, they also direct the day-to-day operations of their communities, including street and sewer maintenance, parks and recreation, emergency services and much more.

They also should be good environmental stewards. Decisions made by local officials impact not only the health and vitality of their community but also their local waterways and the greater Chesapeake watershed.

Members of the Chesapeake Bay Program's Local Government Advisory Committee (LGAC) understand this connection. They have been appointed by their governor (or District of Columbia's mayor) to share their views, insights and experiences with state and federal decision-makers, as well as to enhance the flow of information at the local government level. One way they do this is through peer-to-peer learning opportunities.

These exchanges, called the Wandering Waterways series, provide hands-on opportunities for local officeholders to learn about regional conservation efforts and empower them to take on environmental challenges in their own communities. Hosted by LGAC members, the events foster peer-to-peer connections and provide resources for the implementation of environmental solutions.

This summer, the Wandering West Virginia's Waterways tour took 18 local elected officials, representing 12 municipalities, to Bath (also called Berkeley Springs, the seat of Morgan County) for a tour of new stormwater infrastructure behind the Widmyer Elementary School and at the Greenway Cemetery. These projects address severe stormwater runoff, flooding and erosion issues.

"[Neighboring] Berkeley County is a rapidly growing area, so stormwater management is critically important to the development of the region," said tour host James Barnhart, a Berkeley County commissioner and LGAC member.

Rebecca MacLeod, a member of the Town of Bath Streetscape Committee and vice president of the Warm Springs Watershed Association, leads a tour of downtown Berkeley Springs, WV, to showcase rain gardens, planter boxes and permeable pavers. (Alliance for the Chesapeake Bay)

The Wandering Waterways series helps local officials in the Bay region connect with each other and solve environmental challenges in their communities.

Led by Rebecca MacLeod, a Town of Bath councilwoman and vice president of the Warm Springs Watershed Association, the tour began with a visit to the "Town of Bath Streetscape." The downtown area was built on the floodplain of Warm Springs Run, a Potomac River tributary. It was often inundated during periods of heavy rainfall and suffered hazardous sidewalks during icy winters. In 2012, a major flood submerged much of the area, damaging homes and businesses, and covering streets and storefronts with mud and debris.

To divert stormwater and mitigate flooding, the Warm Springs Watershed Association established a green stormwater control system consisting of rain gardens, permeable pavers, planter boxes, a bioswale and a tree trench. Runoff from severe storms is collected by the rain gardens on Congress Street and soaked up by the permeable pavers and a tree trench on Washington Street.

Next, elected officials explored the lush wetlands behind Widmyer Elementary School just outside the town limits. The school was also built on the Warm Springs Run floodplain, its grounds displacing what once had been wetlands. Without the wetlands to manage drainage, stormwater runoff from the surrounding hilly terrain made for frequent and severe flooding at the elementary school and downstream at Berkeley Springs High School. In 2009, the Eastern Panhandle Conservation Agency, in partnership with the watershed association and Morgan County School Board, reestablished the wetlands, providing an outdoor learning area for students.

The last stop of the tour was the hilly, 29-acre section of Greenway Cemetery, just south of town and across the main drag from the high school. The cemetery's extremely steep slope causes stormwater flows "so severe that on one occasion a recently buried coffin was washed out of the grave and transported to a neighboring lawn," said Kate Lehman, president of the watershed association. "While this was a one-time event, erosion has long wreaked havoc throughout the area, especially on the three roads in this section of the cemetery."

The watershed association responded in 2012 and 2015 by installing green infrastructure to reduce stormwater that was rushing downhill toward Warm Springs Run. Diverters, made of recycled conveyor belts, were installed to channel runoff into French drains and grassy bioswales lining the cemetery's northernmost road. A rain garden installed at the foot of another steep slope collects and filters rainwater, diminishing flooding and providing food and habitat for wildlife.

After learning about the stormwater best management practices and green infrastructure solutions implemented in Berkeley Springs, many attendees were inspired to address similar issues in their own communities. "I [was] familiar with Berkeley Spring's Streetscapes," said Mona Becker, mayor of Westminster, MD, after the tour, "but I wanted to learn a little bit more about how they were implemented and where they got the funding from, because I'd love to see something like that take place in Westminster."

Since its pilot in 2019, the Wandering Waterways series has brought elected officials together in Virginia, Maryland and Pennsylvania to learn how their peers are tackling environmental challenges — with strategies that range from green infrastructure and innovative agricultural practices to clean water initiatives and solutions to localized flooding. By bringing Wandering Waterways to Delaware in 2022 and West Virginia in 2023, the LGAC team has made significant strides in peer-to-peer education and information-sharing.

This fall, Wandering Waterways will be in New York partnering with the Upper Susquehanna Coalition, other organizations and New York state officials at Binghamton University during the 2023 Upper Susquehanna Watershed Forum.

If you are interested in learning about the Wandering Waterways series, email LGAC@allianceforthebay.org. ■

Kayli Ottomanelli is the local government projects associate for the Alliance for the Chesapeake Bay.

Goldfinch guys put on the glitz to attract the gals

By Alonso Abugattas

A female American goldfinch (left) and her mate visit a bird feeder in summer. Goldfinches often change partners every year. (Mick Thompson/CC BY-NC 2.0)

The American goldfinch (*Spinus tristris*) is one of the most colorful and easiest birds to observe in local meadows and at backyard feeders. This widespread finch has an estimated population of 43 million and is found well into Canada in summer, through most of the United States, and into Mexico in winter.

The male "American canary," as it's sometimes called, is easy to spot in spring and early summer with its bright yellow plumage, black forehead and black wings with white accents. He is far less conspicuous the rest of the year.

Goldfinches have two yearly molts, the only member of the finch family to do so. They undergo a complete molt of all their feathers in early fall, the male's body transitioning from bright yellow to a drab yellowish-brown. The black forehead disappears, and their wings go from nearly all black to black with white accents.

In the spring, they undergo a partial molt, replacing only their head and body feathers, which become bright yellow again. It's less dramatic for females, which brighten somewhat in breeding season but look similar to the winter male.

Goldfinches are among the last birds to start nesting. They often begin as late as early August, when more seeds, especially those in the aster family, become available, along with the fluffy down from thistles. Unlike most songbirds, which eat insects in warm months to increase their protein intake for breeding and nesting, goldfinches are almost entirely granivores. They may eat a few insects (and berries and buds when available), but they are principally seed eaters.

This seed diet has some benefits. One is that brood parasitism by cowbirds — which lay their eggs in other birds' nests to be raised — rarely succeeds with goldfinches. Cowbird chicks need insect protein that the adoptive goldfinch parents don't provide, so they do not survive.

It also means that many goldfinches may alter where they stay due to the readily available seeds that are placed out in bird feeders, usually preferring Nyjer (often called thistle) seed and hulled sunflowers.

American goldfinch nests are often found in edge habitat — trees at the edges of fields and meadows — and often near water. They are usually 4–20 feet off the ground in a forked branch and occur in small, loose colonies of two or three breeding pairs.

The nests are extremely well-made, employing a combination of seed down, rootlets and spider webbing so tightly bound that they often hold water. This has led to cases where the young have drowned. The female almost always builds the nest, though the male may deliver materials.

During nest building, the male often deviates from the birds' typical looping, undulating flight. Instead, it dives repeatedly near the nest, pausing occasionally between dives to circle evenly overhead, with no dips or loops.

The female lays three to seven bluish-white eggs. She will stay on the nest 95% of the time, relying on her mate to feed her, until the eggs hatch 12–14 days later.

The female American goldfinch, far less brightly colored than her mate, is usually the chief nest-builder of the pair. (Brian Plunkett/CC BY 2.0)

The young fledge 11–15 days after hatching. At first, the young produce fecal sacs of their waste, which the parents remove from the nest. By the second week, they have learned to poop over the edge, often leaving a distinctive rim of waste around the nest.

While the mating pair will stick together for the nesting season, they may change partners from year to year.

American goldfinches have several calls and songs, one of them sounding a bit mournful — at least to the scientist who gave the bird the second half of its Latin name, *tristis*, which means "sad." They are best known, though, for their "po-TAY-to-chip" call often made during their undulating flights.

The Haudenosaunee (who some people call the Iroquois) Confederacy has an interesting legend, passed on to this day, that explains how goldfinches got their beautiful color. Long ago, they say, all goldfinches were drab gray. The birds wanted to be more colorful, and they got their chance after an act of selfless kindness.

Male American goldfinches undergo a partial molt in the spring, their bodies and heads turning brilliant yellow except for a prominent black forehead. (Eric Ellingson/CC BY-NC-ND 2.0)

The birds came across a fox that had fallen asleep under a pine tree, which dripped sap onto its eyes, sealing them shut. He begged the goldfinches for help to see again, the story goes, and they took turns pecking the sap away. The fox was so grateful for getting his sight back that he offered to make them colorful, which he did with paint he made from yellow flowers. The more he painted them, the more they started to flutter and sing.

Goldfinches may form mixed flocks with other species, such as pine siskins and redpolls, sometimes up to 300 birds. They are not long-distance migrators like some songbirds, moving only as far north or south as necessary for the season — or staying put year-round if the weather permits, as it generally does in the southern half of their range.

The American goldfinch is the state bird in Washington, Iowa and New Jersey.

If everything goes well, goldfinches can live for more than 10 years. The record for one bird banded and recovered in Maryland is 10 years and 9 months.

These beautiful birds are easy to attract to bird feeders and will dazzle you with their acrobatic displays if you plant species that feed them, such as sunflowers, coneflowers and rudbeckias.

If the legend of their selfless kindness is true, we can show them the same by what we plant and feed to them. ■

Alonso Abugattas, a storyteller and blogger known as the Capital Naturalist on social media, is natural resources manager for Arlington County (VA) Parks and Recreation. He is filling in this month for regular On the Wing columnist Mike Burke.

Mexico or bust: the return trip of the magnificent monarch

By Kathy Reshetiloff

Monarch butterflies roost in an oak tree." (Jessica Bolser/U.S. Fish & Wildlife Service)

The monarch butterfly, easily recognized by its dark orange wings with black veins and white edge spots, is one of few butterflies that migrate. And what a journey it is. Even though its annual migration cycle begins in the mountains of central Mexico, a monarch (*Danaus plexippus*) may have made an appearance this summer in your back yard — likely the great or great-great grandchild of the butterfly that left Mexico's oyamel fir forests in March.

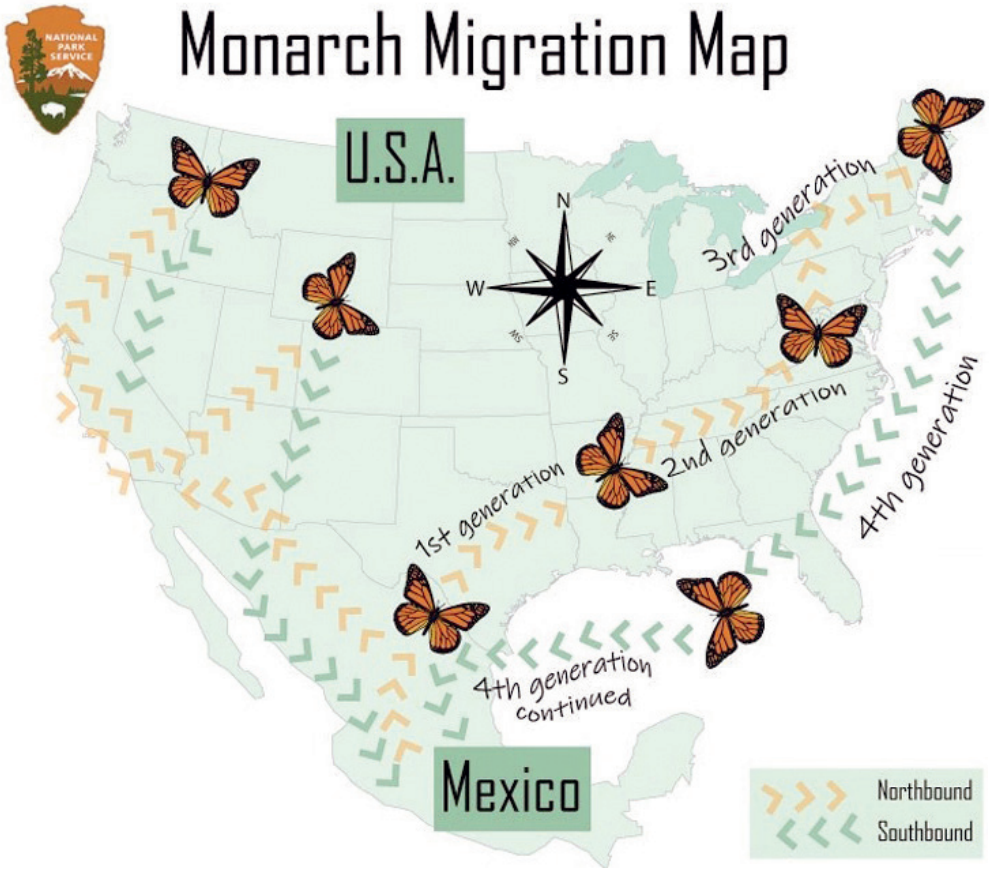
In the late summer and fall, chances are you're seeing the last of four or five generations that have tag-teamed north and east across the continent. And this last generation, instead of stopping to lay eggs and die after flying for four to six weeks and several hundred miles, will live many months longer and make the entire journey, as much as 2,000 miles, back to Mexico. There they go dormant, clustered by the millions in the branches of trees.

This is the journey of the Eastern cohort of monarchs. Western populations make a similar but somewhat shorter intergenerational migration, from Southern California to the Pacific Northwest and back again.

Here in the Chesapeake region in the fall, peninsulas are good areas to observe the southbound butterflies — Point Look out, Eastern Neck National Wildlife Refuge or Black Walnut Point in Maryland, for example, or Virginia's Cape Charles or Kiptopeke in Virginia. The long-distance travelers often stop at the southern edges of these narrow land masses to rest in trees or bushes before crossing water.

Next spring, as temperatures begin to rise, the overwintering monarchs will become active and start the multi-generation round trip all over again. The females of the first generation will lay their green eggs on the leaves of milkweed plants in the southern U.S. The eggs hatch about a week later, releasing a distinctive yellow, black and white striped caterpillar. The caterpillars eat their own eggshells first, then feed on milkweed leaves — the only plant they can thrive on.

Many types of milkweed contain a poison similar to digitalis. The poison is not toxic to the monarchs, but it is to potential predators. An animal that eats a monarch caterpillar or butterfly becomes ill and usually will never try to eat one again, having learned the hard way that the striped caterpillar and orange and black butterfly are things to avoid. Another species of butterfly, the similarly colored viceroy (*Limenitis archippus*), appears to benefit from this phenomenon, even though it has no such toxin in its system.



(National Park Service)

The monarch caterpillar molts five times until it is about 2 inches long. The caterpillar then attaches itself to a plant or other object with a silk thread. After one day, the caterpillar skin splits open and the pupa, or chrysalis, form emerges. The pupa is shiny green with gold spots and a black and gold band. The caterpillar remains in the pupal case for 8–15 days, undergoing its final metamorphosis into the familiar adult butterfly.

For more than 20 years, communities and scientists have been tracking monarch populations and have documented a significant decline in the number of monarchs at overwintering sites. Researchers point to several likely causes of the decline throughout the monarch's range. Loss of habitat is chief among them — from shrinking forestland in Mexico (mostly from illegal logging) and urban development throughout its range to the conversion of grasslands to agriculture, widespread use of pesticides and more severe droughts.

We can all help conserve monarch butterfly populations.

- Reduce or discontinue the use of pesticides, which can eliminate food sources or kill monarch caterpillars and butterflies.
- Plant native milkweed *(Asclepias syriaca)* for caterpillars and other native wildflowers for adult monarchs. Some organizations (and nurseries) offer lists of native plants that support monarchs. A web search for "monarch conservation" or "native plants for monarchs" will put you on the right path.
- Volunteer with a group that monitors and conserves monarchs and other pollinators. Here are a few: Monarch Joint Venture (monarchjointventure.org), Monarch Watch (monarchwatch.org), Monarch Butterfly Fund (monarchconservation.org), Xerces Society for Invertebrate Conservation (xerces.org), and Journey North (journeynorth.org). ■

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