CHESAPEAKE
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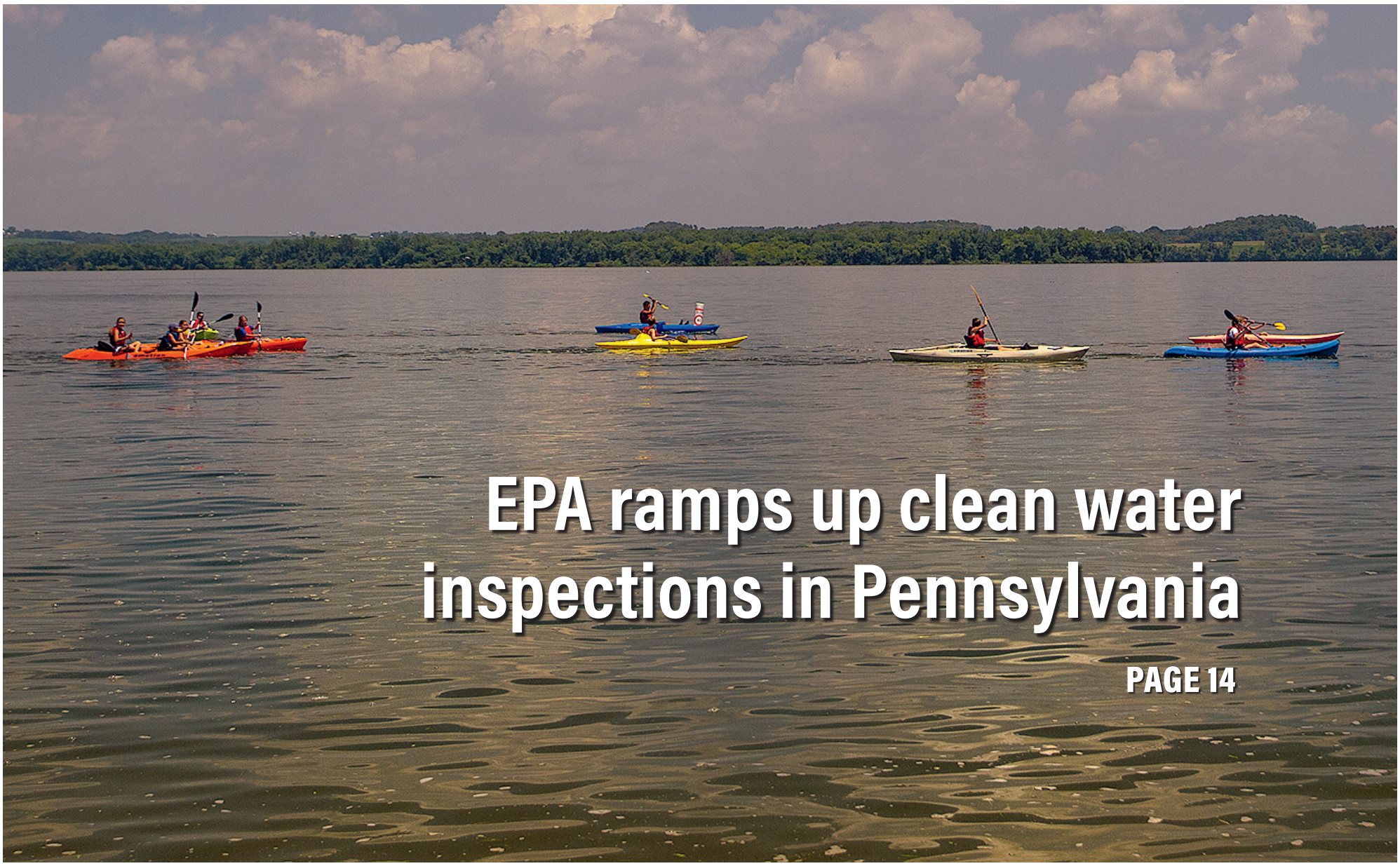
Independent environmental news for the Chesapeake region



EPA ramps up clean water inspections in Pennsylvania

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LAND RETURNED TO TRIBE

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SHEEP AND SOLAR PANELS

Solar sites see dual use as pastureland PAGE 20

TRAIL VOLUNTEERS NEEDED

Heavy trail use leads to maintenance needs PAGE 16

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A crew offloads oysters on Tilghman Island, MD, in 1976, before diseases began to devastate the Bay's oyster population in the 1980s. Some see the success of Maryland's most recent wild oyster season as a sign that the pressure from those diseases has lifted. Read the article on page 10. (Dave Harp)

EDITOR'S NOTE

Bursting with spring, with news and with thanks

Spring is settling in across the Chesapeake Bay region. Leaves and blooms are bursting from their buds. It's the time of year when the *Bay Journal* mailbox is bursting, too — our annual giving campaign is under way! If you've supported our work with a donation, thanks so very much. It's a basic fact of nonprofit news production: We truly need your help. The gifts you send our way are vital for sharing environmental news, including the issue you're holding right now.

This month, I'm struck by the developments around some especially important issues, starting with the Bay itself. The U.S. Environmental Protection Agency is now taking action in Pennsylvania, in response to what the agency has deemed an inadequate cleanup plan for the state's portion of the Bay watershed. Meanwhile, Adam Ortiz, the EPA's new director for the mid-Atlantic region, is consulting personally with Pennsylvanians on meaningful solutions for clean water challenges.

And another big problem for the Bay — the new surge of pollution escaping past the Conowingo Dam — is nearing a crossroads, too. The EPA has asked the Bay states, which have created a cooperative plan to address the problem, to prove they have the funds to make it happen.

You'll also read about major decision points for climate change. Maryland passed a sweeping climate bill, which moved into law without the expected veto. And after a two-year legislative conflict, Pennsylvania is set to join the Regional Greenhouse Gas Initiative.

Other markers: A tract of land along Virginia's Fones Cliffs has been protected from development and given back to the Rappahannock Indians whose ancestors called it home. Maryland's wild oyster harvest was the best in decades. And Virginia's environmental management is being tested on two fronts, the application of a living shorelines law and the regulation of solar panels.

Hefty news, all shaped by the voices of people with concerns and solutions. I hope this issue keeps you up to date, involved and inspired. And please remember, whether or not you can help the *Bay Journal* with a donation, you can always help by sharing this issue with a friend.

— Lara Lutz

ON THE COVER

Paddlers enjoy the Susquehanna River near Wrightsville, PA. (Dave Harp)

Bottom photos: Left by Dave Harp, center by Lightsource BP and right by Ad Crable.

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BY THE numbers

200
Length, in miles, of the Chesapeake Bay from Havre de Grace, MD, to Virginia Beach, VA

15 trillion
Approximate number of gallons of water in the Bay

21
Feet of average water depth in the Bay

348
Species of finfish supported by the Bay's ecosystem

173
Species of shellfish supported by the Bay's ecosystem

500 million+
Approximate pounds of seafood harvested from the Bay each year

Coastal management with living shorelines

Some graphics courtesy of the Integration and Application Network, University of Maryland Center for Environmental Science (ian.umces.edu/symbols/)

The creation of "living shorelines" is a strategy that coastal managers and property owners have been using increasingly over recent decades to combat erosion, improve storm resilience and nurture wildlife habitat at the water's edge. Living shorelines use natural elements like plants, oyster shells, sand and rocks to stabilize the shore while allowing movement between land and water. The specifics of the design vary by setting. Living shorelines are often a preferred alternative to seawalls and bulkheads, except in places with very high wave energy. ■

bayjournal.com/podcast

LOOKING BACK

30 years ago

PA ponders mandatory nutrient management

The state legislature was expected to consider a bill that would require farmers to develop and follow nutrient management plans to guide their use of manure and fertilizer. ■

— *Bay Journal,* May 1992

20 years ago

Fish & Wildlife Service seeks moratorium on nonnative oysters

The U.S. Fish and Wildlife Service called for a moratorium on any further work with nonnative *Crassostrea ariakensis* oysters in the Bay, citing the lack of information about its potential risks. ■

— *Bay Journal,* May 2002

10 years ago

Underwater grasses declined by 22%

Results from the 2011 aerial survey of Bay grasses showed that tropical storms and hot temperatures took a big toll on their acreage. ■

— *Bay Journal,* April 2012

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

Frank Sesno (left), host of the 2022 Chesapeake Bay Summit on Maryland Public Television, talks with panelists (left to right) Bill Dennison of the University of Maryland Center for Environmental Science; Hye Yeong Kwon of the Center for Watershed Protection; Mark Conway of the Chesapeake Conservancy; and Tom Horton, author and Bay Journal columnist. (Courtesy of Maryland Public Television)

Extending our reach with MPT and an award-winning podcast

Three *Bay Journal* films were among the many great programs that aired during Chesapeake Bay Week on Maryland Public Television in April. Many thousands of viewers enjoyed *Nassawango Legacy, High Tide in Dorchester* and our newest film, *Water's Way: Thinking Like a Watershed*.

Editor **Lara Lutz** worked with MPT producers to help plan the annual Chesapeake Bay Summit, which aired as part of Bay Week on April 21 and explored the varied impacts of land use on the health of the Bay. Chesapeake author **Tom Horton**, who is also a *Bay Journal* columnist and part of our filmmaking team, joined the panel of guests and spoke about, among other things, his passion for the potential of beavers in stream restoration efforts. Tom was also featured in the MPT piece, *Smith Island: A Conversation with Tom Horton*. **Tim Wheeler**, the *Bay Journal*'s senior writer and associate editor, made an appearance in *Troubled Tributary: Maryland's Patuxent River*.

If you missed Bay Week, don't worry! Some of the featured programs — including the Bay Summit — are available at mpt.org/bayweek, under "Stream Programs." And you can always find our films at bayjournal.com/films or on our YouTube channel.

Good news arrived in late April, with hearty congratulations to *Bay Journal* writer **Jeremy Cox**. Jeremy is the producer and host of our podcast, *Chesapeake Uncharted*. The podcast debuted in 2021, with the first series of 11 episodes focused on how a warmer, wetter environment is already bringing changes to wildlife, human communities, water quality and forests in the Bay region. We recently learned that Jeremy's work has received an honorable mention in the 2022 Covering Climate Now Journalism Awards — an international competition with more than 900 entries in a variety of categories. Submissions came from TV, radio, print and digital journalists representing newsrooms big and small in 65 countries. We're thrilled to see his work recognized, and we're honored that our podcast earned a place among the awards.

If you haven't heard *Chesapeake Uncharted* yet, you can download episodes from your favorite podcast hosting service or listen on the web at ChesapeakeUncharted.com. And, yes, plans are underway for producing a new season in 2022!

— Lara Lutz

NEWS briefs

LOCAL
REGIONAL
NATIONAL

VA Pipeline withdraws environmental justice appeal

The Mountain Valley Pipeline has withdrawn its appeal of Virginia's decision to reject a permit application for its proposed Lambert Compressor Station.

The Lambert station, proposed for Chatham, VA, would have pumped gas through an extension of the pipeline. Last December, the Virginia State Air Pollution Control Board determined that a related permit application did not satisfy state requirements for environmental justice and site suitability. Soon after, MVP filed an appeal in the U.S. Court of Appeals for the Fourth Circuit.

On March 29, the company notified the court that it would voluntarily dismiss that appeal.

"This is a victory for environmental justice and for the residents of Chatham. The air board found that MVP's permit application failed to meet legal requirements for environmental justice on multiple fronts after a thorough evaluation of the facts. With this dismissal, that decision stands," said Taylor Lilley, environmental justice staff attorney for the Chesapeake Bay Foundation.

The denial of the air permit is yet another setback for the pipeline company, which has encountered delays, legal losses and citations for environmental violations for its project. This is the first permit the air board has denied in the last 20 years. Under new procedures expected to take effect July 1, Virginia's air board will no longer approve or deny permits. Virginia's Department of Environmental Quality will be tasked with the job instead. *— L. Lutz*

Feds greenlight MD's choice for route of third Bay Bridge

The Federal Highway Administration has given preliminary approval to Maryland's plans build to a new Chesapeake Bay bridge near the existing two spans that cross between Annapolis and Kent Island.

The agency's "record of decision" sides with the Maryland Transportation Authority preference for the crossing's location. Before settling on the final corridor, the transportation authority, which operates the two existing bridges, evaluated 14 alternative corridors ranging nearly 100 miles from the northern tip of the Bay to the Virginia state line.

The latest move concludes the first phase in the two-phase environmental study required for large projects under the National Environmental Policy Act. But the project's future is up in the air. The state still hasn't set aside funding for the second phase, which would likely cost several million dollars. The first phase, begun in 2017, cost $5 million.

Politics is likely to factor into what comes next. Republican Gov. Larry Hogan, one of the project's main advocates, is set to step down from office in January 2023 because of term limits.

A new Bay crossing faces strong opposition from many environmental groups and from one of the counties it would traverse. Anne Arundel County Executive Steuart Pittman questioned the study's traffic-growth projections, pointing to the expansion in telecommuting amid the COVID-19 pandemic.

The study also considered a no-build option as well as mass transit and operational alternatives. It concluded that none of the options would suffice on their own. But it suggested that three could be studied in combination with a bridge: operational improvements, bus rapid transit and a ferry service. *— J. Cox*

VA salvage site poised for removal from Superfund list

The U.S Environmental Protection Agency is proposing to remove the home of a former battery salvage operation in Chesterfield County, VA, from its list of the nation's most contaminated hazardous waste sites.

The C&R Battery Co. site has been cleaned up enough to be deleted from the Superfund's National Priorities List, officials said on April 4. The agency was seeking public comment on the move until May 2.

From the early 1970s to 1985, workers at the 11-acre site dismantled car, truck and commercial batteries to recover lead and lead oxide. The process involved cutting open batteries and draining acid into on-site ponds. As a result, the site's soil, sediment and surface water became contaminated with lead and other hazardous chemicals, according to the EPA.

The EPA-supervised cleanup included digging up the hazardous material, converting it into a safer solid form and disposing of it in a nearby landfill. The transformation ended with covering the site with fresh topsoil and replanting it with greenery.

The EPA has determined that the site no longer releases hazardous material to the groundwater or nearby surface waters. The James River wetlands, a spot about 3 miles downstream that is a popular recreational area, was found to be free of site contaminants as well. *— J. Cox*

PA cleared to join Regional Greenhouse Gas Initiative

Legal, legislative hurdles remain before it becomes official

By Ad Crable

After more than 2 years in legal and legislative battles, Pennsylvania is poised to become the 12th state to join the carbon-cutting effort known as the Regional Greenhouse Gas Initiative.

A Commonwealth Court failed to block the state's publishing of final regulations on April 23, clearing the way for Pennsylvania's hotly contested membership in the program.

The energy-intensive state, which produces about 4% of the nation's greenhouse gas emissions, would give RGGI more clout in fighting climate change.

Gov. Tom Wolf, who began his pursuit to join RGGI with a 2019 executive order, sees the compact as the best way for the state to address a changing climate that he says is already dramatically affecting businesses and people's health.

However, a number of legal and legislative roadblocks remain. With Wolf in office for only another eight months, it's uncertain how far the process will get.

RGGI began in 2009 among mid-Atlantic and New England states as a means of reducing greenhouse gases that cause global warming and contribute to extreme weather.

States that join the initiative agree to require a cap-and-trade system for power plants that emit carbon dioxide from coal, oil and natural gas. The cap is reduced each year to reduce overall carbon emissions. Power plants pay for and trade allowances of carbon emissions.

Hundreds of millions of dollars are raised through the sale of emissions allowances at regional auctions. States use the money for energy efficiency programs and to encourage renewable energy sources such as wind, solar and nuclear.

Pennsylvania power plants will have to start tracking their carbon emissions beginning July 1 and can purchase carbon credits in the RGGI auction in September.

"Today, we are already experiencing the effects of climate change and those impacts are only going to get worse. Our children and their children are going to look back at our decisions and, by participating in RGGI, we have begun to set Pennsylvania on the path toward addressing this threat," said Patrick McDonnell, secretary of the state Department of Environmental Protection.

Environmental groups celebrated the state's move to join RGGI.

The Conservation Voters of Pennsylvania called it a "historic step forward in addressing our climate crisis and building a 21st century green economy."

But several hurdles remain. Legal challenges are pending from Republican state legislators who maintain that Wolf exceeded his authority in pursuit of RGGI membership. The emissions penalty amounts to a new tax that must be approved by the legislature, they maintain.

There also are Republican-led bills in the works to prevent Pennsylvania from joining RGGI. Legislators have twice voted to block participation but failed to override Wolf's vetoes of their resolutions.

At a Pennsylvania Senate hearing on RGGI in March, Republican senators cited a report from the Independent Fiscal Office that found that recent RGGI auction prices had been 3.8 times higher than forecast. That will mean the costs will likely be passed on to state ratepayers and could devastate small businesses, they said.

"RGGI will exacerbate the rising costs of doing business. This is a cattle prod rather than a carrot and stick to reduce climate change," said Melissa Morgan of the National Federation of Independent Businesses.

However, economists from Penn State and the University of Virginia have predicted that the high auction prices will be temporary and not burden ratepayers in the long run.

Senators also argued that carbon emissions have dropped significantly in Pennsylvania in recent years without RGGI, though RGGI advocates countered that was because of COVID-19. ■

Bay states urge EPA to stick with Conowingo cleanup plan

They say funds to carry out the cooperative strategy are on the way

By Karl Blankenship

Maryland's recently approved budget includes $25 million to help address pollution stemming from the Conowingo Dam, the first sizable state investment to address a problem that has vexed Chesapeake Bay cleanup efforts for years.

Bay watershed states pledged four years ago to help write and implement a plan to address the increased nitrogen and phosphorus pollution traveling past the dam. Research shows the reservoir behind the 94-foot-high structure on the Susquehanna River has largely filled and no longer traps a portion of the nutrients and sediment washing downstream.

The resulting plan, completed in 2020, would cost more than $53 million annually to control the additional 6 million pounds of nitrogen and 260,000 pounds of phosphorus that computer models estimate now get past the dam in a typical year.

The states committed no funding to implement the plan. As a result, the U.S. Environmental Protection Agency in January declared it had "no confidence" the plan would be carried out and gave the states 60 days to respond.

In a letter dated March 21, state officials insisted that funding was on the horizon, citing the Maryland commitment among other potential sources. Besides the $25 million allocated in its capital budget, Maryland aims to spend an additional $6 million on a pilot program exploring the feasibility of dredging sediment from behind the dam. It will also apply almost $13 million generated by the new licensing agreement with Exelon, the dam's owner, on related projects, including efforts to stock water-filtering mussels in the river.

In a separate letter, Pennsylvania officials said Gov. Tom Wolf's proposed budget includes substantial funding increases for several programs that could help address the Conowingo issue, though it did not commit any specific amount. Much of that money would come from federal funds related to COVID relief and infrastructure improvements.

For decades, the dam kept large amounts of nutrients and sediment from reaching the Chesapeake, but in recent years scientists discovered that the reservoir — located just 10 miles upstream from the Bay on its largest tributary — had largely filled. That means that even more nutrients and sediment are flowing past the dam and into the Bay.

As a result, the cleanup goals that states are working toward will no longer fully achieve Chesapeake water quality targets, according to Bay Program computer models. To address the problem, the states agreed in 2018 to jointly develop a plan to offset the additional pollution load from behind Conowingo in the most cost-effective way possible. For the most part, that means installing more pollution control practices on Pennsylvania farms.

State and federal officials at that time hoped that a settlement between Maryland and Exelon would generate tens of millions of dollars a year to implement the plan. But a subsequent agreement between Maryland and the utility did not produce enough money to fund the effort.

The EPA has indicated that if the Conowingo plan is not likely to be funded, it could instead order each state to make additional nutrient reductions as part of their individual Bay cleanup strategies. That would likely be more costly, and it would require places with less water quality impact to do more.

The rationale is that all of the Bay states benefited when Conowingo was helping to improve water quality by trapping nutrients and sediments. That, in turn, lessened the pollution reduction goals each state was assigned by the EPA when cleanup goals were set in 2010.

The EPA has not said when it will make a final decision after reviewing the states' letter.

The letter also calls for the federal government to chip in, saying it "is essential that EPA and other federal agencies" also invest money they are receiving from new federal infrastructure funding programs to implement the Conowingo plan. ■

State takes charge at Baltimore's wastewater treatment plant

Furor erupts over safety of Back River as testing reveals high levels of bacteria in water

By Timothy B. Wheeler

In an unprecedented move, Maryland regulators have taken control of Baltimore's troubled Back River Wastewater Treatment Plant after finding deteriorating conditions there that they warned could lead to catastrophic failure.

But the takeover, executed on just 48 hours' notice in late March, has failed so far to turn things around at the plant. Nor has it quelled a furor among local residents and their elected leaders over what the plant's murky discharge is doing to Back River, which for decades has had some of the worst water quality in the Chesapeake Bay region.

The Back River plant is the largest in Maryland, designed to discharge up to 180 million gallons a day of treated wastewater from Baltimore city and Baltimore County.

Ben Grumbles, secretary of the Maryland Department of the Environment, directed the Maryland Environmental Service to take over the operation of the plant after a March inspection found the facility beset by severe staffing shortages and broken or malfunctioning equipment.

He acted after giving city officials a 48-hour deadline to bring the plant into compliance, warning that "the decline in the proper maintenance and operation of the Plant" risks a calamitous breakdown that could endanger public health and the environment.

The city has gone to court challenging the legality of the state's takeover, but the Department of Public Works also issued a statement saying "we welcome the MDE and MES collaboration going forward."

MDE spokesman Jay Apperson said that MES was working to improve operations and maintenance, identifying short-term remedies and developing a long-term plan for repairing and replacing malfunctioning systems.

"All pollutant concentrations still appear to generally trend upwards," Apperson said in mid-April, "but immediate maintenance and operations improvements are expected to begin to change the trend."

MES, a not-for-profit business unit of the state that runs dozens of mostly small municipal, county and privately owned wastewater facilities, assigned 11 operators and a supervisor to help run the Back River plant.

MDE went to court in January seeking to force the city to fix problems at Back River, as well as at its Patapsco treatment plant, Maryland's second largest sewage facility, which discharges up to 63 million gallons of treated wastewater daily into the Patapsco River. The lawsuit alleges multiple ongoing discharge violations at both plants. The case is pending in Baltimore City Circuit Court.

The controversy began a year ago when routine water quality monitoring by the nonprofit Blue Water Baltimore found elevated bacteria levels and floating fats, oil and grease near the outfall for the Patapsco

Solids are built up in an inactive settling tank at Baltimore's Back River Wastewater Treatment Plant during a state inspection of the facility on March 22, 2022. (Courtesy of Maryland Department of the Environment)

plant. The watchdog group reported its findings to MDE, which during a series of inspections through the summer and fall of 2021 saw extensive violations of both plants' discharge permits. It also noted serious maintenance and staffing problems at both facilities.

The problems came to light publicly in late August when Blue Water released the MDE inspection reports for the plants along with an MDE letter to the city demanding immediate action. The city had given a plan to MDE last fall for coming into compliance, but the timeline indicated it could take years to fix all of the problems.

Blue Water Baltimore filed a lawsuit of its own in the U.S. District Court in December alleging ongoing violations at the two sewage plants. The group agreed early this year to put the case on hold while it worked with state and city officials to negotiate a consent agreement to address the problems. But since the takeover, Blue Water has asked the federal court to reactivate its case, something the city has opposed. A decision is pending.

Since the takeover, Blue Water and the Back River Restoration Committee, a local watershed group, have skirmished in press statements with state and city officials about conditions in the river. Alice Volpitta, the Harbor Waterkeeper, helped the committee test the river, and the results showed elevated bacteria levels — the highest nearly 200 times the threshold considered safe for recreational contact with the water.

MDE and the city issued statements denying that the plant is the cause of the high bacteria readings and insisting that brown clumps seen floating in the river were not raw sewage. Residents weren't mollified.

"There's just such a hyperfocus on 'this bacteria is not coming from the plant, the plant's fine, the plant's fine,'" said Desiree Greaver, project manager for the Back River Restoration Committee. "But according to our bacteria readings, there's something happening in the river somewhere."

On April 19, the activists and MDE jointly sampled the river, revealing lower bacteria levels than found previously but still above the safety threshold in three out of four places. The highest reading was at the end of the wastewater outfall pipe.

MDE issued a statement April 20 acknowledging that the presence of particles at high concentrations in the plant discharge could indicate that sewage is not being completely treated. Solids in the wastewater could hinder disinfection by the plant's chlorination process.

The Back River community group, in its own statement, said that whether the high bacteria levels are coming from plant discharges or a source farther upriver, people need to exercise caution when coming into contact with the water because there is an increased risk of becoming ill from it.

Volpitta said that since the state takeover, MDE's public statements about the plant have become more defensive.

"Obviously, it's going to take a little bit of time to bring this facility into compliance," she said, but added, "putting out confusing messaging about public health is not the answer."

MDE declared in late April that it would begin weekly sampling of the river for bacteria. On April 22, it issued an advisory with the state Department of Health telling the public to avoid contact with Back River water. A warning sign is to be posted at Cox's Point Park in Baltimore County across the river from the plant.

Baltimore County Executive John A. Olszewski Jr. welcomed the additional testing but noted that while the Back River plant is run by the city, it's located in the county and the county pays half the cost of operating it.

Its problems, he added, threaten the ability of county residents to recreate on the river without concerns that water contact is a threat to their health. It's time, he said, that the county has a role in plant oversight.

"I do believe that residents should have some confidence that we're at the table," Olszewski said.

Meanwhile, MDE's April 6 inspection of the Patapsco plant found continuing and even worsening discharge violations, with treated wastewater that was "an opaque dark gray color" with high concentrations of particles in it. The plant was having trouble removing solids from the incoming wastewater flow, and untreated sludge was accumulating in an ad hoc storage area where bacteria and disease-causing pathogens could be draining into the Patapsco River.

Volpitta, the Harbor Waterkeeper, said those inspection results show that the Patapsco plant needs the same kind of state oversight that Back River is getting.

"We are in discussions with the city and MES about immediate fixes to the unacceptable conditions at Patapsco," MDE's Grumbles said in a statement released April 13. ■

Bivalve bounty: MD oyster harvest hits 35-year high

Environmentalists, watermen contemplate future of the industry

By Timothy B. Wheeler

The 2021–22 wild oyster season in Maryland yielded 511,00 bushels, the best harvest since 1986–87. (Dave Harp)

Maryland waterman enjoyed the best wild oyster season last fall and winter that they've had in 35 years, according to preliminary state data, a possible sign the keystone Chesapeake Bay species finally may be recovering from the diseases that began ravaging them in the 1980s.

About 511,000 bushels of oysters were landed in the six-month season that ended March 31, according to a still-incomplete tally from the state Department of Natural Resources. That's the best harvest since 1986–87, near the beginning of an outbreak of MSX and Dermo that for years afterward killed off most oysters before they could grow to marketable size.

"You couldn't ask for a better season," said Jeff Harrison, a Talbot County waterman. He and many others were generally able to catch their limits, often well before each day was over. The bounty continued throughout the season, he said, and the price they got paid for their harvest remained strong, too.

Chris Judy, DNR's shellfish director, called the wild harvest last season "a notable increase" over the previous year's, which produced 333,000 bushels. Judy attributed the jump to a few successive years of good natural reproduction, including the third highest count in 2020 of juvenile oyster "spat" in the state's annual fall survey of oyster reefs.

Those bumper crops of baby oysters, he said, were "followed by good survival that allowed growth to market size."

Virginia harvest figures for the season are not yet available, but Andrew Button, deputy shellfish manager for the state Marine Resources Commission, said that the oyster population has increased to record numbers there based on annual reef surveys.

As MSX and Dermo drove the wild harvest down in both states, Maryland's landings hit a record low of 27,000 bushels in 2003–04. But the diseases have since abated and haven't caused a significant die-off for years.

Record rainfall in 2018–19, though, lowered salinity in the Bay and its rivers, curbing oyster growth and reproduction and even killing oysters in some places. Maryland and Virginia both imposed harvest restrictions, reducing daily bushel limits. Virginia also shortened its season by a month, while Maryland banned harvests on Wednesdays, reducing the workweek to four days.

The salinity has since rebounded, and DNR's juvenile spat count in 2020 was the best in more than two decades. The agency lifted its Wednesday harvest ban in 2021 while retaining the lower daily bushel limits.

Virginia did not ease any of the curbs on its wild fishery, which Button said has meant that, lately, the state's wild harvest has not grown as much as Maryland's.

The same weather and water conditions in 2020 and 2021 that helped the wild oyster stock reproduce and grow also aided Maryland oyster farmers, who saw their harvest from leased bottom reach a record 90,029 bushels last year, surpassing its previous high of 73,000 bushels in 2017, according to DNR data.

"It's a good time for oyster farmers," said Scott Budden, co-owner of Orchard Point Oyster Co.

The increase in Maryland's wild harvest gave Mike Wilberg some satisfaction. The fisheries scientist with the Chesapeake Biological Laboratory of the University of Maryland Center for Environmental Science helped to lead a computer-driven stock assessment of the oyster population for DNR. Factoring in reams of historical and recent data, the scientists' mathematical model had projected the harvest this past season would be nearly 500,000 bushels.

"You'd expect the fishery to show a response after a stellar spat set year," Wilberg said. "The question then becomes, what's going to happen in future years?"

Rachel Dean, who oysters in Calvert County, said she wouldn't mind seeing the daily bushel limits restored to what they had been in 2018.

"If we needed to take cuts when things were down," she said, "then the opposite should be true when things are up."

But Dorchester County waterman Bubby Powley and a few others said they're not anxious to return to more relaxed catch limits.

"We're happy where it's at," he said. "Right up to the last day, people were catching their limits. … It's better for the market. It stretches things out."

Harrison, the Talbot County waterman, said there's no evidence now that the population is being overfished, something scientists had warned was happening to a significant degree just a few years ago. Not only have there been more oysters to harvest, he noted, but they're bigger on average.

"It shows the areas are sustaining themselves," he said. Now, he added, "there's an opportunity to grow our industry, if we could just work it out with the environmental people."

Environmentalists and watermen have been at odds for years over oyster management in Maryland, differing over the value of the extensive network of harvest-free sanctuaries established in 2010. They also disagree on the need for costly restoration efforts under way, in which tens of millions of dollars are being spent on building new oyster reefs, often with stone instead of natural shell, and seeding them with oysters spawned in hatcheries to supplement the limited reproduction of wild oyster reefs.

"What's going on is a natural thing," Harrison said of the harvest increase. He predicted another good harvest next season as well, based on the number of juvenile oysters seen in the past year.

Environmentalists, though, point out that the harvest is not a reliable indicator of the Bay's overall oyster abundance. It can also reflect the effort put into it by the watermen.

"I'm happy to see the watermen doing well," said Allison Colden, senior fisheries scientist for the Chesapeake Bay Foundation. But she questioned whether this could be a repeat of what happened about a decade ago, when another good spat count was followed by the harvest topping 400,000 bushels, driven at least in part by a near doubling of the number of watermen going out to harvest them.

"I just hope that this is not a harbinger for another boom-and-bust cycle," she said.

DNR's Judy said he did not yet know the number of watermen who paid license surcharges to go oystering for the most recent season. The year before, the number had grown to 1,239, the highest in 20 years.

A few areas in Maryland waters are still being overfished, according to the latest stock assessment. Colden contended that DNR could do more to reduce that by requiring real-time harvest reporting, setting harvest quotas by area and limiting entry into the fishery, which Virginia has done.

Another bumper crop of baby oysters this summer could help sustain the current harvest or even nudge it higher, Wilberg suggested.

"One of the big factors in all of this is we haven't had a severe disease event in 20 years now," Wilberg said, "so I credit the recovery of the oyster population a lot to that."

But the conditions needed for another banner spat set also flirt with disaster. Higher water salinity improves oyster reproduction, but it also feeds the diseases.

Next year, Wilberg said, the model projects a harvest in the range of 350,000–400,000 bushels. ■

VA debates impacts of solar panels on stormwater runoff

DEQ issues order to regulate panels as impervious surfaces

By Whitney Pipkin

Solar panels are erected on a field in Campbell County, VA, in March 2021. (Kipp Teague/CC BY-NC-ND 2.0)

The new director of Virginia's top environmental agency, Mike Rolband, seemed to be stating the obvious when he said at a conference in late March that "water does not go through" solar panels.

But his declaration that solar panels should be regulated as impervious surfaces — followed by a memo from the agency stating the new policy would go into effect immediately — signaled a major pivot in policy. It also sent tremors through the solar industry, which has been rapidly erecting power-generating facilities across the state to meet both the state's and private companies' renewable energy goals.

Two weeks later, on April 14, the Virginia Department of Environmental Quality responded to the industry's concerns in a second memo. The agency said it would give projects more time to comply and indicated that stakeholder feedback would be considered in shaping how the policy will be applied.

Typical examples of impervious surfaces are roads, parking lots and rooftops. Those types of land cover keep water from soaking into the ground as it would through a natural surface. When rain falls, more of it runs off these hardened surfaces and at higher velocities, causing erosion and washing pollutants into waterways. Polluted stormwater is a major problem for the Chesapeake Bay and its rivers.

Regulating solar panels as impervious can be complicated.

"The way it was presented was as though it's decided science. I don't think the industry would agree with that," said Harry Godfrey, executive director of Virginia Advanced Energy Economy, a business coalition seeking affordable clean energy. "To treat ground-mounted solar arrays, for runoff purposes, the way you treat a new road or big-box store — the hydrology just doesn't work that way."

Many states have chosen to regulate the panels as pervious. They say that the volume and velocity of runoff the panels contribute fall somewhere between farmland and parking lots and greatly depend on the type of groundcover under the panels. Also, agencies have been directed, often by state legislatures, to regulate the solar industry in a more holistic way that takes into account its potential to help wean localities off fossil fuel-based energy sources.

As one green-building lawyer put it, referring to Maryland's stance on solar panels, these states are "not trying to alter the laws of science, but rather seeking through public policy to prioritize environmental stewardship."

Mike Tidwell, director of the Chesapeake Climate Action Network, said he sees Virginia's change in solar panel regulations as a slight against the state's renewable energy sector. And he said it's particularly problematic for the Northern Virginia epicenter of data centers for companies like Amazon and Google, which have doubled down on their 100% renewable energy commitments.

"I think the [Gov. Glenn] Youngkin administration is out of step, and this will have practical economic consequences for the state," he said.

Virginia has previously taken a tack similar to other states on solar panels. The Virginia Department of Environmental Quality's previous practice was to consider only the solar panel support posts and beams, which connect to the ground, as impervious areas, the March 29 memo stated.

"However," the memo continues, "this approach has the potential to underestimate the post-development runoff volume or runoff rate from solar panel arrays, which in turn has the potential to negatively impact downstream waterways or properties."

Rolband, the DEQ director, had a nearly 40-year career in resource protection before Youngkin appointed him to the post early this year. He expounded on some of the stormwater issues that he thinks have been associated with solar development during remarks at the Environment Virginia Symposium on March 29, the day the memo was issued.

"There are all sorts of problems with runoff from solar facilities," he said. "The fundamental issue is that for several years now a decision was made that solar panels are pervious. That's a problem for the downstream folks [because] it doesn't follow the erosion and sediment protocols. It's causing damage to people, and we want to fix that."

Solar panel operations in the state have been cited for stormwater violations, but some say those cases do not represent the majority and that using best practices can prevent them.

In 2018, heavy rain caused muddy water to gush off the grounds of a newly constructed, 200-acre solar panel project in Essex County and into Muddy Gut Creek, a tributary to the Rappahannock River.

A local TV news station ran the headline, "Green solar farm is turning Essex County watershed brown," with a video of murky water flooding part of a roadway and residents who were appalled at the runoff. As part of a consent decree, DEQ later fined the Essex Solar Center and the company behind the project $245,000 for violating stormwater and erosion control laws.

Even at a well-managed solar facility, there is some debate as to whether the panels have a significant effect on runoff volumes.

A 2011 study by the American Society of Civil Engineers found that solar panels did not have a significant effect on runoff volumes as long as certain ground covers and buffer strips are in place. If the ground under the panels is bare or covered with gravel instead of grass, that would increase the need for stormwater management.

"The kinetic energy of the flow that drains from the panels was found to be greater than that of the rainfall, which could cause erosion at the base of the panels," the study found.

The solar industry has a task force researching best practices for reducing stormwater impacts at facilities. As it stands, DEQ's policy change could require solar facilities to acquire 20% more land for projects to offset impervious surfaces, which would have "a significant impact," said David Murray, director of solar policy for American Clean Power.

DEQ's first memo states that the state-federal Chesapeake Bay Program also considers solar panels to be impervious areas for the purposes of performing water quality modeling under the Chesapeake cleanup plan. This means, as Rolband put it, that "the rest of Virginia will have to offset" their additional runoff.

Bay Program spokeswoman Rachel Felver confirmed that, for modeling purposes, solar panels are considered "impervious, buildings and other" in current land use data. In Virginia, they are reported as "unconnected" impervious to account for the spacing between panels.

"However, the impervious land use is not modeling solar panels specifically, and we are still trying to figure out how states are reporting the stormwater management actions and practices associated with solar farms," she wrote in an email.

The program's modelers are planning to further discuss those inputs during a technical workgroup meeting in early May.

Maryland, Pennsylvania and New Jersey have policies that either consider solar panels as pervious under most conditions or exempt the panels from being considered impervious for the purpose of stormwater management. ■

Yellow perch run spawns hope in Magothy River

Bay region population has partly recovered from a sharp decline in the 1980s

By Timothy B. Wheeler

If hope springs eternal, spring brings eternal hope to Paul Spadaro.

As winter wanes, Spadaro, longtime president of the Magothy River Association, patrols this Chesapeake Bay tributary north of Annapolis to look for the return of yellow perch. Those golden yellow fish with dark vertical stripes herald the approach of spring by swimming up the Bay's rivers and streams to spawn in freshwater.

Decades ago, their reproductive runs drew anglers out of their homes in droves for their first fishing trip of the year. They would line creek banks or go out in canoes or skiffs and try to fill a creel with the panfish.

The perch are less plentiful now, and so are their human pursuers.

Above: Yellow perch head upstream in the upper Magothy River. (Tom Capema/Magothy River Association) Inset: Hay bales were installed to control erosion at the Lake Waterford dam on Maryland's Magothy River to help protect perch habitat. (Paul Spadaro/Magothy River Association)

But the annual mating ritual persists, as do the watchful eyes of Spadaro and members of the Magothy watershed group. They are trying everything they can — against long odds and some official skepticism — to restore yellow perch to their historic abundance in the river.

"It's a keystone species," he explained. "If the river is producing yellow perch, it does mean the river is on a comeback."

Perca flavescens, as they're known to scientists, are found in tidal rivers and streams but also in freshwater lakes and reservoirs from Canada to the Carolinas. In the Chesapeake, they supported a robust commercial fishery in the early 1900s, but catches have dwindled over time.

From the late 1970s into the early 1990s, yellow perch reproduction was "very, very, very poor," said Paul Piavis, finfish program manager for the Maryland Department of Natural Resources.

In Maryland, the population had dropped to such alarmingly low levels by 1989 that the state imposed a catch moratorium in some Bay tributaries. Recreational anglers blamed the commercial fishery, and watermen blamed pollution and development.

Striped bass, the Bay's most prized finfish, were already under a moratorium at the time because of perilous declines, so the state shut down the yellow perch fishery out of an abundance of caution. A few years later, after observing a couple of springs of robust spawning, DNR partially reopened yellow perch fishing.

The fish have rallied, and an uneasy truce has been reached over their management, with size and creel limits for anglers and limited commercial netting allowed only in the Upper Bay and the Chester and Patuxent rivers.

"The perch are up and down, but I think they're fairly stable," said Mike Benjamin, who with his father runs a tackle shop in North East, MD, once the home of an annual yellow perch fishing tournament.

Benjamin said the fish don't seem as plentiful as they were a dozen or so years ago, but the ones they're catching are as big as they've ever seen. "It's a lot better than when I was a kid," he said, adding, "You just couldn't catch them. They weren't there."

Creel limits have increased for anglers from five to 10 fish per day. The commercial fishery remains tightly regulated, with a "slot limit" on the size range of legally catchable fish and catch quotas for the Upper Bay and its tributaries that are adjusted annually annually based on trawl surveys done each winter.

Ups and downs

In recent years, the yellow perch population has been essentially stable, Piavis said, with a bountiful spawn every few springs offsetting poor reproduction in other years.

Since 2017, the roughly two dozen commercial fishermen licensed to net yellow perch in the Upper Bay haven't come close to catching their limit. Likewise for the much smaller fisheries in the Chester and Patuxent.

Paivis said the population is "in a declining phase" now, without a banner reproduction the past few years to generate a rebound. As a result, DNR cut the commercial catch limit by more than 40% for the 2021–22 season. By the end of March, with the spawning run largely over, it still had not been reached.

"We're still holding our breath for a good one, for a good spawn," Piavis said. "I don't have a whole lot of hope for this year. It should be OK. We'll see."

Steve Lay of Havre de Grace, who fishes for yellow perch both commercially and for personal consumption, blamed the subpar harvests not on a scarcity of fish but on unfavorable weather and reduced market demand for fresh fish of any kind.

"The last two years, we haven't had winter," he said. As a result, the water didn't get cold enough to prompt yellow perch to school up, which would make it easier to fill a fyke net.

But fishermen are seeing more yellow perch in the Choptank and Nanticoke rivers, Lay said, which have remained closed to commercial harvest.

"It's kind of a shame that there is a sustainable population there, and it could be harvested on a limited basis."

Mike Luisi, acting DNR fisheries director, said the department hasn't been willing to do that so far because it lacks sufficient data on the yellow perch populations in other rivers.

"We've got to prioritize," he said. "We can't survey the entire Bay specifically for yellow perch. It takes too much staff time and resources."

Paul Spadaro of the Magothy River Association empties a bucketful of yellow perch egg masses into a wire cage, intended to keep them from being washed away or eaten. (Timothy B. Wheeler)

That aside, Luisi said he considers DNR's management of yellow perch a "success story." By varying the commercial harvest quotas based on regular surveys, he said, the population in the Upper Bay has essentially stabilized.

"We can't always control the reproductive success and recruitment success [of fish]," he said, "but one thing we can control is the harvest."

There is a cloud on the horizon, though. Piavis said there's been a dramatic increase in the number of blue catfish found in the Upper Bay trawl survey. The nonnative fish is a top predator, which could literally eat away at populations of yellow perch and other native fish there.

"It has us all on edge as to what the impacts are going to be over time," for yellow perch and other species, Luisi said.

Tenacity on the Magothy

On the Magothy, the outlook for yellow perch is even murkier. The recovery seen in the Upper Bay and on the Eastern Shore didn't seem to occur in Western Shore tributaries. The translucent streamers or ribbons of eggs released by female yellow perch for the males to fertilize were scarce. Of those that could be found, comparatively few hatched.

"We could find egg chains, but the eggs were dead," said DNR fisheries biologist Jim Uphoff.

Scientists saw abnormalities in some eggs, which suggested the fish might be suffering from contaminants in the water. Uphoff said the tributaries with the most abnormalities had the most development in their watersheds, though the precise culprit or culprits remain a mystery.

Yellow perch show up every spring in the Magothy and other Western Shore tributaries, but genetic analysis indicates they were spawned in the Upper Bay rather than locally, scientists said.

Even so, Magothy advocates have refused to give up. They began doing annual counts of the telltale egg sacs, then collected some for DNR to try raising in a hatchery. About half proved viable, but doubts remained about whether those hatchlings could survive to adulthood. When association leaders worked with DNR to sample the river for nearly microscopic fish larvae after the spawning run, they found that about 10% were alive.

"That's not great," said Sally Hornor, the Magothy association's vice president and a retired ecology and microbiology professor from Anne Arundel Community College. "You'd like to see more, but it's something."

The basic problem, Hornor said, is that more than 20% of the Magothy's watershed is covered by pavement and buildings. Those "impervious surfaces" produce flashy runoff that can carry sediment, oil and other contaminants. Perhaps more significantly, it also alters streamflow and temperature and causes the banks to erode — all factors that potentially affect the survival of fish eggs and larvae.

A recent study, yet to be published, failed to find any clear differences in the viability of yellow perch eggs from the Eastern Shore and from the Severn River, just south of the Magothy, which has a similar degree of development.

Alex MacLeod, a University of Maryland graduate student, said his research found a small number of abnormal eggs, a possible indicator of chemical contamination, from fish sampled on both sides of the Bay. After seeing less natural debris and vegetation to which fish eggs might attach in the Severn, he said he believes that a lack of habitat also could be hampering reproduction in those Western Shore tributaries.

"These are low-hanging fruit compared with trying to remove contaminants," MacLeod said.

That gives hope to Magothy advocates. Spadaro notes that Maryland's Critical Area Act, which limits shoreline development, calls for localities to protect water quality in Bay tributaries that have or had spawning runs of popular fish, including striped bass and yellow perch.

A seasonal no-fishing sign is posted along the upper Magothy River. (Timothy B. Wheeler)

A waterman holds a yellow perch netted in the Upper Bay, where limited harvests are permitted. (Dave Harp)

"Our biggest problem with the Magothy is overdevelopment," he said. "I could use [the yellow perch run] as leverage with the county to not build so many houses."

The county has stepped up, he said, by acquiring and preserving land along the upper Magothy to buffer stormwater runoff and by posting signs forbidding fishing during the spring along a key stretch of the river.

But last year's run was a disaster, one Spadaro attributes to lack of enforcement of laws governing polluted runoff. Just as yellow perch spawning peaked, heavy rains flooded the upper Magothy with a torrent of muddy water from the parking lot of a waste management and recycling company. The state attorney general subsequently sued, seeking record penalties of more than $2 million for stormwater violations. Spadaro said he'd been complaining about that company for a year before the incident.

This year, in an attempt to expand the spawning run — and protect against another such catastrophe — Spadaro and association members decided to "plant" yellow perch eggs in a couple of different places. They collected the milky egg sacs in buckets and transferred them to a pair of creeks feeding the river. One, Cattail Creek, had undergone a $1 million stream restoration a few years ago to curb erosion.

The other, Muddy Run, ran crystal clear the morning Spadaro placed a small metal cage in the shallow water and poured the egg sacks into it. The cage, made for raising young oysters, was intended to keep the egg stringers from washing away and to perhaps protect them from fish and other predators.

The run this year hit another glitch. A beaver or beavers had piled branches inside a road culvert, and Spadaro feared they were preventing yellow perch from getting upstream to their usual spawning ground just below a milldam that creates Lake Waterford. Fish were depositing their eggs just below the beaver dam instead.

Spadaro summoned county staff to pull the branches apart, and within a few hours schools of yellow perch could be seen venturing upstream.

"Oh, yeah, you can see the fish are coming up here," Spadaro said as he walked through the brush along Magothy Branch, the river's upper reach. "I just saw one dart through."

Within about 10 days, the run was over and, in late March, Spadaro reported that the transplanted egg sacs appeared to be staying put. And some showed up in Cattail Creek just downstream of the restored section.

"The fish have said, 'We're still here,'" he said. ■

EPA, citing PA's shortfall for Bay goals, ramps up inspections

Advocates hope the action spurs lawmakers to fund clean water programs

By Karl Blankenship

Most of the Susquehanna River watershed, which provides half of the freshwater flow to the Chesapeake Bay, is located in Pennsylvania. (Lara Lutz)

Pennsylvania's failure to live up to its Chesapeake Bay cleanup obligations means farmers, wastewater plant operators and industries are more likely to get knock on their door from the U.S. Environmental Protection Agency.

The ramped-up inspections and enforcement of clean water regulations are intended to spur more action — and funding — from the state. The EPA announced the measures April 18 as it released its review of Pennsylvania's latest Bay plan which, the agency said, still falls short of meeting the Keystone state's goals.

Pennsylvania sends more water-fouling nutrients (nitrogen and phosphorus) to the Bay than any other state. It has been far behind in taking cleanup actions for nearly a decade, and the EPA's previous failure to press the state to do more has drawn criticism and lawsuits.

The EPA's decision to increase inspections and enforcement is the strongest action the agency has taken. And the EPA said it could take additional measures unless state officials fix shortcomings in their Bay cleanup plan within 90 days.

Among other things, the agency said the state's latest plan, submitted at the end of December, achieves only 70% of its nitrogen reduction goal. It did achieve 99% of its phosphorus goal, though.

"We're sending a very real message," said Adam Ortiz, administrator of the EPA's mid-Atlantic region, which includes most of the Bay watershed. "We're not rubber stamping something that doesn't add up."

Ortiz said the state lacks adequate programs and policies to keep manure from farmlands out of streams and, ultimately, the Bay. And, unlike most other states in the watershed, Pennsylvania lacks dedicated programs to help farmers fund and install conservation practices that can help reduce nutrient-laden runoff, such as streamside buffers, fall cover crops and manure storage facilities.

State officials disagree that the plan fails to add up. But along with farm groups, environmentalists and others, they believe that the prospect is better than ever for increased funding to help improve the state's streams, 25,000 miles of which fail to meet water quality standards.

"I haven't been as cautiously optimistic as I am right now for a very long time," said Harry Campbell, Pennsylvania science, policy and advocacy director for the Chesapeake Bay Foundation.

"Having EPA play that role they are intended to be, the ultimate enforcer of our clean water laws across the nation and in Pennsylvania, can in many ways be an important motivator," Campbell said.

Long running shortfalls

Under a 2010 cleanup plan, formally known as the Bay's total maximum daily load, the EPA assigned all six states in the Chesapeake watershed, along with the District of Columbia, specific goals for reducing nitrogen and phosphorus, the two nutrients largely responsible for the Bay's poor water quality and oxygen-starved "dead zones." The hope was to have all of the necessary practices in place by 2025 to meet those goals.

Pennsylvania was tasked with reducing the amount of nitrogen it sends to the Bay each year by 39.7 million pounds — a majority of the 71.5-million-pound annual load reduction sought from the entire watershed.

But the state's progress, as measured by computer models, immediately fell behind. Through 2020, its annual nitrogen load was reduced by just 7.2 million pounds. The EPA has previously expressed concern about the state's lack of progress but until now had done little to address the shortfall beyond temporarily withholding and redirecting some Bay-related grant money.

The issue reached a boiling point when the state submitted an updated cleanup plan in 2019 that fell 9.8 million pounds short of meeting its nitrogen goal and identified an annual $324 million funding shortfall. Maryland, Virginia and Delaware, along with the District of Columbia, Chesapeake Bay Foundation and others, filed suit against the EPA for failing to press the state to make greater progress. That suit is still pending.

Pennsylvania, which does not border the Bay, has had a particularly difficult job reducing nutrient pollution because the vast majority comes from farms and stormwater, sources that all of the states have struggled to control.

Roughly 90% of nutrient reductions in the Bay watershed since 2010 have come from wastewater treatment plant upgrades. Those upgrades account for most of the nutrient reduction progress in Maryland, Virginia and the District of Columbia. But wastewater accounts for less than 10% of the nutrients that originate in Pennsylvania.

At the end of December, Pennsylvania officials submitted a revised plan that they insisted met the goals. But most of the gap was filled by counting agricultural runoff control practices installed years ago, which the EPA says have exceeded their expected lifespan and are no longer effective. When those practices are removed from Pennsylvania's plan, the EPA said it comes up 9.7 million pounds short in reducing nutrients.

The state-federal Chesapeake Bay Program tracks cleanup progress by incorporating data from states about the amount of conservation practices installed by farmers and others, then estimating the impact those actions have on water quality. But under policies adopted by the Bay Program, those practices are removed from the model after they reach their expected lifespans.

Jill Whitcomb, director of the Pennsylvania Department of Environmental Protection's Bay office, said that is shortchanging Pennsylvania. She said information collected by the department suggests "a very high percentage" of streamside buffers, manure storage facilities and barnyard controls last longer than the time frame assumed by the Bay Program.

"We continue to lose historically implemented practices that should still be credited," Whitcomb said. The net result, she

Reducing water pollution from agriculture is a challenge throughout the Bay watershed. Pennsylvania has more farms in its portion of the watershed than any other state in the region. (Dave Harp)

Ryan Davis of the Alliance for the Chesapeake Bay checks a young streamside buffer on a Plain sect farm near Christiana, PA, in 2020. The nonprofit group conducted the project with help from a state grant, but Pennsylvania is the only the only major state in the watershed without a dedicated program to help farmers fund and install conservation practices. (Will Parson/Chesapeake Bay Program)

said, is that model estimates are subtracting runoff control practices faster than new ones are put in place.

The EPA contends that the state needs to do a better job documenting "expired" practices and should work with other Bay Program states to develop a new policy for counting them toward cleanup goals. Such an effort is under way, but the states have yet to agree on changes.

While other states have voiced similar concerns, the problem is most acute in Pennsylvania because it has more farms in the Bay watershed — about 30,000 — making the job of inspecting old runoff control practices cost-prohibitive, Whitcomb said.

"Do I want to spend time on implementing new practices where we can see viable improvements to local water quality, or should we spend our time going out and looking at practices that we already know exist and are functioning?" she asked. "We have to have a balance there."

Whitcomb also said that the Bay Program needs to do a better job articulating "uncertainties in the model" used to evaluate state progress. She noted that water quality monitoring has shown improving trends in the Susquehanna River, which drains most of Pennsylvania's portion of the Bay watershed.

Hope for new funding

No one disputes that Pennsylvania is the only major state in the watershed that lacks a dedicated program to help farmers fund and install conservation practices.

The lack of state funding has been exacerbated by continued budget tightening by the legislature for more than a decade. As a result, environmental agencies are severely understaffed and unable to enforce regulations already on the books.

Politically, it's been difficult for advocates to secure support for Bay-related efforts. Half of the state drains into the Chesapeake, primarily through the Susquehanna River, but that portion of the state contains less than a third of the population.

The EPA's new action changes that equation. Its increased inspections and enforcement cover the entire state, not just the portion that drains to the Bay.

"EPA's intent to apply consequences statewide for the Chesapeake Bay shortfall, instead of just in the Bay watershed, recognizes that we need to take a hard look at how Pennsylvania prioritizes our own water resources," said state Sen. Gene Yaw, a Republican from northern Pennsylvania who chairs the Environmental Resources and Energy Committee. He called it "disappointing that Pennsylvania continues to fall short of its obligations to our downstream neighbors."

Yaw, who is also a member of the Chesapeake Bay Commission, an advisory panel that includes lawmakers from the Bay states, has co-sponsored legislation that would use federal COVID relief funding to provide $250 million for a Clean Streams Fund. The money would be available for a variety of water quality improvements statewide. Half of the money would go toward a new Agricultural Conservation Assistance Program that would support farmers through county conservation districts.

The legislation would also allocate money to address acid mine drainage, municipal stormwater runoff, implementation of nutrient management plans, and other water quality programs. The federal money needs to be spent by the end of next year, though, and it's not clear whether the state would pick up the tab after that.

"The intent is, let's get it established and prove that the programs work and have the impact that we think they're going to have," said Marel King, Pennsylvania director of the Bay Commission. "That will make people want to fund it in the future."

Indeed, regardless of a long-term commitment, advocates say the fund is a good first step toward increasing Pennsylvania's efforts to protect its waterways and the Chesapeake.

Justin Clapper, manager of government affairs and communications with the Pennsylvania Farm Bureau, said he "absolutely" thinks the EPA's action will help spur the General Assembly to pass the measures. "Quite honestly, it underscores the need for the program in general."

Future steps

Because of the shortfall in Pennsylvania's plan, the EPA's Ortiz said the agency will increase inspections and enforcement for water discharges throughout the state from farms, stormwater systems, industries, municipalities and wastewater plants.

In some cases, small farms that are currently exempt from EPA oversight could be brought under its permit programs if the agency deems they have "a substantial likelihood of discharging into local streams," Ortiz said.

Typically, the EPA has little authority to regulate farms except for the largest concentrated animal feeding operations, or CAFOs. But the agency can extend its regulatory reach over smaller animal operations if it can show they are having a direct impact on water quality.

Clapper said the Farm Bureau has received little detail about the EPA's plans but the potential for increased farm inspections "is concerning for us. We're waiting to see how this unfolds."

In addition to showing how its updated plan will be paid for, the EPA wants the state to provide greater levels of detail about how it would be enacted. For instance, it calls for increasing the implementation rate for some runoff control practices by more than tenfold — a move that would require state agencies to greatly increase oversight.

If the state does not submit an adequate plan within 90 days, Ortiz said the EPA could take further actions.

Those could include requiring Pennsylvnia wastewater treatment plants, which have already achieved their share of Bay goals, to do even more, and that could be extremely expensive. The agency could also put forth water quality standards that are stricter than the state's, or it could object to any new requests for discharge permits within the state's portion of the Bay watershed.

The EPA could also require all new permitted facilities to not only offset new pollution but achieve "net improvements" by paying others to reduce pollution beyond what is created by the new operation. That's likely to discourage new development.

"Enforcement is part of what we do here at EPA," Ortiz said. "It's not always our first choice. It rarely is our first choice. But we're at a point now where we have to step up and do our part." ■

PA volunteers maintain trails now strained by record use

More help needed as list of tasks grows

By Ad Crable

With seven volunteers gathered around him in Pennsylvania's Michaux State Forest, Tom Moutsos apologized in advance for ruining the group's future hiking experiences.

Moutsos, the regional trail coordinator for the North Country Trail Association, then listed all of the trail imperfections, maintenance needs and design faults that the volunteers would likely encounter while tending to just a few of the trails among Pennsylvania's thousands of miles of public hiking routes.

The trail chosen for the day's training session, a popular one at Michaux, had no shortage of lessons: a stream crossing without steppingstones, causing visitors to hop all over the place and braid new trails through sensitive wetlands; a clogged rock drainage culvert; loose rocks in a staircase; a con-fusing turn in the trail without blazes to guide hikers.

The volunteers, some representing large hiking organizations, had come from all over Pennsylvania to attend the Keystone Trail Association's Trail Care 101 training weekend and learn how to build, repair, maintain and improve trails.

Their behind-the-scenes help is needed like never before. Two years of COVID have fueled an unprecedented level of outdoor recreation on public lands and a corresponding strain on trails throughout Pennsylvania.

According to a survey of 40 trails by the Pennsylvania Environmental Council, yearly trail visits nearly doubled between 2018 and 2020, rising from 180,342 to 355,574.

Trail stewards are playing catchup.

In a time when state natural resource agencies face budget shortfalls, volunteers are indispensable in keeping trails open and safe. Overcrowded trailheads have become especially troublesome.

And the need for added maintenance help comes at a time when COVID concerns have hindered work sessions. Younger potential volunteers, who use social media to stay in touch with like-minded peers, are less likely to join established hiking clubs that have long provided the service.

"Trails don't maintain themselves," said Brook Lenker, executive director of the Keystone Trails Association, a statewide trails advocacy nonprofit in Pennsylvania. With increased damage to trails from the more frequent occurrence of extreme wind and rainstorms, paired with an aging corps of volunteers, Lenker and his organization cite a need for more outreach and recruitment.

Volunteers dig out a new trail corridor in Michaux State Forest in Pennsylvania. (Ad Crable)

Participants in a trail care workshop in Michaux State Forest use loppers to trim rhododendron branches invading a trail. (Ad Crable)

Most people have no idea how much work is needed to keep Pennsylvania's vast network of trails open. In addition to more than 12,000 miles of trails in state parks and state forests — the ninth most in the nation — there are thousands more miles of trails in local parks and land trust nature preserves.

And then there is the Appalachian Trail's 230-mile rocky slice through the state, maintained almost exclusively by nine trail clubs and individual volunteers. The North Country National Scenic Trail, another national trail, has 265 miles in the state, also cared for by volunteers.

Without the unheralded and mostly unseen work of volunteers, hiking these pathways or getting to a favorite vista would be an unpleasant, perhaps impossible, experience.

Rob Pingar of West Chester, PA, realizes that. He came to the training weekend so he can start helping with maintenance.

"I hike and backpack several times a year, and I'm just appreciative of the work that is done," he said. "You can see the maintenance needs after a winter. Somebody has got to fix that, and someone is. Why not give back for all the joy we had walking those trails?"

Army of volunteers

Despite the headwinds, Pennsylvania has been able to muster a corps of volunteers who have risen to the occasion to remove blowdowns, pluck litter, stem erosion, build bridges across streams, remove rogue "social" trails, paint blazes, help direct traffic flow at overcrowded trailheads and the many other needs of a trail system under pressure.

They do this work while getting scraped, stung by bugs, bitten by ticks and infected with poison ivy.

The Keystone Trails Association has 40 trail clubs around the state, most of which adopt specific trails. Some are a considerable distance from their home base. The group also has about 125 volunteers it can dispatch to take care of trails that have no dedicated group and would likely be closed without their efforts.

The nonprofit Pennsylvania Parks and Forests Foundation has 48 groups of "friends" that adopt a state forest or state park. In 2021, more than 1,000 of those volunteers put in 2,400 hours to help their favorite park or forest. Another 15 groups are not affiliated with the foundation but are invited to training and work weekends.

Marci Mowery, the foundation's president, talks about the "loving hands" and "sweat equity" that go into building and maintaining trails. "It takes a village to care for these places in the landscape," she said.

The trails in state forests and parks, some built by the Civilian Conservation Corps during the Depression, are the responsibility of the state Department of Conservation and Natural Resources.

But the agency is understaffed and depends heavily on volunteers. "Primarily, we address safety issues like trail damage from storms," said Matt Crosbie, a specialist in nonmotorized recreation for the DCNR's Bureau of Forestry. Volunteers and staff sometimes work side-by-side to build bridges on trails or conduct other maintenance projects.

"Volunteers are important in assessing the trails. We can't get around to all of them. Volunteers will report issues," he said. From time to time, trails have been retired because there is no one to take care of them.

Since 2016, the state agency's trail maintenance has been bolstered by the Pennsylvania Outdoor Corps, which pays participants, ages 15–25, and teaches them resource management skills. In 2020, 10 crews built or rehabilitated 89 miles of trails.

One of the program's funding partners is the Student Conservation Association, a nationwide nonprofit that sends crews to do trail work in Pennsylvania each year. ■

How to help

To become a volunteer at a Pennsylvania state park or forest, search for "volunteer PA parks" in your web browser.

To donate to or become a trail volunteer for the Pennsylvania Parks and Forests Foundation, visit paparksandforests.org, then click on "Friends Groups."

To donate to or become a trail volunteer for the Keystone Trails Association, visit kta-hike.org, then click on "Trail Care."

Fones Cliffs land returned to Rappahannock Tribe

Another 1,000 acres still slated for housing, hotel and 10-story condominiums

By Jeremy Cox

This portion of Fones Cliffs along the Rappahannock River in Virginia was once the site of Pissacoack, home to the Rappahannock people. (Jeff Allenby/Chesapeake Conservancy)

Chief Anne Richardson of the Rappahannock Tribe (left) and U.S. Interior Secretary Deb Haaland participate in a commemoration of the transfer to the tribe of 465 acres along the Rappahannock River in Virginia. (Will Parson/Chesapeake Bay Program)

Nearly 400 years after it was wrested away, a large portion of one of the most spectacular landmarks in Virginia's Tidewater region is back in the hands of its original occupants.

In 1649, European settlers, defying the terms of a treaty signed only three years earlier, forced the Rappahannock people off their ancestral lands on what is now Virginia's Northern Neck and Middle Peninsula. That action severed the Rappahannocks' longstanding connection to Fones Cliffs, a 4-mile stretch of sheer rock standing on the northern bank of the river that bears the tribe's name.

At an announcement April 1 presided over by the first Native American to serve as a U.S. Cabinet secretary, officials and local tribal members celebrated the return of 465 acres of Fones Cliffs land to the Rappahannock people.

The Chesapeake Conservancy purchased the tract recently from the Northern Neck Lumber Co. for the discounted price of $4 million, officials say. The group then donated the land to the Rappahannock Tribe, a federally recognized sovereign nation.

The land will be open to the public through an easement granted to the U.S. Fish and Wildlife Service. The tribe plans to keep much of the site in its natural state, except for developing a network of trails and a replica 1500s era village, where contemporary Rappahannocks can practice their traditions and educate visitors about their history.

"It's a big deal for the tribe and a big deal for the landscape of the Chesapeake [Bay]," said Rappahannock Tribe Chief Anne Richardson.

The ceremony marking the acquisition drew several VIPs to Fones Cliffs, including Fish and Wildlife Service Director Martha Williams and Interior Secretary Deb Haaland, a member of the Pueblo of Laguna Tribe of New Mexico.

"This historic reacquisition underscores how tribes, private landowners and other stakeholders all play a central role in this administration's work to ensure our conservation efforts are locally led and support communities' health and well-being," Haaland said.

In recent years, Fones Cliffs has become one of the Chesapeake region's most hotly contested battlegrounds between developers and conservationists.

The formation lies about 40 miles southeast of Fredericksburg. The white-and-orange face of the cliffs consists of diatomaceous earth, a soft rock that observers say sparkles in the right sunlight. The towering location is rich in wildlife, providing an ideal hunting perch for bald eagles. The National Audubon Society has designated the cliffs an Important Bird Area with "global significance."

"It's a stunningly beautiful property," said Joel Dunn, the Chesapeake Conservancy's president and CEO. "I call it the Yosemite of the Chesapeake."

Artifacts and historical records draw a strong connection between the Rappahannock people and Fones Cliffs. Before European contact, the Rappahannock established three towns atop the cliffs: Wecuppom, Matchopick and Pissacoack. The newly acquired property encompasses the site of Pissacoack.

During his 1608 exploration of the Bay region, Capt. John Smith fled a barrage of arrows shot by the Rappahannock people from Fones Cliffs at his boat. But within a few decades, the English occupation ousted the tribe from this area of their homeland.

The Rappahannock may have departed Fones Cliffs. But, as Richardson sees it, their relationship with the land remained intact.

"We know the bones of ancestors reside in the ground, and the DNA of the tribe is in that land," she said, citing recent archaeological surveys conducted by St. Mary's College of Maryland.

Financial support for the land purchase came from the family of William Dodge Angle and the National Fish and Wildlife Foundation through a grant from Walmart's Acres for America partnership. The tribe plans to place the land in trust with the U.S. Bureau of Indian Affairs.

Conservation interest in preserving Fones Cliffs has ramped up over the past decade amid increasing pressure from developers. Dunn said that the conservancy's goal is to preserve about 2,000 acres of Fones Cliffs.

The group helped facilitate the purchase of one property in 2018. The tract totals more than 250 acres of forests and deep ravines along the cliffs. The U.S. Fish and Wildlife Service later acquired the parcel, adding it to the Rappahannock River Valley National Wildlife Refuge.

To the north of that property, though, a 1,000-acre tract remains in limbo. There, the owner, the New York-based Virginia True Corp., initially proposed a luxury golf resort with 205 homes, 513 multifamily units, 18 cabins and a 116-room lodge.

The company filed for bankruptcy in 2019, making the future of its Fones Cliffs holdings uncertain. Amid those proceedings, the firm has unveiled a new plan for the property: a combination of federally funded housing, a hotel and luxury condos in 10-story towers.

That particular stretch of the cliffs isn't pristine. Two years before the bankruptcy filing, Virginia True drew ire from environmentalists and fines from state regulators after it illegally cleared 13 acres of trees adjacent to the cliffs. A few months later, a portion of the cliff face near that clearing tumbled into the river after several days of rain.

"When that happened," Richardson said, "it was just appalling. It was an emergency. We had to do something."

Dunn said that the land returned to the Rappahannock Tribe, on the other hand, has remained largely untouched. Although it was owned by a timber company, the land's difficult terrain largely kept loggers at bay. As a result, some of the region's oldest trees can be found growing in its soil, he said.

The land acquisition, Richardson said, will strengthen the tribe's Return to the River program, which trains their youth in traditional river knowledge. Until now, the tribe's sole property near Fones Cliffs — but not on its waterfront — was a single acre donated to the Rappahannock people in 2017 by Virginia Warner, daughter of former U.S. Sen. John Warner of Virginia. ■

Landowners seek clarity over VA's living shorelines law

Confusion centers on handling of existing structures, potentially high costs of repair, replacement

By Whitney Pipkin

Larry Zaragoza paddles through a portion of Little Hunting Creek in Alexandria, VA, that features both armored and living shorelines. (Whitney Pipkin)

Some property owners along Virginia's tidal waterways are concerned that a recent change in state law has muddied the waters for managing their shorelines.

Natural or living shorelines have for years been the preferred approach of scientists and state agencies to prevent erosion, accommodate sea level rise and preserve tidal wetlands along shorelines in the Chesapeake Bay region. Rather than hardening property edges with concrete or wood seawalls or piled stones (known as "riprap"), living shorelines create natural contours that receive the water's ebb and flow and, over time, can be more resilient. They also create habitat for wildlife and filter polluted runoff from the land.

So, in 2020, Virginia turned its push for softer shorelines into law. Legislators directed the Virginia Marine Resources Commission to approve only living shoreline designs when property owners seek permits for shore stabilization projects "unless the best available science shows that such approaches are not suitable."

The new law does not necessarily mean that existing hardened shorelines will need to be immediately demolished and replaced with beds of seagrass. About 18% of Bay shoreline has already been armored, with much of that hardening concentrated in urban areas.

But property owners who have a seawall nearing the end of its life or in need of repair are worried the law could require costly changes, and they point to a few properties in the state that have already had trouble getting permits. Words like "suitable" — intended to give the scientific community and regulators flexibility — are viewed as inherently vague by property owners who aren't sure what will be expected of them when they seek a new permit.

"Right now, there's fear about how it would be applied," said Katherine Ward, co-chair of the Mount Vernon Council of Citizens' Association and former president of an association of nearly 500 homes, 64 of them on the Potomac River. Regulators, she said, "may seem to think there's flexibility in the law. But my neighbors who live on the water don't believe there's flexibility."

Shoreline homeowners in Fairfax County, VA, especially concerned about the law's impact on personal property rights, worked with Del. Paul Krizek (D-Fairfax) to propose a bill with significant changes. It died in committee early this year. The measure would have softened living shoreline requirements for properties with existing erosion measures or where a living shoreline would "substantially detract … from enjoyment of the property."

Maryland has had a living shorelines law similar to Virginia's since 2008. But Maryland explicitly mentions existing structures in its permit process and allows for "certain exceptions" through a waiver application.

A well-worn wall

About a year after moving into his home in Alexandria, VA, in 2019, Brian Jones began a process that would make him the first in Fairfax County to seek a permit under Virginia's living shorelines law. Other homeowners saw his project as an early test of whether existing infrastructure could be maintained under the new law but say it's still not clear.

Jones hired a contractor to assess the condition of a wooden seawall that forms the edge of his lawn which, at low tide, stands several feet above the creek. The contractor said it was beyond repair — nibbled by beavers, with sediment leaking from gaps — and needed to be replaced. He proposed building a new wall on the water side before removing the existing one and filling in the gap.

But by the time the contractor sought a permit for the work, the living shorelines law was in place. Through conversations with state and county officials who visited his property, Jones said it became clear that a permit to replace the wall was not likely to be approved.

"If I didn't have a wall and they said, 'Oh, you can't have a wall,' then that's OK," said Jones, whose house is on Little Hunting Creek, a tidal tributary to the Potomac River. "But I do have a wall, so let me fix the wall or reinforce the wall."

Jones said installing a new wall would have cost about $70,000. A quote to turn the treeless half of his yard into a living

Brian Jones' efforts to repair or replace the seawall along his property in Alexandria, VA, met with complications under the state's new living shorelines law. (Whitney Pipkin)

shoreline, grading it to slope down to the water's edge, came in at about the same price. But that quote didn't include the potentially high cost of removing the wall's water-soaked wood or account for losing the use of about half of his yard, Jones said.

"In the end, we took the state's and county's reluctance to talk about anything other than a living shoreline as a 'no,' " Jones said. He now hopes to work around the deteriorating wall by building a walkway to a floating dock. "It would be nice to get some clarity about what they're going to do when the wall actually fails."

Larry Zaragoza lives nearby along a constructed canal that spurs off Little Hunting Creek. The neighborhood was built in the 1960s around two canals carved into the landscape and lined with wooden seawalls. They are periodically dredged to provide boat access to some two dozen homes.

Zaragoza said he doesn't think the law was written with an intent to remove seawalls and the yards they hold in place. But, by not explicitly addressing existing infrastructure, he said the regulation leaves property owners vulnerable to what a local board might decide.

"I think a lot of this is an unintended consequence," Zaragoza said. "But what this law is actually doing is alienating property owners who care about the environment. I think, in the end, that is going to do more harm than good."

Local environmentalists and officials have tried to assure Zaragoza and others that they should be able to maintain existing infrastructure under the law. Many cite a 1984 attorney general opinion written by Gerald Baliles. It states that "normal maintenance, repair or additions to a bulkhead would be permitted under [a section of existing law] if no further wetlands were covered."

An airing of concerns

Betsy Martin, president of Friends of Little Hunting Creek, helped host a webinar in March to address some of the concerns she was hearing from Fairfax homeowners about living shoreline requirements.

Many of the residents were not aware of the Virginia Conservation Assistance Program, which reimburses 75% of the cost of a living shoreline project up to $15,000 per parcel per year to property owners living in a Soil and Water Conservation District (Fairfax County is included in the Northern Virginia district). But that program is not always fully funded each year, and the funds and staffing can fall short of needs.

Zaragoza mentioned his concerns during the webinar — including the potentially high cost of compliance — to Mark Eversole, an environmental engineer who oversees permits for Fairfax and a dozen other counties for the Virginia Marine Resources Commission.

A contractor who built a permitted pier along this shoreline in Hampton Roads, VA, added stone and a gravel kayak ramp without getting a necessary permit required under the state's living shorelines law. The landowners tried to correct the issue by adding living shoreline elements but were denied a permit three times. (Courtesy of Mary Swift)

Eversole said he didn't think living shorelines would cost as much as some have estimated but was open to discussing "whether cost should be a factor in determining whether a living shoreline is suitable."

"Rest assured, we do hear you," Eversole said, adding later, "If citizens are concerned with this law and how it's enforced, you do need to go back to your legislators. … I do know that wetland boards all across the state are dealing with this and learning how to enforce the living shoreline [regulations]."

Eversole also said that, in general, repairing existing bulkheads is allowed by local wetlands boards as long as no new wetlands are affected. Some boards, he said, don't even require a permit for certain types of maintenance. But he advised property owners to start a project by filling out a joint permit application (which combines local and state approvals) to be sure.

Pamela Mason, a senior research scientist with the Virginia Institute of Marine Science, also gave a presentation during the webinar. She said determining whether a property is a fit for a living shoreline can often only be done on a case-by-case basis because it depends on so many factors.

"The tidal wetlands law calls for a public-private balance to assess the benefits and detriments," she said. "That's part of the hearing process."

In practice

Looking for clarity, many looked to a hearing before the Virginia Marine Resources Commission in March. A Hampton Roads couple appealed to the commission after their third attempt to secure a shoreline work permit was denied by a local wetlands board that said they should incorporate more living shoreline elements.

In that case, a contractor hired by Fred Westphal and Mary Swift to construct a permitted pier along their shoreline added stone and a gravel kayak ramp without getting a permit for the additional work, as required by the living shorelines law. The contractor was fined $2,000. The landowners were fined $100 and instructed to get a permit to correct the issue.

On their third attempt to get that permit, the couple proposed a plan that added elements of a living shoreline, such as planting grasses into the rocky revetment and replacing the kayak ramp with grasses, at a cost of $12,000. A more expansive living shoreline design they considered, according to one contractor's estimate, would cost $69,000.

Testimony at the hearing focused on whether a local wetlands board should deny a permit for failing to devote every "suitable" square foot to living shoreline practices — and whether cost should factor into such decisions.

Jay Ford, Virginia policy and grassroots adviser for the Chesapeake Bay Foundation, said that it shouldn't, based on the law. Acting Commissioner Justin Worrell of the marine resources commission said it should. "It's unrealistic to pretend that cost doesn't matter when it does," Worrell said.

But the question before the state board, as one member put it, was ultimately about whether the local wetlands board followed the law. The board agreed in a 5–1 vote (and one abstention) that it did, denying the couple's appeal.

Meanwhile, back in Fairfax

After hearing from residents, the Fairfax County Wetlands Board in March released a draft guidance document on how the regulations would be applied. The draft acknowledges that "there are many locations where living shorelines may not be suitable for implementation…" but where "feasible elements of living shorelines may still be required in concert with other hardening measures."

The document indicates that maintenance of existing seawalls, riprap and bulkheads could require a permit and suggests starting any project by applying for one in case its needed (at a cost of $300). Failed infrastructure, though, could cause the board to assess whether a living shoreline would be suitable for the property.

The guidance document also includes a checklist of factors to help determine whether a living shoreline is suitable for the project's location. Among them are the costs for both removing existing erosion controls and installing the living shoreline.

Aaron Wendt, one of two environmental specialists with the state's Shoreline Erosion Advisory Service, which offers free consultations to Virginians, said that the state guidance is not as clear as it could be and was glad to see a county trying to help. He also said that he can meet with property owners to "talk hypotheticals about what they want to accomplish and guide them before they get to a permit."

Zaragoza said he appreciated the additional guidance from the Fairfax wetlands board but that it doesn't go far enough. He said it should provide "an objective process" that any board could follow rather than a list of considerations.

"The choice of installing a living shoreline, where appropriate, should be that of the property owner and not be dictated by an arbitrary process," he wrote in comments to the board. ■

Sheep graze among solar arrays

Using solar sites for pasture increases benefits

By Ad Crable

A solar power boom generated by new renewable energy mandates is unfurling in the Chesapeake Bay region. Virginia, for example, was ninth in the nation for new solar capacity in 2021.

With many solar arrays ending up on farmland, a movement is fast taking hold to make sure that they will benefit the environment, agriculture and wildlife, and not just create a sea of silicon. Allowing sheep to graze among solar panels has become one attractive antidote.

Grazing by sheep and other livestock joins other dual uses: planting groundcover to benefit pollinators, growing marketable plants such as cherry tomatoes and lavender under the panels, installing beehives and maximizing soil health practices to improve the land for later ag use. Projects that combine farming and solar energy are called agrivoltaic.

State agencies in Virginia, Maryland and New York have created pollinator-friendly scorecards for solar developers, underscoring the expectation that environmentally beneficial groundcover will become the norm on both rural and urban solar farms.

"Solar [arrays] on farmland should be required to be dual use," said Arjun Makhijani, founder of the Maryland-based Institute for Energy and Environmental Research.

The use of solar sites for livestock grazing is still in its infancy, but flocks of sheep are already grazing contentedly under and around glass panels in Pennsylvania, Virginia, Maryland and New York.

By welcoming the grazers, solar operators save money on land maintenance. After the cost of leasing the land, vegetation management is often their top expense.

Photo: Sheep feed from a mix of plants growing at the Nittany 1 solar array in central Pennsylvania. The plants were selected to support the sheep's nutritional needs and attract pollinating insects. (Lightsource BP)

Sheep owners get access to new grazing pastures while receiving payments to boot, adding precious income at a time when many farmers are struggling. Surveys suggest that sheep farmers often are paid $300–$500 an acre.

There are environmental benefits as well. For example, a new study funded by the National Renewable Energy Laboratory found that native vegetation munched on by sheep shows an uptick in carbon capture and improves the soil by increasing the cycling of nutrients, carbon and water.

The synergies of grazing and leaving the ground undisturbed can actually improve a farm's soil during its use as a solar site, according to a study by the Institute for Energy and Environmental Research, based on solar projects on three Maryland farms. Farmers want and financially need the opportunity, the study said.

Why are sheep the most popular choice, at least for now? Because most solar arrays are too close to the ground to accommodate cattle. A solar project being built in Howard County, MD, though, has panels 6 feet off the ground so cows can graze on hay planted underneath. Goats tend to eat wiring and jump onto the panels. Pigs wallow.

Sheep, on the other hand, fit nicely under the panels, typically built 2–3 feet off the ground, and they keep their heads down for the business at hand. The panels provide shelter and shade. Studies are also finding that vegetation planted for grazing under solar panels helps keep the panels cool, boosting energy production.

"Normally, we hired crews with lawnmowers and [weed trimmers]. For a solar business focused on sustainability, the idea of using fossil-fuel equipment is counterintuitive," said Keith Hevenor of Nexamp Inc., one of the largest solar developers in the nation. The New Jersey-based company has sheep grazing at 14 sites in New York and may double that total by the end of the year.

"It's been a great fit for us," he said.

At some sites, solar grazing has blunted the concerns of those rattled by the conversion of farmland to energy production. Twenty states have sheep grazing on solar sites.

It seems too good to be true. But it's not, said New York sheep farmer Lexie Hain, who helped form the grassroots American Solar Grazing Association in 2018 to connect and mobilize sheep farmers and solar operators around the country.

"Sheep are the natural fit for solar. It's creating a shift," Hain said. "This is a land-use change as well as a business opportunity for people, and they are responding. Solar grazing is happening on its own because it works better than mechanical mowing. It's kind of remarkable."

She and her nonprofit are being flooded with requests for advice and have helped launch grazing at solar arrays in Virginia, Pennsylvania, New York and other states. Hain and a business partner graze 1,400 of their own sheep at eight solar sites in New York and Pennsylvania.

The growing interest has already prompted a seed mix specially designed for solar grazing by sheep. Fuzz & Buzz by Pennsylvania-based Ernst Conservation Seeds combines various nutritious grasses favored by sheep with blooming plants that draw pollinators and improve soil health.

Fat as butterballs

In the spring of 2020, John Fisher and his son, who are Amish sheep farmers near Gettysburg, PA, turned loose 100 lambs inside the newly opened 130-acre Nittany 1 solar array erected by Lightsource BP on former farmland.

"Those lambs gained weight like crazy, more than sheep ever gained on our pastures," Fisher said.

Things went so well that this past season the brothers have increased the number of sheep they grow for meat on the property to 480. To keep from overgrazing the ground bare, the sheep are rotated into new areas of the property every few days with moveable fences.

Lexie Hain, who co-founded the American Solar Grazing Association to connect sheep farmers and solar developers, walks among her sheep at a solar array in New York. (Lindsay France/Cornell University)

The best grazing was under the solar panels themselves, he said. Studies have shown that "microclimates" of heat and moisture develop under panels, providing ideal growing areas for an assortment of vegetables, berries and other marketable plants.

"I couldn't have found a better pasture for my sheep, in all honesty," Fisher said when asked if he was satisfied with the grazing arrangement. Coreopsis, goldenrod, ox-eyed daisies, milkweed and other flowering plants added to the mix to benefit bees and other pollinators had "blooms all over the place," the grazier reported.

About 100 miles east, near Sunbury and the Susquehanna River, grazier Caroline Owens lets 40 sheep she raises for meat, wool and public education fatten up on a 14-acre solar array. The panels there power 30% of the surrounding campus of Susquehanna University. The college initiated the grazing venture with her three years ago. Now, the sheep share the site with a beehive and communal gardens for students.

"They have everything they need. They're butterball fat," she said.

Are there enough sheep to do the job?

With the accelerating interest in solar grazing, the question may soon be if there are enough sheep to go around.

On average, it takes about one to five sheep per acre to keep plant growth trimmed.

In Virginia, where an estimated 7,500 to 35,000 acres of solar fields will be needed to meet the state's renewable energy goals, there are approximately 72,000 sheep. Roughly 417 solar projects are awaiting approval from PJM Interconnection, the nation's largest electric grid operator. At the upper end of the estimated need for solar acres, there would not be enough sheep to cover that ground.

Pennsylvania has about 96,000 sheep, according to the National Agricultural Statistics Service. Under Gov. Tom Wolf's 2019 executive order to lower greenhouse gas emissions by 80% by 2050, some estimates say 80,000 acres of solar arrays will be needed in the next eight years. Approximately 437 solar projects are awaiting review by PJM Interconnection, a majority on open land. Pennsylvania would have a deficit of sheep unless only one or two sheep are needed to keep grasses shorn.

In Maryland, the state had mandated that 14.5% of its energy come from solar sources by 2030 — triple the amount installed now. That was before the Climate Solutions Now Act became law this spring, speeding up the targeted rate of greenhouse gas reductions. Under the former law, a governor's task force estimated that 7,766–33,033 acres of farmland would be needed to meet the goal. Currently, there are an estimated 23,400 sheep on 925 farms of various sizes. That would not be enough sheep to handle the upper estimate of needed solar acres.

"I think there's a lot of interest [in solar grazing] in Maryland. I'm not certain we have enough sheep," said Susan Schoenian, a sheep and goat specialist at the University of Maryland's Western Maryland Research and Education Center.

New York, which has one of the most ambitious clean-energy goals in the nation, has about 80,000 sheep.

Challenges include transportation to distant solar sites and lack of awareness of solar grazing opportunities. That's why Todd Schmidt is working on a three-year study, funded by the U.S. Department of Agriculture and Schmidt's Cornell University, for ways to increase solar grazing in Pennsylvania, New York and other mid-Atlantic and New England states.

Sheep farmers forming cooperatives that can buy and share transportation —even marketing sheep meat as "produced under solar arrays"— are among the ideas to increase the sheep-solar connection.

"I think from a policy standpoint, there is considerable interest from state legislatures that this needs to be considered," Schmidt said.

Hain and others said that they believe the demand for solar grazing will create growth in the sheep industry. Plus, the relatively low costs of starting a sheep farm is attractive to entry-level participation by young and beginning farmers.

"Sheep farming in the United States hasn't really taken off because it hasn't been a profitable venture," said Caleb Scott, a New York sheep farmer and vice president of the American Solar Grazing Association. "But now, with the opportunity to provide a service through feeding your sheep, it's increasingly making sheep farming maybe one of the most profitable animal husbandry markets that's scalable."

Sheep graze between and under solar panels that help power Susquehanna University in Pennsylvania. (Owens Farm)

A workable tradeoff?

Despite its multiple benefits, sheep grazing among solar fields has not been universally embraced and is seen by some as enabling the conversion of prime farmland to energy production. Some think solar belongs only or primarily on rooftops, parking lots, abandoned mine land and industrial or commercial sites.

This is especially true where prime soil is taken out of production. Some groups don't want to see farmland converted into industrial energy sites, even if theoretically the land can resume agricultural use, on healthier soil, after solar contracts end, typically in 25 years.

Roughly 61% of solar arrays built on Virginia farmland so far have been on the highest-rated soil, according to a study by Aaron Berryhill of Virginia Commonwealth University.

"The scale and pace at which this is happening means reasonable mitigation measures need to be strengthened," said Ethan Winter, the American Farmland Trust's northeast solar specialist.

While solidly endorsing solar energy, the Chesapeake Bay Foundation says solar arrays should avoid prime farmland and the removal of trees. A planned 7-acre community solar project on the foundation's Clagett Farm in Maryland will incorporate an existing herd of sheep for vegetation management and to increase the herd size.

Grazing may not address all concerns, but it is playing a role in handling the increasing pressure for multiple benefits from solar sites.

"It doesn't necessarily solve the problem of prime farmland going into solar developments and loss of farmland," Schmidt said. "But maybe it's a middle-ground strategy." ■

MD lawmakers pass wave of environmental legislation

'Landmark' session delivers sweeping climate change bill, strengthens enforcement, tackles equity

By Timothy B. Wheeler

Patuxent Riverkeeper Fred Tutman regained his seat on the Patuxent River Commission as a result of legislation passed in response to the Hogan administration's shake-up of the panel after Tutman and another veteran member advocated opposing development projects. (Dave Harp)

Activists gather on the steps of the Maryland State House in Annapolis to celebrate the enactment of a sweeping climate change bill. (Chesapeake Climate Action Network)

After two years of frustration, Maryland environmental advocates have much to celebrate after the April conclusion of what one called a "landmark" General Assembly session in Annapolis.

Over the course of 90 days, lawmakers enacted sweeping climate change legislation that committed Maryland to the most ambitious greenhouse gas reductions of any state in the nation. They also passed a flurry of other "green" bills, including measures to reduce environmental inequities, beef up water pollution enforcement and boost efforts to restore the Chesapeake Bay's diminished oyster population.

"When you look at the many topics and the many places where we saw improvements in this legislature," said Josh Kurtz, the Chesapeake Bay Foundation's Maryland executive director, "it was a very strong session."

The outpouring of legislation this year was a relief for activists, who saw many of the bills they backed founder in 2020, when the COVID-19 pandemic cut the Assembly session short, and again in 2021, when pandemic precautions kept the Assembly operating in virtual mode, limiting opportunities to meet with legislators.

This year brought a growing and more diverse coalition of supporters to Annapolis to press for environmental causes and voice mounting frustration with inaction over chronic and critical issues like pollution enforcement and climate change.

Climate solutions

The most significant environmental bill to pass this year was the Climate Solutions Now Act, an omnibus measure that advocates say has restored Maryland to the top rank of states addressing global climate change and its impacts. The law calls for a 60% reduction in climate-warming carbon emissions by 2031, a near-term target unmatched by any other state, and net-zero emissions by 2045.

"We have just put a stake in the ground that says we are going to lead on climate [and] greenhouse gas reduction goals in the country," said Kim Coble, executive director of the Maryland League of Conservation Voters.

The measure's 100-plus pages spell out a variety of initiatives to work toward those goals, notably a requirement that large existing buildings reduce carbon emissions by improving their energy efficiency. By 2030, all state facilities would have to get at least 75% of their electricity from low– or zero-carbon sources. The state also must electrify its fleet of cars by 2031 and light-duty trucks by 2036.

The law pushes local school boards to electrify their bus fleets, offering a pilot financing scheme through partnerships with utilities while prohibiting the purchase of diesel– or gas-fueled buses after 2024.

Under another provision, lawmakers established a "climate corps" for youths and young adults to work on climate mitigation projects. They also established a $5 million fund for climate projects and directed that 40% of it be spent in low– to moderate-income neighborhoods — an attempt to tackle inequities in how climate change is both felt and addressed.

Similar but less comprehensive climate change legislation had fallen short in each of the last two years. This measure passed the Democrat-dominated House and Senate by wide margins, but only after some of its most controversial features were cut or watered down so that it would get to Republican Gov. Larry Hogan in time to override his expected veto.

Hogan had blasted the bill before it passed either chamber as a "reckless and controversial energy tax." But once the amended bill landed on his desk, he decided to let it become law without his signature, adding that despite his disappointment with what he saw as politically motivated legislation, he was encouraged by some of the changes in it.

One of the largest of those changes was dropping a requirement that all new buildings of a certain size built in the state be all-electric. The state's Climate Change Commission had recommended such a transition, noting the large contribution of greenhouse gas emissions from heating and cooling buildings. But that provision drew intense opposition from real estate interests, the natural gas industry, utilities and some labor groups. Yielding to the pushback, lawmakers opted instead for a 15-month study of the feasibility of transitioning to an all-electric building code.

Other changes that bothered climate activists included recognizing nuclear power as a carbon-free energy source and the removal of language giving permission to localities to go beyond state law in requiring emission reductions from buildings. Montgomery County is considering such a law.

Victoria Venable, Maryland director of the Chesapeake Climate Action Network, said her group's members were "incredibly disappointed" by the removal of the provisions dealing with electrifying buildings. But even with that and other weakening changes, she called the overall bill a "vital step forward."

"Does it get us 100 percent there?" asked the conservation league's Coble. "No, of course not, there is much work ahead … but we believe this bill really builds a foundation from which the state can move forward."

Reducing pollution inequities

One of the bills to pass this year takes a step toward addressing longstanding complaints that polluting facilities tend to be concentrated in low-income communities of color. It requires applicants for air and water pollution permits to disclose existing pollution sources in the vicinity and to provide that information to affected communities early in the permitting process.

Advocates have tried without success for years to get lawmakers to require regulators to base permitting decisions on the cumulative impact of a proposed pollution source on top of existing ones. This bill gives communities a heads-up in time to speak

Fred Pomeroy, left, and Roman Jessian from Dorchester Citizens for Planned Growth sample Transquaking Creek water quality downstream from Valley Proteins Inc., a poultry-rendering plant in Linkwood, MD, with discharge violations. (Dave Harp)

out, but "does not dictate any outcomes," said Betsy Nicholas, executive director of Waterkeepers Chesapeake. 'It is just providing greater public notice and awareness early in the [permitting] process."

Tightening enforcement

Spurred by some glaring enforcement miscues in the past year, lawmakers passed legislation requiring the Maryland Department of the Environment to increase inspections of facilities that discharge wastewater to the state's rivers and streams. The legislation, which like the climate bill became law without Hogan's signature, also requires penalties for noncompliance and directs regulators to update dozens of so-called "zombie" permits that have allowed facilities to continue operating for years with outdated treatment requirements.

The bill was put in after news broke of deteriorating conditions at the state's two largest wastewater treatment plants in Baltimore, plus illegal discharges at the Valley Proteins poultry-rendering plant on the Eastern Shore, which has been operating on a permit that hasn't been updated since 2006.

Other environmental measures

■ **Rebuilding oyster populations:** Lawmakers acted to boost Maryland's oyster restoration efforts by increasing hatchery capacity, reforming oyster shell recycling programs, surveying the Bay bottom for additional sources of shells and researching the use of materials other than shell for building oyster reefs. The legislation also called for focusing on reviving oyster populations in Eastern Bay, with $2 million a year to be divided equally between rebuilding habitat for the wild fishery and new reefs in sanctuaries. In past years, Hogan has pushed back against what he saw as unwarranted legislative meddling in fisheries management. He allowed this measure, which drew on recommendations from the state's Oyster Advisory Commission, to become law without his signature.

■ **Boosting renewable energy:** Lawmakers passed legislation to expand the development of "community solar" projects that sell subscriptions for moderate-size solar installations to households or businesses, which then receive credit on their power bills for their share of the electricity generated. Another bill sets up a grant program to fund "resiliency hubs" where solar panels and batteries would help low– and moderate-income households weather power outages. Another bill reinstated tax credits for buying electric vehicles.

■ **Toxic contaminants:** Legislators banned the sale of rugs and paper-based food packaging that contain PFAS, a group of highly persistent chemicals widely used for their stain– and water-resistant traits. The bill also bars the use of firefighting foams containing PFAS, which has led to the contamination of groundwater, streams and drinking water wells near military bases, airports and fire-training facilities. Similar legislation had failed last year, but this year it passed unanimously, a turnaround that Emily Scarr of Maryland's Public Interest Research Group attributed in part to strong support from firefighters concerned about their own health dealing with PFAS-laden foam. Another bill prohibits the sale of driveway sealants made from coal tar, which has been linked to stream and fish contamination.

Climate legislation passed by the Maryland General Assembly creates a pilot program to help localities pay for electric school buses and bars them from buying any more diesel– or gas-powered buses after fiscal 2024. (Courtesy of Navistar Inc.)

Jordan Bethea tends a community garden in 2020 at BLISS Meadows in Baltimore. Maryland lawmakers have approved grants and technical assistance for urban farmers across the state. (Dave Harp)

■ **Patuxent River:** Patuxent Riverkeeper Fred Tutman has regained his longtime seat on the Patuxent River Commission, which oversees the health of the only major Bay tributary totally within Maryland. Lawmakers acted to reinstate him and expand the commission after a Hogan administration shake-up that replaced Tutman and another veteran member. They had sparred with state planning staff as they pushed the panel to speak out against development projects that they believed would harm water quality in the 110-mile river.

■ **Park needs**: Lawmakers voted to significantly increase funding for the development, maintenance and staffing of state parks, which have suffered for years from overcrowding and failing infrastructure. The bill, dubbed the Great Maryland Outdoors Act, also boosts funding for farm and rural land preservation.

■ **Growing urban agriculture**: New legislation will offer grants and technical assistance to urban farmers, who often face challenges accessing affordable water and energy for raising and marketing their food.

■ **Old-growth forests:** Lawmakers passed a bill that prohibits logging patches of public woodlands that are 100 years old or older, but only after limiting its protection to state parks and wildlife management areas.

Bills that didn't make it

Not every environmental cause succeeded. A proposed state constitutional amendment that would guarantee Marylanders the right to a "healthful and sustainable environment" failed for the fourth year in a row to get out of committee.

Another repeat proposal to strip clean-energy subsidies for waste incineration died as well. A bill that would have committed Maryland to preserving 30% of its land from development by decade's end and 40% by 2040 likewise stalled in committee. Other bills that foundered were aimed at curbing the use of single-use plastic, boosting recycling and getting manufacturers to take responsibility for the waste their products generate.

Josh Tulkin, Maryland Sierra Club's director, said environmental advocates were especially frustrated by the failure of the environmental rights amendment. Despite a growing and diverse group of supporters backing the measure, industry groups scored points with legislators by warning the amendment's language was so broad it could unleash a flood of litigation.

"There's some concern about leaving too much of this up to the courts," Tulkin said, "but I think there's also a clarity that we need to find some way to codify these rights."

Even so, Tulkin and other advocates said they were heartened by the number of green bills that did pass this year. To protect those gains and push for more, he said, environmental activists need to impress on voters the benefits of new legislation like the climate bill to see that sympathetic lawmakers are re-elected in this year's elections. ■

Region's EPA leader seeks 'transformational' changes

Ortiz meets with PA farmers, industry officials in an effort to find solutions for ag runoff

By Karl Blankenship

Starting a three-day swing through farm country in Lancaster County, PA, Adam Ortiz spent a bone-chilling spring morning at a small dairy learning how farmers might limit runoff that stems from such operations. Then came meetings with corporate food industry officials. The day was topped off with a tour of a local ice cream operation.

The next day was going to be another busy one. But Ortiz, administrator of the U.S. Environmental Protection Agency's mid-Atlantic region, paused to talk with the *Bay Journal* about what he'd learned and hoped to learn during his discussions with farmers.

"[Farmers] are doing, by in large, great stuff," he said in an interview. "They are feeding this country. They are feeding our region. They are feeding us in this restaurant we are sitting in right now."

The late March visits highlight the importance that Ortiz, who has been on the job since October, has placed on finding ways to manage pollution from the region's farmlands. That's especially true in Pennsylvania, which has more farms — and farm-related runoff — than any other state in the Chesapeake Bay watershed.

"This is the third time I've been here in Lancaster farm country," he said. "It is three times more than I have been in most places in the mid-Atlantic region since I started the job, which I think is a demonstration of our sincere interests in listening and learning and meeting farmers where they are."

The meetings have come largely without press events, with Ortiz choosing to forgo photo-ops and focus on conversations with the agricultural community.

Above, left: Adam Ortiz, administrator for the U.S. Environmental Protection Agency's mid-Atlantic region, joins a variety of conservation partners on a visit to a Pennsylvania farm. (Will Parson/ Chesapeake Bay Program)

Above, right: Spring Meadow Farm in Peach Bottom, PA, recently hosted guests from federal agencies, nonprofit organizations and corporations to discuss current and potential strategies to reduce water pollution in the Bay region. (Will Parson/Chesapeake Bay Program)

It's a challenging issue. While farmers are aware of how their actions may impact local streams and the Bay, Ortiz acknowledged that many are working on thin profit margins. Skyrocketing fertilizer prices, partly a byproduct of the war in Ukraine, aren't helping, he said.

"Our role is, how do we make it work?" he said. "How can we be most helpful, accelerate progress, but ensure that small family farms are viable? That is the sweet spot that we are going to figure out."

Figuring out a way to reduce nutrient and sediment runoff from the tens of thousands of mostly small farms that cover a quarter of the Bay's 64,000-square-mile watershed has proven elusive.

Farms require large amounts of nutrients in the form of manure or synthetic fertilizer to produce crops and are therefore the largest source of nitrogen and phosphorus reaching the Bay. Once there, those nutrients fuel algae blooms that cloud the water and deplete it of oxygen, creating "dead-zones."

Since 2010, when new pollution reduction goals were set, computer models used by the state-federal Bay Program show that the Chesapeake region — and nearly all of the states in it — have had little success reducing nitrogen runoff from farms, even as the 2025 cleanup deadline grows closer.

States, including Pennsylvania, contend the modeled estimates undercount their actual progress. Nonetheless, the data illustrate a key problem: States want to reduce runoff, but economics and increasing market demands push farmers to produce more, which typically requires more nutrients.

The issue is most acute on small farms, which operate on thinner profit margins and, because of their sheer number, are less likely to get individual attention or assistance.

Big challenge for Pennsylvania

Nowhere is the issue greater than in Pennsylvania, which has 30,000 farms in the Bay watershed. Lancaster County alone has 5,000 — the average size is just 77 acres — and produces more nitrogen runoff per acre than any county in the Chesapeake drainage basin.

The EPA in April announced actions against Pennsylvania. (See *EPA, citing PA's shortfall for Bay goals, ramps up inspections* on page 14.)

"EPA has a well-earned reputation as a regulator, but we are also equally a grant maker and a partner, we can provide technical assistance [and] guidance," he said. "There is a lot more constructive stuff that we can do, and we prefer to do, before ever taking regulatory actions. It is all necessary, and different tools are appropriate at different times."

To accomplish those goals, Ortiz said, there needs to be "transformational" changes to dramatically scale up efforts, and most of those changes will need to take place outside the regulatory arena.

Conservation partners from state and federal agencies, nonprofit organizations and corporations tour Spring Meadow Farm in Peach Bottom, PA. (Will Parson/Chesapeake Bay Program)

Adam Ortiz (left), administrator of the U.S. Environmental Protection Agency's mid-Atlantic region, tours the Turkey Hill Dairy factory in Conestoga, PA, with Derek Frey, great-grandson of Turkey Hill's founder. (Will Parson/Chesapeake Bay Program)

The EPA has little direct regulatory authority over farms, except for the largest concentrated animal feeding operations, or CAFOs. That means solutions rely heavily on things like government cost-share programs that help farmers pay for best management practices — such as stream buffers, manure storage facilities and other methods and actions that can reduce the amount of nutrients and sediment reaching streams.

Equally important is having enough technical assistance staff available to work one-on-one with farmers interested in adopting such practices. It may take many visits over months or years to persuade a farmer to adopt them, but agencies and organizations often lack secure, long-term funding for those positions, making sustained contact with individual farmers difficult.

Those problems are especially acute in Pennsylvania, which lacks both staffing and a cost-share program for farmers. "Ensuring that the state has committed long-term resources to the success of conservation practices on farms will be a transformational success, too," Ortiz said.

"In Maryland and Virginia, it is not always perfect, but they have dedicated funding, and they are steadily putting more [conservation practices] on the ground on farms. And they are making a difference. We can talk about pace and effectiveness and inspections, but for the most part, that element, that part of the foundation, is there."

Ortiz also said federal and state agencies can be "more surgical" in how they target available money in "the right places where it will make the most difference."

"Lancaster is certainly a hotspot of pollution," he added. "That is why we are here."

EPA mid-Atlantic chief Adam Ortiz (center) joins a group of conservation partners for a meeting with Hershey's corporate officials. (Will Parson/Chesapeake Bay Program)

Potential corporate partnerships

Ortiz is especially interested in the potential for private sector partnerships to accelerate progress. The previous day he had visited farms supplying Turkey Hill Dairy, which is working to have conservation practices installed on all of the more than 150 farms that supply its milk.

The program is partly funded by the EPA and U.S. Department of Agriculture with the Alliance for the Chesapeake Bay handling outreach. By incorporating conservation expectations for individual farms while providing financial incentives to help install them, the intent is to ramp up farmer participation and get more conservation practices installed faster.

"That is transformational," Ortiz said. "Our goal is [to figure out how] we replicate and make mainstream these pilot programs, and how to work with and transform an industry as well.

"That will have far more long-term impact than just our regulations alone," Ortiz said. "I don't see how we can achieve scale and speed without the active participation of the private sector."

Kelly Shenk, agricultural adviser for the EPA's mid-Atlantic region, said that such initiatives can mesh with sustainability goals already set by many businesses. "It is what the market wants," she said.

Corporate goals are often aimed at climate concerns, but many farm conservation practices can address both climate and water quality issues, Shenk said. "The private sector being at the table is one of the missing pieces," she said. "They are really leading this in a lot of ways. I think there could be some great synergies there."

Ortiz said there is "no question" that if such programs prove successful in Pennsylvania, they can be applied to other states in the region and the nation. In fact, the agency's national agriculture adviser, Rod Snyder, joined Ortiz, Shenk and others on the visits to farms participating in the Turkey Hill effort.

Officials with the Pennsylvania Farm Bureau, which had unsuccessfully sued the EPA over its cleanup plan, formally called the Chesapeake Bay total maximum daily load or TMDL, said they appreciated Ortiz's proactive outreach. The Farm Bureau was one of the first agricultural organizations Ortiz met with in his new position.

"We believe the administrator really now does understand the diversity of agriculture in our state and the economic challenges our farmers face," said Joel Rotz, manager of the bureau's government affairs and communications division, who retired in April. "He genuinely wants to be helpful in achieving a funding program that is locally driven to make the 'best bang for the buck,' so to speak, in meeting water quality goals."

Rotz said that while he appreciated increased outreach, the EPA is a regulatory agency, and farmers are "a segment of the regulated community that often feels that no matter what we do, it is not enough."

In the years after the TMDL and its 2025 deadline were established, the EPA and Bay states focused most of their efforts on reducing discharges from wastewater treatment plants. That delayed emphasis on the complex job of reducing farm runoff.

Now, to meet the 2025 Bay cleanup goals, more than 80% of remaining nitrogen reductions need to come from farms. And that will require a rate of progress that is far beyond anything the region has accomplished to date. The result, many in the agricultural community say, is that farmers will get blamed for missing the 2025 goal.

Ortiz didn't answer directly when asked whether farmers will bear much of that criticism. He instead emphasized that the changes being discussed could significantly scale up action and speed progress.

"I talk about trajectory a lot," he said. "Are things on a trajectory to get to that goal or not? … All of this takes a long time, but one of the themes you've been hearing from us is that we want to keep it real. If we aren't on a real path for success, let's stop kicking the can down the road and [instead] have tough conversations and do what we have to do to get things on a realistic path, and not pretend."

Ortiz said he plans to return to Lancaster County for more conversations. ■

Indulge in a wide and varied landscape at MD's Fair Hill natural area

By Ad Crable

Out of a crucible that included pioneering Scot-Irish farmers and the industrialist du Pont family's fox hunting and equestrian passions has emerged one of Maryland's most varied recreational opportunities.

The 47-year-old, 5,656-acre Fair Hill Natural Resources Management Area near Elkton has nearly 90 miles of trails fashioned from a mix of old carriage roads, fox-chasing routes across hill and dale and new trails built to follow streams and traverse rolling forested ravines and open fields.

In a share-the-trail spirit, almost all are meticulously groomed to simultaneously accommodate hikers, mountain bikers and horseback riders.

Fair Hill is not a state park. You won't find the picnic pavilions and campgrounds that are often featured in state parks managed by the Maryland Department of Natural Resources.

Instead, there is a concentration of more passive recreational opportunities, such as the extensive trail network, popular trout fishing in Big Elk Creek that bisects the property, picnicking and management of the woods and meadows to benefit wildlife.

You'll encounter the decaying remains of old homesteads, a still-impressive three-story stone grist mill from the early 1800s and a covered bridge. Visitors can also explore an old fox hunting lodge that is now home to the Fair Hill Nature Center and see some of the 14 miles of tall fence, now considered historic, that once kept foxes in the enclave and prevented pursuing hounds and horses from running into traffic.

Hedgerows, which once separated farms in the 1700s and 1800s, now provide valuable travel corridors and shelter for wildlife. It's an oddity in the eastern United States, where modern farmers have erased most of them to gain every inch of tillable land.

The mixed landscape features are a draw for those who journey to Fair Hill, said park manager Rachel Tremby. "It is so expansive and there are so many miles of trails you can explore that you really have the opportunity to get away and find some peace and solitude," she said.

That's certainly the way frequent visitor Susan Lester of Elkton sees it. "I just like the diversity of it, and it's not crowded," she said while walking her dog and using a phone app to identify the birds she was hearing. One trail reminded her of New England.

You likely will see license plates from several states in the parking lots of major trailheads because the tract runs to the Pennsylvania state line and within a half-mile of Delaware.

Top photo: A hiker in Maryland's Fair Hill Natural Resources Management Area walks by the ruins of a three-story grist mill that operated for nearly 100 years, starting in the early 1800s. (Ad Crable)

Right photo: Elementary students search for aquatic insects as part of an environmental program at the Fair Hill Nature Center. (Ad Crable)

Left photo: The Foxcatcher Farm covered bridge, a landmark in Maryland's Fair Hill Natural Resources Management Area, was built for Cecil County in 1860. (Ad Crable)

Center photo: Big Elk Creek, swollen with rain, runs through the Fair Hill NRMA. (Ad Crable)

Right photo: Maryland manages about 1,700 acres of open fields at the Fair Hill NRMA for wildlife, allowing visitors to experience expansive views, waving grasses and big skies. (Ad Crable)

Its streams drain into both the Chesapeake and Delaware bays.

The earliest European settlers of the land here were 16 Irish immigrants brought to the area in the late 1600s to secure the northeastern Maryland border at a time when Maryland and Pennsylvania were skirmishing over who owned what. The area was called New Munster and Fair Hill.

Centuries later, William du Pont Jr. began buying the land by purchasing bankrupt farms during the Depression. He amassed more than 8,000 acres from 125 contiguous properties along the Pennsylvania-Maryland line. The remnants of many of these farms are visible from the trails. Many of the farmers whose land du Pont purchased were hired to run his large beef cattle operation.

Du Pont later repurposed the land as a playground for his fox hounds. He closed the smaller public roads — part of the trail system today — and surrounded the property with miles of fence.

German prisoners from World War II performed some of the work.

On public roads that were not closed, overpasses and tunnels ensured safe passage for hounds and riders on fox hunts. Today, they serve as wildlife corridors.

Du Pont also built an international-level steeplechase racecourse. At this and other nearby estates, he established a thoroughbred racing stable and breeding operations. Under the name Foxcatcher Farms, the family's horses would win the Preakness Stakes. One horse, Rosemont, won a race against legendary Seabiscuit in 1937.

All of these features are part of the Fair Hill Estate Historic District designated by the Maryland Historical Trust.

Du Pont died in 1965. When Maryland purchased the land within its boundaries in 1975 for $6 million, it came with more than 100 buildings, including the Cecil County Fairgrounds. Many are rented out today to private equestrians and horse clubs.

The fox hunting and equestrian legacy set up by du Pont remains today. The rambling fox hunts continue, though no foxes are killed.

The 25 miles of gravel carriage roads, a network often compared with those at Acadia National Park built by John D. Rockefeller, Jr., are still used by horse-and-carriage enthusiasts while serving as all-weather walking trails.

The Fair Hill Training Center, one of the nation's premier thoroughbred training centers, was built in 1983. In 2016, a $20 million project added a world-class equestrian center on 350 acres at Fair Hill. Included were racecourses and the Fair Hill Equine Therapy Center, which uses hyperbaric oxygen therapy among its treatments for ailing horses.

One of du Pont's enduring traditions introduced at Fair Hill was a steeplechase race: an overland scramble, where horses jump fences and water, that grew out of the fox-hunting tradition.

In 2021, Fair Hill hosted the inaugural Maryland 5 Star, becoming one of only seven courses in the world suitable for the top-level, three-day "eventing," which is an equestrian triathlon of sorts, descended from fox hunting and the training of military horses. The three-day test of horse and rider attracted 21,000 spectators and included riders from eight countries. Many had competed in the Olympics.

Despite the strong equestrian influence onsite, much of the management of Fair Hill revolves around recreation, environmental stewardship and the management of its many habitats, from wetlands and upland forests to riparian environs and undulating meadows.

Because the open countryside, hedgerows and farmland of yesteryear are retained at Fair Hill, hiking its trails is a figurative walk back in time.

Among its many users are birders who can count on finding species that favor different habitats. More than 150 species have been sighted at Fair Hill.

The vast 1,700 acres of grasslands are carefully managed for both wildlife and trails, so users can experience the pleasures of moving through waves of grasses under big skies.

Hay grown at Fair Hill is sold to mushroom growers, but it is not cut until grassland birds such as bobolinks, meadowlarks and grasshopper sparrows have finished nesting. Grasses favored by wildlife and plantings that attract pollinators are used in some sections.

On a mid-April day, the stone former hunting lodge at Fair Hill was alive with the chatter of fifth-grade students as they slid their samples of pond scum under microscopes for examination.

The nonprofit Fair Hill Environmental Foundation has leased this building for 32 years and operated the Fair Hill Nature Center with a simple but impactful mission of providing environmental education for youth and connecting people to nature. Many of the 5,000–6,000 students who come through here each year to catch aquatic insects in the stream have never had such experiences.

That saddens and motivates executive director Laura Hannan. "We were meant to be outside," she said. "Many don't even know this world exists and it's right here in their backyards. Tons of studies show if you can just get kids outside, they are healthier, happier, less stressed, achievement in school is better and their eyesight is even better."

Fair Hill is a great setting to help make those vital connections, regardless of age. ■

If you go

Fair Hill Natural Resources Management Area is located at 300 Tawes Drive, Elkton, MD, and is open sunrise to sunset. For information, including special events, visit dnr.maryland.gov and enter "Fair Hill" in the search box. Portable restrooms are available at trail parking lots. Pets are allowed but must be leashed at all times.

Most of the 90 miles of trails and carriage roads accommodate hikers, mountain bikers and horses. Mountain bikers must yield to hikers and horses, and hikers must yield to horses. All trails are multi-use unless otherwise marked.

Archery, deer hunting and falconry hunting are allowed in designated areas. Put-and-take trout fishing is available in Big Elk Creek.

The 2022 Maryland 5-Star three-day event, an international-level equestrian competition, takes place Oct. 13–16. For information, visit maryland5star.us.

- **Day use fee**

$3 for Maryland residents; $5 for out-of-state residents.

- **A map is a must**

Many trails are not blazed or named. The area is large enough to get lost. Maps are available inside or outside Fair Hill's headquarters at 300 Tawes Drive.

- **Nature center**

The Fair Hill Nature Center and grounds at 630 Tawes Drive in Elkton are open 8:30 a.m. to 2:30 p.m. Monday through Friday. For information and events, visit fairhillnature.org.

The North American beaver is enjoying a new, improved reputation as an important wetland engineer. (Dave Harp)

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A morel mushroom emerges in early May. (Michele Danoff)

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Tracks of history: railroading's gift to modern-day explorers

By Tom Horton

"The forgotten outdoorsmen of today are those who like to walk, hike, ride horseback or bicycle. … for them we must have trails."

— Message to Congress from Lyndon B. Johnson in 1965, said to be inspired by his wife, Lady Bird

I've spent much of my life paddling the Chesapeake Bay and its far-flung tributaries, but more recently I've derived equal enjoyment from *pedaling* the Bay, following a growing network of blissfully car-free trails throughout its six-state watershed.

Jamestown to Richmond, some 50 miles in Virginia; western Maryland across the Eastern Continental Divide, 150 miles into Pennsylvania; Annapolis to York, PA — it won't be long before a cycle route connects Lake Ontario to the Chesapeake. Meanwhile, an East Coast Greenway linking the Bay region to Key West and Maine is about a third complete.

A key component of all this exciting pedal-ability is the legacy of what might seem the antithesis of the humble and serene bike: the thunderous Iron Horse, locomotives of a hundred tons or more hauling millions of pounds of freight in a single train.

Railroads at their peak about a century ago extended more than a quarter of a million miles. That's five times the length of today's interstate highway network. The Bay watershed had more than 25,000 of those miles, including the oldest commercial track in America: a 14-mile line out of Baltimore that still carries daily freight.

Today, close to half of all those rail miles have been abandoned. In the District of Columbia and Bay states of Maryland, Virginia, Pennsylvania, West Virginia, New York and Delaware, abandoned tracks total about 15,000 miles (though not necessarily all of them fall within those states' portions of the Bay watershed).

In scattered places, abandoned rails became trails as early as 1949. The 20-mile Stony Valley Rail-Trail near Harrisburg is the second oldest trail of its kind in the nation. But the enormous opportunity for outdoor recreation wasn't seriously envisioned until the 1960s, when interest in trails of all types began to get more attention.

Railroads, with their massive yet precise engineering, remain a pinnacle of human technological achievement. They pioneered where highways never went. They followed the flattish floodplains of rivers, bored through mountains, crossed wild gorges atop spectacular trestles, forded swamps and transected and connected the hearts of cities and villages.

Nationwide, roughly 25,000 miles of that abandoned rail have been either repurposed as trails or are available for creating trails that can be enjoyed by cyclists, hikers and horseback riders. About 5,000 miles, with more than 400 separate rail trails, lie within the six Bay states and DC.

To accommodate trains, the corridors were engineered to be relatively flat, and their hard-packed roadbeds still offer surfaces suitable for most bicycles. The potential for many more rail trails remains, including the completion of the remaining 48% of an east-west, coast-to-coast trail network.

The compelling story of how this came about is told by Peter Harnik, an Arlington, VA, resident and Johns Hopkins graduate who witnessed "a miracle" as a teen in New York City in 1966. That was the day the city closed Central Park to cars for one day: "The quiet was profound, birdsong in the city, no fear of being sideswiped, forced into a guardrail or flattened," Harnik wrote in *From Rails to Trails* (University of Nebraska Press 2021), which is both a fine sketch of U.S. transportation history and an inspiring guide to the power of trails to reconnect us to nature and lure us around the next bend.

An ivy-cloaked tree grows between the rails of an abandoned rail right-of-way, now state owned, near Queen Anne, MD. (Dave Harp)

It was never easy. A railroad corridor while operating, Harnik explains, seems immutable. But once abandoned, it often turns out to have been underlain by a hodgepodge of agreements, easements and other mechanisms both public and private that were used to assemble the right of way. He calls it "bundle of sticks" and "a lawyers paradise." Reassembling it for a trail involves politics at least as daunting as the physical engineering of a railroad's original route.

A legal gamechanger, signed into law by President Ronald Reagan in 1983, was "railbanking," which lets abandoned track be kept on hold by government while trail advocates negotiate to reassemble and convert it.

Money was always key, and in 1977 the federal government allocated $5 million to jump-start nine rail trails nationwide, some in the Chesapeake watershed — one of which would be particularly influential. Creating the Torrey C. Brown Rail Trail, extending 40 miles through forests and farms along the Gunpowder River between the Baltimore suburbs and Pennsylvania, was a years-long fight, but by 1984 it was under development. Today it has more than half a million users annually and has inspired Pennsylvania to extend the trail to York. Strollers, runners and bikers recreate along the route that was part of Abraham Lincoln's trip to give a brief talk in Gettysburg.

The trail set a pattern that has proven essential to rail trail success everywhere. The Torrey Brown (aka the North Central trail, for the old railroad) succeeded because of citizen advocacy, a clear plan of action and strong government support. Wherever all three of those ingredients are present, success usually comes, Harnik wrote; but where even one is missing, progress often fizzles.

In 1986, as rail abandonments were snowballing, Harnik and David Burwell, a lawyer with the National Wildlife Federation, co-founded the Rails to Trails Conservancy, which remains the nation's leading advocate for rail trails.

Today, more than 18,000 miles of rail trails have been built, with thousands more miles in the works or at least with potential to become the delights of the "forgotten outdoorsmen" acknowledged in Lyndon Johnson's 1965 "special message" to Congress. A route linking trails from the Potomac River to Puget Sound, approximately 3,800 miles, is a little more than half complete.

Harnik, now riding an E-bike, his legs weakened by childhood polio, may not ever ride a coast-to-coast trail, but one can always dream and dream big, which has always been a hallmark of rails-to-trails projects. ■

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.

Electrify your lawn care and you'll help save the Bay

By Harry Campbell, Doug Myers & Joseph Wood

Every hour of running a gas-powered mower can emit the same amount of air pollution as driving a passenger car 300 miles. (Matt Mallet/CC BY-NC-ND 2.0)

There's a good chance, if you use a gas-powered lawn mower, that maintaining your lawn is worse for the environment than your morning commute. In some cases, far worse.

Running a typical gas mower for one hour creates roughly the same amount of smog-forming air pollution as driving a passenger car 300 miles, according to the California Air Resources Board. In the case of some gas-powered leaf blowers, an hour's worth of use is equivalent to driving 1,100 miles.

All told, say the authors of a 2021 study published in the *International Journal of Life Cycle Assessments*, the small, inefficient gas engines used for lawn mowers, blowers, weed trimmers and other garden equipment account for a quarter of all nonroad gasoline emissions nationwide each year.

Why does this matter for the Chesapeake Bay and its rivers and streams across the watershed? For starters, one-third of the nitrogen pollution that ends up in the water comes from air pollution, according to the Chesapeake Bay Program. That makes air emissions a big challenge for Bay restoration, but we should also see it as a big opportunity.

Changing the way we care for lawns — or better yet, reducing the amount of lawn we need to care for — offers a way to make significant water quality improvements. The Bay watershed states collectively are not on track to meet targets for implementing pollution-reduction measures by 2025. This is something individuals, localities and states can do quickly and at a much lower cost than many other nutrient control best management practices.

One reason lawns matter is their sheer scale. A 2010 report by the Chesapeake Stormwater Network, based on data from 2000 to 2005, found that turf covers as much as 3.8 million acres in the Bay watershed, which is about 10% of the total land area. Development has likely increased that amount. While residential lawns make up much of that acreage, turf also proliferates along roadways and around commercial buildings.

All of this has big implications for water quality, especially as more forests and farmlands are developed. A 2020 assessment

Leaf blowers, especially the powerful commercial "backpack" models, can emit as much smog-forming air pollution in one hour as driving a typical passenger car 1,100 miles. (Micah/ CC BY-SA 2.0)

showed that polluted runoff from urban and suburban areas is the only significant source of pollution in the watershed that is still growing — and in some cases even offsetting some of the pollution reductions made to date in wastewater management and agriculture.

What many people may not know is that, during a rainstorm, lawns can act more like green-carpeted concrete than a forest floor, soaking in only one-tenth the amount of precipitation, often less. The reason is that yards have more compacted soil, less organic matter and shallower root systems than forests. As a result, in a heavy rainstorm, much of the water that falls on a lawn rushes quickly into storm drains and out into local streams, often taking fertilizer and pesticides along with it.

The volume and speed of water running off the land can erode streambanks, contribute to localized flooding and negatively affect aquatic insects and fish. As climate change drives more frequent, severe storms, this becomes even more problematic.

We can do much more to address this source of pollution. Maryland and Virginia have passed statewide limits on phosphorus fertilizers for lawns, but Pennsylvania is still considering legislation to do so. Phosphorous limitations are a good start, but the partnership also needs new initiatives to find ways to address this source of pollution.

A ban on gas-powered leaf blowers took effect this year in the District of Columbia, but a measure that would allow Virginia localities to regulate leaf blowers has been tabled. In Maryland, a General Assembly bill to ban sales of gas-powered leaf blowers in the state was withdrawn earlier this year.

Addressing these sources should be considered at a much broader scale across the watershed as a way for Bay states to meet their pollution-reduction commitments.

In your own yard, the best solution is to convert more lawn to native trees, shrubs, plants and low-maintenance groundcover. This allows more water to soak into the soil, provides food and shelter for wildlife and reduces the harmful air pollution emitted by lawn equipment.

Another important step is to limit fertilizing. Get your soil tested first to determine what is or isn't needed. Better yet, instead of fertilizing, use an electric mulching mower, which naturally fertilizes the grass by leaving the clippings in place to decompose and add nutrients and organic matter to the soil. The clippings also provide food and habitat for pollinating insects.

The same goes for leaves in the fall. Don't bag them and send them off to a landfill; use an electric mulching mower to return them to the soil.

Finally, switch from gas-powered to electric lawn and garden equipment. Electric mowers, blowers, trimmers, edgers and such are widely available, usually with a choice of cordless or plug-in models. This significantly reduces air pollution that contributes to smog — a major threat to human health — and the nitrogen pollution that harms waterways.

Addressing stormwater pollution through retrofits can be expensive and challenging, but changing the way we care for our yards is not. It also benefits our health, improves wildlife in our yards and can save us some time in the process. We can't afford *not* to take these steps. ■

The Chesapeake Bay Foundation's Harry Campbell, Doug Myers and Joseph Wood are, respectively, director of science policy and advocacy for its Pennsylvania Office, Maryland senior scientist and Virginia senior scientist.

To heal a landscape, 'let it be' worked for me

By Kenneth Carter

With all due respect to the songwriting genius of Sir Paul McCartney and John Lennon, I don't think the Beatles were thinking about natural succession when they wrote the song *Let It Be*.

In my 40-plus years of conservation work, I have seen natural succession heal some profoundly degraded sites. Abandoned cropland and pastures are the most common examples seen today. This natural phenomenon of the transition from annuals to perennial grasses and forbs and eventually to woody vegetation has reduced tremendous amounts of sediment over the lifespan of these sites. I remember a tall pine stand behind my boyhood home, where the ground still showed the ridges and furrows of a long-abandoned cornfield.

The fact that natural vegetative growth can and will heal disturbed ground, however, does not automatically make it a desired remedy and may be far from a "best management practice." Many sites are too heavily degraded with deep gullies, total loss of topsoil or other factors that prevent healing. In those cases, some type of mechanical treatment is necessary prior to vegetative establishment to correct the existing erosion and prepare a proper planting condition.

In addition, it is a very slow process and one not many conservationists would recommend to a land user or landowner. Most would not want to wait that long or take on the risk of failure.

That said, my personal experiment with an eroding shoreline on my own land has yielded interesting results and new insight in my understanding of natural succession.

In 2009, right at the time of my retirement, I inherited land along the Great Wicomico River on Virginia's Northern Neck. Part of the shoreline along a tributary creek had been stabilized by a wooden bulkhead years before, but the portion along the main riverbank was eroding at a rate I estimated to be 6–12 inches a year. I did not want to consider extending the bulkhead or using riprap to stabilize the site. I preferred to use a vegetative option — if it would work.

In the early 1980s, I participated in joint efforts with what is now the Virginia Department of Conservation and Recreation, the Virginia Institute of Marine Science and what is now the Natural Resources Conservation Service to investigate sites for vegetative establishment to stop erosion along tidal shorelines. In addition, I participated in the development and management of Virginia's stream and shoreline buffer programs since their inception. Now almost 70 years old, I thought I knew what would work, but it appears that I am still learning.

It took a few years, but once mowing stopped in this 25-foot buffer along the shore of the Great Wicomico River in Virginia, native warm season grasses eventually replaced the turf grass and stopped erosion. (Kenneth Carter)

My first attempt at a treatment option was to establish a buffer to slow overland flow. The previous owner had a local person cutting the grass on the property and mowing it right to the shoreline. So I flagged off a 25-foot buffer zone where the shore was eroding and gave strict instructions not to mow this area at all.

Over the next few years, I had a mess. More than one neighbor "commented" on the growth and asked about my intentions. In the several years that followed, though, the unsightly tangle of fescue grass and weeds started to thin out, and native warm season grasses took their place. I had heard anecdotal accounts of these native grasses flourishing on abandoned sites along tidal rivers for years but had never actually watched the process unfold.

As the years progressed, the bank began to heal itself. The erosion virtually stopped. One or two hurricanes caused an isolated spot or two to wash out, but they quickly healed on their own.

In hindsight, I wish I'd run an elevation profile on the site, as the steep bank lessened and is moving toward a safer angle of repose covered by the native grass. Much to my amazement, the most interesting thing happened four years ago, when I noticed a few sprigs of vegetation growing in the intertidal zone. Since then, a natural marsh fringe of smooth cordgrass (*Spartina alterniflora)* has established itself.

The only maintenance I do on the site is to periodically (every two or three years) remove any woody vegetation that has sprouted.

Throughout this process, I have not spent any money on the site. I simply "let it be." All of the growth is natural with nothing seeded or managed, other than occasional hand labor with a machete.

Would I recommend this method in most cases? The answer is no. It is too slow a process. Establishing a living shoreline through planting is a far better option and heals a site more quickly.

Am I glad I did it this way? Yes, I have enjoyed watching the change; I have realized I am never too old to learn. And when I'm listening to the oldies channel, I find I have a new appreciation for the song *Let It Be*. ■

Kenneth Carter, a retired assistant state conservationist with the USDA's Natural Resource Conservation Service, lives in Virginia.

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 or 410-746-0519. You can also reach us at P.O. Box 300, Mayo, MD, 21106. Please include your phone number and/or email address.

CHESAPEAKE CHALLENGE

— Kathleen A. Gaskell

Are you a 'feather brain' or feather 'brain'?

Feathers are more than just "fur" for birds. Here are the main feather types and their functions. Can you match them with the illustrations on this page? Answers are on page 36.

Bristles: These stiff feathers, when present, are usually found on the bird's head. Some serve as eyelashes. In insect eaters, they may be located near the mouth to serve as funnels or protection against stinging insects.

Contours: These feathers, found everywhere but the beak and feet and legs of most birds, give a bird its shape. Just their ends (the only part we see) are colored. When brightly colored (especially on males), they may help to attract mates. Most, though, are colored to provide camouflage from predators, especially in nesting females. Contour feathers get fluffier near the skin, where they serve as insulation.

Downs: These small feathers are located near the bird's skin. When fluffed out, they trap air, which keeps the bird warm. Some birds grow what are called powder down feathers. These continuously growing feathers break down into a powder that helps clean or waterproof the larger feathers.

Flight feathers (wing and tail): As a rule, these are the longest, strongest feathers on a bird. In some birds, flight feathers also play an important role in courtship dances and displays.

- **Wing:** These asymmetrical feathers provide thrust and lift, which are responsible for flight itself.
- **Tail:** These symmetrical feathers are used for stability and steering in flight and as a brake for landing.

Filoplumes: These are very tiny and bare, with a tuft of barbs near the tip. Unlike other feathers, they are not attached to muscles; instead, they are connected to nerve endings and serve as sensory receptors. They relay information about wind and air pressure, which helps the bird position other feathers for flying most efficiently.

Semiplumes: The tips of these feathers, along with the contour feathers, give a bird its color and shape. The fluffier bottoms serve as insulation.

Facts for feather brains

Light as a feather? Not necessarily. The bones of birds that fly are mostly hollow to help them stay aloft. In most birds, the total weight of its feathers is greater than that of its skeleton.

Feather-saurus: Today, birds are the only animals with feathers, but that wasn't always true. Paleontologists studying fossils have discovered that some dinosaurs probably had feathers, including the Tyrannosaurus rex.

The skinny on feather muscles: A bird's skin follicles contain a network of little muscles that allow the creature to manipulate its feathers.

Feather figures: The number of feathers on a bird varies by species. A hummingbird has roughly 1,000 feathers; a small songbird 1,500–3,000; a bird of prey 5,000–8,000; and a swan up to 25,000. An emperor penguin, meanwhile, keeps warm with approximately 80,000 feathers.

Shake a tail feather: The males with the brightest feathers, longest tails and best moves usually get the bird babes, according to avian studies. It is thought that these attributes indicate good health and vitality, assets a female would look for in a potential mate.

Cock-a-doodle doozy: The Onagadori cock, a Japanese chicken breed, has the longest feathers — up to 32 feet!

Icon: A male chestnut-sided warbler sports a bright yellow cap and black bars angling away from its eyes. (Michael Janke/CC BY-NC-ND 2.0)

A–G: Feather artwork by Andrew Leach, Cornell Lab of Ornithology.

H: A male cardinal fluffs its feathers to keep warm in the morning chill. (Michele Danoff)

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 for/register an event, or report a site needing a cleanup: Lucy Heller at lheller@allianceforthebay.org.

DC, VA, MD shoreline cleanups
Learn about cleanup opportunities in the Potomac River watershed: Click on "Cleanups" at fergusonfoundation.org.

Clean Swell App
Use the Ocean Conservancy's free Clean Swell app to upload stream cleanup results to a database providing a global snapshot of trash, suppling researchers and policy makers with insight. Web search "Ocean Conservancy Clean Swell App".

Citizen Science: Creek Critters
Use Audubon Naturalist's Creek Critters app to check a stream's health by identifying small organisms living in it, then creating a report based on what you find. Get it for free at App Store or Google Play. Info: anshome.org/creek-critters. To learn about partnerships/host a Creek Critters event: cleanstreams@anshome.org.

PENNSYLVANIA

Middle Susquehanna River
Get involved with the Middle Susquehanna Riverkeeper Association. Contact Riverkeeper John Zaktansky at 570-768-6300, midsusriver@gmail.com.
- *HERYN (Helping Engage our River's Youth with Nature):* Assist with youth outdoor activities.
- *Susquehanna Stewards:* Deliver programs, info to people in your region, help to develop new initiatives.
- *Water Reporter App:* Track fish health in the Middle Susquehanna watershed by sharing photos, info about catches via an app. Also upload pictures of river activities. Reports, interactive map available at middlesusquehannariverkeeper.org.

VIRGINIA

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

Pond cleanup program
Join a Prince William Soil & Water Conservation District's One-Time Pond Cleanup in the fall or spring with no other commitments. The district needs kayaks to support this effort. Info: waterquality@pwswcd.org.

Cleanup support & supplies
The Prince William Soil & Water Conservation District in Manassas provides supplies, support for stream cleanups. Groups receive an Adopt-A-Stream sign recognizing their efforts. For info/to adopt a stream/get a proposed site: waterquality@pwswcd.org. Register for an event: trashnetwork.fergusonfoundation.org.

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

Citizen Science: Ghosts of the coast
The Gedan Lab at George Washington University and the Virginia Coast Reserve Long-Term Ecological Research project are documenting the formation of ghost forests created by rising sea level. Submit observations to storymaps.arcgis.com/stories.

Become a water quality monitor
Train online with the Izaak Walton League to volunteer or become a certified Save Our Streams water quality monitor. Follow up with field practicals, then adopt a site of your choice in Prince William County. Info: Rebecca Shoer at rshoer@iwla.org, 978-578-5238. Web search "water quality va iwla." Activities include:
- *Stream Selfies:* Collect trash data, take a photo of local stream.
- *Salt Watchers:* Test for excessive road salt in a stream.
- *Check the Chemistry:* Spend 30 minutes at a waterway with a handful of materials, downloadable instruction sheet.
- *Stream Critters:* Use app to identify stream inhabitants. Number, variety of creatures reveal how clean a water is.
- *Monitor Macros:* Become a certified Save Our Streams monitor with one day of training. Learn to identify aquatic macroinvertebrates, assess habitat, report findings, take action to improve water quality.

Chemical water monitoring teams
Help the Prince William Soil and Water Conservation District and VA Department of Environmental Quality by joining a chemical water quality monitoring team. Training provided. Monitoring sites are accessible. Info: waterquality@pwswcd.org, pwswcd.org.

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 branch for details.

MARYLAND

Severn River Association
Join the Severn River Association's 2022 water quality monitoring crew. Visit 51 stations from the river's mouth to its headwaters. Info: Jack Beckham at fieldinvestigator@severnriver.org.

Anita Leight Estuary Center
Remove invasive plants and install native species 1–3 p.m. May 15 at the Anita C. Leight Estuary Center in Abingdon. Volunteers, ages 14+, learn to ID problem plants, removal & restoration strategies. Wear sturdy shoes, long sleeves, work gloves. Weather permitting. Preregistration required: 410-612-1688, 410-879-2000 x1688, otterpointcreek.org.

Chesapeake Bay Maritime Museum
The Chesapeake Bay Maritime Museum in St. Michaels needs help with guided tours, programs, exhibitions & collections, as well as in its grounds & gardens, working shipyard and on-the-water & dockside with its Floating Fleet. Info: cbmm.org/support/volunteer.

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

Maryland State Parks
Search for volunteer opportunities in state parks at ec.samaritan.com/custom/1528. Click on "opportunity search" in volunteer menu on left side of page.

Delmarva Woodland Stewards
Delmarva Woodland Stewards is an outreach program by the Maryland Forest Service and U.S. Department of Agriculture's Forest Service to enhance forest & wildlife management practices, promote benefits of prescribed fire, pursue tree planting opportunities, highlight the need for low grade/biomass markets. For training, outreach to landowners and volunteers: Matthew Hurd at matthew.hurd@maryland.gov.

Breeding Bird Atlas project
Help the Breeding Bird Atlas of Maryland & the District of Columbia — a project documenting the distribution, abundance of local breeding bird populations — by looking for nests. Data are used to manage habitat, sustain healthy ecosystems. Info: ebird.org/atlasmddc/about.

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

St. Mary's County museums
Join the St. Mary's County Museum Division Volunteer Team or Teen Volunteer Team.
- *Adults:* Assist with student/group tours, special events, museum store operations at St. Clement's Island Museum or Piney Point Lighthouse Museum & Historic Park. Work varies at each museum. Info: St. Clement's Island Museum, 301-769-2222. Piney Point Lighthouse Museum & Historic Park, 301-994-1471.
- *Students:* (11 & older) Work in the museum's collections management area on artifacts excavated in the county. Info: 301-769-2222.

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.
June issue: May 11
July issue: June 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.

CHESAPEAKE CHALLENGE

Answers to:
Feather Brain on page 35
A. Contours
B. Wing flight feathers
C. Downs
D. Semiplumes
E. Tail flight feathers
F. Filoplumes
G. Bristles

BULLETIN BOARD

National Wildlife Refuge at Patuxent
Volunteer in Wildlife Images Bookstore & Nature Shop with Friends of Patuxent Research Refuge, for a few hours a week or all day 10 a.m.–4 p.m. Saturdays; 11 a.m.–4 p.m. Wednesday–Friday. Help customers, run the register. Training provided. Info: Visit the shop in the National Wildlife Visitor Center, 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 a.m.–4 p.m. the second Saturday in May, June and July 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 a.m.; return at 5 p.m. Carpool contact: 301-277-7111.

Chesapeake Bay Environmental Center
Volunteer at the Chesapeake Bay Environmental Center in Grasonville a few times a month or more frequently. Help with educational programs; guide kayak trips & hikes; staff the front desk; maintain trails, landscapes, pollinator garden; feed or handle captive birds of prey; maintain birds' living quarters; monitor wood duck boxes; join wildlife initiatives. Or, participate in fundraising, website development, writing for newsletters & events, developing photo archives, supporting office staff. Volunteering more than 100 hours of service per year earns a free one-year family membership to CBEC. Info: volunteercoordinator@bayrestoration.org.

Chesapeake Biological Laboratory
Chesapeake Biological Laboratory's Visitor Center on Solomons Island needs volunteers, ages 16 & older, who can commit to at least two, 3– to 4-hour shifts each month in spring, summer, fall. Training required. Info: brzezins@umces.edu.

Citizen science: angler surveys
The Volunteer Angler Survey smartphone app helps the Department of Natural Resources collect species, location, size data used in developing management strategies. Surveys: artificial reef initiative, blue crab, freshwater fisheries, muskie, shad, striped bass. Win quarterly prizes. Info: dnr.maryland.gov/Fisheries/Pages/survey/index.aspx.

EVENTS / PROGRAMS

WATERSHEDWIDE

Watershed Forum request for proposals
The Alliance for the Chesapeake Bay is seeking proposals for its 17th annual Chesapeake Watershed Forum Nov. 4–6 at the National Conservation Training Center in Shepherdstown, WV. The theme is *Nature in Your Neighborhood: Connecting Communities to the Outdoors* and will showcase local benefits of the Chesapeake Bay restoration movement. The Alliance is looking for a combination of theme related sessions that spotlight a case study or introduce new, innovative, and/or hot topics or more in-depth presentations that facilitate discussion and application to activities and organizations at the local level. Submission deadline is 11:59 p.m. EST June 3. Info: allianceforthebay.org/event/chesapeake-watershed-forum.

PENNSYLANIA

Parks & forests photo contest
Pennsylvania Parks and Forests Foundation is accepting submissions for its photo contest, which this year celebrates the 50th anniversary of the Clean Water Act as well as the role of forests in watershed health. Categories are: Water is Life, Caught in the Rain, Raindrop to River, Reflections, Forests, and Young Photographers (ages 12–17). Amateurs, professionals welcome. All photos must be taken in a Pennsylvania state park or forest. The deadline is Sept. 30. Info/contest details: paparksandforests.org.

VIRGINIA

Reedville Fishermen's Museum
The Reedville Fishermen's Museum's concert to benefit the *Claud W. Somers* skipjack takes place 7–9 p.m. May 14. Folk singers Janie Meneely and Rob van Sante perform. Info: rfmuseum.org or email us at office@rfmuseum.org.

Grain, medium farm workshop
Join Future Harvest, Common Grain Alliance and Taste of Jubilee/Green Sprig Ag 10 a.m.–1:30 p.m. May 14 at Green Sprig Ag Farm/Taste of Jubilee in Rocky Mount for a workshop on growing local grains with a soil health mindset. The event feature soil health demonstrations, tips to manage shifts in planned land use, farm tour. Fee: $30. Info: futureharvest.org, under Programs/UpComing Events.

MARYLAND

Burgers & Brews for the Bay
Join the Chesapeake Bay Foundation, Future Harvest and Go Grassfed for Burgers and Brews for the Bay — a farm-to-table benefit 12–4 p.m. May 14. at Clagett Farm in Upper Marlboro. Food includes pasture-raised meats & dairy, local vegetables and craft beer from the region. Family-friendly event includes hayrides, educational stations, chef demonstrations. Proceeds support CBF's efforts to promote regenerative agriculture, climate-friendly food choices. Ticket bought before 5 p.m. May 13 are: $55/adults; $35/designated drivers and& ages 12–20; $10/ages 3–11; free/2 & younger. Tickets at the event are: $70/adults; $45/designated drivers & ages 12-20; $10/ages 3-11; free/2 & younger. Rain or shine. No weather-related refunds. will be issued due to weather. Info: David Tana at dtana@cbf.org.

Youth fishing rodeos
Youths, ages 3–15, are invited to take part in the Department of Natural Resources' Youth Fishing Rodeo Program. All events are free, but require registration (see info for each site). Most events provide bait or fishing gear and have volunteers on hand to help the kids learn to fish. Attendees should check dnr.maryland.gov/fisheries/pages/youth/rodeo for any cancellations or rescheduling.

Allegany County
- *Laurel Run:* 7 a.m. May 14. Info: Donna Thomas at 301-876-8614.
- *Lions Pond (Glendenning):* 9 a.m. May 14. Info: Nick Green at 240-362-3918.
- *Patch:* 2 p.m. May 21 & June 5. Info: Sharon Merrbach at 301-463-2498.
- *Battie Mixon:* 10 a.m. June 11. Info: John Dawson at 240-727-0785.

Baltimore County
- *Middle Branch Park:* 10 a.m. May 28. Info: Bob Wall at 443-955-0484.
- *Hillcrest Park Lake:* 7 a.m. June 11. Info: Joan Mitchell at 410-887-6994.

Calvert County
- *Calvert Cliffs State Park:* 8 a.m. June 4. Info: Sandy Abell at 410-586-1101.

Carroll County
- *Krimgold Park:* 7:30 a.m. May 22. Info: Tina Shupp at 410-386-2103.

Garrett County
- *Bear Creek Clyde "Jr." Fike Memorial Fishing Rodeo:* 8 a.m. May 14. Info: James Tallentire at 724-208-2972.
- *Accident Pond:* 9 a.m. May 14. Info: Brad Williams at 301-387-1101.
- *Potomac River:* 5 p.m. May 20. Info: Heather Berg at 301-501-2038.
- *Accident Pond:* 8 a.m. May 21. Info: Machelle Bender at 301-616-1602.
- *New Germany Lake:* 8 a.m. May 21. Info: Erin Thomas at 301-895-5453.
- *Muddy Creek:* 9 a.m. May 28. Info: Jim Smith at 310-616-4754.

Montgomery County
- *Kings Pond:* 9 a.m. May 22. Info: Jennifer Scully at 301-528-3463.

Washington County
- *Cushwa Basin:* 9 a.m. June 4. Info: Noel Williams at 304-279-1209.

Wicomico County
- *Tributary of the Wicomico:* 7 a.m. June 4. Info: Jamie Nichols at 410-548-4900.

Worcester County
- *Newton Pond:* 9 a.m. May 28. Info: Trudy Gebhardt at 410-632-2144.

Eden Mill Nature Center
Here are upcoming programs at Eden Mill Nature Center in Pylesville. All require preregistration: edenmill.org, edenmillnaturecenter@gmail.com.
- *Wildlife Photography*: 5–7 p.m. May 12. All skill levels, ages 16+ Fee: $13.
- *June Early Bird Summer Camp:* 9 a.m.–3 p.m. June 21–24. Ages 6–11. Animal programs, trail, wetlands exploration, games, crafts, canoeing. Fee: $140.

Anita Leight Estuary Center
Take part in any of these programs at the Anita C. Leight Estuary Center in Abingdon. Ages 12 & younger must be accompanied by an adult. Events meet at the center. Payment due at time of registration. Info: 410-612-1688, 410-879-2000 x1688, otterpointcreek.org.
- *Critter Dinner Time:* 1:30 p.m. May 14. All ages. Learn about turtles, fish, snakes while they eat. Free. Registration required.
- *Songs of Spring:* 1–2 p.m. May 15. Ages 5+ Look for nesting birds along trails. Treat. Fee: $10/family. Register by 5/11.
- *Kayak Cruise on the Creek:* 10 a.m.–12:30 p.m. May 20. Adults. Otter Point Creek & upper Bush River. Track seasonal changes. Fee: $12. Registration required.
- *Nature Discovery Tots:* 10:30 a.m. May 21. Ages 0–6 w/adult. Explore Nature Discovery Area with naturalist. Free.
- *Critter Scavenger Hunt Canoe:* 1–3:30 p.m. May 21. Ages 8+ Fee: $12. Register by 5/20.
- *Ponds & Polliwogs:* 1:30–2:30 p.m. May 22. Ages 3+ Explore ponds with dip nets. Fee: $10/family. Register by 5/20.
- *Dinner Cruise Canoe:* 4–6:30 p.m. May 22. Ages 8+ Bring your own dinner. Fee: $12. Registration required.
- *Sunset Canoe*: 6:30–9 p.m. May 27. Ages 8+ Otter Point Creek. Fee: $12. Register by 5/27.
- *Marsh Magic Sunset Kayak:* 6:30–9 p.m. May 28. Ages 8+ Look for migratory birds, resident mammals. Fee: $12. Register by 5/27.
- *Meet a Critter:* 1 p.m. May 29. All ages. Live animal program. Free. Registration required.

DNR photo contest
The Department of Natural Resources is accepting entries for its photo contest until Aug. 1. It's open to state residents and visitors, but only photos (birds, insects, flora, recreation, scenic landscapes or wildlife) taken in Maryland can win. Winning entries will be posted online and appear in Maryland Natural Resource magazine and the 2023 DNR wall calendar. The overall grand prize winner receives a $500, one-year Maryland State Park and Trail Passport, free magazine subscription and five copies of the calendar. First through third place winners also receive prizes. Social media users can choose a "fan favorite" via facebook.com/MarylandDNR. Info: dnr.maryland.gov/Pages/photocontest.aspx.

Only heavenly waters will do for eastern hellbender

By Jim Kauffman

An eastern hellbender, the Pennsylvania state amphibian, hugs the rocky bottom of a freshwater stream. (Adam Miller)

When we think of Chesapeake Bay stewardship, images of charismatic (or delicious) estuarine creatures often come to mind. Blue crabs, oysters, striped bass, ospreys, diamondback terrapins, American oystercatchers — the list is extensive.

These species are part of a diverse ecosystem that relies on a specific suite of aquatic conditions for survival and reproduction. Their fates are inextricably intertwined with our commitment to clean water initiatives in the upstream watersheds that feed the Bay.

And those freshwater systems are home to many species that can only survive in clean, cool water.

In my mind, there's one freshwater organism that truly illustrates the importance of clean water in those headwaters: the eastern hellbender.

My first interaction with a hellbender was profound. Imagine putting your head underwater in a cool mountain stream and inadvertently coming face-to-face with a gigantic, 15-inch aquatic salamander. We were snorkeling in a clear Pennsylvania mountain stream, looking at crayfish and taking photos of fish with our underwater camera. I peered under a rock to get a closer look at a colorful darter, and there it was: a snot otter, the alligator of the Alleghenies, a devil dog, a grampus. Known by many names, the eastern hellbender (*Cryptobranchus alleganiensis*) is a species of giant salamander endemic to eastern North America. It is a completely aquatic amphibian and can grow to be quite large — the record is almost 30 inches.

Hellbender populations were once widespread throughout the many tributaries and creeks of the Susquehanna River Basin, but their range is now restricted to only a handful of waterways — those with water quality suitable for their survival.

It was no surprise to us that there were hellbenders in that creek. The water was clear and cool, the bank was fully forested and the riparian tree canopy shaded most of the stream. Rocks and gravel covered the stream bottom, and there was no muddy coating of sediment. And the stream was teeming with crayfish — the primary prey of hellbenders — so there was plenty of food for them.

Sadly, the conditions in that particular creek are not as common as they once were. Pollution, runoff, mine drainage, chemical spills, deforestation and more frequent flooding have degraded most of the rocky freshwater streams that hellbenders once called home. Hellbender populations have subsequently declined, and the animals can be found only in the comparatively few streams where unpolluted water remains.

This amphibian has evolved to live in cold, fast-flowing rocky waterways that contain gravelly substrate and large rock slabs. Hellbenders use these slabs for both shelter and food acquisition. It was under one of these where I had my surprising encounter.

It's no accident that hellbenders prefer fast-flowing, highly oxygenated water. As adults, they have no external gills and obtain oxygen by exchanging gases through their skin — a method known as cutaneous respiration, which is not uncommon among amphibians. The many folds and wrinkles in their skin aid the process, increasing the total surface area available for gas exchange.

Because of this adaptation, hellbenders are extremely sensitive to changes in water conditions. Increased temperature, often a result of lost tree canopy, means less available dissolved oxygen. Erosion that leads to sedimentation and siltation reduces potential hellbender nesting and foraging habitat. Chemicals and nutrients entering the waterways change the water chemistry and can be absorbed through the animal's skin, disrupting its physiological processes.

Luckily, some waterways have retained their historic conditions, and hellbenders have continued to thrive, though in notably smaller numbers. Many streams in the hellbender range are still degraded. And that's where stewardship and improved soil conservation practices come in.

The Alliance for the Chesapeake Bay, where I work as the forests projects coordinator for Pennsylvania, develops programs and provides funding for clean water initiatives throughout the Bay watershed, including the hellbender's historic range in Pennsylvania.

Our forests team focuses on establishing forested riparian buffers — high-density tree plantings along streams, which not only reduce erosion and filter pollutants but will eventually create shade to cool the water.

We partner with county conservation districts, environmental organizations, private landowners and local municipalities to identify streams where buffers are needed and to start the reforestation process. We also work with farmers to reduce nutrient (nitrogen and phosphorus) runoff associated with livestock and agricultural operations. Our buffer program is designed to create this habitat at no cost to the landowner or project participant.

By creating forested buffers, we can enhance local freshwater habitats needed by hellbenders and many other aquatic organisms, while also improving conditions downstream and in the Bay itself.

In 2019, the hellbender officially became the state amphibian of Pennsylvania. The designation creates a symbol that promotes awareness of hellbender conservation and identifies the importance of clean water.

In addition to contacting the Alliance or other organizations to volunteer for tree-planting projects, there are other simple ways you can help the hellbender when you're out and about in nature. If you are wading in a stream that might be clean enough for hellbenders to thrive, don't flip rocks or disturb the streambed. Don't remove rocks or build cairns.

If you are lucky enough to see one of these amazing creatures, don't disclose where it happened. Hellbenders are sometimes illegally collected and sold as pets, so if you feel a need to describe the experience to your friends or post an Instagram photo, be as discreet as possible about the location.

My chance encounter with a hellbender was an unforgettable experience. But without intact riparian forests and the presence of clean water, the opportunity to observe the "alligator of the Alleghenies" might not exist for future generations. And that's something I just can't imagine.

So please excuse the language, but the pun is just too appropriate to pass up: As stewards of the Chesapeake, we should all be "hell bent" on clean water. ■

Jim Kauffman is the Pennsylvania forests projects coordinator for the Alliance for the Chesapeake Bay.

Catching a great glimpse of the even greater yellowlegs

By Mike Burke

Sparkles of gold glinted off the water. The clear morning air was crisp, but brilliant May sunshine held the promise of a warm spring day. We stood on the shore, basking in the wonder of a beautiful day that starts with birding.

A few yards away, standing in hip-high water, a high-stepping shorebird was looking for breakfast. As the bird assertively probed the water column, we watched attentively through our binoculars.

Bigger than a typical sandpiper and smaller than a great blue heron, it was thick-bodied with a long, slender neck and small head. Dark brown feathers, heavily marked with white spots, covered its wings and back. Its head, neck and breast were pale with streaks of brown. Most distinctive was its long bill. Heavy at the base, it quickly tapered to a thin tip. Caught at the right angle, the bill appeared to have a slight upward tilt. This was a greater yellowlegs (*Tringa melanoleuca*).

The nearly identical looking *lesser* yellowlegs differs only in size; it is noticeably smaller and finer-bodied. It looks almost dainty next to the greater. Interestingly, the two birds are not one another's closest relatives in the *Tringa* genus. Some biologists identify the phenomenon as an example of "convergence," defined as "the repeated evolution of similar traits in independent evolutionary lineages inhabiting similar environments." In other words, the lesser and greater yellowlegs didn't look much alike further back in their evolutionary histories. Facing the same environmental pressures, though, over generations they have developed a common set of visible characteristics.

The greater yellowlegs we were watching was in water up to its belly, hiding its eponymous long, yellow legs. It was eating small fish and aquatic invertebrates (such as crabs and snails), which form a major part of its diet. The bird also feeds on frogs, terrestrial invertebrates (such as beetles and worms) and the occasional seeds and berries.

We were at the Merkle Natural Resources Management Area. It's a 1,900-acre gem along the Patuxent River, just south of Upper Marlboro, MD. Merkle is part of a group of natural lands that protect both sides of a long, continuous stretch of the Patuxent River. It's just downstream from Anne Arundel County's Jug Bay Wetlands Sanctuary, which encompasses the Parris N. Glendenning Preserve. Also nearby are segments of the Patuxent River Park system, which is operated by the Maryland National Capital Parks and Planning Commission. Merkle is state-run. Protecting this ecosystem is an example of cooperative conservation at its finest.

Merkle is best known as a magnet for thousands of wintering geese. And more than 220 bird species have been identified on the property, giving strong testimony to the wisdom of protecting natural corridors.

Greater yellowlegs are solitary and often on the move. In the Chesapeake Bay region, the best time to see them is during spring migration. In Delaware, Maryland the District of Columbia, the peak occurs in April and the first two weeks of May.

The greater yellowlegs we saw at Merkle was likely on its way north to breed. (Because the sexes look alike, there was no way to determine if we were looking at a female or male.) The species breeds in the sub-Arctic boreal wetlands of Canada and Alaska.

A greater yellow legs prowls the marsh for its next meal. (Steven Kersting/CC BY-NC-ND 2.0)

A greater yellowlegs scans the shallow water for food, usually small fish or aquatic invertebrates like crabs and snails. (Alberto V05/CC BY-NC 2.0)

The birds seek out a special kind of marsh called a muskeg. These wetlands include bogs with extensive peat moss and marshes with lots of decaying, floating vegetation. The sites are remote and brimming with mosquitos during the summer breeding season.

For a nest, the female greater yellowlegs scrapes out a small depression at the base of a conifer. She'll lay a clutch of three to four eggs. Twenty-three days later the chicks hatch. They are covered in down and leave the nest almost immediately. One parent will lead the youngsters on a long walk, where the juveniles learn to feed themselves.

Just two days later, the youngsters take their first tentative flights. They will soon seek out water to expand their diets to include aquatic species.

In the fall, adult females are the first to head south from their breeding grounds, often before the young have fledged. Adult males are next, after they have concluded their job of protecting the young birds. The juveniles are last, as much as six weeks later. Consequently, the fall migration season is quite long.

Some of the southbound yellowlegs will stop at the Chesapeake and settle in for the winter. More of the birds go as far as the Gulf Coast states, from Texas to Florida. Still others undertake an epic migration to South America, some going as far as the southern tip of Chile. In the spring, they head back to Canada.

I had no way of knowing, of course, but I

A pair of greater yellowlegs wades in shallow water at dusk. (Scott Heron/CC BY-SA 2.0)

couldn't help wondering if the yellowlegs we were watching had come all the way from the far end of Chile.

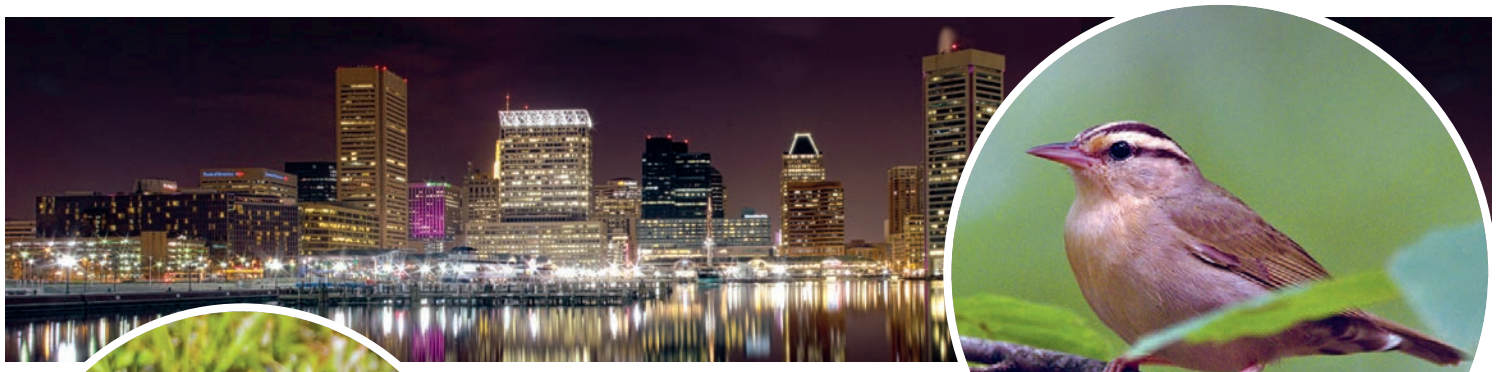
At Merkle, we continued watching it actively forage. I considered what the bird meant to me. Along with its cousin the lesser yellowlegs, the bird was a marvel of evolutionary biology. The species engages in one of the most extraordinary migrations in the world. It was feeding *here* because so many visionary conservationists had worked together to protect these lands and waters.

But first and foremost, the greater yellowlegs was simply a bird, here in a lovely setting on a wonderful spring morning. For the moment that was more than enough. I sighed, smiled and pulled the binoculars up for another look. ■

Mike Burke, an amateur naturalist, lives in Mitchellville, MD.

Here come the birds — somebody douse the lights!

By Kathryn Reshetiloff



Baltimore, pictured at night, is one of dozens of cities around the U.S. with Lights Out organizations, which spread the word about the dangers migrating birds face from nighttime lighting. (Astoddard73/CC BY-SA 4.0)

A worm-eating warbler. (Andrew Weitzel/ CC BY-SA 2.0)

As spring returns to North America, so do the birds — heading for their spring and summer breeding grounds in the U.S., Canada and the Arctic, where they will feed on a new generation of worms, spiders and insects.

Birds are bona fide nomads in the animal world, ceaselessly traveling with the change of seasons.

Most long-distance migratory songbirds and shorebirds migrate at night when the air is cooler and calmer, and predators are few. They evolved to make the journey using natural light from stars and the moon to navigate.

Artificial nighttime light is increasing globally by at least 2% per year, according to a 2021 article in the Cornell Lab of Ornithology's *Living Bird* magazine. It is known to adversely affect many bird species by interfering with their navigation, causing them to fly off course toward brightly lit urban areas.

Birds disoriented by lights are not only more likely to be killed by flying into buildings but also are known to circle lighted structures for long periods of time. That can have fatal consequences by depleting the energy reserves they need to reach breeding grounds, often thousands of miles away.

Many cities, the most concentrated sources of artificial light, are located directly in migratory flyways. But large, lighted commercial buildings are not the only problem. Birds are also attracted to light from porches, landscaping and windows.

Fortunately, many communities are taking action to reduce these impacts. Light minimization is especially important during peak bird migration periods (early April through late May and mid-August through early November). It's also critical during inclement weather, which increases the risk of collision by reducing visibility, distorting light or forcing birds to fly at lower altitudes.

The wood thrush (above), the worm-eating warbler (right) and the Canada warbler (below) are three otherwise threatened species that appear to be disproportionately vulnerable to building collisions, according to a 2014 study published in the journal Ornithological Applications. (Wood thrush photo by Steve Guttman/CC BY-NC-ND 2.0)

There are more than two dozen "lights out" programs in which businesses and homeowners reduce nonessential lighting in cities around the country.

Lights Out Baltimore encourages businesses and residents to turn off nonessential lights. The organization's volunteers also rescue and recover birds that have collided with buildings in the city. They take injured birds — and bats — to the Phoenix Wildlife Center in Baltimore County for rehabilitation. The dead ones (which, sadly, far outnumber the injured) are donated to the Smithsonian Natural History Museum and Johns Hopkins School of Medicine for research.

"Since 2008, over 5,000 birds have been found, with 1,500 birds and 92 bats rescued," said Lindsay Jacks, executive director of Lights Out Baltimore. "Our ultimate goal is to encourage business owners and residents to turn off [nonessential] lighting during migration months to save money, save energy and most importantly, save birds."

New York City late last year passed a law requiring city-owned and city-occupied buildings to turn off nonessential outdoor lighting between 11 p.m. and 6 a.m. from Aug. 15 to Nov. 1, and from April 1 to May 31 — peak migration periods for the New York area.

Lights out programs always need help and volunteers. Plus, there are many simple steps we can all take around our homes and workplaces to reduce the threat of artificial lights to migratory birds.

Turn off lights when they're not in use, especially during peak migration periods and on rainy or foggy nights. Better yet, install motion sensors on lights that would be visible to birds, indoors and out, so that the lights turn off when you don't need them.

Use window shades to minimize light "spills," and use light shields on outside fixtures to keep light from shining into the sky.

In public or commercial buildings, unneeded lights should be doused at night. If it's not your call to make (and it often isn't), don't be shy about asking the building manager to make it a policy or use timers to turn off specific lights: floodlights that face the sky, rooftop lights illuminating the landscape, architectural lighting, upper-story interior lighting, and lobby or atrium lighting. Or recommend motion sensors that activate lights only when people are present.

A Canada warbler. (John Benson/CC BY 2.0)

Reducing light use doesn't just help birds. It also saves money, reduces energy use and pollution and brings the added benefit of seeing starrier skies. Cities, parks and communities recognized as International Dark Sky Places are becoming tourist attractions, bringing benefits to local economies.

There are also daytime hazards to birds that you have some control over — chiefly ways to reduce the collision dangers of large windows, which can be deadly to birds that either don't see the glass at all or see a reflection of what appears to be more open air. This is a year-round hazard that kills nonmigrating birds by the millions. Window decals and strips of tape can make a big difference.

To explore this subject and find simple, inexpensive ways to make your windows less bird-deadly, go to the U.S. Fish and Wildlife Service's website, fws.gov, and search for "threats to birds."

So, when you are thinking about bird migration, or relaxing in your home at night, remember — sometimes it's a bright idea to dim the lights. And the more we help birds at night, the more they will be around for us to see in the daytime. ■

Kathy Reshetiloff is with the U.S. Fish and Wildlife Service's Chesapeake Bay Field Office in Annapolis.