

CHESAPEAKE

BAY JOURNAL

November 2023

Volume 33 Number 8

Independent environmental news for the Chesapeake region



A matter of trust: Farmers question whether Chesapeake model reflects reality

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CHESAPEAKE LEADERSHIP



Chair of Bay executive council
calls for new approach **PAGE 12**

ENDANGERED SPECIES



Endangered lists in Bay region
reach all-time high **PAGE 16**

SALTY FARMLAND



Saltwater intrusion takes a toll
on agriculture **PAGE 14**

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Plant a native black chokeberry and enjoy the edible rewards. To learn more, read the article on page 38. (Courtesy of the Alliance for the Chesapeake Bay)

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ON THE COVER

Farmland in Lancaster County, PA. (Dave Harp)

Bottom photos: left by Dave Harp, center courtesy of the U.S. Geological Survey Bee Inventory and Monitoring Lab, right by Paul Leoni

CORRECTIONS

In August, an article referred to bats as pollinators of crops and flowers. Bats are important pollinators in desert and tropical regions, but they are not pollinators in the Eastern U.S.

An October article about a construction site misstated the amount of penalties that Maryland can levy. Administrative penalties can be up to \$10,000 for each violation and for each day it continues but not more than \$100,000 in total.

Also in October, a caption in an article about the Anacostia River misnamed a person in the photo. Nolan Bennett of ecoSPEARS was shown holding plastic spears pulled from river sediment.

EDITOR'S NOTE



Problem-solving opportunities

Years ago, a friend of mine told me a workplace story. As a manager, she supervised an employee who reported on "challenges" facing their team. The employee would begin with a smile and the cheery question, "How would you like a problem-solving opportunity?"

Framing is everything, right? That staffer's question is a reminder that every current problem is a potential pivot point toward great solutions. And it reminds me that energy, creativity and a positive attitude are critical to the problem-solving process.

For the Bay restoration effort, two articles in this month's issue underscore that for me. The first, by Karl Blankenship, describes the watershed computer model, which has benefited from some of the best minds in the Bay restoration business. But the near-indescribable complexity of modeling a 64,000-square-mile ecosystem leaves many people with little confidence in understanding how much we've helped the Bay over recent decades or how much further we have to go. There is no clear solution in sight. Yet.

The second article is a staff report on the 2023 Chesapeake Bay Executive Council meeting. With an enormous problem-solving opportunity at hand — in 2025, the region faces its third failure to meet major pollution reduction goals for Bay — only two members attended in person and no major actions were taken.

The depth of the Bay's challenges can't be overstated, and people across the region are working on them. Still, there is a sense of stalled progress. What happens next? We can hover in that space, fatigued. Or we can find that pivot point. And that's what I hope Bay leaders will do: Grab the problem-solving opportunity before them. Look with fresh eyes, daylight the hard questions, seek new perspectives and act boldly.

At the *Bay Journal*, it's our job to report on difficult environmental issues. But we do this knowing that solutions are possible, driven sometimes by individual leaders and sometimes by the insistence of the general public. Let's all become more energetic, visible partners in our problem-solving opportunities.

— Lara Lutz



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BY THE numbers

9,158,456

Acres of protected land in the Chesapeake Bay watershed as of 2018, about 22% of the total area

165,000

Approximate number of road crossings over streams in the Bay watershed, many of which obstruct fish movements

61.7

Percentage of stream miles in the Bay watershed considered to have healthy macroinvertebrate communities in the 2000–2005 survey period

67.8

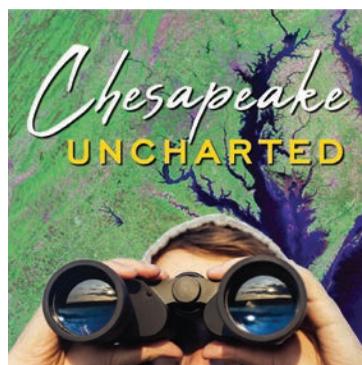
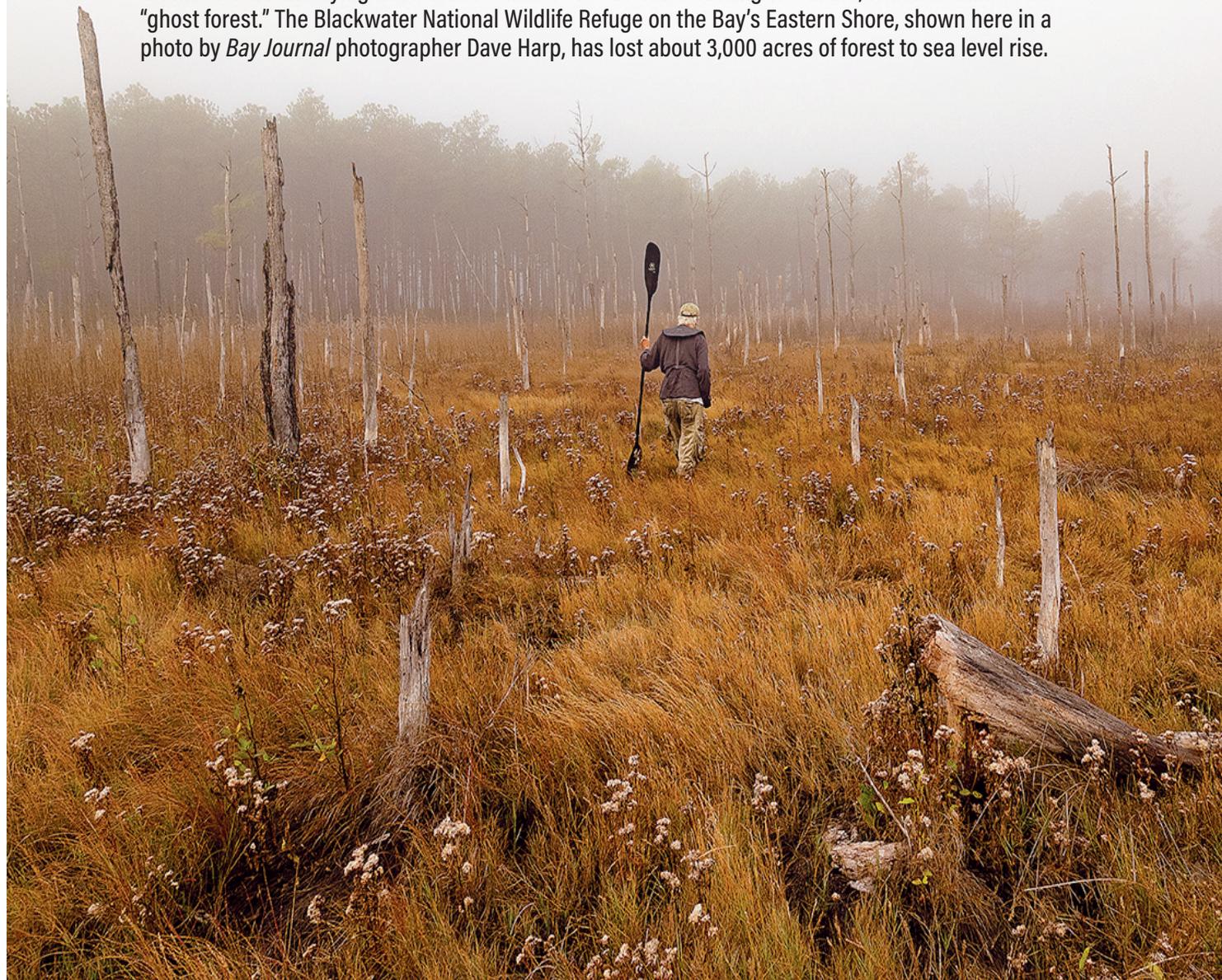
Percentage of stream miles in the Bay watershed considered to have healthy macroinvertebrate communities in the 2012–2017 survey period

174

Depth of the Bay, in feet, at its deepest point, about 10 miles northwest of the mouth of the Choptank River

What are 'ghost forests'?

Water in the Chesapeake Bay and its tidal rivers is rising and pushing inland, bringing salty water with it. The wet ground and rising salinity kills trees. Over time, forested areas become flooded, convert to marsh and can eventually become open water. At the beginning of that process, the white trunks of dead and dying trees stand sentinel over a former thriving woodland, which is dubbed a "ghost forest." The Blackwater National Wildlife Refuge on the Bay's Eastern Shore, shown here in a photo by *Bay Journal* photographer Dave Harp, has lost about 3,000 acres of forest to sea level rise.



bayjournal.com/podcast

LOOKING BACK

30 years ago

Farmers concerned about emphasis on streamside buffers

Farmers were worried that taking land out of production to plant 100-foot-wide streamside buffers would significantly impact their bottom line. ■

— *Bay Journal*, November 1993

20 years ago

Drought is good for the Chesapeake Bay

Scientists confirmed that the 1999–2002 drought improved the Bay's water quality because less polluted water washed into the Bay and its rivers. ■

— *Bay Journal*, November 2003

10 years ago

Sturgeon study brings spawning news

Virginia researchers discovered evidence of fall spawning activity by sturgeon in the James River. ■

— *Bay Journal*, November 2013

ABOUT US

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

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Bay Journal writer Jeremy Cox interviews Imani Black, director of Minorities in Aquaculture, for an article and upcoming podcast episode. (Dave Harp)

Exploring the future and a sad farewell

Work is officially underway on the third season of our *Bay Journal* podcast, *Chesapeake Uncharted*. Since its inception, thousands of listeners in the Bay region, across the nation and abroad have been tuning in to hear host and reporter **Jeremy Cox** serve up stories about the Chesapeake Bay ecosystem.

Season 3 explores this space through yet another lens. We are tracking down movers and shakers younger than 40 years old to learn more about what those leaders, stewards and activists think about our shared natural resources and the future of the Bay. We are looking for stories that inform as well as inspire. If you'd like to suggest a person to be interviewed, please contact Jeremy at jcox@bayjournal.com.

Last month, the *Bay Journal* staff was greatly saddened by the passing of longtime *On the Wing* columnist **Mike Burke** on Oct. 11, after his battle with cancer. His column, offering a bird's-eye view of the watershed, was launched in our Feb. 2006 issue.

At the time, Mike said that writing the column was "a way of helping me to pay attention to the natural world and take a moment for reflection. If people who read the column take away an appreciation of the subject matter and it gives them a moment ... of reflection for themselves, then that is more than enough for me."

For more than 17 years, Mike's column has been a hit with *Bay Journal* readers. Comments in reader surveys consistently showed it was among our most popular features. One reader described Mike's words as "poetry." He continued writing the column through April 2023, when he stopped to focus on his health.

Mike was a passionate conservationist. He was retired from the U.S. Environmental Protection Agency's Bay Program Office and also had served as a congressional staffer working on environmental issues. He was an avid birder and described himself as an amateur naturalist, though we might say he was more than an "amateur" in that department. His expertise was frequently tapped by *Bay Journal* staff to help identify birds and describe them accurately.

We, and our readers, will miss him. We will have more to say about Mike in our next issue.

— Karl Blankenship

VA Judge OKs menhaden lawsuit

A Virginia judge has refused to throw out a lawsuit brought by a Maryland anglers group challenging the state's management of large-scale commercial fishing for menhaden.

In a split verdict following a Sept. 7 hearing, Richmond City Circuit Court Judge Richard B. Campbell granted the Virginia Marine Resources Commission's motion to dismiss one of the lawsuit's two claims: that the commission failed to adopt its regulations in the legally prescribed time.

But the judge denied the state's motion to dismiss the fishing group's other claim, that the commission had violated Virginia law in deciding to permit an increase in commercial menhaden harvest from the Chesapeake Bay. The judge ruled that the Southern Maryland Recreational Fishing Organization, which filed the suit, had "sufficiently pleaded facts upon which relief can be granted." That means the case can go forward.

The group filed the suit in May, challenging the commission's decision two months earlier to raise the allowable harvest of menhaden by a little less than 50 million pounds. The commission did so to match an increase in catch permitted coastwide

by the Atlantic States Marine Fisheries Commission after a scientific assessment determined menhaden were not being overfished.

Commercial harvest of the small, oily fish has long been controversial, especially in the Bay, a prime nursery area for the coastal stock. Conservation groups contend a fishing fleet operated by Omega Protein out of Reedville, VA, which processes menhaden into animal feed and nutritional supplements, leaves too few of the forage fish in the water to support striped bass and a variety of other creatures that feed on them.

The Chesapeake Legal Alliance, the nonprofit law firm representing the Maryland anglers, contends that the commission abrogated its duty to conserve the menhaden population. The alliance argues that it ignored a state law requiring it to base its decisions on the best available science, among other factors. — *T. Wheeler*

PA's inclusion in RGGI uncertain

Pennsylvania's participation in the Regional Greenhouse Gas Initiative remains as uncertain as ever after a working group convened by Democratic Gov. Josh Shapiro endorsed some form of a cap-

and-trade system to reduce carbon emissions in the state but disagreed on whether it should be RGGI.

In 2019, former Democratic Gov. Tom Wolf had unilaterally started the process to join RGGI, a multistate effort to fight climate change and reduce carbon emissions.

But two lawsuits — one by state lawmakers and another by labor groups and utilities with coal-fired power plants — assert that the governor exceeded his authority. A Commonwealth Court blocked Pennsylvania from participating in carbon credit auctions and collecting money from carbon emissions through RGGI until the case is decided. That case is currently before Pennsylvania's Supreme Court.

During his campaign, Shapiro pledged to cut carbon emissions in the state but was careful not to endorse RGGI. He expressed concerns about the loss of jobs and energy revenue to other states that don't control carbon emissions, as well as higher electric bills for residents.

The working group he appointed, made up of environmental advocates, energy representatives, consumer advocates and union representatives, concluded that "a form of cap-and-invest carbon regulation for the power sector that generates

revenue to support the commonwealth's energy transition is the optimal approach moving forward."

The working group recommended that the Shapiro administration consider an alternative cap-and-trade program, one that is agreed on by the 13 states, plus the District of Columbia, that are served by PJM, a regional electric grid authority. Critics of that approach argue that a consensus is unlikely or would take years to develop.

More than half of the states served by PJM are not part of RGGI. In the Chesapeake Bay region, Maryland, Virginia, New York and Delaware are members, though the Virginia State Air Pollution Control Board has voted to leave RGGI at the end of the year. The move has been challenged in court by environmental groups. — *A. Crable*

Oyster planting record set in MD

Maryland planted an annual record of almost 1.8 billion juvenile oysters this year in its portion of the Chesapeake Bay, Democratic Gov. Wes Moore announced in October. He said it demonstrated the success of the state's partnership with watermen,

See **BRIEFS**, page 6

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briefs

From page 5

nonprofits, academic institutions and federal agencies in rebuilding the state's oyster population.

Of the total, 1 billion young oysters were placed in sanctuaries in the five Bay tributaries the state has targeted for large-scale oyster restoration. Since 2014, the state has planted almost 7 billion oysters after committing to restore oyster reefs in Harris Creek and the Manokin, St. Mary's, Tred Avon and Little Choptank rivers.

Those oysters were mainly produced by the large hatchery in Cambridge run by the Horn Point Laboratory of the University of Maryland Center for Environmental Science. Other participants providing technical, financial or logistical support included the Oyster Recovery Partnership, U.S. Army Corps of Engineers and the National Oceanic and Atmospheric Administration.

Oysters planted in other sanctuaries, privately leased areas and public oyster grounds came from a collaboration with multiple groups — nonprofits such as the Chesapeake Bay Foundation, Severn River Association and ShoreRivers, watermen's associations and several private producers. Participants in the state's Marylanders Grow Oysters program and similar initiatives joined in raising hatchery-spawned oysters for the plantings.

About 212 million post-larval oysters, or spat, went into sanctuaries in Eastern Bay as part of

a new restoration project there, while nearly 113 million got planted in smaller sanctuaries in Anne Arundel and Queen Anne's counties. And more than 455 million oysters were planted on grounds open for commercial harvest throughout state waters.

"It took three decades to plant 10 billion oysters in Maryland," noted Ward Slacum, executive director of the Oyster Recovery Partnership, "and half of that was completed in the last decade." — *T. Wheeler*

Many Shenandoah swimming spots unsafe last summer

Forty percent of the swimming locations tested in Virginia's Shenandoah Valley this year were unsafe for swimming due to high levels of fecal bacteria.

That is an improvement over last year, when 81% of the sites were considered unsafe based on water samples. But the Shenandoah Riverkeeper and the Environmental Integrity Project note in a report on the findings that most of the improvements can be attributed to below-average rainfall.

"Less rainfall means less manure is washed off farm fields and into streams and rivers," the groups said.

Since 2015, the Environmental Integrity Project and Shenandoah Riverkeeper have been working to analyze water quality data from the Virginia Department of Environmental Quality. Near the end of September 2023 — typically the end of water recreation season in the Shenandoah — 21 of the 52 water monitoring locations in the

valley had levels of *E. coli* bacteria that exceeded the U.S. Environmental Protection Agency's recommendations for recreational water contact.

These fecal organisms indicate the presence of potentially harmful bacteria. They are present in higher numbers after rain, which can flush animal waste and raw sewage into the water. In sufficient numbers, these bacteria can cause gastrointestinal illnesses, skin and ear infections, and conditions that can be life-threatening for some people.

The Shenandoah Riverkeeper and others have been fighting the misconception that rural rivers are cleaner and safer for recreation than urban ones. That can be particularly untrue when farm animals have unencumbered access to a waterway.

The Virginia General Assembly has directed a record \$265 million toward farm pollution control practices, including fencing to keep livestock away from waterways. The EIP reported that 626 farmers signed up for the fencing program in the fiscal year that ended on July 1, including 33 in two Shenandoah counties. — *W. Pipkin*

PA way behind in renewable energy, study finds

Pennsylvania is one of the worst states in the nation at increasing renewable energy, according to a study by PennEnvironment.

Using data from the U.S. Energy Information Administration, the environmental watchdog group said that Pennsylvania ranked higher than only

Alaska and the District of Columbia for percentage of growth in total solar, wind and geothermal generation in the last decade.

The state also ranked next to last in providing savings for consumers through energy efficiency programs, the study said.

From 2012 to 2021, Pennsylvania added enough renewable energy to power only 2% of its homes.

"Ranking near the bottom of the barrel for renewable energy production in the U.S. should raise red flags for our politicians in Harrisburg and the people of Pennsylvania," said Ellie Kerns, climate and clean energy associate with the PennEnvironment Research and Policy Center.

A legislature that has solidly backed fracked natural gas production in the state has so far stymied bills to increase community solar energy programs and energy efficiency requirements for new construction. Pennsylvania's goal of generating 8% of the state's electricity with "clean" alternative energy sources is lower than most states and was met in 2021.

Environmental groups have criticized Pennsylvania for its broad definition of alternative energy, which includes the burning of waste coal and wood and the use of waste methane from sewage treatment plants, municipal waste and poultry litter.

Pennsylvania did better in other categories in the study, ranking 10th in electric vehicle sales and 11th for the addition of electric vehicle charging stations. — *A. Crable*

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Poor striped bass spawning increases calls for conservation

Juvenile fish survey yields 2nd lowest tally in MD since 1957

By Timothy B. Wheeler

Striped bass suffered poor spawning this year in the Chesapeake Bay, survey results show, lending new urgency to calls by conservation groups to curb recreational and commercial catch of the highly sought-after finfish all along the East Coast.

The Maryland Department of Natural Resources reported Oct. 12 that its annual seine survey of state waters for juvenile fish yielded an average of just 1.02 little striped bass per net haul, far below the long-term average of 11.1. That is the second lowest tally since 1957. It also marks the fifth straight year of seriously subpar reproductive success for the species.

The Virginia Institute of Marine Science reported finding below-average numbers of young striped bass this year in a similar survey it conducts annually in the lower

portion of the Bay. It averaged 4.25 fish per net haul, also below that survey's long-term average of 7.77.

Lynn Fegley, DNR's fisheries and boating director, attributed the poor survey results in Maryland to warm, dry weather in winter and spring for the past several years, which she suggested in a statement may have hindered reproduction.

Striped bass, also known as rockfish, are one of the most popular sport and commercial fish in the Chesapeake and along the East Coast. As adults, they spend much of their lives roaming the coastal Atlantic Ocean but migrate every spring into the Bay and its tributaries to spawn in freshwater. That typically occurs in April and May, usually coinciding with the growth of zooplankton, which are a major food source for newly spawned striped bass larvae.

But research has found that winter weather has a significant impact on zooplankton abundance. Cold, wet winters in the Bay improve the odds for striped bass larvae to find high concentrations of their microscopic prey in April and May.

Conversely, warm and dry conditions could upset that timing.

DNR noted that its survey found evidence of below-average reproduction in other anadromous fish that spawn in similar ways, including white and yellow perch and herring.

Striped bass spawning success varies from year to year, but the overall coastal population has been maintained by bumper crops of juveniles produced every few years. This five-year reproductive slump is the longest since overfishing in the 1970s and '80s led to a near-collapse of the population, prompting catch restrictions coastwide and even a five-year ban on taking any of the fish in Maryland.

The population rebounded from that swoon but is struggling again to recover from recent overfishing. The Atlantic States Marine Fisheries Commission, which regulates in-shore fishing of migratory species, imposed an emergency 31-inch size limit on recreational catches in May.

The commission, which met in North Carolina in mid-October, voted to propose further limits on both commercial and

recreational harvests next year. It is aiming for a 14.5% reduction in the total loss of striped bass to help offset a surge in coastal recreational catch in 2022. The commission plans to decide on those cuts in January after taking public comments in writing and at a series of hearings.

The Chesapeake Bay Foundation called the juvenile fish survey results evidence of recruitment failure for striped bass in the Bay, which is a prime nursery ground for the coastwide population. Chris Moore, the foundation's senior regional ecosystem scientist, appealed for "immediate conservation action," including modifications to the commercial catch quota catch and more recreational fishing closures in summer, when the fish are weakened by warm water and likely to die even if released after being caught.

Fegley said that the Maryland DNR is working with the Atlantic states commission to support coastwide protections for striped bass until conditions improve for spawning success. DNR is also considering additional actions in its waters, she added. ■



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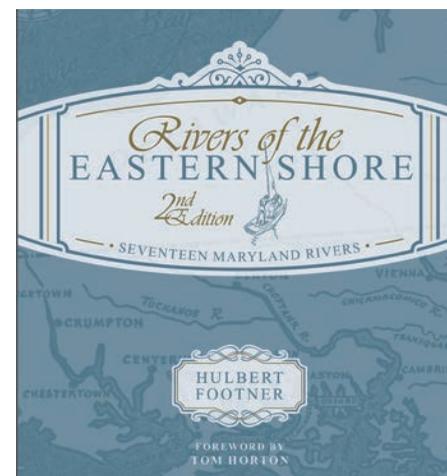


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Federal funding provides \$9.6 million for Bay-related projects

Work aims to reduce nutrient and sediment pollution in waterways

By Karl Blankenship

Forest buffers on Pennsylvania farms, stream health in underserved Baltimore neighborhoods and ancestral lands of the Mattaponi Indians in Virginia will all get a boost from \$9.6 million in grants announced Oct. 16.

They were among 10 projects, funded by the U.S. Environmental Protection Agency, that are expected to leverage another \$9.4 million in matching funds, bringing the total value of the environmental work to about \$19 million.

The grants were awarded by the National Fish and Wildlife Federation as part of the Innovative Nutrient and Sediment Reduction Program it administers for the EPA. The program aims to support projects that help meet Chesapeake Bay cleanup goals by reducing nutrient and sediment

pollution in waterways throughout the Bay's 64,000-square-mile watershed.

Adam Ortiz, administrator of the EPA's Mid-Atlantic region, said money for the program was part of the \$238 million from the Bipartisan Infrastructure Law targeting Bay restoration over five years.

"These projects represent a portion of the generational investments that the Biden administration is making in the Chesapeake Bay watershed," Ortiz said. "Each one of them will improve not just the local environment where the projects are located, but the Chesapeake Bay ecosystem downstream by removing runoff pollution, cleaning up streams and rivers, and planting native trees and grasses."

The funded projects include:

- \$1 million to the Stroud Water Research Center for work in eight Pennsylvania counties to provide training to conservation professionals and funding support for stream forest buffer planting.
- \$983,500 to the Maryland Association of Soil Conservation Districts to support nature-based structural conservation practices on the Delmarva Peninsula such

as wetland restoration, riparian buffers and shoreline management.

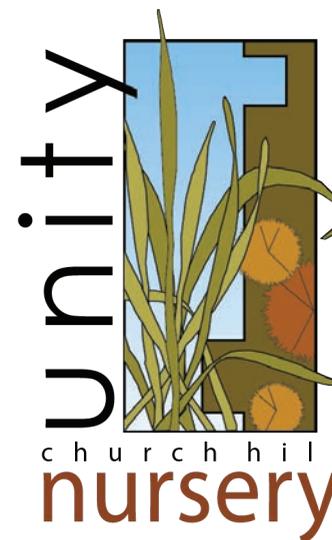
- \$997,300 to the Delmarva Poultry Industry Inc. to create cost-share programs for conservation practices on Delmarva Peninsula chicken farms, such as stream buffers, precision nutrient management, conservation drainage and litter management.
- \$1 million to Pennsylvania State University to work with places of worship on green infrastructure projects in the Lower Susquehanna River watershed and promote the adoption of conservation practices on farms of their members.
- \$1 million to the Upper Mattaponi Indian Tribe to help conserve the tribe's ancestral lands and restore their upland, riparian and wetland habitats.
- \$1 million to the Upper Susquehanna Coalition to accelerate restoration efforts along streams that straddle the New York and Pennsylvania border.
- \$984,900 to Backyard Basecamp in Baltimore to help implement nature-based stormwater solutions in some of the city's underserved communities, including

the "daylighting" of buried streams and efforts that improve habitat and restore native vegetation.

- \$1 million to the Alliance for the Chesapeake Bay to partner with Perdue Farms to provide financial and technical support for Perdue's organic poultry farmers in Pennsylvania.
- \$646,800 to the Alliance for the Chesapeake Bay to accelerate the planting of riparian forest buffers on farms in Maryland and Pennsylvania.
- \$997,600 to The Nature Conservancy to work with the Delmarva Wetland Partnership to provide support for the design and restoration of more than 600 acres of wetlands and 46 acres of associated upland buffers in Maryland, Delaware and Pennsylvania.



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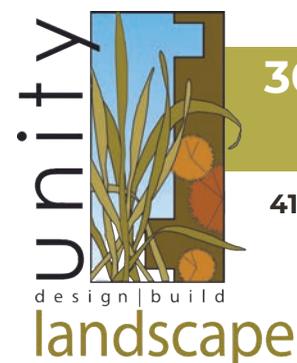


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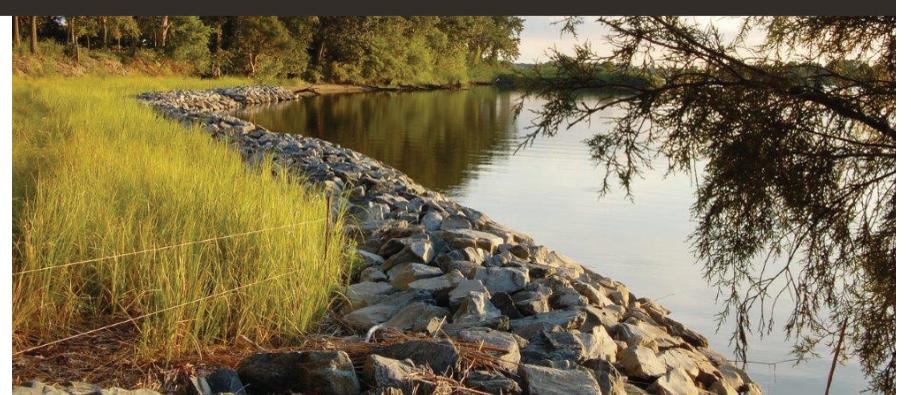
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VA ponders reopening long-closed winter crab harvest

Formal proposal in the works might require smaller crab pot harvest

By Jeremy Cox

Fifteen years after Virginia shut down its winter blue crab harvest, the industry is seeking to claw its way back into the season — at least on an experimental basis.

In 2007, the Chesapeake Bay crab population cratered at an estimated 251 million, prompting a federal disaster declaration the next year. Alarmed, Maryland and Virginia regulators enacted a series of sweeping measures aimed at protecting reproductive females through spawning.

One of the key moves in Virginia was to ban winter dredging. The practice, which involves dragging heavy, metal traps behind a boat to scoop up dormant crabs, was already illegal in Maryland.

Over the past decade, annual surveys have counted an average of 392 million crabs per year. Some crabbers in Virginia

say the prized crustacean has recovered enough to warrant reopening the winter dredge season on a small scale.

In August, the state's industry-dominated Crab Management Advisory Committee formally asked officials with the Virginia Marine Resources Commission to propose a regulatory framework that would allow a modest number of boats to participate.

At the time of the 2008 ban, there were 58 holders of winter dredge permits. The committee recommended restricting the new fishery to no more than six entrants.

"Watermen really need something like this to lean on," said James "J.C." Hudgins, president of the Virginia Watermen's Association. "I think it's something we could look at on a very limited basis, a managed basis."

It's too late to get the proposal approved in time for this winter, said Pat Geer, head of fisheries management for the VMRC. The earliest it could be in place would be winter 2024–25.

But he cautioned that the proposal, if finalized, won't be possible without concessions.

Since 2008, the three jurisdictions that

oversee the Baywide crab fishery — Maryland, Virginia and the Potomac River Fisheries Commission — have enforced a 34% reduction in the female crab harvest. If Virginia increases its harvest in the winter, the state will have to reduce quotas during other times of the year, Geer said.

Those cuts would almost certainly impact the commercial crab pot fishery, which represents 97% of the state's crab take. In that fishery, watermen place bait in cages and sink them to the bottom, returning a day later to retrieve crabs that have been lured inside.

The commercial crab pot season typically extends from March 17 to Nov. 30. The VMRC's main board agreed in September to keep the season open until Dec. 16 this year to allow crabbers to take advantage of better pricing during that time of year.

One of the main reasons that regulators closed the winter dredge season was to relieve pressure on adult female crabs, Geer said. They would typically account for about 90% of the winter harvest.

Why? At that time of year, females migrate to the southern end of the Bay to

release their eggs, Geer explained.

The crab board's members were somewhat divided over the winter dredge proposal during their August meeting, voting 6–3 in its favor.

Nathan Reynolds, a crabber based in Cape Charles who is not a board member, said he worries that the reintroduction of winter harvests will be offset by deep cuts in bushel limits on crab pots.

"In the big picture, we're going to shoot ourselves in our own foot," he told the advisory group.

Several crabbers said they would prefer to see the crab pot season extended to year-round. Because of climate change, the lower Bay's waters are warming earlier in the year and staying warm later in the fall. As a result, crabs are spending less time hibernating in the mud, where dredges are the only device that can reach them.

Geer poured cold water on that idea, for now: "Water temperatures are changing. We may look into those things, but I think opening it up on a year-round basis today is probably not the path we want to go down." ■

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Spill of plastic 'nurdles' reveals their polluting potential

Train derailment in MD released pellets into Anacostia watershed

By Whitney Pipkin

A train that derailed in the Anacostia River watershed in September introduced local officials to a pollutant no one was quite prepared to handle: nurdles.

These tiny plastic pellets, each about the size of a lentil, are transported around the world as the raw materials of plastic production. At 1 a.m. on Sept. 23, during a tropical storm, a CSX train derailed, spilling an unknown quantity of the pellets from some of its 16 railcars.

The spill occurred in the stretch of tracks that crosses alternate U.S. Route 1 (Baltimore Avenue) on the south side of Hyattsville, MD, just outside the District of Columbia and less than a half-mile from the Northeast Branch of the Anacostia River. The nurdles were made of recycled plastic and were on their way to be turned into new products. A CSX spokesperson did not answer a question about where the shipment was headed or how frequently nurdles are transported through the area.

"This is the first time in the recent memory of our staff for dealing with a train derailment," said Cindy Zork, communications manager for Hyattsville.

There were no reported injuries and, other than a small amount of diesel fuel, "no hazardous materials" released in the spill. The city closed the busy thoroughfare to traffic for two weeks, frustrating drivers.

But, Zork said, residents were equally concerned about the tiny white nurdles that covered the ground nearby.

Most state and local governments do not yet have rules in place for monitoring, preventing or cleaning up nurdle spills, according to The Great Nurdle Hunt, a project of the Finland-based nonprofit Fidra that aims to end nurdle pollution. According to Fidra, California is the only U.S. state with a strong law regulating nurdles and marine plastics as a specific source of pollution. Other states have varied approaches to handling this emerging source of pollution. Many are developed on the fly after a spill occurs.

The Clean Water Act provides some means for the federal government, under the U.S. Environmental Protection Agency, to address nurdle pollution in waterways.



These plastic pellets, or nurdles, were among those that spilled from derailed train cars in Hyattsville, MD, on Sept. 23. (Courtesy of the City of Hyattsville)

But a legal overview published after the Hyattsville spill points out that nurdles aren't federally classified as pollutants or hazardous materials, so no federal agency is expressly responsible for preventing or cleaning up the spills. Legislation that would require the EPA to prohibit the discharge of plastic pellets into waterways or during transport was introduced as recently as July but has not yet been passed.

Most nurdle pollution is found on beaches, where the pellets wash in on the tide from faraway plastic production plants or ships that have spilled them.

A cargo ship that sank off the coast of Sri Lanka in 2021 caused the largest known marine plastic spill to date, washing approximately 70 billion nurdles onto area beaches. Thousands of dead animals, including sea turtles, lionfish and dolphins, also washed onto shores. One dead fish was photographed with a mouthful of nurdles, which look a lot like edible fish eggs.

The Maryland Coastal Bays Program recently joined a national Nurdle Patrol campaign to track and remove nurdles that wash up on the state's coastline, but the program is in its early stages of assessing the problem locally.

In Hyattsville, residents who learned about the potential impacts of nurdles on wildlife and water quality began volunteering to clean up the pellets themselves.

Anacostia Riverkeeper Trey Sherard said that, while Hyattsville showed "some real

leadership" in managing the spill, he was disappointed in the pace of environmental agencies responding to it.

On Oct. 6, nearly two weeks after the spill, the riverkeeper sent an alert asking the public to write to the Maryland Department of the Environment.

In it, the riverkeeper said the agency's response nearly two weeks after the spill had been "inadequate." He called for protective measures such as silt fences to be installed to contain the nurdles and prevent rain from washing them into the nearest storm drain and the Anacostia River watershed.

MDE spokesman Jay Apperson said on Oct. 13 that the agency had conducted multiple inspections, including one by its water compliance and solid waste programs shortly after the incident.

"At our request, CSX has installed a silt fence as a precaution to keep the pellets, which are not classified as hazardous waste, out of the waterway," he wrote in an email. "MDE will continue to monitor this cleanup to ensure that the environment and public health is protected."

CSX hired a contractor to handle the environmental cleanup, and Hyattsville officials

confirmed that silt fences and storm drain covers had been installed by Oct. 11.

CSX spokesperson Sheriee Bowman said in an emailed statement that vacuum trucks and excavators would completely remove the pellets and any impacted soil. The city said all but six of the rail cars had been removed by then and the rest were being dismantled for removal.

"There is no risk to the public or to the environment. No waterways were impacted," the statement read. "The cause of the incident remains under investigation."

Riverkeeper Sherard said he takes issue with the "no risk" assertion. He would like local agencies to learn from this spill so that they can better respond to similar situations in the future.

"We haven't seen any nurdles in the water, but we weren't on the water during or after the tropical storm [Ophelia]," Sherard said. "We weren't looking, so we don't know if any escaped, and that's alarming."

Hyattsville's Zork said the CSX contractor reported finding no evidence of nurdles in nearby waterways or storm drains. The contractor and the city will continue to monitor the area, she said. ■

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Stream restoration draws fire for plan to carve up forest

Critics say Baltimore project would clear enough trees to cover three football fields

By Timothy B. Wheeler

Oak, tulip poplar, beech and sycamore trees stand tall and thick in Northeast Baltimore's Mt. Pleasant woods, largely shading the forest floor from the bright October sun.

But pink ribbons staked to the ground show where the leafy canopy is about to be torn asunder. Hundreds of trees are to be removed so heavy equipment can reach the western branch of Herring Run and re-engineer its channel. Nearly a mile of the tributary to Back River is in line for a \$5.5 million stream restoration project intended to help the city meet its obligation to reduce stormwater pollution and do its part to clean up the Chesapeake Bay.

But to Rob Schnabel, a watershed restoration scientist with the Chesapeake Bay Foundation, the plan to restore what appeared recently to be a gently flowing, clear stream "makes absolutely no sense." The Annapolis-based environmental group has called on the city's Department of Public Works to reconsider, arguing it will do more harm than good.

"Removing trees to restore a stream is chasing your tail," Schnabel said, as he and other CBF staff were joined by leaders of the city's forestry board and a local park friends group to walk the woods and voice their concerns to reporters.

The Baltimore stream project is just the latest example of what some say is a misguided statewide approach to dealing with stormwater pollution, which Chesapeake Bay Program computer models show is a significant and growing source of nutrient and sediment pollution degrading the Bay.

Stream restorations have been increasingly undertaken by localities in urban and suburban areas of the Bay watershed where development has led to intense runoff from pavement and buildings.

Experts say modifying stream channels can be effective at reducing the erosion that's sending sediment and nutrient pollution downstream. But scientists also have found ample cases where such projects did little to boost the waterway's ecological health. To make matters worse, they've found that the removal of trees and forest along the banks can worsen water quality, at least temporarily, while degrading upland habitat.

City documents provided by the



Rob Schnabel (left) and Doug Myers of the Chesapeake Bay Foundation say a project to re-engineer the western branch of Herring Run in Baltimore could do more harm than good. (Timothy B. Wheeler)

Maryland Department of the Environment say the project is intended to stabilize the stream and prevent the loss of sediment and nutrients downstream while protecting existing utilities and infrastructure.

But another goal is to maximize credits for complying with the requirements of the city's state-issued stormwater management permit. MDE approved the project in 2020, according to department spokesman Jay Apperson.

The Herring Run project will earn the city credit from MDE for treating polluted runoff from 90 acres of pavement and buildings in Baltimore, Schnabel said. But this and many other stream restoration projects won't do anything to reduce the underlying runoff problem, he argued. And getting through the woods to modify this stream will require the removal of 3.8 acres of woods, an area equal to approximately three football fields.

"This is a really good-looking forest," Schnabel said. "You've got some 100-year-old trees in there." Cutting them down will open the canopy to sunlight, he added, which will enable invasive vines and other plants to encroach and choke other trees.

Erik Dihle, retired city arborist and chair of the city forestry board, estimated that 600 or more trees would be removed, many of them 50 to 80 years old. But he said the loss could be even greater, with some trees

that aren't removed dying later from root damage caused by heavy equipment.

In response to an interview request, Mayor Brandon Scott's office issued a statement defending stream restorations in general while saying it is "actively exploring the least invasive ways to complete the work while adhering to all regulatory processes."

Documents submitted to MDE say the city plans to reforest the impacted woodlands by planting more than 600 new trees, along with new shrubs, elsewhere along the stream. But Tracy Smith, a board member of Friends of Herring Run Parks, expressed skepticism about such promises, saying trees replaced at another project site downstream had not survived.

Stream projects have sparked vehement debate in recent years throughout Maryland and Virginia. The underlying problem, said Doug Myers, CBF's Maryland senior scientist, is that the state allows localities to use stream restoration as a surrogate for directly addressing stormwater pollution. Under five-year permits MDE issued in 2021, Baltimore City and the state's 10 largest counties must collectively treat runoff from about 10% of their built landscape.

CBF and another environmental group, Blue Water Baltimore, are challenging the permits MDE issued for Baltimore City and Baltimore County, saying they fall short of what's needed to curb problems with flooding and runoff. They argued the case before the Appellate Court of Maryland in Annapolis on Oct. 11.

Stream restorations are "low-hanging fruit" to local officials, Myers said, because they can be done on land owned by the government. By giving such projects generous credits, the state lets localities avoid direct reductions of runoff from pavement and buildings, which is often more expensive and complicated by private ownership.

Experts say stream restorations in developed areas should be combined with measures to reduce runoff, such as stormwater ponds, rain gardens and tree plantings. The MDE website says the agency has incentivized such "holistic approaches."

But Schnabel said he was unaware of any upland measures planned with this project. He pointed to the Mt. Pleasant ice rink and golf course along the stream corridor as city-owned places where steps could be taken to curb runoff.

"They're chasing credits," he said, "not addressing the source of the problem." ■

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Accepting gavel, MD governor vows new approach for Bay

Chesapeake Executive Council held annual public meeting but took no major action

By Jeremy Cox, Timothy B. Wheeler & Karl Blankenship

Taking the helm of the policy-making body overseeing the Chesapeake Bay restoration effort, Maryland Gov. Wes Moore called for the federal government and states in the Bay region to dramatically redefine the focus and goals of the 40-year-old partnership.

The Democratic governor pointed to a recent sobering report by the Chesapeake Bay Program's own science advisors, which said that the state and federal partnership may be overestimating its progress toward reducing nutrient pollution. Existing strategies aimed at controlling stormwater runoff from farms and city landscapes are unlikely to reach their goals, a panel of the Bay's top scientists said in the May report.

Citing the recommendations in the *Comprehensive Evaluation of System Response*, Moore on Oct. 19 urged members of the Bay Program's Executive Council to take a "new approach."

"The report was very clear that the practices that reduce pollution have not been adopted at the scale necessary to achieve our targets — not showing it's too late, but showing that we have more work to do," Moore said.

He added that he agreed with the scientists' call to shift the effort's investments to be "less focused on restoring the Bay of the past and instead focusing on building a Bay and watershed of the future."

The Executive Council sets the top-line agenda for the Bay Program, a partnership between the federal government and the six states in the estuary's drainage basin. The council's members include the governors of Maryland, Pennsylvania, Virginia, West Virginia, New York and Delaware; the administrator of the U.S. Environmental Protection Agency; the mayor of the District of Columbia; and the chair of the Chesapeake Bay Commission, a bipartisan group of state lawmakers.

The meeting came as the Bay Program prepares to mark its 40th anniversary in December. But only two Executive Council members — Moore and Bay Commission chair Scott Martin — showed up. The other governors and the EPA administrator sent subordinates.

The gathering is often the setting for major policy announcements, such as the approval of a diversity and equity directive and the strengthening of the partnership's



Pennsylvania Sen. Scott Martin, chair of the Chesapeake Bay Commission, shakes hands with Maryland Gov. Wes Moore during the Chesapeake Executive Council meeting Oct. 19 at the National Arboretum in the District of Columbia. (Dave Harp)

approach toward climate change. This year, the council took no significant actions beyond appointing Moore as its new chairman while meeting at the National Arboretum in DC.

For some Bay advocates, though, Moore's words were enough.

"At this point, I think it's good to sort of hear the recommitment part," said Choose Clean Water Coalition Director Kristin Reilly. "It's going to take a lot more for us to see how that actually plays out. I didn't know if I fully expected to hear a new plan, how we're going to achieve that and if there's going to be a new agreement. I think that's [going to happen] over the next couple of years."

The Executive Council signed the current restoration agreement in 2014. They outlined 10 goals and 31 outcomes and set a 2025 deadline for many of them. It has grown increasingly clear in recent years that the effort is going to fall short of many of its objectives.

At the council's 2022 convening, leaders tasked top-level staffers with reporting back on ways to accelerate Bay restoration efforts. At this year's meeting, the council reviewed the resulting report, *Charting a Course to 2025*. It stresses that "significant progress" has been made over the last nine years toward achieving the outcomes

spelled out in the 2014 *Chesapeake Bay Watershed Agreement*.

Among the efforts on track or completed are those for reopening more stream miles for spawning fish, restoring oyster habitat in 10 designated tributaries and providing more public access to the Bay and its rivers.

Rough road ahead

But while 17 of those outcomes are already completed or on track to be reached by 2025, the report acknowledges that 12 are clearly off-course and two are uncertain because of insufficient information about their status.

Among the efforts falling short is the core commitment to have all actions in place by 2025 that are needed to meet nutrient and sediment pollution reduction targets. Others in trouble include "keystone" pledges to plant many more pollution-buffering trees along rivers and streams and restore more wetlands. Those actions are critical to achieving other restoration goals, the report notes, such as improving water quality, climate resiliency and habitat.

The report identifies challenges hindering efforts, repeatedly citing staff and resource shortages along with inadequate outreach and poor coordination among states or agencies. Agencies have also failed to prioritize certain efforts, it says.



Janet McCabe, deputy administrator of the U.S. Environmental Protection Agency, participated in the Oct. 19 meeting of the Chesapeake Executive Council in place of EPA administrator and outgoing council chair Michael Regan. (Dave Harp)

The 85-page report recommends steps for speeding up each lagging effort. It calls generally for increased investments in conservation and pollution reduction as well as fast-tracking action plans to accelerate progress.

But it doesn't suggest that any can be boosted enough in time for the 2025 deadline. An outpouring of federal funding from Congress in 2022 should help, it says. But it warns that continuing staff constraints may limit how fast more pollution-curbing projects can be completed.

Finally, in a nod to another report due in 2024, *Charting a Course* implies that at least some of the goals and outcomes set in 2014 need to be revisited when considering what to shoot for beyond 2025 — to make them more meaningful, or at least achievable.

"Ambitious outcomes are inspiring and can help drive change," the current report says, "but they must be established with a reasonable understanding of the costs, commitments and who is responsible for them."

As the Bay Program falls short of its 2025 nutrient reduction goal, it will mark the third time that the partnership has failed to meet a self-imposed cleanup deadline for nutrient pollution since its inception in 1983.

Still, supporters say that credit is due for simply holding the line — and even making progress in some cases — against the headwinds of a growing population and changing climate.

"These improvements were made despite the continuing and cumulative impacts of climate change, population growth, increased agricultural production and development, which have impacted the level of effort needed to meet these restoration goals," said Janet McCabe, the EPA deputy administrator who attended in the place of Administrator Michael Regan, the council's outgoing chair. "So, we have to look at our net progress, right?"

"I think there's a lot to be proud of here," McCabe added. "But we still literally have significantly more work to do."

If Moore and others have their way, that work may look different after 2025.

Beyond the 'dead zone'

For decades, the partnership's toil has largely been aimed at a narrow target: reducing the size of the summertime "dead zone" in the Bay's deepest waters. A dead zone is an area of water with so little dissolved oxygen in it that any creature that can't flee is at risk of suffocating.

The cause extends throughout the estuary's 64,000-square-mile watershed. Farms, wastewater treatment plants and growing



As part of their October meeting, the Chesapeake Executive Council and other government officials toured nearby stormwater retrofits with Steve Saari (left) of the District Department of Energy and Environment. (Will Parson/Chesapeake Bay Program)

urban areas release a glut of nutrients and sediment. Washed into the Bay by stormwater runoff, the pollution fuels massive algae blooms that suck oxygen out of the water column when they die.

The *Comprehensive Evaluation of System Response*, drafted over four years and endorsed by more than 60 current and former members of the Bay Program's Scientific and Technical Advisory Committee, calls for a more holistic strategy.

It advocates for greater focus on shallow areas of the Bay and tributaries — places where improvements would likely be realized more quickly. Those shallows serve as the nursery grounds for fish and other aquatic life, so such an approach should give the Bay a big biological lift as well, the researchers said in the report.

"We have to redouble our work, for sure, but focus on the living resources that we and the aquatic life interact with," said Adam Ortiz, administrator of the EPA's Mid-Atlantic region, in an interview. "What's emerged over the 40 years of the partnership is the importance of local water systems, that they have to be viable, that they have to have a habitat that people can access in a sustainable way."

By shifting efforts more toward waters that people see, Ortiz and others hope to glean more public support for the improvements.

"It connects people with their resource, so they become champions for it," he said. "It's a strategic shift in emphasis but one that's much more meaningful to people than the Bay, which [for many] is an abstract concept. Rather, it's something that's

literally right in our backyard."

Moore said that future efforts should emphasize improving the welfare of communities within the watershed, especially those that have been historically underserved. He compared the Bay to an heirloom passed on from one generation to the next.

"We're going to take this heirloom, and when it's time to pass it off, it's going to be even better, brighter, shinier and cleaner than the heirloom that we inherited from those who came before us," he said.

Sowing concern

Meanwhile, the Executive Council did not address a request to elevate the role of the agricultural community within the Bay Program. With the region's farmers being expected to achieve the vast majority of future nutrient reductions, state agriculture secretaries have called on the Executive Council to give them a larger voice in the cleanup effort.

In a July 28 letter to Ortiz, agriculture secretaries from all six states in the watershed asked for the creation of an agriculture advisory committee within the Bay program. Although 83,000 farms cover a quarter of the Bay watershed, generating the most nutrient runoff reaching the Chesapeake, the agricultural community has relatively little say in the Bay Program and most involvement takes place at relatively low levels.

The Bay Program already has three advisory committees representing local governments, science and stakeholders in general. They report directly to senior decision makers, including the Executive Council.



Kristin Reilly of the Choose Clean Water Coalition was glad that the Chesapeake Executive Council reaffirmed its commitment to the Bay but said it will "take a lot more" to see what comes of it. (Dave Harp)

But the agriculture secretaries said in their letter that "none of those committees fully represent agriculture." The broader farm community frequently expresses frustration that many in the Bay cleanup, and the public at large, have a poor understanding of farming.

"So," they wrote, "it's critical that programmatic decisions are vetted by the men and women of agriculture who have an in-depth understanding of farming operations and best management practices for agricultural conservation."

Their letter did not say who would serve on such a group, but discussions at Bay Program committees suggest it could include state and federal agricultural agency officials, farmers, industry representatives and agriculture specialists from nonprofit organizations.

Engaging with the farming sector will be critical in determining the success of the cleanup, said Chesapeake Bay Foundation President Hilary Harp Falk.

"Scientists have made clear that to achieve a healthy Bay we need to welcome innovation and creative approaches, as well as invest in projects with verified benefits for the region's waterways," she said in a written statement. "More than 90% of remaining pollution reductions needed to meet Bay restoration goals must come from agriculture. Working with the agricultural community is key to success, as well as investment in farm conservation practices in the Federal Farm Bill and state programs." ■

Salt patches spreading rapidly on Delmarva farmland

Amount of Eastern Shore cropland hit by saltwater intrusion nearly doubled over a six-year period

By Jeremy Cox

Climate change is claiming farmland at “an alarmingly high rate” in one of the Mid-Atlantic’s most productive agricultural regions, inflicting tens of millions of dollars in economic damage, a team of scientists says in a new study.

Their research on the Eastern Shore of the Chesapeake Bay spotlights a pernicious side effect of sea level rise: the salt left behind from water washed onto land during storms or unusually high tides. The resulting salt patches, supercharged by evaporation, can poison large swaths of cropland, reducing yields and farm profits.

From 2011 to 2017, the amount of Delmarva Peninsula farmland that converted into salt patches nearly doubled to more than 2,200 acres, the study estimates. That translates into as much as \$107 million in annual crop losses in the region, the researchers say.

“Saltwater intrusion is far more extensive than I think we originally anticipated,” said Kate Tully, an agroecologist at the University of Maryland and one of the study’s authors. “There is an important need for us to come up with a suite of solutions for farmers and landowners on the Eastern Shore.”

The study, published by *Nature Sustainability* in July, shows that farms located in low-lying areas along tidal bays and creeks are most at risk. Rather than overtaking



Researchers say that rising sea levels have created approximately 2,200 acres of salt patches on Delmarva Peninsula farmland. (Paul Leoni)

entire fields, the salt appears to be slowly eating away at the edges, another team member said.

“It’s not like you lost half a field,” said Jarrod Miller, a soil expert at the University of Delaware. “It could have been just a foot along the edge of these fields. But when you add it up, it’s a lot of acreage across the region.”

In affected areas, the patches show up as areas of bare white sand and salt. In cases where salt has just begun to invade, there still may be intermittent sprigs of vegetation.

The research group, which also includes members from George Washington University, has been studying threatened farmland on the Delmarva Peninsula for more than five years. Tully, Miller and their colleagues have been working to map the extent of saltwater intrusion, predict its path and test the viability of more salt-tolerant crops, such as sorghum and switchgrass.

The peninsula stretches more than 170 miles, separating the Chesapeake Bay and Atlantic Ocean. It encompasses all of Delaware, as well as parts of Maryland and Virginia. Corn and soybeans dominate the landscape during the growing season. The grains are almost exclusively grown to feed not people, but chickens, which are raised to supply Perdue, Tyson and other meat companies in the region.

Some of the land has been under intense

cultivation since the 1600s, when European settlers began establishing farms.

In their latest study, the team used aerial photographs, satellite imaging and soil-sampling to estimate the spread of salt patches. Employing machine learning, they also developed software that can identify, with 85% accuracy, different types of land cover from the satellite-derived data.

Across Delmarva, the salty land’s expansion came quickly. In Maryland, the patches each grew by about 80% over six years, surpassing 1,000 acres by 2017. There was far less impacted farmland on the Eastern Shore of Virginia, but the 300 acres recorded that year represented a 243% increase since 2011.

The influx of saltwater can reach surprisingly far inland. The highest jump was in Maryland’s Caroline County, Delmarva’s only land-locked county. Salt patches there expanded by 450%.

The salt patches remain a minor part of the landscape, accounting for well below 1% of the total farmland in any given county. But salt is only part of the story across the peninsula. During the study period, 20,000 acres of farmland converted to marsh, an area about half the size of the District of Columbia.

The researchers were stunned by the pace of change.

“This is a rapidly evolving landscape,” said Pinki Mondal of the University of

Delaware, the paper’s lead author. “We can’t wait and watch what is going on.”

Mondal has developed a mobile app to display Delmarva’s change in land cover from 2011 to 2017. Salt patches are delineated in purple and farmland in orange.

Randy George, a retired neurosurgeon, has owned about 460 acres of land in rural Somerset County, MD, along Gales Creek, since the mid-1980s. He lives in a farmhouse that dates to the 1700s and leases about 200 acres to a grain farmer.

Mondal’s mapping shows only a few flecks of purple invading the orange on George’s acreage as of 2011. By 2017, purple streaked across his land in broad brushstrokes.

“It’s a losing battle,” George said. “It’s not that we’re being flooded all the time. We’re being flooded occasionally, and that’s enough.”

Mondal said it’s probable that the impact of saltwater intrusion is wider than what is visible. Soil samples that researchers collected at 36 farm sites in 2019 indicated high sodium levels up to several hundred feet away from some of the visible salt patches. Crops in these “at-risk” zones are almost certainly under stress, according to the study.

To gain a sense of the scope of these invisible intrusions, researchers calculated how much farmland on Delmarva lies within 200 meters (656 feet) of the patches that can be seen by the eye. The answer: more than 400,000 acres.

Farmers impacted by saltwater intrusion have a few options to delay its onset, Miller said. They can install tide gates on their ditches, which can be opened to allow water to drain off the land and closed to prevent tidewater from infiltrating. Farmers can also spread calcium sulfate (gypsum) onto their fields. That loosens the soil’s grip on sodium, enabling rain to wash it away, the University of Delaware researcher said.

The scientists say they studied Delmarva because it is experiencing sea level rise effects earlier than many other places. Water there is rising faster than the global average along that portion of the North Atlantic. Meanwhile, much of the region’s land is sinking — as it has been by a millimeter or two per year since the end of the Ice Age, likely accelerated by modern-day draining of aquifers. ■



Amid a salt patch on the Delmarva Peninsula, a close-up view reveals cracked, dry earth. (Paul Leoni)

PA to crack down on ‘forever chemicals’ in streams and rivers

Contamination linked to electronics manufacturing, wastewater, stormwater runoff, fracking

By Ad Crable

After a statewide survey showed that 76% of 161 tested rivers and streams were contaminated to some extent with PFAS, or “forever chemicals,” the Pennsylvania Department of Environmental Protection said it will set safety thresholds for the chemicals in surface waters.

PFAS is the shorthand term for per- and polyfluoroalkyl substances, a group of about 9,000 chemicals widely used in consumer products, from nonstick cookware and stain-resistance products to water-repellent clothing and even food packaging.

The U.S. Environmental Protection Agency says that high concentrations of PFAS may pose health risks in people and animals. Preliminary studies on animals have shown harm to the immune system, disruptions in reproductive and fetal development, hormone disruption and increased risk of cancer.

Ten states, including Pennsylvania, have set safety limits for levels of PFAS in drinking water.

But until now, only Michigan, Minnesota and Florida have adopted thresholds for the chemicals in surface water. A study by a Vermont state agency warned that setting mandatory limits on PFAS in surface water is “logistically difficult, would take a long time and be very expensive.”

Pennsylvania’s DEP said it would ramp up monitoring of waters where the chemicals were found and would require some wastewater treatment plants to monitor for PFAS. The agency said the standards for PFAS in streams and rivers would mandate limits on known discharges through industrial discharge permits.

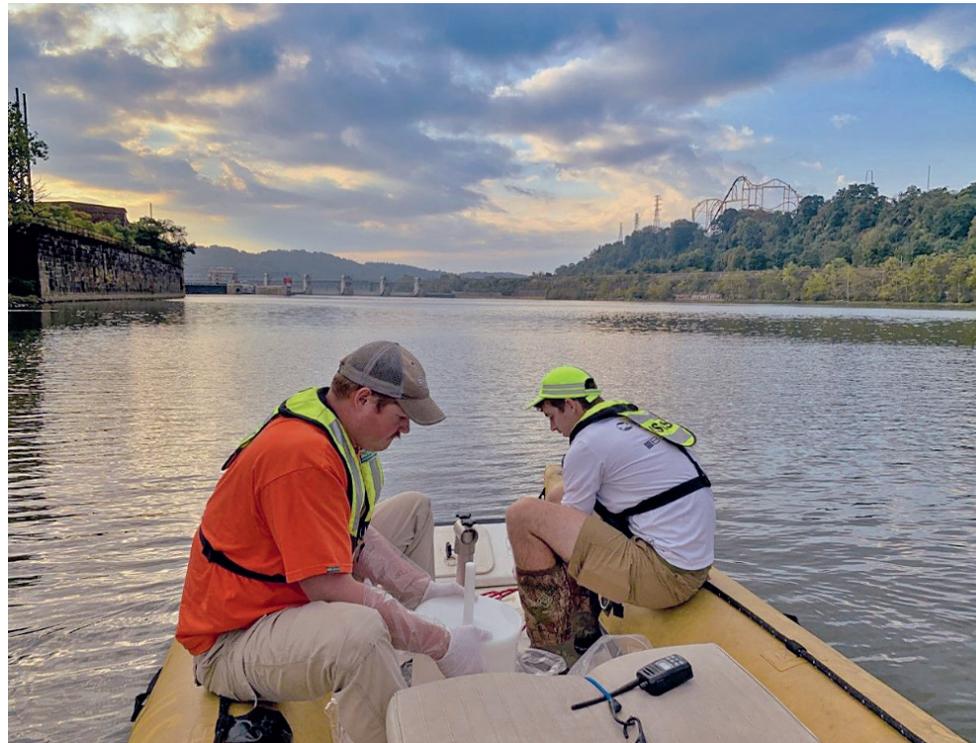
A fish consumption advisory was issued for one stream, Neshaminy Creek in the Delaware River watershed, as a result of the study.

The water samples, collected by DEP in collaboration with the U.S. Geological Survey, were tested for 33 different chemicals.

Researchers said results pointed to several likely sources of contamination.

Electronics manufacturing, wastewater treatment plants and developed areas with stormwater runoff appeared to be top sources in urban areas.

“This is the first statewide study that associates electronics manufacturing as a source of PFAS in streams. [It] is likely



Hydrologic technicians for the Pennsylvania Water Science Center collect water samples from the Monongahela River near Braddock to be tested as part of a statewide survey for PFAS chemicals in surface water. (Lowell Abbadini)

an underrecognized but significant source of PFAS contamination,” said Sara Breitmeyer, a USGS chemist and lead author of the study. “Our study contributes new information on PFAS sources to surface water in Pennsylvania, which will help regulatory agencies address the growing concerns of PFAS’s ecological and human health impacts across the state.”

In some rural areas, DEP said, the chemicals may have come from natural gas fracking operations. The fluids and foams used for drilling and hydraulic fracturing of gas wells can contain PFAS, the study points out. In towns with combined sewage systems, heavy rain can cause stormwater and wastewater to mingle. If the stormwater runoff contains PFAS, it could then enter the wastewater stream, too, and become part of the discharge from treatment plants into local waters.

“To the best of our knowledge, this study provides the first description of PFAS associations with the local catchment sewer infrastructure in rural oil and gas development regions,” the study concludes.

Runoff from farmland may also be contributing, it says.

“This study has expanded our understanding and will assist in determining

what steps need to be taken in addressing issues associated with this emerging contaminant,” said DEP Secretary Rich Negrin. “Our findings have already helped and will continue to guide DEP’s actions regarding where to focus resources on identifying, tracking and addressing potential sources of PFAS contamination.”

Pennsylvania’s plans to control PFAS chemicals in surface water were applauded by the Environmental Working Group, a nonprofit organization based in the District of Columbia that strives for a healthier environment.

“States are in the best position to regulate industrial discharges of PFAS into the air and water, including surface water. Surface water criteria will make it easier for states to permit polluting facilities, reduce overall dischargers and take enforcement actions against the facilities that contaminate our rivers, lakes and streams,” said Melanie Banesh, vice president of government affairs for the group.

The EPA and many state agencies are scrambling to develop regulations and find local sources of the chemicals, which are prevalent in the environment due to their wide-ranging use. Many forms of PFAS break down very slowly, allowing them to



Ten states have set safety thresholds for PFAS levels in drinking water, but only three have done so for surface water like streams and rivers. Pennsylvania has just announced plans to become the fourth. (Timothy B. Wheeler)

persist in the environment for many years and bioaccumulate in people and animals.

In March 2023, the EPA announced its intent to establish legally enforceable levels for six PFAS chemicals known to occur in drinking water. The standards have yet to be announced.

In other Bay drainage states, neither Virginia nor Maryland have adopted minimum levels of PFAS chemicals allowed in drinking water or surface water.

Maryland has issued fish consumption advisories for several bodies of water because of the presence of PFAS. It also enacted a law that prohibits the manufacture or sale of fire-fighting foam that contains PFAS. It also outlaws the manufacture or sale of certain PFAS-treated rugs and carpets, as well as use of the chemicals in certain food packaging, after Jan. 1, 2024.

The Virginia Department of Health is monitoring public water providers. Public water systems that detect PFAS in their drinking water are advised to take steps to inform customers, look for the sources of high levels of contamination and “examine steps to limit exposure.” ■



Endangered species lists in Bay region reach all-time high

Scientists and resource managers face challenges finding, protecting rare plants and animals

By Ad Crable

Jessica McPherson, a botanist with the Pennsylvania Natural Heritage Program, was celebrating a wedding anniversary with her husband on a hike in Pennsylvania's Laurel Highlands in June. Along their route, she noticed an unusual grasslike plant with a bright reddish-purple stem.

She took a photo and conferred with a leading plant authority when she returned to her office. The plant turned out to be a purple sedge, never before recorded in Pennsylvania. It will be added to the state's endangered species list.

The discovery of the rare plant was cause for celebration among Pennsylvania's ecosystem caretakers. But the plant's existence in the state for perhaps centuries, unbeknownst to even the most ardent botanists, indicates the unknowns and uncertainties facing public agencies tasked with finding and protecting rare plants, animals, birds, fish, insects, amphibians and reptiles.

In the Chesapeake Bay region, states such as Pennsylvania, Maryland and Virginia have added protective laws and funding to keep common species common and save dwindling species.

But the species they champion face increasing threats. The agencies cite unrelenting destruction and fragmentation of key habitat, as well as diseases; invasive plants, insects and animals such as wild boar and nutria; impacts of overabundant deer; the poaching and illicit sales of rare specimens; and a changing climate.

"Unfortunately, in conservation you often thrive on small victories, while being surrounded by catastrophic losses," said John Kleopfer, state herpetologist with the Virginia Department of Wildlife Resources.

No wonder the endangered species list for all three states is at an all-time high. Pennsylvania is about to add 11 native plants to its endangered list. Virginia in recent years has placed the Piedmont fameflower,

black rail and rusty patched bumblebee on its critically imperiled list.

Altogether, Pennsylvania has 428 living organisms in danger of disappearing from the landscape. Maryland has 346 and Virginia, which uses a "critically imperiled" category, has 873.

The majority of endangered species in each state are plants, partly because there are so many of them. In Pennsylvania, for example, there are approximately 3,000 species of plants — more than four times the number of mammals, birds, amphibians, reptiles and fish species combined.

Only species facing the most critical concerns land on the states' endangered lists. There are other less dire categories for species considered threatened, rare or vulnerable.

There are also what biologists call extirpated species: animals and plants that have vanished from an area they once occupied. Mountain lions and gray wolves, for instance, have been considered extirpated in the eastern U.S. since the early 1900s.

Lesser-known species continue to wink out in modern times. Pennsylvania has a list of more than 100 extirpated plants and will add five more this fall: the two-seeded copperleaf, hazel dodder, retrorse flatsedge, broad-leaved beardgrass and slender bladderwort.

Data gaps

During heightened environmental awareness in the 1970s and early 1980s, Virginia, Pennsylvania and Maryland passed laws requiring various agencies to determine the status of living organisms and protect them from disappearing.

But keeping tabs on plants, animals and insects has been a difficult business from the start. Despite advances in technology, resource managers say they don't know how many of the states' species are faring or, in some cases, if they still exist.

Above photos, clockwise from left:

The Piedmont fameflower, an endangered species in Virginia, grows in the Bald Knob Natural Area on land the state purchased to protect the flower from being trampled. (Virginia Department of Conservation and Recreation)

An eastern tiger salamander nestles among leaves. (John P. Clare/CC BY-NC-ND 2.0)

A rusty-patched bumblebee visits a flower. (Trisha Leaf/CC BY 4.0)

A diamondback terrapin enjoys a protected life at the Terrapin Institute in Maryland. (Ryan Haggerty/U.S. Fish & Wildlife Service)

Mammals and birds have been pretty well-monitored through the ages, with sightings on file sometimes going back 200 or more years. But people haven't been looking for or tracking many less charismatic but more numerous species such as mussels, moths, beetles, amphibians and especially plants. For example, Pennsylvania listed the St. John's wort as extirpated because no had reported seeing it since 1920. It was rediscovered in 2021.

Some plant species with very specific habitat requirements exist in tiny and isolated communities. Some mammals, such as voles and shrews, spend almost their entire lives underground and out of sight. So do reptiles and amphibians.

Some species of flatworms only live in a single cave. In Virginia, the endangered harperella plant has been found only in rock crevices on the Quantico Marine Base.

And although state agencies are constantly sending parties out to confirm sightings of various species, they don't have enough funds or staff to meet monitoring needs.

"We haven't crawled into every last corner, and there are still surprises out there," said Jonathan McKnight, associate director of the Maryland Wildlife and Heritage Service. "Rediscovery of species is not incredibly uncommon, particularly with plants. We will continue to find species in Maryland that we did not know were there."

The Pennsylvania Natural Diversity Inventory has confirmed the presence of 400 spider species in the state. "However, based on predicted ranges, hundreds more species probably occur," the document says.

When Virginia started its endangered species program in the 1980s, it declared 369 dragonfly species critically imperiled based on minimal reported sightings. But when field surveys were done over the years, it turned out that many were quite common and were removed from the list.

Many secretive reptiles and amphibians faced the same initial lack of inspection. But public interest grew in recent decades and reports of sightings have increased.

New aids

In recent years, technology has provided some tools to scientists who are seeking and boosting populations of endangered species.

One of the most helpful aids in aquatic settings has been environmental DNA, or eDNA. Free-floating bits of DNA found in water samples can be used to determine the presence of a species in a particular waterway. The method has detected threatened fish, turtles, salamanders and mussels.

For some species, seeds or eggs are taken into labs where they can be placed under ideal conditions for propagation. That's helped expand and start new populations of freshwater mussels in Virginia.

In Pennsylvania, researchers have been using drones since at least 2018 to find rare plants and animals in places such as rock cliffs and large wetlands, where scientists can't go on foot.

The Pennsylvania Natural Heritage Project has teamed with the Carnegie Museum of Natural History to fit evening grosbeaks with solar-powered transmitters. This allows them to track the birds' winter movements to try to find out why they have declined by 92% in Pennsylvania since 1970.

Volunteers from the Pennsylvania Plant Conservation Alliance collect seeds from Jacob's ladder, a globally rare plant. They are propagated at Longwood Gardens near Philadelphia, then planted in the Poconos to strengthen wild populations.



Fire specialists with the Virginia Department of Conservation and Recreation conduct a prescribed burn at Chub Sandhill Natural Area Preserve to help rare plants that depend on periodic fires to survive. (Virginia Department of Conservation and Recreation)

A changing climate

Global warming and extremes in weather are often bad news for vulnerable plants and wildlife.

"As our climate changes, some state-listed species with very specific requirements for growing conditions will certainly suffer. This includes species that are at the southern edge of their range in Pennsylvania and prefer a cooler climate like that found in the upper Midwest or northeast United States," said Kelly Sitch, an ecologist with the state Department of Conservation and Natural Resources.

The blue false indigo plant is already being affected, said Cheyenne Moore, a DCNR ecological program specialist. It grows only along the Allegheny River and tributaries that are kept open by scouring from ice breakups. But in recent warm winters, the waters have not iced over, allowing other vegetation to dominate the shores. Also, extreme rainfalls have inundated the plants when they should be flowering, preventing them from reproducing.

The Pennsylvania Natural Heritage Program recently assessed climate change vulnerability for 85 species of animals, fish, plants, birds, reptiles and amphibians. Some 37 species were rated as extremely or highly vulnerable, including the eastern hellbender, the state amphibian. Other species are expected to have resilience, and a handful of bird species will likely see population increases. But much remains unknown.

For birds across the Chesapeake region, scientists are concerned that changing and variable climate patterns will alter food sources and habitat and will no longer be timed for when migratory birds arrive.

In Maryland, sea level rise is already impacting such endangered species as the diamondback terrapin and the black rail, a shorebird highly dependent on marsh habitat.

In Virginia, many rare plants exist where brackish water meets fresh water. "They are disappearing because of sea level rise," said Anne Chazal, chief biologist at the Natural Heritage Inventory run by the Virginia Department of Conservation and Recreation.

Higher up, on mountaintops, Virginia scientists are worried about the fate of Shenandoah salamanders, one species in a category known as "sky island" salamanders, which can survive only in the specific temperature ranges of high altitudes. They live most of their lives in a small area, sometimes under a single log. "They simply have nowhere to go and don't disperse well," Kleopfer said.

"A dozen species of salamanders will go extinct in the next hundred years because of climate change," he predicted.

Invasive species can also gain prominence in a changing climate, causing problems that ripple through the ecosystem. In the Bay region, "a rapidly changing environment favors invasive species that come through the door where the ecological balance is screwed up," said McKnight of the Maryland Wildlife and Heritage Service.

Success stories

Although threats to the most vulnerable species in Bay states show no signs of going away any time soon, there have been success stories from protection efforts.

In Maryland, the American tiger salamander exists entirely in circular shallow-water depressions known as Delmarva bays that are found in sand on the Eastern Shore. For generations, farmers routinely dried out these wetlands with trenches and drain tiles. Roads were built through them. Working with landowners, Maryland officials have purchased and restored a number of Delmarva bays. In some, eggs have been recovered from mating salamanders and used to jump-start others.

At Soldiers Delight Natural Environment Area north of Baltimore, controlled burns are helping to bring back 39 species of rare, endangered or threatened plants that evolved when fires on the landscape were common.

Virginia has been strategic about buying land to protect species under threat. One example is the Bald Knob Natural Area Preserve in Franklin County. The Piedmont fameflower is found on a bare knob there and in only a handful of other places on the globe. Worried that the rare plant, located on private land popular for its views, would be trampled to death, the state bought 112 acres in 2016. Trails that avoid the plant are in the works.

In the Blue Ridge Mountains, Virginia has protected sinkhole ponds, helping to stabilize populations of the Virginia sneezeweed plant.

Some 65 other preserves have been created expressly to preserve biodiversity in the state.

Although they are required to protect endangered species, state agencies in Maryland, Pennsylvania and Virginia don't have regulatory power to stop construction projects for adversely affecting state-listed endangered species. But they consult with developers about their concerns, which sometimes leads to altered plans that avoid or at least mitigate harm to the rarest living things in their state.

For example, when it was discovered that a wind farm project would have impacted the threatened Allegheny plum plant on a rock outcrop, the Pennsylvania Department of Conservation and Natural Resources worked with developers to reconfigure the site design to avoid the spot.

In another case, agency officials got developers of an oil well project to change the locations of an access road and well pads to leave a buffer around the threatened red currant plant. ■

It's not the end of road for section of abandoned PA Turnpike

Old route, 2 tunnels to become a trail for hikers, cyclists

By Ad Crable

An 8.5-mile abandoned section of the Pennsylvania Turnpike — with two tunnels that have for decades attracted a cult following for its post-apocalyptic feel and vast graffiti canvas — will be converted to a public bicycling and hiking trail.

In September, top executives of two state agencies stood with local officials at the entrance to the 1.2-mile Sideling Hill Tunnel to announce \$726,000 in federal, state and local funding for a project to make the eerie abandoned highway and railroad grade available to the hiking-bicycling public. The announcement comes more than 20 years after various failed plans to make the crumbling abandoned roadway and two derelict tunnels accessible to the public. (The tunnel at Sideling Hill is not to be confused with the excavated mountain gap in Maryland, also known as Sideling Hill, where Interstate 68 cuts through the same ridge in the eastern Allegheny Mountains, but about 25 miles farther south, just across the state line.)

“This is a great project that comes only once in a lifetime,” said Michael Chapaloney of the Pennsylvania Department of Community and Economic Development during the announcement at the tunnel entrance.

“I knew it would always happen. The trail is so incredibly unique and fantastic,” said Murray Schrottenboer, who used to lead bicycle tours on the abandoned road and helped head an earlier effort to preserve it. “It had no choice but to finally break through and really become what it should.”

The project, referred to as the Old PA Pike Trail, will be headed by the Bedford-Fulton Joint Recreation Authority, formed by Bedford and Fulton counties. Officials want to link it to the large network of existing bicycling and hiking trails in the area. One trailhead will be developed at the Sideling Hill Travel Plaza on the Pennsylvania Turnpike (with access via local roads) 1 mile north of the old turnpike and 2 miles from the Sideling Hill Tunnel. Another trailhead is planned near Breezewood to the west, beyond the second tunnel at Rays Hill. Lighting will be added in both tunnels.



Hikers approach the Sideling Hill Tunnel on a winter day in 2010. (Jason Pratt/CC BY 2.0)

Abandoned lure

Ever since the stretch of the Pennsylvania Turnpike was abandoned in 1968, it has increasingly attracted modern-day explorers to its disintegrating pavement — encroaching trees and vegetation in places — and its pair of dark, dripping, echoing tunnels. Its post-apocalyptic appearance has drawn filmmakers, notably for the movie based on Cormac McCarthy's novel *The Road*.

Schrottenboer remembers poring over a topographic map in 1998, searching for places to ride his mountain bike and seeing a spot labeled “abandoned turnpike” and another marked as “abandoned tunnel.”

“I thought, oh my God, I have to go there,” he recalled. “There’s no sign of civilization,” he said of his first visit. “This road is ruined and with woods on both sides and you come to tunnels with no lights. That’s what I thought would draw people.” Beyond hikers and bicyclists looking for outré

experiences, use of the abandoned right of way has been diverse and offbeat: testing roll-over vehicle crashes and calibrating truck brakes; military training exercises; training snow plow drivers; testing rumble strips and reflective road paint; and storing large quantities of Jersey barriers.

And you never know who else has found their way to this unearthly place. In 2015, Jeffrey Shubert was cycling with his family when he heard faint but beautiful sounds coming from the end of the Sideling Hill Tunnel. It was a local Mennonite choir rehearsing a cappella.

An estimated 20,000 people explore the forgotten highway each year.

Making the roadway and tunnels safe for visitors will be one of the first uses of money, said Jim Edwards, chair of the recreation authority, adding that some of the less “family-friendly” graffiti will be removed. “Our problem is it was abandoned for



A photo of a Goodyear Tire newspaper ad from the late 1950s shows traffic entering and exiting the Sideling Hill Tunnel a decade or so before it was closed. (Brian/CC BY-NC 2.0)

so many years and people came in to do whatever they wanted to,” he said.

The proceed-at-your-own-risk adventure will continue to be allowed from dawn to dusk, but visits outside of those times will be considered trespassing, he said.

Long transportation history

The new trail would be the third incarnation of this path through the heavily forested mountains of southcentral Pennsylvania. The route was first cleared, and tunnels built, in the early 1880s for a new railroad by tycoons William Vanderbilt, Andrew Carnegie and Henry Oliver — to challenge the thriving Pennsylvania Railroad nearby. But in 1885, fearing a divided rail system might sink both, financier J. P. Morgan mediated a settlement that halted construction of the new railroad, which was 60% complete. The right of way through the mountains lay unused until the 1940 opening of the 160-mile Pennsylvania Turnpike, celebrated as the nation's first super highway. Seven tunnels in all were dug through mountains.

But while the highway was two lanes in each direction, it narrowed to one lane in each direction through the tunnels, creating massive bottlenecks. Annual traffic swelled to 31 million vehicles by 1960 — more than 24 times the volume engineers had anticipated.

Consequently, extra tunnels were built at some locations, but the Sideling Hill and Rays Hill tunnels were bypassed with nearby overland routes. All told, a 13.5-mile stretch of the turnpike, including the two tunnels, was abandoned in 1968.

The effort to convert the turnpike and tunnels to trails dates back to at least 2001, when the Pennsylvania Turnpike Commission sold the right of way for \$1 to the Southern Alleghenies Conservancy.

But the Pike2Bike Trail effort that arose from that failed to get traction, mostly, some observers have said, because of Fulton County's reluctance to invest in a project that would primarily benefit tourism in neighboring Bedford County. But Fulton County (where the Turnpike Plaza trailhead is planned) is now on board, and the Southern Alleghenies Conservancy has turned over ownership to the Bedford-Fulton Joint Recreation Authority.

The total cost to complete all of the rehabilitation and development needed to turn the spot into a unique national destination could reach \$18 million. ■

Biologist, nonprofit leader is 'crusader for aquaculture'

Imani Black aims to rally interest, opportunities through nonprofit group, Minorities in Aquaculture

By Jeremy Cox

Editor's note: This interview is the first in a series highlighting young professionals at work in the Chesapeake Bay arena. Look for audio versions in upcoming episodes of our Chesapeake Uncharted podcast.

Imani Black has saltwater in her veins. Her family tree boasts a great-great uncle who harvested oysters off Maryland's Dorchester County as far back as the 1800s. The ensuing decades were populated by a mix of uncles, cousins and grandfathers — all engaged in some fashion in the Chesapeake Bay's seafood industry. Now, it's just her.

Recent decades have seen African Americans virtually disappear from workboats, shucking houses and docks around the Bay. Black, a native of Maryland's Eastern Shore, is working to bring them back.

After graduating from Old Dominion University with a degree in marine biology, she worked for oyster aquaculture operations in Virginia and Maryland. Black loved the work. But she often felt lonely and discouraged as the only woman or person of color on staff.

In 2020, she founded Minorities in Aquaculture. The group has amassed scores of members and raised tens of thousands of dollars to support mini-grants and internships for women interested in careers in the industry. Meanwhile, Black plans to complete her master's degree from the University of Maryland in January. Her thesis: a history of African Americans who worked and continue to work on the Bay.

Black spoke with the *Bay Journal* at the UMCES Horn Point Lab outside Cambridge, where she has been working to grow and breed oysters in the facility's hatchery. The interview has been edited for length and clarity.

Question: What's your Chesapeake Bay origin story?

Answer: Growing up on the Eastern Shore and being in a coastal community, a lot of my childhood activities were around the water or seafood. My family used to go fishing every Sunday together. But I got really interested in Chesapeake Bay restoration when I was 7, at a science camp here at Horn Point. That's really where I fell in love with the Bay and started to understand that this is something that I might want to do as a career.



Marine biologist Imani Black founded the nonprofit organization Minorities in Aquaculture. (Dave Harp)

Q: What led you to pursue a graduate degree in environmental science?

A: I unexpectedly lost my job in 2020. That was a really pivotal moment in my life. That was right when the Black Lives Matter movement started to get off the ground. That really affected me as a person of color. I was asking myself, was I set on the career that I was dedicating my life to? Did I really feel like it was safe? Did I really feel like it was inclusive?

I can only speak from my experience, right? But for me, there was this conflicting moment when I realized it didn't really matter what skin color I had. It only mattered that I was a female. I had gone from the Chesapeake Bay Foundation, which was a team full of women, to the commercial end, which was not like that. I was the only woman out of 25 guys on an oyster farm — besides, you know, the owner's wife. I had to learn how to survive in that atmosphere and dig my heels in and be like, "No, I'm here, and I can do this."

Q: What is your goal with Minorities in Aquaculture?

A: It just started with wanting to find other women of color who were in my space. I'd never worked with another woman of color who was in a leadership role or who owned a farm or was a hatchery manager

or anything like that. I started asking people who they knew who was a person of color in that role, and no one could give me an answer. It just sort of exploded from there. Now, we're really the bridge between underrepresented demographics and the workforce development of aquaculture.

Q: You're using the term "minorities." How do you define that term?

A: I've had to think about the definition of minorities a little bit differently from most people. Some people in my community don't like the word "minorities" because it automatically puts us kind of in that "other" [category]. I know it is a trigger. But we're also about diversification of skill, diversification of ideas and knowledge. So, for us, it's the underrepresented demographics of aquaculture, specifically. Women in general, are an underrepresented group. Women of color are obviously a double minority. There are also men of color, LGBTQI-plus, disabilities, prison reform — it's all the things that we're trying to bring into that space now.

Q: Why did you choose the Bay's Black history for your master's project?

A: My overall thesis is looking at the historic involvement of African Americans and the Chesapeake's big commercial fisheries. That story has been hot these last

couple of years. A lot of people want to write about it. I love the spotlight on it. But for me, there hasn't been a recent write-up of the experiences of Black captains written by an African American — by someone in our community telling the story of our community. I really want to find out what were the domino effects of how did we go to now only having 12 Black captains.

Q: How do you approach the research?

A: My data, in that sense, is oral histories. That's a common thing for anthropology. But it's super powerful because those 12 Black captains have never been recorded and never been asked about their experience. Like, what was it like for you? How did you get into it? How long have you been into all those things? I'm interviewing them as well as Bay historians, naturalists, journalists, authors and members of historically Black fishing communities.

Q: What are your thoughts on the Chesapeake Bay restoration? Do you think it's heading in the right direction?

A: Definitely, for sure. Being here at Horn Point, I'm surrounded by colleagues who are doing really great research. But I think, for me, we're heading in the right direction because social sciences are getting involved. People are not only just caring about the Bay and the ecological changes that have happened, but they're caring about how those ecological changes have changed our community. We can't move forward without the whole picture.

Q: What do you see in the future for Minorities in Aquaculture?

A: I feel like we're on a fast trajectory. And I'm super excited about that. I feel like this is our transformative year when the vision is getting clearer. When I started it, I think some people were wondering if this was just a passion project. But no, we are an official [registered nonprofit]. We are the only minority-focused workforce development nonprofit in aquaculture globally right now. That's a big shoe to fill, and I'm ready to fill it. I just want to be, for lack of better words, a crusader for aquaculture. One, because I care so much about it, but also, I want to be known for being a long-lasting steward of the environment. There's not a box that you have to fit in to be in the space. You can create your own box. ■



Farmers question whether Chesapeake model reflects reality

By Karl Blankenship



Editor's Note: State and federal leaders have acknowledged that the Chesapeake Bay region will not meet its most fundamental 2025 cleanup goal: reducing nutrient pollution in the Bay and its rivers. Now, many people are asking, "How did we get here?" and "What's next?" This article is part of an ongoing series that tackles that question.

For 40 years, the Bay region has struggled to sufficiently reduce nutrient pollution from farms. The reasons are complex. But it's important to explore those challenges as the region begins a tough conversation about the future of the Bay restoration effort beyond 2025.

Previous articles in this series discuss difficult trade-offs with agriculture, the challenge of setting realistic goals and the dearth of technical support to help farmers with conservation projects. You can find them at bayjournal.com.

The state-federal Chesapeake Bay Program had a clear message for farmers in September: Their runoff control efforts are accelerating and helping to clean up the Bay.

What's actually happening? That's far less clear.

The Bay Program's report on pollution reductions did, indeed, show that farmers have increased the use of cover crops, stream buffers and other practices that would reduce nutrient-laden runoff fouling the Bay and its rivers.

But the report did not include other data indicating that fertilizer sales and farm animals have increased, both of which can add to pollution loads. Had that information been incorporated, the conclusion might have been quite different: It could have offset most progress made by recent runoff control efforts.

Such conflicting information frustrates people in the agricultural community, from individual farmers to state-level department heads. It contributes to a loss of confidence in the Bay Program, as well as the computer models it uses to set cleanup goals and gauge progress.

It's a significant issue. Agriculture is the largest source of nutrient pollution to the Chesapeake, and states are relying on farmers to achieve the overwhelming majority of nutrient reductions needed to meet Bay goals.

But those largely voluntary actions often cost farmers money, increase their workload and reduce productivity, which in turn

hurts future income. Uncertainty over what is expected of farmers and whether their actions are making a difference can make it more difficult to get people to act.

State agriculture secretaries made that point last year in a letter to Adam Ortiz, administrator of the Mid-Atlantic region of the U.S. Environmental Protection Agency, complaining about "mixed messages that are quite discouraging for our farmers."

"Continued confusion could erode confidence and trust between cooperating parties and the science we rely upon to guide our investments," they wrote.

Bay Program records show that state and federal agencies have spent more than \$2 billion to help reduce runoff from farms over the last decade. But it remains unclear what has been achieved, at least in computer models used to assess progress.

Officials have already acknowledged that the Chesapeake region will miss its self-imposed 2025 deadline for reducing nutrient pollution in the Bay. And people in the farm community worry they will get the bulk of the blame.

In their letter, the agriculture secretaries insisted that farmers are doing more than they are credited for and that model results "seem at odds with the water quality improvements we have observed."

Not everyone agrees. Some in the academic community suspect the Bay models may overestimate, rather than understate, the impact of farm runoff control efforts.

But most agree that confidence in the models is critical.

If farmers don't believe in the system, they are less likely to spend money and take measures that may not be in their best economic interests, said Dan Nees, who worked for decades with the University of Maryland and others to find effective financial strategies to improve the Bay.

"The bottom line is that trust is not there," Nees said. "Until we figure out how to solve that, it doesn't matter how much money you put out there."

The virtual Bay

Efforts to understand the Chesapeake ecosystem through models date to the late 1970s, when the U.S. Army Corps of Engineers began designing and building an 8-acre, three-dimensional model of the Bay.

Carved from concrete and filled with water pouring in from simulated rivers, it helped provide an understanding of complex water movements within an estuary where rivers and ocean water mix.

Since then, modeling has become an indispensable part of the Bay cleanup effort. The 8-acre model has long since been replaced by sophisticated computer simulations that drive decisions about how billions of dollars are spent.

Photo above: Fall colors accent foliage in a streamside buffer on Maryland farmland. (Dave Harp)

The Bay Program relies on four models:

- An airshed model, which estimates the amount of nitrogen (a nutrient) deposited directly on the Bay and its watershed from air pollution
- A land use model, which predicts the nutrient impact of development, human population and changes in agricultural land use, such as shifts from pasture to crops
- A watershed model, which estimates the amount of nutrients that reach the Bay from all of the activities in its 64,000-square-mile drainage basin
- An estuarine model, which estimates the impact that changes in nutrient inputs will have on Bay water quality

Nutrients spur algae blooms that cloud the water, blocking light essential for underwater grasses, a critical habitat for fish, crabs and other species. When algae die, their decomposition removes oxygen from the water, leading to “dead zones” that are off-limits to aquatic life.

When the EPA established its Chesapeake Bay total maximum daily load, or “pollution diet,” in 2010, it relied on models to estimate the amount of nutrients (nitrogen and phosphorus) that must be reduced to clear the water and eliminate dead zones.

The modeled answer: The amount of nitrogen reaching the Bay needs to be slashed from 270.8 million pounds a year, measured from a 2009 baseline, to 199.3 million pounds. Phosphorus needs to be cut from 17.17 million pounds to 12.86 million pounds.

The models were then used to divide the needed nutrient reductions among the states and major rivers.

States used the models to write cleanup plans outlining the number of wastewater treatment plants that needed to be upgraded and the amount of nutrient-reducing best management practices, or BMPs, that were needed to meet the goals. In agriculture, BMPs include things like nutrient-absorbing cover crops, stream buffers and no-till farming.

Each year, states report on their actions, and the models use that data to estimate cleanup progress, which is then publicly reported. It is hard, therefore, to overstate the region’s reliance on models to drive cleanup efforts and evaluate results.

“You absolutely need a model to be able to do those things,” said Zach Easton, a Virginia Tech computer modeler who has participated in several reviews of Bay Program models. “But we have put all our eggs in the watershed model basket, and we don’t at this point have a way around that.”

A watershed of data

When people talk about “the model” — especially if it’s a complaint — they are usually referring to the watershed model. It is the primary tool used to drive cleanup plans and the yardstick for measuring progress. As such, it plays a major role in shaping public perception.

It uses a massive amount of data and predicts water quality improvements in the Bay that are often difficult to confirm through monitoring programs because the results of many actions taken today won’t be measurable in waterways for years.

That level of uncertainty makes the model a target for criticism, and views of the model are often shaped by whether it



Predicting the exact amount of pollution reductions that come from any conservation practice is difficult, and the benefits of some projects, like planting streamside buffers, can take years or decades to have maximum impact on water quality. (Dave Harp)

produces results people like.

For instance, in their letter, which questioned model results, the agriculture secretaries said, “We trust estimates that suggest agriculture has contributed significantly to reducing runoff and nutrient contamination.”

Measuring reductions from wastewater treatment plants is relatively easy. Nutrient levels are measured in discharge pipes (hence their name, “point sources”), and their impact is seen quickly in waterways.

But for nonpoint sources such as farms or developed lands, such direct measurements are difficult. Nutrients can reach waterways through many different routes, over long periods of times. And nitrogen and phosphorus behave differently.

Much of the nitrogen sinks into the ground and is transported to streams through slow-moving groundwater, a journey that can take years, or decades.

Much of the phosphorus bonds with sediment. It is pushed off the land during storms but can be stored in streams for years before a large storm washes the sediment and attached phosphorus farther downstream, where it is deposited again, waiting for another storm.

Also, many BMPs designed to reduce nutrient loads, like streamside forest buffers, take years to become fully effective.

Because of such lag times, the watershed model is a critical tool for estimating the future impact of nutrient reduction actions taken today. But modeling such complex dynamics is an enormous challenge, dependent on the amount and quality of data that’s fed into the system.

Model predictions have a profound impact on the region’s farmers, who are being asked to achieve more than 90% of future nutrient reductions.

Collectively, wastewater treatment plants across the region have slashed their discharges of nitrogen by more than 25 million pounds since 2009 and have achieved their 2025 goal. But most plants have now been upgraded, and few additional reductions are expected from them.

On agricultural lands, runoff controls only produced an 8.9 million pound nitrogen reduction during the same time period, according to model estimates.

But those lands generate almost four times as much nutrient pollution as wastewater plants. At the rate of reduction since 2009, farms would not reach their collective Bay cleanup goals for many decades. So, if the model predictions are correct, farmers face a huge challenge.

But predicting impacts from agriculture is particularly difficult. Farms cover a large area of the Bay watershed and include a range of operations, from small organic produce farms to massive poultry and dairy operations.

Over time, those farms have produced greater amounts of crops and meat, which can demand more fertilizer and animal feed. At the same time, agricultural advances have made many operations more efficient, so they require fewer inputs for each bushel of corn or pound of meat produced. And the use of runoff control practices has increased.



Data showing that the farm animal population in the Chesapeake Bay watershed has increased has not yet been incorporated into the Bay Program computer model. (Will Parson/Chesapeake Bay Program)

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Accurately assessing nutrient inputs and outputs from these competing factors is challenging — and it's typically at the heart of disagreements over modeled agricultural impacts.

Real perceptions

That was clearly on display Sept. 26. That day, the Bay Program released its nutrient reduction update for 2022, based on information reported from the states.

Model results showed that 85% of nitrogen and 98% of phosphorus reductions reported during that year stemmed from actions taken by farmers.

In an EPA press release, regional administrator Ortiz, who has been working hard to improve the agency's relationship with farmers, said "the story of the past two years is one of tremendous improvement, especially in the agricultural sector."

Yet that same day, Ortiz chaired a meeting of senior state and federal Bay officials to determine how to include uncounted information in the computer models.

While the models are updated annually with information about nutrient reduction efforts, they are also periodically updated with data that could show an increase in nutrients, such as changes in land use, crop production, farm animal numbers and fertilizer sales.

That was scheduled to happen two years ago, but many state officials balked at the new data, as it would erase millions of pounds of nutrient reductions, mainly because of increases in fertilizer sales and a growing farm animal population.

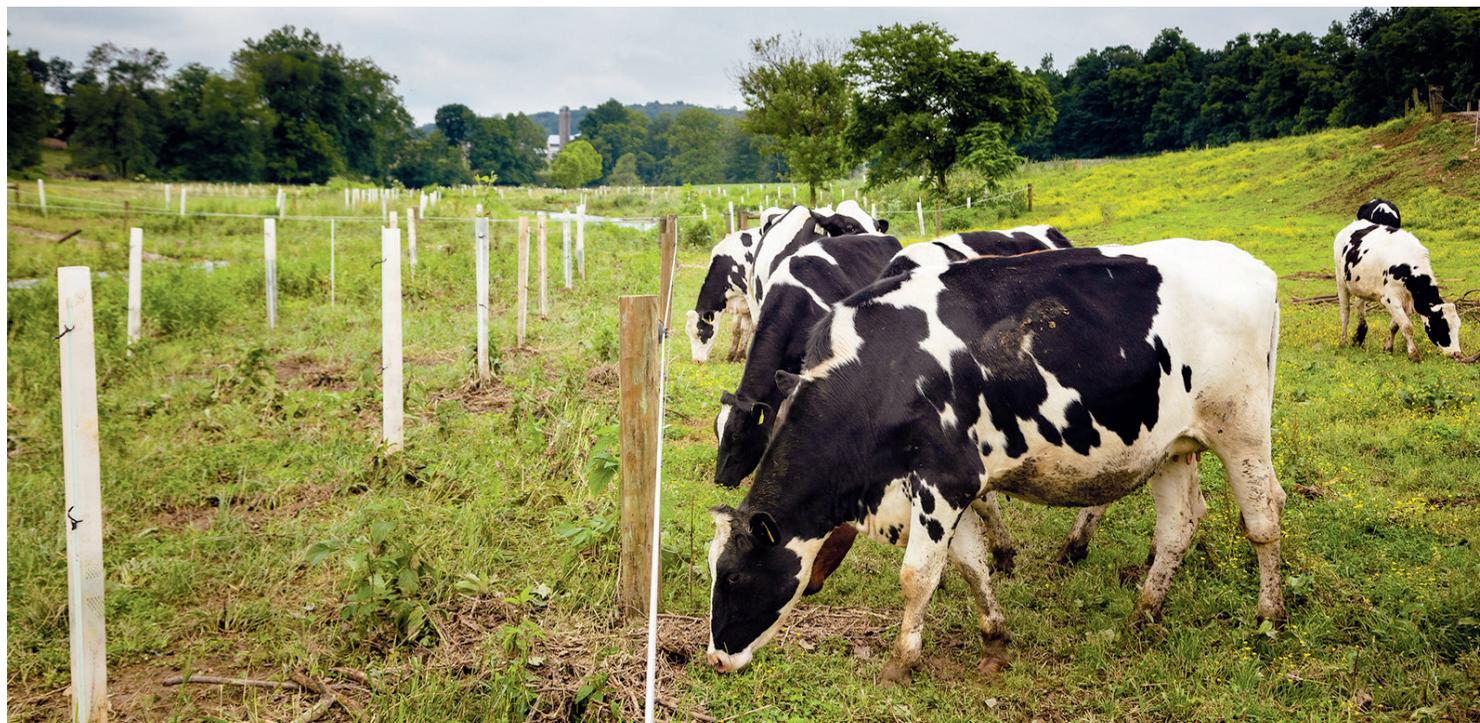
The "unaccounted additional loads" total about 9.9 million additional pounds of nitrogen and nearly 80,000 pounds of additional phosphorus — although the modeled numbers are still being finalized and could shift slightly.

Bay Program partners agreed at the meeting that states will not have to address those increases until after the 2025 deadline.

But it reveals how modeled numbers influence perception. After telling the public that farmers are making "tremendous" progress, the future adjustments seem likely to erase most, if not all, of the model-estimated 8.9 million pounds of nitrogen reductions credited to farms since the TMDL went into effect.

The conflicted messaging, in which farmers are credited for progress only to have it taken away, has frustrated those in the farm community for years.

Chris Thompson, director of the



Dairy cows graze near a fence designed to keep them out of a creek in Lancaster County, PA. (Will Parson/Chesapeake Bay Program)

Lancaster County Conservation District in Pennsylvania, which is the most intensive agricultural county in the Bay watershed, said he understands the need to incorporate new information into the model. But because of such changes, "the general public sees [Bay goals] as a moving target that we will never hit."

"When there's an article that talks about the model being reassessed, reassigned, recalibrated, it makes it very difficult to build confidence that, no matter what we do, we will ever clean up the Bay," he said.

As a result, he asks farmers to think about the benefits to nearby streams and rivers. "The messaging that we focus on is fixing our local water," Thompson said. "When improving the Bay comes up, the model is held suspect by almost every level of the community."

Data dilemma

Much of debate over the model is less about the model than it is about the data.

The usefulness of the fertilizer figures that triggered much of the "unaccounted" nutrient loads have been debated for decades because of questions about whether sales data accurately reflects when or where purchased fertilizer is actually used.

"I am gravely concerned about agriculture's ability to meet our TMDL goals, not because I don't think that conservation is happening on the ground, but because we are being tasked with overcoming a commercial fertilizer assumption that is vastly overstated," said Lindsay Thompson, director of the Maryland Grain Producers

Association and a former member of the Bay Program's Agriculture Workgroup.

Meanwhile, she and others contend that the model underestimates yields of corn, the largest crop grown in the watershed. Higher yields would soak up more fertilizer, leaving less to potentially run off.

Much of the data about crops and animal populations comes from the U.S. Department of Agriculture, but it is collected for other purposes and the level of detail often varies from state to state.

It also may have omissions. For instance, the largest concentrated animal feeding operation in Pennsylvania's portion of the Bay watershed has 5.5 million egg-laying chickens and produces about 5 million pounds of nitrogen a year — but it is

apparently not included in the USDA data used by the Bay Program model.

Such data concerns are not new. A 2007 report prepared for the Bay Program warned that the agricultural information available for decision-making was poor and could get worse in the future.

Mark Dubin of the University of Maryland, who is the Bay Program's senior agricultural advisor, said that while progress has been made, the Bay Program still lacks significant dedicated funding to improve data.

Too often, he said, that means it must extrapolate from national data, draw on decades-old information or rely on studies conducted in other places.

The models are so complex that there is



Some say that crop figures used in the Chesapeake Bay watershed model underestimate corn yields in the Bay region. (Dave Harp)

often a drive to aggregate data and reduce specificity. But, Dubin said, making the effort to include more precise information is important to building confidence.

“In the grand scheme of things, maybe it’s not significant,” he said. “But I think having those elements represented is part of the key factor for trust. If producers look at what we’ve done and they don’t see what they’re doing represented, it just calls everything into question.”

Counting BMPs

Another model data uncertainty, and point of dispute, involves BMPs.

The Bay Program recognizes more than 200 BMPs, and each is assigned a nutrient reduction value derived by a team of experts. But they often have limited research to draw upon. And a nutrient reduction value may not reflect all of the varied soil, geologic and hydrologic conditions throughout the Bay’s huge watershed. In fact, their effectiveness may vary from place to place on the same farm.

“Estimates of achieving TMDL targets generally assume that expected pollutant responses to BMP implementation are accurate,” a recent report from the Bay Program’s Scientific and Technical Advisory Committee, or STAC, states. “Given the complexity and uncertainties of reducing pollutant loads across a large watershed, this will rarely be the case.”

Not only is it unclear how well BMPs perform, it’s also unclear how many are on the landscape.

Early on, Bay Program datasets were plagued with overcounted BMPs. At one point, state-reported data showed more acres under nutrient management plans than actual crop acreage in the watershed.

Over time, the Bay Program has improved the quality control of data and developed complex procedures about what is counted and how. BMPs must be periodically “verified” to ensure they still exist or they are removed from the data.

But that is a time-consuming process that many in the farm community say leaves out a large number of practices that exist and function. Also, actions taken by farmers without government cost-share funding are not in the databases because agencies have no record of them.

And if a farmer takes an action that fails to fully meet the Bay Program’s design specifications for a BMP, such as a minimum width for a streamside buffer, the practice gets no credit, even though it may have some lesser benefit.

“We have farmers that have already fenced off their streams, but it might not



Mark Dubin, the Chesapeake Bay Program’s senior agricultural advisor, said that the program lacks significant dedicated funding to improve data used in the watershed computer model. (Dave Harp)

be up to the specs that the state has set, so you can’t count those, even though there’s no cows in the stream,” said Lynn Graves, a farmer and chair of the Culpepper Soil and Water Conservation District board of directors in Virginia. “There’s more out there than we think there is. But it’s not getting credit.”

What’s real?

Those uncertainties contribute to skepticism of model results.

Dartmouth University researcher D. G. Webster conducted interviews with 59 people deeply involved in the Bay cleanup process in 2021 and found “the vast majority of comments evaluating the model and/or the modeling process were negative.”

Her interviews found “no statements indicating enthusiastic acceptance of the model or the modeling process.” Most thought the model was undercounting progress toward nutrient reduction goals.

That is counter to what many in academia think — that it *overcounts* nutrient reduction progress. “Data indicate that efforts to reduce nonpoint source loads are not as effective as expected,” the Bay Program’s STAC, said in a recent report.

It’s hard to directly compare model predictions with actual water monitoring data because of the time lag between when actions are taken and when they actually affect water quality.

The watershed model predicts the direction of nitrogen trends fairly well in most major rivers. That coherence sometimes disappears in smaller watersheds, though.

For instance, in the agriculturally intensive upper Choptank River in Maryland,

monitoring shows that nitrogen is increasing while the model predicts an overall reduction.

For the Conestoga River, which drains much of Pennsylvania’s farm-intensive Lancaster County, monitoring shows greater nitrogen reductions than the model has predicted.

More concerning is phosphorus. For years, the model has been showing that the region is well on track to meet reduction goals. But that predicted success is not reflected in most rivers. Monitoring shows that the regional trend is flat or decreasing only slightly. The phosphorus results are particularly concerning, STAC noted, because they have led states to focus largely on nitrogen.

“There’s substantial evidence out there, certainly for phosphorus and probably to some extent for nitrogen, that the model isn’t right,” said Virginia Tech’s Easton.

But no model of such a complex system is exactly “right.” Other models beyond the Bay Program evaluate the impact of land-based actions on waterways. Each have their strengths and weaknesses and paint slightly different pictures.

A widely used model by the U.S. Geological Survey estimates fewer nutrient reductions from agriculture than the Bay Program’s model. But a model used by the USDA in the past has shown greater reductions from farms. (Portions of those models are incorporated into the watershed model).

But there is no perfect model. STAC, in its most recent model review, said it was “favorably impressed” with the overall framework of the model but also called for the Bay Program to use multiple models to

improve confidence in results, much as the weather service does in making predictions. That’s often been resisted, in part because of concerns that people will veer toward models that make them look best.

“I don’t know that you’re ever going to get around the model-shopping phenomenon,” acknowledged Easton, who still favors the multiple-model approach. “Certainly not when it comes to crediting water quality BMPs.”

Building confidence

Improvements are expected in the next major overhaul of the watershed model, slated for 2027. “Ideally, we’ll get a better handle on the input data,” said Easton, who chairs a Bay Program workgroup striving to improve agricultural estimates in the next model version. “Data is a big limitation with the modeling system and decisionmaking.”

Other improvements include new efforts to improve model alignment with water monitoring data by trying to adjust for lag times. Such efforts are underway and, in some cases, that seems to provide a better match between the model and monitored observations of nitrogen, but phosphorus remains problematic.

How far such efforts will go toward building trust in the farm community remains to be seen.

Ken Staver, a farmer and a scientist with the University of Maryland Wye Research and Education Center, has been involved with the Bay Program and the modeling effort for decades.

He generally considers the watershed model to be high quality but said that some of its simulations for agricultural land get simplified to the point that people don’t believe the results.

“All the states have to be able to buy in and go back and sell it to their farmers,” Staver said. “You have to have faith that the cost you’re going to inflict is going to get the result that you want.”

It’s a critical issue. How accurate should a model be to persuade a small dairy operator, who has seen milk prices drop by a third in the past year, to embrace even more economic hardship for the health of a bay 100 miles away? For now, that question is unanswerable.

Getting “right” model results for a vast watershed will always be a challenge. “It’s just a very dynamic system,” Dubin said. “It’s changing every day. We’re probably short in one area and probably over in another. In the end, does it balance out? That’s the question. We still really don’t have a good answer for that.” ■

More environmental justice funds flowing to Bay region

Projects aim to deliver resources, technical assistance to underserved and disadvantaged communities

By Jeremy Cox,
Whitney Pipkin
& Timothy B. Wheeler

Looking a little like wayward space probes, weather stations on tripods have been popping up around the Baltimore area since spring, beside homes and in churchyards, gardens and vacant lots.

They're mechanical scouts for an ambitious \$25 million research project led by Johns Hopkins University to explore the impacts of climate change in the urban environment and find ways to alleviate them.

The initiative, called the Baltimore Social-Environmental Collaborative, brings together more than 70 scientists, engineers and other experts from seven universities and two national laboratories. It also includes a robust group of city officials and neighborhood leaders who are helping to guide the effort.

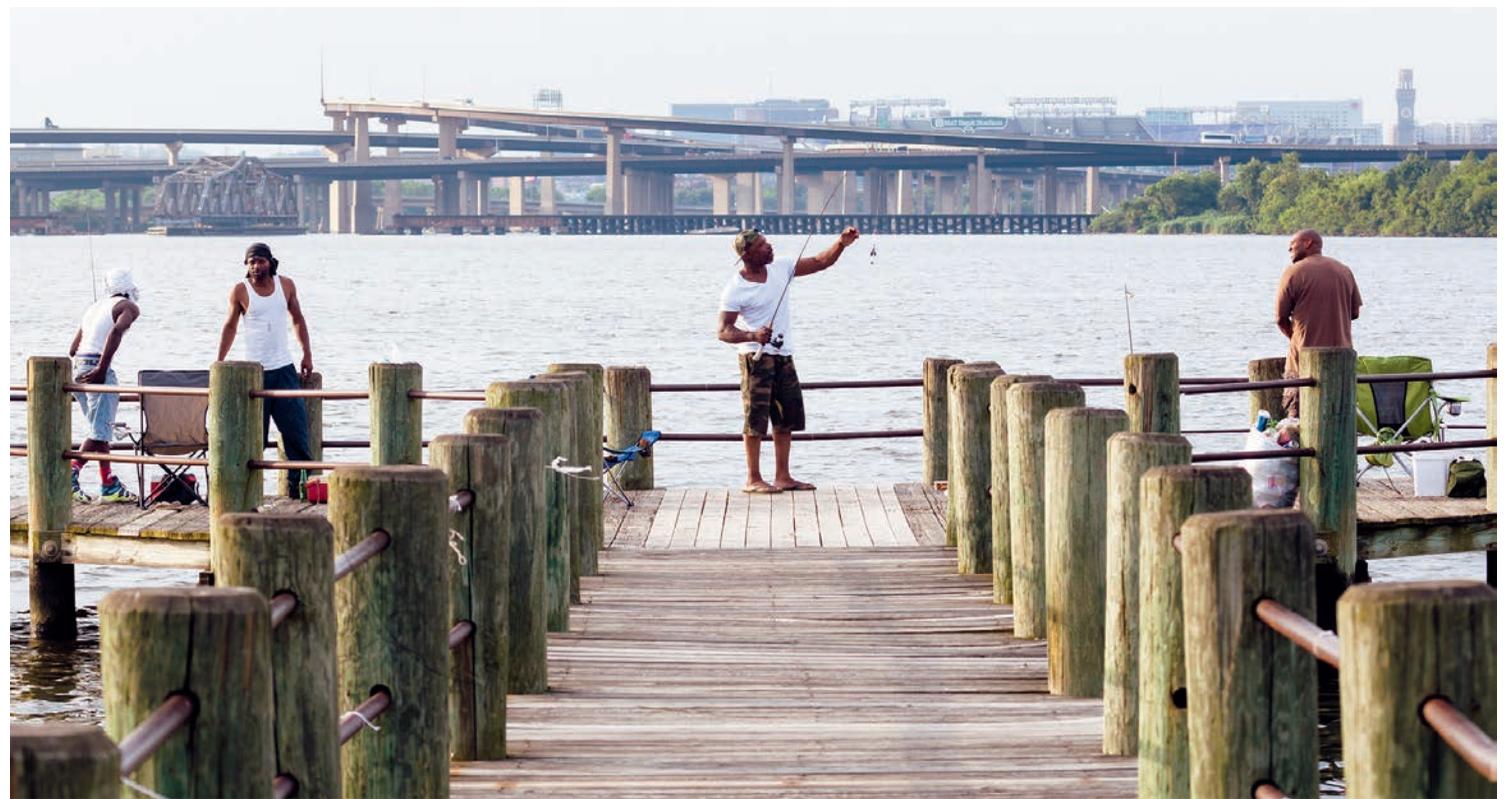
In announcing funding for the project, the U.S. Department of Energy's science office director, Asmeret Asefaw Berhe, said the work will help fill major gaps in the scientific understanding of urban climate systems. "They will also help us use this knowledge in ways that will empower historically underserved and disadvantaged communities ... in urban environments," she said.

Three years after the George Floyd killing heightened attention on racial justice and equity, federal funding has begun cascading toward projects in the Chesapeake Bay region and beyond that seek to mend longstanding environmental injustice.

In addition to research in the Baltimore area, the projects include helping West Virginia industries reduce pollution in disadvantaged communities, establishing an environmental justice fund in the Mid-Atlantic, and helping utilities in underserved locales.

"The [impact] of what injustices have been on communities is starting to be understood ... in the environmental community," said Carmera Thomas-Wilhite, vice president of diversity, equity, inclusion and justice for the Chesapeake Bay Foundation. "Now we're seeing a lot of the federal funding be intersected with that."

The efforts, advocates say, have been bolstered by a spate of pandemic era funding packages, such as the \$1 trillion



Anglers try their luck with the Baltimore skyline as a backdrop. The city is the focus of a "social-environmental collaborative" involving scientists, city officials and neighborhood leaders that aims to study and improve the urban environment. (Will Parson/Chesapeake Bay Program)

infrastructure law passed in 2021. They also point to the Biden administration's Justice40 program, which aims to steer 40% of funding from certain federal environmental investments toward historically disadvantaged communities.

Thomas-Wilhite said that the temporary infusion of federal dollars will help get projects off the ground. But it will be even more critical for local organizations to increase their workforces and obtain sustainable funding to continue the work for years to come.

The Biden administration's expansive definition of environmental justice has come under fire from some groups because it applies a "race-neutral" standard toward tackling inequities. The strategy may help keep the conservative majority on the Supreme Court from striking it down, but critics worry it will hamper efforts to close health and environmental gaps between communities of color and whiter areas.

Some of the Justice40-backed programs in the Chesapeake Bay region, as a result, have a less obvious connection to race.

The spending, though unprecedented, is a drop in the bucket compared to the scale of environmental injustice in the region,

supporters say. But it's a promising start.

"These federal dollars are temporary, but they can be catalytic," said Kacey Wetzell, vice president of outreach for the Chesapeake Bay Trust, which awards funds from sales of Maryland's Bay-themed license plate and other sources. "It's a level of investment we've never seen for righting longstanding wrongs."

Researchers & residents collaborate

The recent federal initiatives each seek partnerships with community members to shape their design and direct funding.

True to its name, the Baltimore Social-Environmental Collaborative project aims to engage a wide swath of the community in deciding what ought to be included in the five-year study.

Ben Zaitchik, a scientist at Hopkins who helped secure the federal grant, calls the team's approach "knowledge cogenation." Researchers are working with neighborhood leaders, city officials and nongovernmental groups, he said, to figure out "what is the science we need based on the solutions that we see for ourselves? And then build the science in response."

The project has engaged researchers from

Hopkins, Morgan State University, the University of Maryland Baltimore County, Penn State and Drexel University, as well as Oak Ridge National Laboratory and the National Renewable Energy Laboratory. Also in the mix are city officials and leaders of two Baltimore neighborhoods, Old Goucher and Broadway East, that have been targeted for study.

The research is broken down into climate-related themes in four primary categories: extreme heat, air pollution (indoor as well as outdoor), urban flooding and decarbonization.

There's also an "equitable pathways" steering committee, whose job is to provide feedback on whether the research is structured to benefit the community, including those most disadvantaged and at risk.

Toward that end, Zaitchik said, community leaders "tell us what they think we should study." They also tell researchers "who else needs to be in the room" to broaden reach for the project. Those studying decarbonization, for instance, focus on "how are we going to hit our greenhouse gas [reduction] targets in a way that's both feasible and equitable," he explained.

The project held a kickoff meeting in

January and followed up with a fall session at Morgan State examining issues around extreme heat. But the fieldwork is “just being spun up,” Zaitchik said.

About 20 weather stations have been posted so far around the city and suburbs to collect data on temperature, precipitation, humidity and sunlight. Those stations complement summer air measurements that Hopkins has gathered for a decade or so now to assess the urban heat island effect in Baltimore, as well as data on area streams that UMBC researchers have been monitoring for years.

The goal is to bring all the research threads together to identify ways to deal with climate change and weigh tradeoffs that might be involved in pursuing their various combinations.

“We might not get all the way there on all those topics in five years. I’m pretty sure we won’t,” Zaitchik said. But he said it’s critical to quickly demonstrate the value of collaborative research, given the urgency of the climate crisis, which requires both mitigation and adaptation at the same time.

“So, like they say, ‘If you want to move fast, go alone. If you want to go far, go together,’” he added. “We’ve got to go together quickly, and to do that we need these processes that engage people — and a system they can have confidence in.”

Grantmaking power

Another new federally funded program seeks to take collaboration a step further. Under the Mid-Atlantic Environmental Justice Fund, the goal is to “cede power and philanthropy to those most affected by environmental injustice,” said Wetzel of the Chesapeake Bay Trust, which is managing the program.

The trust has partnered with nine other organizations to administer \$17 million in federal grant money to communities and community-based organizations that have historically faced constraints in competing for money to address environmental problems. The program will use a participatory grantmaking process, in which members of impacted communities have the power to decide who and what to fund.

“People on the outside can’t do that necessarily as well as the people who face these challenges,” Wetzel said.

In addition to awarding grants to under-resourced groups, program partners will provide outreach and technical assistance. In doing so, supporters say, a larger number of grantees can more effectively address disparities in environmental and public health.

The U.S. Department of Agriculture’s



A weather station in eastern Baltimore monitors temperature, precipitation, humidity and sunlight. Instruments to measure soil moisture are being installed by Morgan State University. (Timothy B. Wheeler)

Forest Service awarded the grant through its Urban and Community Forestry Program. The funding stems from the Inflation Reduction Act of 2022.

Among the trust’s partners in the initiative are Sacoby Wilson, director of the Center for Community Engagement, Environmental Justice and Health and co-director of the Thriving Communities Technical Assistance Center in the U.S. Environmental Protection Agency’s Mid-Atlantic region; the National Wildlife Federation; Howard University; the Environmental Finance Center; and a network of regional environmental justice leaders.

“We will achieve environmental justice only when the power, resources and

decision-making are yielded to the communities most impacted by environmental harms and related health inequities,” Wilson said in a written statement.

Infrastructure assistance

Moonshot Missions, a nonprofit based in Bethesda, MD, is receiving EPA funds to advance water equity and access “for all,” as the agency press release put it. The EPA has awarded \$7.5 million over five years to the organization, which will also serve as one of a handful of National Environmental Finance Centers that helps connect communities to federal and state funds.

George Hawkins started Moonshot Missions in 2018 after spending eight years

as general manager of DC Water, where he saw firsthand the difficulties water utilities face in maintaining aging infrastructure. He is credited with helping to transform the utility through an innovative approach to addressing stormwater and wastewater improvements.

Severely under-resourced utilities often don’t have the staff resources to plan and seek grants for larger capital projects or the financial capacity to do the projects on their own.

“They’re running a fire department basically, dispatching people to fix their broken system,” Hawkins said.

Often, smaller utilities may not know about proven innovations to address problems like energy costs or combined sewer overflows.

Moonshot Missions helps small or under-resourced utilities plan and fund projects that would help them run more efficiently. The \$7.5 million that the nonprofit will receive from the EPA will be used to help localities rethink costly infrastructure problems that they may not otherwise have the capacity to address.

Although the EPA funding infusion is just beginning, Moonshot has already been doing work across the country with the help of private foundation and grant funding.

The Campbell Foundation has funded much of its work to date in the Chesapeake Bay watershed, including a recent project in Dorchester County, home to Maryland’s third-highest poverty rate. Hawkins said the Dorchester effort exemplifies the type of projects they intend to keep doing in and beyond the region.

In this case, the Maryland Department of the Environment asked Moonshot to help the county’s sanitary district replace failing and aging wastewater infiltration ponds surrounded by earthen berms. These were being threatened by sea level rise and the technology they relied upon is no longer considered a best practice.

Moonshot’s consultants found that sending the wastewater to a larger system for treatment would be a better approach. They helped the utility create an intended-use plan and apply for the Maryland State Revolving Fund to pay for the additional infrastructure that was needed.

“It’s a very complicated process to get access to those funds. It’s mainly become a bigger utility game, because there are studies and workups [required] to apply for the program,” Hawkins said. ■



Water utility managers in Dorchester County, MD, received assistance solving problems with aging wastewater infiltration ponds. (Maryland Department of the Environment)

Cleanup transforms part of VA Superfund site into job hub

Work on former munitions disposal site in Suffolk receives federal award for excellence

By Whitney Pipkin

A portion of a site in Suffolk, VA, that was once home to thousands of pounds of discarded munitions debris is now home to a bustling warehouse employing 300 people.

Officials from the U.S. Environmental Protection Agency gathered with partners at the former Nansemond Ordnance Depot on Sept. 19 to acknowledge the progress that's been made since it was first placed on the agency's Superfund National Priority List in 1999.

Superfund sites have significant contamination by hazardous materials, and inclusion on the list gives the EPA authority to require or lead the cleanup efforts.

The EPA worked with the U.S. Army Corps of Engineers and Virginia Department of Environmental Quality to assist local companies in redeveloping a 45-acre portion of the Suffolk site into a warehouse and distribution hub run by RoadOne IntermodaLogistics, Inc.

The overall Superfund site, which contains seven completed cleanups and 20 additional areas of concern, covers nearly 1,000 acres near the Nansemond River's confluence with the James. The cleanup of the site and removal of harmful materials began in 1988 and is still ongoing.

"This site had an important function — not a glorious or glamorous function — to dispose of munitions from two world wars," said Adam Ortiz, administrator of the EPA's Mid-Atlantic region. "But our work often is cleaning up things that have been done to places decades before — in some cases centuries before — and to bring sacrificed places back to economic and community vitality."

The history of this site dates back more than a century. The U.S. Army used it from 1917 to 1960 to store and destroy munitions. At the end of World War II, the Navy began using the depot to destroy explosives, ammunition and chemicals.

Contractors working on the Superfund site have removed more than 6,200 munitions items and 200,000 pounds of munitions debris from the overall property. The cleanup has also entailed removing contaminated soils and creating new stormwater systems.

In the decades since 1960, when the federal government conveyed the property to other parties, it has been home to a private military academy, a community college and a General



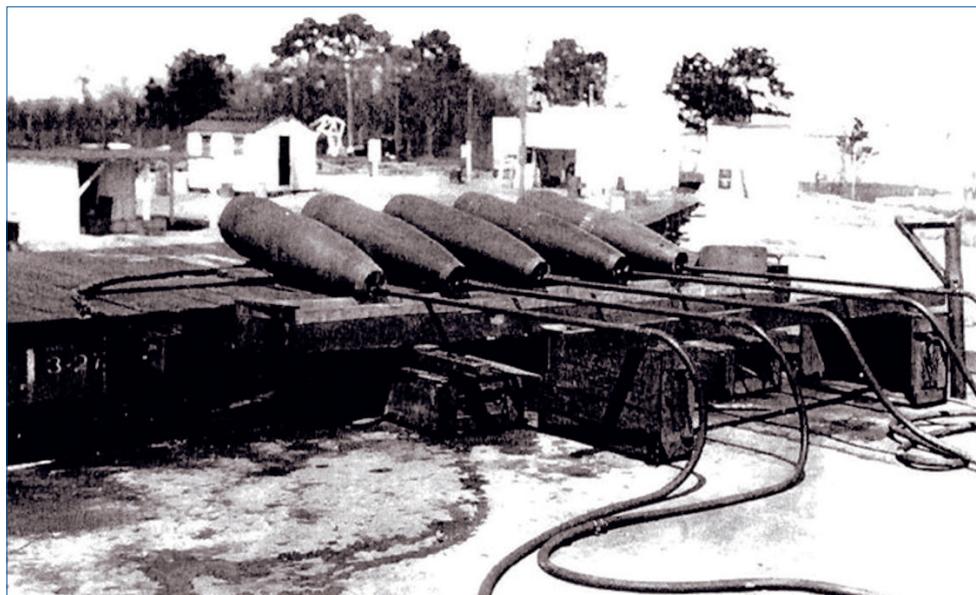
Cliff Villa, deputy assistant administrator for the Office of Land and Emergency Management at the U.S. Environmental Protection Agency, said at an awards presentation in Suffolk, VA, on Sept. 19 that some Superfund cleanups can turn eyesores or hazards into community assets. (Whitney Pipkin)

Electric television assembly plant. The Tidewater Community College still operates its Frederick Campus on site, which is served with municipal water lines from Suffolk because of contaminated groundwater.

The EPA added the site to its Superfund National Priorities List in 1999 after a site inspection identified "extensive

contamination in disposal pits, fill and demolition areas, holding tanks, trenches and offshore dumping areas."

More than 400 munitions excavated from the former Nansemond Ordnance Depot were considered "live," containing enough explosives that they needed to be deactivated. One of the first cleanup



The history of this Superfund site in Suffolk, VA, dates back more than a century to when the U.S. Army used it to store and destroy munitions from 1917 to 1960. (U.S. Army Corps of Engineers)



A warehouse and distribution hub run by RoadOne IntermodaLogistics, Inc., sits on the former Nansemond Ordnance Depot site, which was the focus of an award-winning Superfund cleanup effort. (Whitney Pipkin)

projects in 1988, before the Superfund listing, entailed removing 19 live 3-inch British shells from the community college's soccer field, along with thousands of pounds of other munitions and contaminated soils.

Cliff Villa, deputy assistant administrator for the EPA's Office of Land and Emergency Management, said the right kinds of Superfund cleanups can turn properties like these into assets for communities that have long considered them eyesores or hazards.

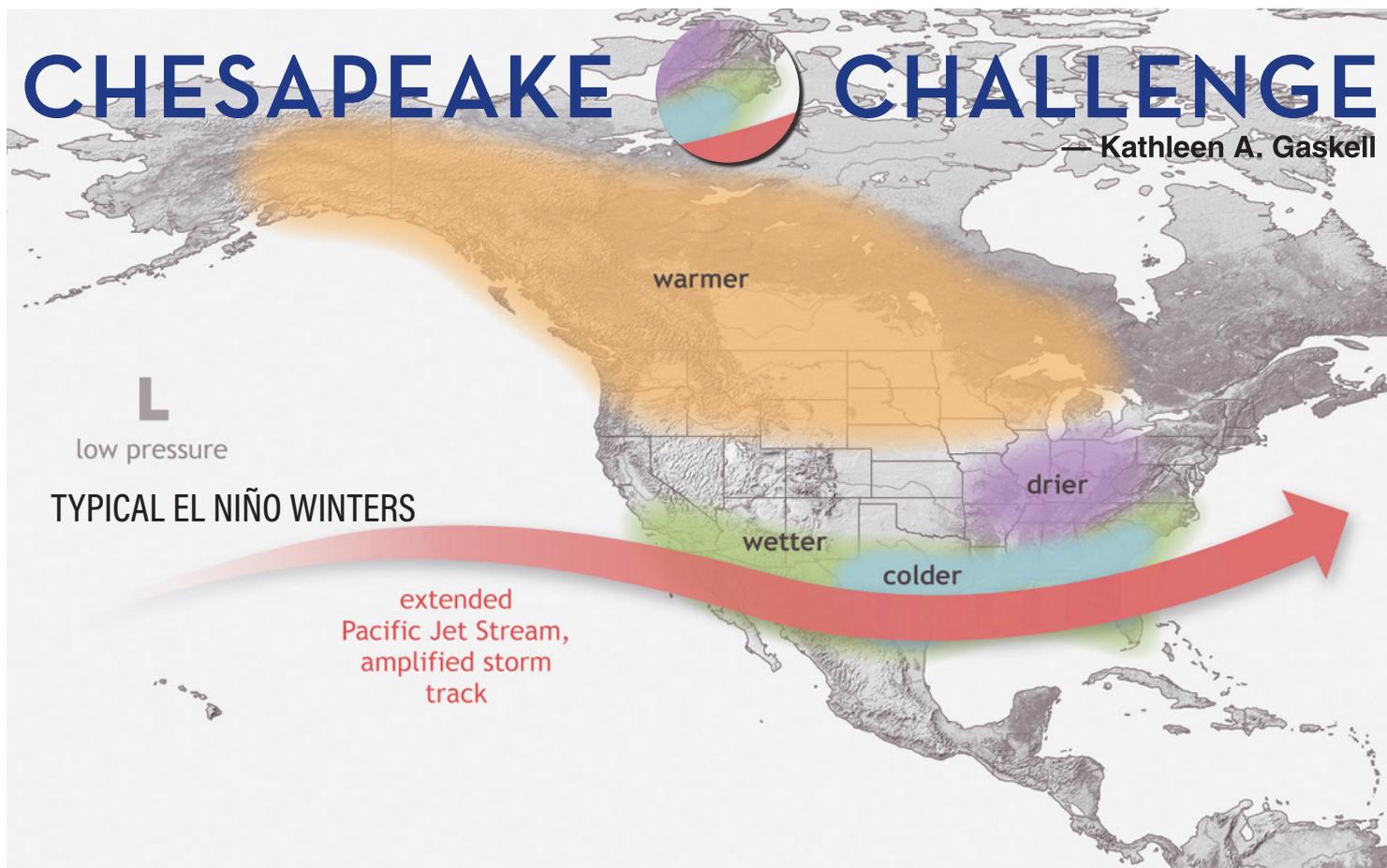
"The truth is, around the country, one in four Americans lives within three miles of a Superfund site," Villa said. "And they're not always the toxic stews you might imagine. They are places where people live and work and play. Our job is to make it safe for people to reuse and redevelop [these sites]."

He and other officials presented the EPA's Excellence in Site Reuse Award to two contractors who worked on the portion of the site that is now home to the RoadOne warehouse: Brookwood Capital Partners and Hana Engineers and Consultants, LLC. The award recognizes industry partners who help return portions of contaminated Superfund sites into properties that contribute to the community and, in this case, the local economy.

John Rector, a Suffolk City Council member, called the transformation "nothing short of miraculous." ■

CHESAPEAKE CHALLENGE

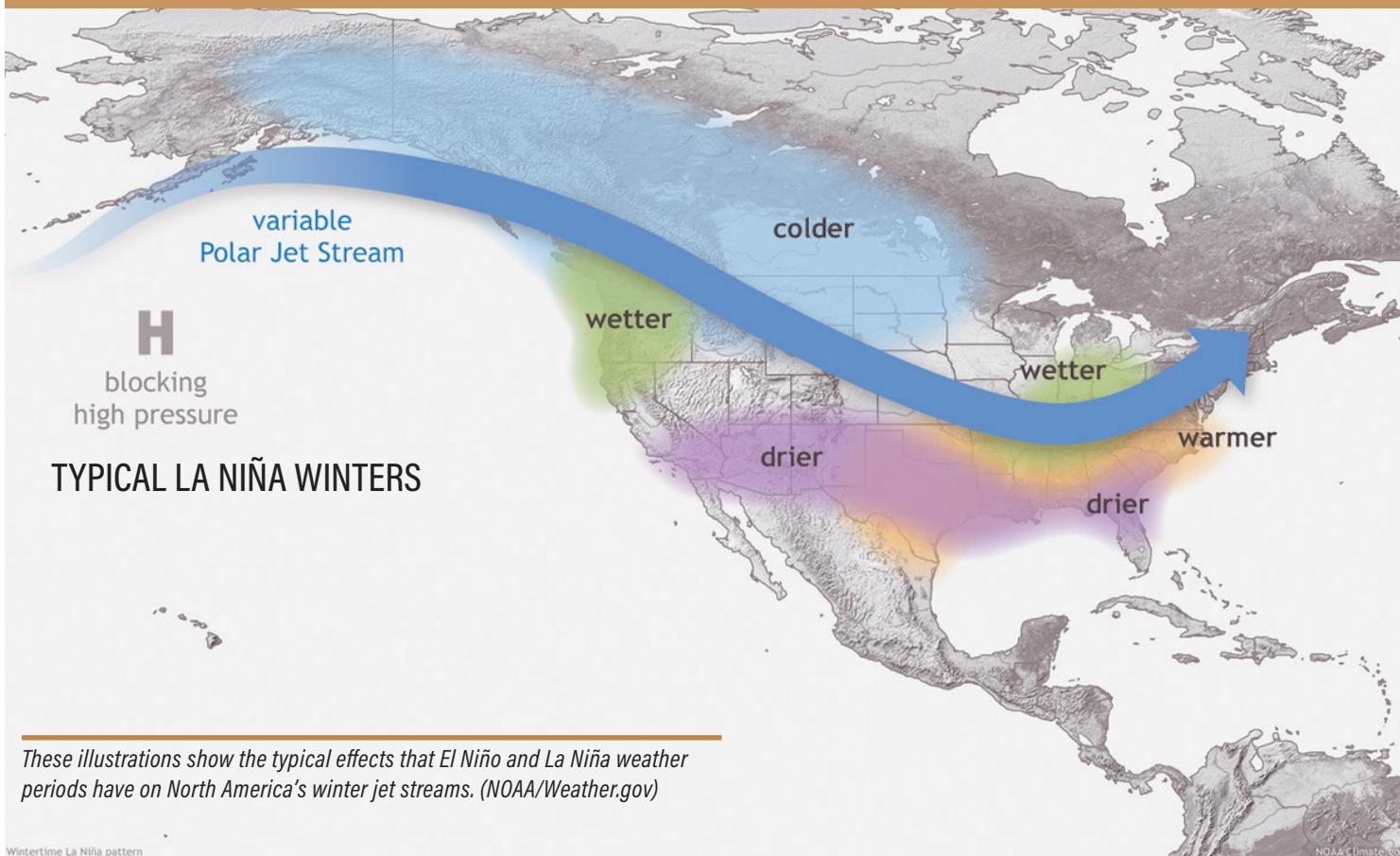
— Kathleen A. Gaskell



TYPICAL EL NIÑO WINTERS

extended Pacific Jet Stream, amplified storm track

Oh Boy! El Niño is back



TYPICAL LA NIÑA WINTERS

These illustrations show the typical effects that El Niño and La Niña weather periods have on North America's winter jet streams. (NOAA/Weather.gov)

After three years of the global weather conditions known as La Niña, its counterpart — El Niño — returned in June 2023. Like most El Niños, it will probably last 9–12 months. La Niñas, on the other hand, typically persist for 1–3 years. But we are talking about the weather, so who knows for sure? Here's what we do know.

ENSO it goes: El Niño and La Niña are the extreme warm and cold periods, respectively, of the El Niño/Southern Oscillation (ENSO). ENSO is a natural cycle brought on by strong variations in sea-surface temperatures, surface air pressure, atmospheric circulation and rainfall across the equatorial Pacific Ocean. Both extremes affect weather conditions around the world. El Niño periods are characterized by above-average temperatures in the east-central equatorial Pacific Ocean. During La Niña periods, surface temperatures are cooler in that part of the Pacific.

And in between: Some years have neither El Niño nor La Niña. These are known as neutral years. About half of all years are considered neutral years. During these years, the ocean's surface temperatures may favor one of these two extremes, but the atmospheric conditions do not — or vice versa.

Not a cause ... an effect: Global warming does not cause El Niño and La Niña periods. But it does appear to affect them. The ENSO cycles, which historically have occurred every 2–7 years, are increasing in frequency, and their accompanying storms and droughts are becoming more severe.

Tis the season: In Spanish, El Niño means Christ Child (or male child when not capitalized). The weather period has this name because its impact on fish and seabirds becomes more noticeable around December, when Christ's birth is celebrated. The ocean's surface water is warmer during El Niño. That sometimes kills fish outright. But it also causes them and the birds that eat them to migrate elsewhere.

Blame it on El Niño or La Niña?

Certain weather conditions are usually associated by either El Niño or La Niña periods. Can you match these weather conditions to their likely cycle? Answers are on page 36.

1. When this weather pattern hits the U.S., northern states usually have less precipitation and warmer winters. Meanwhile, the Southeast undergoes wetter and cooler conditions.
2. When this weather pattern hits the U.S., winters in the Northeast are colder and snowier. Meanwhile, the Southeast is warmer and has fewer storms.
3. One of these weather periods is usually associated with a more active hurricane season in the Pacific, while the other increases these storms in the Atlantic. Which is which?
4. One of these weather periods moistens and warms the air currents moving north from the Gulf of Mexico, which increases the likelihood of tornadoes in the Midwest. The other is associated with fewer tornadoes. Which is which?



Douglas Point harbors nature and history in Southern MD

By Timothy B. Wheeler

Looking for a place to stroll or bicycle through a dense forest, spy a bald eagle and comb a sandy beach for shells and shark teeth? Try Douglas Point on the Potomac River in Southern Maryland.

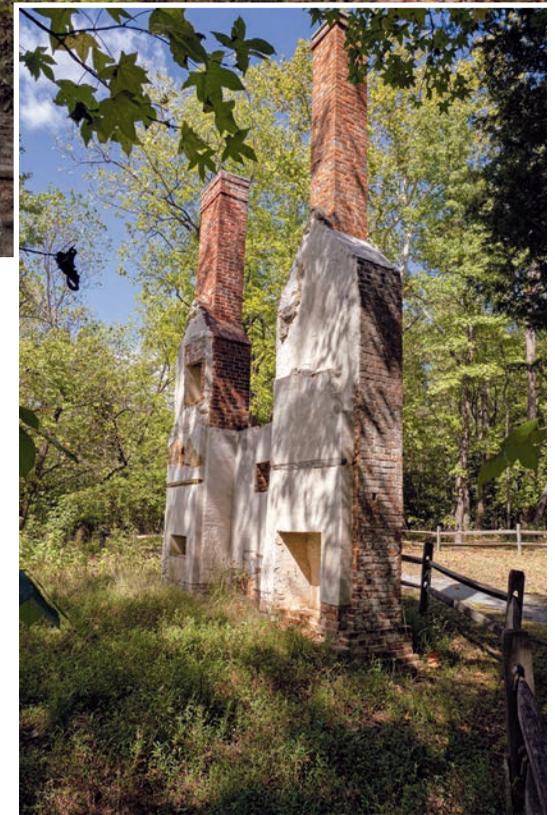
It's not a state, local or national park. Rather, it's a 548-acre "special recreation management area" owned by the U.S. Bureau of Land Management, the federal agency known for managing vast land holdings in the West and leasing them out to graze cattle, drill for oil and gas, or mine for precious metals.

Of the 245 million acres of land that the BLM manages nationwide, only 40,000 acres are in the East. Douglas Point is one of two special recreation management areas the agency oversees in the Chesapeake Bay watershed. The other is Meadowood, an 800-acre mix of meadows, forest, creeks, ponds, streams and wetlands on the Mason Neck Peninsula on the Virginia side of the Potomac. (That's a visit for another day.)

Douglas Point is the more remote of the two areas — an hour's drive from the District of Columbia and 90 minutes from Baltimore. It drew just 1,250 visitors last year, according to the BLM. That tally includes group visits by schools and others, so it's conceivable that visitors could commune with nature in solitude, especially on weekdays.

It's worth the effort to get there. Douglas Point lies on the Nanjemoy Peninsula in southwestern Charles County, which is widely considered one of the most ecologically and culturally significant regions in Maryland. Despite intense development pressures elsewhere in the county, the peninsula remains largely rural and heavily forested, noted Joel Dunn, president and CEO of the Chesapeake Conservancy. The Audubon Society has designated it an "important bird area," one that offers prime habitat for many forest-dwelling birds and other at-risk species. The region is also home to a large heron rookery.

It is similarly rich in cultural features, with traces of a Native American presence that goes back 10,000 years or so. European colonists



A pair of reconstructed chimneys at Douglas Point mark a site that was home to a Baptist minister in the 1800s. (Dave Harp)

began settling along the river in the 1600s, and visitors to Douglas Point can see the ruins of a brick house built in the late 1700s that around 1840 became the home of a Baptist minister, Rev. William I. Chiles. All that remains of the Chiles homesite are its foundation and a rebuilt pair of brick chimneys. But archeologists have identified the locations of nearby outbuildings, possibly including a dairy or a smokehouse for preserving fish and meats.

Photo above: Douglas Point, a special recreation management area in Southern Maryland run by the U.S. Bureau of Land Management, features about 2 miles of mostly forested trails for hiking, bicycling and horseback riding. (Dave Harp)



While visiting Douglas Point, Mitchell Leverette, Eastern States Director of the U.S. Bureau of Land Management, points out a nearby tract on the Potomac River that his agency also manages. (Dave Harp)

Records indicate that the Chiles family enslaved 14 people. Ground-penetrating radar surveys of the site have identified what officials believe may be the burial ground for some of them. The Chiles family cemetery, some distance away in the woods, is marked with gravestones.

How the BLM came to control this tract is a tale in itself. In the 1970s, the Potomac Electric Power Company planned to build a nuclear power plant on the peninsula. It erected meteorological towers to measure winds there and drilled wells to monitor groundwater levels. At least one capped well-head can still be seen in the woods along the trail. Pepco also dismantled the old Chiles house, which had passed through successive owners and fallen into disrepair.

Local residents fought the power plant, arguing that the facility could, among other things, interfere with striped bass spawning in the river. Pepco scuttled its plans in the late 1970s, but decades later sold the land to a gravel mining company that intended to develop the site into a quarry. Locals fought that, too, and in 2001, the state and the BLM jointly acquired 1,270 acres.

Douglas Point is part of that larger tract now known as the Nanjemoy Natural Resource Management Area, jointly managed by the BLM, the Maryland Department of Natural Resources and Charles County.

The county operates a waterfront park just north of Douglas Point, featuring a boat ramp and kayak launch for access to Mallows Bay. In 2019, the Mallows Bay and the surrounding stretch of the Potomac were designated a National Marine Sanctuary to protect the remains

of a “ghost fleet” of more than 100 sunken wooden steamships built during World War I and scuttled there after the war. (That’s another attraction for anyone looking to visit the area.)

Visitors can explore Douglas Point on foot, bicycle or horseback. It features about 2 miles of trails passing through hardwood and pine forest, interspersed with open fields and wetlands.

On a mid-September visit, our party included a contingent of BLM staff and the Conservancy’s Dunn. We started from the small parking lot at the northern end of the

recreation area and followed a trail that is mostly hard-packed diatomaceous earth and relatively easy to hike — though you need to avoid tripping over tree roots that rise from the surface.

Along the way, we gathered fallen pawpaws, the soft potato-shaped fruit of a native deciduous pawpaw tree, *Asimina tribola*. Inside, the fruit is yellow and juicy, edible and tasting like a blend of mango, banana and citrus.

A little more than half a mile on, we came to the turnoff for the Blue Banks Beach Trail, a half-mile spur that wends down to the Potomac River. In one stretch, a long wooden boardwalk traverses a wetland that was dry during our visit.

At the river, there’s a narrow sandy beach, which offers easy launching or landing for canoes and kayaks. Those intrepid enough to lug their craft nearly a mile from the parking lot can pick up a pair of trails with segments that follow the Potomac — the Captain John Smith Chesapeake National Historic Trail and Star-Spangled Banner National Historic Trail. Both are managed by the National Park Service.

On the beach, hikers can stroll the water’s edge, ducking beneath the trunks of fallen trees and possibly getting their feet wet in places when the tide is up. Peering down at the shells, pebbles and washed-up flotsam, the sharp-eyed can spot fossilized shark teeth, probably deposited there from the crumbling riverbank.

In the eroding bluff itself, you can see layers of white shell fragments. A single dis-

embodied crab claw stood out amid the shells, raising questions about how it got there.

Just off the beach trail is a small overlook with a picnic table where visitors can sit and eat while enjoying a panoramic view of the Potomac. Upriver in the distance, on the Virginia side, you can see the Marine Corps base at Quantico. In the sky, we also spotted the white headed of a bald eagle working its way downriver.

Back on the main Cal Posey Trail — named for a longtime local resident and biologist known for his oral history of the area — we headed south toward the Chiles homesite. At the ruins, hikers can take a break on a bench and learn about the site’s history from posted plaques.

From there, the last quarter-mile trail segment is universally accessible, a crushed gravel path that is navigable by people with mobility issues. The path leads to a similarly small parking lot on the area’s southern boundary.

For those interested in a longer hike, Douglas Point’s trails link up on either end with trails in the state-run natural resource management area and in Purse State Park. Douglas Point is also part of the Potomac Heritage National Scenic Trail, which is a network of trails from the C&O Canal upriver from the District of Columbia to the Potomac’s confluence with the Chesapeake Bay. ■

IF YOU GO

The Douglas Point Special Recreation Area is open to the public year-round, from dawn to dusk daily. You’ll find it about 15 miles southwest of Indian Head, MD, via state routes 225 and 224. The north parking lot at 9275 Riverside Road in Nanjemoy. Another lot about a mile south on Riverside Road also accesses the Cal Posey Trail.

It’s a primitive site, without toilet facilities or trash receptacles. Pack out what you pack in. With a federal government shutdown possible in November, Douglas Point is one federally managed recreation site likely to remain open.

For information, search for Douglas Point at blm.gov, call the BLM Lower Potomac Field Station at 703-339-8009 or email blm_es_meadowood@blm.gov.



Beachcombing at Douglas Point in Southern Maryland can yield fossilized shark teeth. (Dave Harp)

Photo inset: A selection of finds on the beach at Douglas Point includes fossilized shark teeth (right) and gill rakers, bony structures inside fish that help them sieve food from water flowing through their gills. (Dave Harp)



Marsh marigold line the bank of Robins Creek in Maryland as a kayaker enjoys a morning paddle. (Dave Harp)

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Tree swallows rest on the tops of phragmite before resuming their journey south for the winter. (Dave Harp)

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Boats cluster at the docks in Cambridge, MD. (Dave Harp)

Our heartfelt thanks — your monthly support for the Bay Journal is invaluable!

We'd like to extend a special thank-you to the following people who have made monthly contributions to the *Bay Journal* in 2023. Steady support is incredibly helpful toward maintaining and expanding our reach. We truly appreciate their commitment to helping the *Bay Journal* be the best it can be.

Can you be a monthly supporter in 2024? If you'd like to add your name to this group, please contact Jacqui Caine today at jcaine@bayjournal.com or 540-903-9298.

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Utility-scale solar is coming, like it or not, so let's do it right

By Robert N. Whitescarver

We are undergoing a wonderful, historic, frustrating and in some cases (Maui) devastating transition to renewable energy. Solar panels will be on buildings and parking lots, and in highway medians, landfills and brownfields. Utility-scale solar projects should be installed in those places before we put them on farmland. But that's not what's happening.

Like it or not, utility-scale solar is coming. Localities — especially those with weak ordinances for utility-scale solar, defined as projects with 50 acres or more of solar voltaic panels — need to get ready for it. I support big solar, but it must be done right.

Here are 10 things we should demand from any utility-scale solar project on rural land in the Chesapeake Bay watershed:

- Proper screening with vegetation and setbacks from property lines
- Riparian buffers along all hydric features (like springs and streams) within the project area
- Pollinator-friendly plants and/or marketable crops under and around the panels
- Enough space between the rows of panels to support plant growth and allow water infiltration
- Proper erosion, sediment and stormwater runoff controls (Solar panels themselves, after all, are impervious surfaces.)
- Proximity to transmission lines
- The requirement that the land be returned to its original use if solar panels are removed
- A decommissioning plan with a bond to back it up, including a requirement to recycle and reuse whatever is possible from the decommissioned panels
- Minimal impact on prime farmland (more on this later), forests and cultural resources
- Robust public participation and full transparency

Much guidance is available on the proper siting of utility-scale solar, including model ordinances. In Virginia, I have found the most complete guidance from the Alliance for the Shenandoah Valley. There's also good information at the American Planning Association and the Chesapeake Bay Foundation.



A utility-scale solar array is constructed near Lynchburg, VA. (Kipp Teague/CC BY-NC-ND 2.0)

Farmland protection purists may disagree with me, but please hear me out. In this country, we lose one acre of farmland every *minute* to residential and commercial development. Leasing farmland for solar (and eventually putting it back as it was) is a way to protect farmland.

U.S. farmers, conservatively estimated, currently devote about 30 million acres to growing corn to produce ethanol for our gas tanks, and some studies show this produces more greenhouse gases than it prevents. A little more than a third of that land in solar panels could generate 100% of U.S. electricity demand.

The U.S. Department of Agriculture's Conservation Reserve Program has retired 23 million acres of farmland from annual crop production because they are highly erodible. Solar panels on half of that acreage could generate 100% of U.S. electricity demand.

We also need to recognize the difference between prime farmland and marginally productive farmland. Prime land — mostly level with deep, well-drained soil capable

of producing food without irrigation — should be avoided for utility-scale solar.

Soil quality is another important factor. Utility-scale solar should avoid the best soil for crops, defined as class I and class II in the USDA's Land Capability Classification System. No more than 30% of land turned over to solar projects should have class I or II soils.

Farmland with soil that is class III or higher is considered marginal, with "severe limitations" for growing food. These types of soil are better suited for solar arrays and may support pollinator plants or forage for sheep to graze.

Solar panels may ruin your view, but that's a non-issue. If you don't like the "unnatural" look of solar panels, get over it. It's not your land. I wish there were a cost-share program to pay me for the view our farm provides the neighbors, but there isn't.

Putting solar panels on my land is a right granted because I bought and own the land. A changing view is not a legitimate reason to object to utility-scale solar.

Consider the alternative view if the

farmer sells out to development. Would you rather look at a sea of McMansions, which come with a host of far worse downsides, like suburban traffic, higher taxes and demands for more services?

Finally, it's time to move on from our fossil fuel binge. In a time when we have atmospheric rivers, bomb cyclones, heat domes, and record durations of extremely high temperatures, and in a time when we have smoke from wildfires thousands of miles away clouding the Statue of Liberty and the mountains in the Shenandoah Valley, and in a time when drought conditions bring death and devastation like that visited on Maui in August, we need to reduce carbon emissions, now — and in a big way. Utility-scale solar will help us get there. ■

*Robert "Bobby" Whitescarver is a farmer in the Shenandoah Valley, author and watershed restoration consultant. He teaches natural resources management at James Madison University. His website is gettingmoreontheground.com. This commentary was first published in the *Virginia Mercury* (virginiamercury.com), a nonprofit news organization covering state government and policy.*

SHARE YOUR THOUGHTS

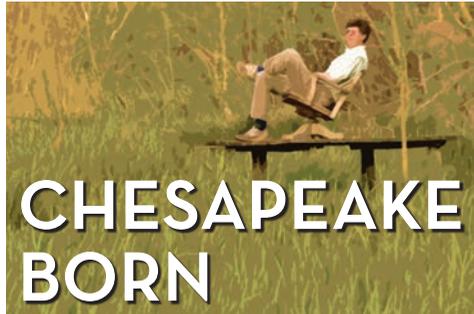
The *Bay Journal* welcomes comments on environmental issues in the Chesapeake Bay region.

Letters to the editor should be 300 words or less. Submit your letter online at bayjournal.com by following a link in the Opinion section, or use the contact information below.

Opinion columns are typically a maximum of 900 words and must be arranged in advance. Deadlines and space availability vary. Text may be edited for clarity or length.

Contact T.F. Sayles at tsayles@bayjournal.com, 410-746-0519 or at P.O. Box 300, Mayo, MD, 21106. Please include your phone number and/or email address.

A beaver champion in VA, and the need for more like her



CHESAPEAKE BORN

By Tom Horton

It was a teachable moment I'd rather not have had. I took a van full of Salisbury University students 130 miles to Baltimore to show how a colony of beavers had wrought their ecological magic.

Damming and ponding, slowing the flow of a degraded Chesapeake Bay tributary, settling out sediment, filtering pollution, the beavers were thriving in the heart of a heavily paved, suburbanized watershed.

"God's own engineers," a farmer friend called the bucktoothed rodents. Rivalled only by humans in their ability to transform landscapes, beavers dominated the hydrology of North America for millennia. They assured clear, clean water, resilience against flood and drought, and habitat for an array of wetland creatures from frogs to migratory waterfowl.

But on this day, the dam was deteriorating, the beaver lodge decaying. No fresh chews in the streamside forest. What had happened?

It was a Sunday, but on the way home I Googled "trappers near me" and called a number that popped up. The trapper answered, and before I could finish my question: "Yep, I know exactly where you mean," he said, "took six beavers out last month." Nearby landowners, concerned about their trees, had hired him.

The trapper was just doing his job. But what if his job could include educating landowners about the benefits of beavers and showing them ways to coexist that in the long run might be cheaper than trapping?

Which brings me to Alison Zak, a Northern Virginia resident who operates, all by herself, the Human-Beaver Coexistence Fund, worthy of your interest and support. We need more like her in the Bay watershed



Alison Zak examines an abandoned beaver lodge in the upper reaches of the Magothy River in Anne Arundel County, MD. (Dave Harp)

facilitating beavers, the most charismatic link to water quality I know of.

"You can't conserve wildlife without understanding and working with the people who will interact with that wildlife," Zak said.

As she's talking, we're knee deep in the chilly swamp headwaters of Maryland's Magothy River, a Bay tributary where she showed locals how to chew-proof an assortment of streamside maples, oaks and gums they didn't want taken down by beavers.

An anthropologist by training, Zak, a Florida native, was living not so long ago on Sulawesi Island in Indonesia, studying seven endangered species of macaque monkeys. Having decided against years' more research for a Ph.D., she migrated to environmental education work in Virginia's Fauquier County.

There, she encountered wild beavers for the first time and became fascinated — or, she admits, "obsessed" with the animal. Landowners began to seek her advice on their beaver interactions.

"Most didn't know much about them. They just knew this animal had shown up and [was] changing their property ... flooding, chewing ... that's what beavers do."

In 2021, she founded the Human-Beaver effort, working on coexistence projects from West Virginia to the Magothy — "anywhere

I can reasonably drive."

She is close to becoming a bona fide "beaver professional," a certification offered by the Beaver Institute in Southampton, MA. Tuition is \$2,500 and requires roughly 60 hours of online coursework, plus completion of four field projects.

These mostly work on the flooding issues that result when beavers impound water, which they do for their own safety, avoiding predators in the depths of their pond. In more than 90% of cases, Zak said, there are viable nonlethal solutions.

Easily maintained low-tech "flow devices," for instance, can keep water deep enough for the beavers while preventing flooding. Where beavers block road culverts, a common issue, the solution is either flow devices or "beaver dam analogs" — human-made dams that encourage the rodents to relocate their own dams away from the culvert.

Engaging landowners and highway departments (for culverts) depends a lot on education, Zak said. "Because beavers are just now slowly rebounding after being gone so long [trapped out of the Chesapeake by mid-1700s], there's a sort of ecological amnesia ... A true beaver wetland to most of us looks like chaos. Single-channel streams spreading out to multiple channels, dead and dying trees, unruly vegetation."

Her work usually begins with relationship building, understanding the landowners' values and points of view. As for trappers, "I don't vilify them," she said. "They know a lot about beavers."

She hopes to go full time with coexistence work in another year. In the meantime, she's coordinating events for a local bookstore and writing a book, *Wild Acana*, about connecting with nature through yoga.

"We're on the right trajectory. Beaver consciousness is growing. There are several good books out there," she said, referring to Ben Goldfarb's *Eager — the Surprising Secret Life of Beavers and Why They Matter* (2018) and Leila Philip's more recent *Beaverland — How One Weird Rodent Made America* (2022).

She says real promise lies in working with trappers, who are frequently a landowner's go-to when beavers arrive. "How can we make it lucrative for them to offer non-lethal solutions?"

Promise also lies with highway departments who must deal (often harshly) with beavers blocking highway culverts. In both instances, coexistence is a cheaper solution than constantly trapping or tearing out dams every year.

Where we wade in the upper Magothy exemplifies the need for a more comprehensive approach. The beaver dam there gets torn down every spring by fisheries biologists, worried that threatened yellow perch can't migrate farther upstream to spawn.

A simple solution, Zak thinks, would be to induce the beavers to dam outside a concrete culvert there, allowing easier dam bypass for the perch.

The Beaver Institute has trained more than 80 people nationwide to do what Zak does and is looking for more recruits.

So how about this as a new Bay restoration goal: at least one trained beaver problem-solver in every government environmental and transportation agency, as well as every environmental nonprofit? ■

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.



BULLETIN BOARD

VOLUNTEER OPPORTUNITIES

WATERSHEDWIDE

Project Clean Stream

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

Potomac River watershed cleanups

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

PENNSYLVANIA

Nixon Park

Volunteer at Nixon Park in Jacobus. Contact: 717-428-1961, NixonCountyPark@YorkCountyPA.gov.

■ *Front Desk Greeter*: Ages 18+ can work alone. Families can work as a team.

■ *Project Feederwatch*: 9 am–4 pm Tuesday or Wednesday Nov. 14 through spring. (Participants sign up for 1-hour shift every other week). Beginners welcome. This citizen science program, which is part of a North American effort run by the Cornell Lab of Ornithology, counts birds that visit feeders. The data is used to track winter bird population trends. Visitors can drop in any time.

PA Parks & Forests Foundation

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

State park, forest projects

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

VIRGINIA

Cleanup support & supplies

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

Strange green organisms in ponds?

Concerned about strange greenish organisms in ponds or lakes in the Prince William Conservation Soil & Water Conservation District? Email: waterquality@pwsacd.org. Learn about green algae, cyanobacteria: vdh.virginia.gov.

Goose Creek Association

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

Borrow cleanup supplies

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

Reedville Fishermen's Museum

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

Virginia Living Museum

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

Pond cleanup programs

Join a Prince William Soil & Water Conservation District *One-Time Pond Cleanup* in fall or spring. Kayaks needed to support this effort. Volunteers also needed to take on longer-term commitments on a variety of waterways. Info: waterquality@pwsacd.org.

Chemical Monitoring Program

Help collect monthly water quality data on conductivity, pH, dissolved oxygen, temperature, and turbidity from waterways across Prince William County, Manassas City, and the Town of Dumfries. Support a team with data from your backyard or nearby stream. To adopt a site under the Water Quality Program, contact: Veronica Tangiri at waterquality@pwsacd.org.

MARYLAND

Bay safety hotline

Call the Maryland Department of Natural Resources' Chesapeake Bay Safety and Environmental Hotline at 877-224-7229 to report these issues: fish kill or algal bloom; floating debris that poses a navigational hazard; illegal fishing activity; public sewer leak or overflow; oil or hazardous material spill; critical area or wetlands violation.

Anita C. Leight Estuary Center

Meet 1–3 pm Nov. 19 at the Anita C. Leight Estuary Center in Abingdon for an *Invasinators Workday*. Ages 14+ (12 & younger w/adult). Remove invasive plants, install native species. Wear sturdy shoes, long sleeves, work gloves. Weather permitting. Registration recommended. Info: 410-612-1688, 410-879-2000 x1688, otterpointcreek.org.

Severn River Association

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

Annapolis Maritime Museum

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

Patapsco Valley State Park

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

Oyster growers sought

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

National Wildlife Refuge at Patuxent

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

Ruth Swann Park

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

Streamlink tree projects

The Maryland Department of Natural Resources' Streamlink Education program needs volunteers, ages 10+, to join its stewardship teams.

■ *Tree Teams*: 9–11 am Nov. 18 & Dec. 2, 9, 16. Help maintain young forests along Tom's Creek in Emmitsburg.

■ *Nursery Teams*: 9–11 am Dec. 2, 9, 16. Help grow native trees in in Creagerstown. Info, registration: www.streamlineducation.org/volunteer.



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. December issue: November 11
January/February issue: December 11

FORMAT

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

CONTENT

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

CONTACT

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

Answers to CHESAPEAKE CHALLENGE on page 27

1. El Niño
2. La Niña
3. El Niño, Pacific; La Niña, Atlantic
4. More tornadoes, La Niña; fewer tornadoes, El Niño



BULLETIN BOARD

Chesapeake Bay Environmental Center

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

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/atlasmdcdc/about.

Maryland State Parks

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

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:** Ages 11+ Work in the museum's collections management area on artifacts excavated in the county. Info: 301-769-2222.

Invasive Species Tool Kit

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

Lower Shore Land Trust

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

Conservation opportunities

The Lower Shore Land Trust works with individual landowners who want to protect the natural heritage of their properties. Info: lowershorelandtrust.org/volunteer-sign-up.

EVENTS / PROGRAMS

PENNSYLVANIA

York County Parks

Events offered by the York County Parks and Recreation Department are free, take place at Richard R. Nixon Park, near Jacobus and do not require registration, except where noted. Info: NixonCountyPark@YorkCountyPA.gov or 717-428-1961. When registering, include number of participants, names, children's ages, phone number.

■ **Teen Naturalist Club:** Year-round meetings. 8th-12th grade students. Nature adventures, volunteer opportunities. Email only for info.

■ **Pre-Colonial PA Natural History:** 2-3:30 pm Nov. 19. Learn the history, ecology of Pennsylvania prior to European colonists.

■ **Thankful for Forests Walk:** 2-3:30 pm Nov. 26. Casual nature walk to view signs of the seasons. Register if you arriving in a group of 10+ people.

■ **Nature Walks at the Ridge:** 9:30-11 am & 1-2:30 pm Dec. 13. Meet at Pheasant Pavilion in Rocky Ridge Park's Hidden Laurel picnic area in York. Search for signs of wildlife signs, identify plants without their leaves, Learn how animals survive winter. Trails' uneven surfaces are unsuitable for strollers. Registration required.

■ **2023 Christmas Magic - A Festival of Lights:** Nov. 24-Dec. 30 (closed Dec. 24, 25 & 31). Rocky Ridge County Park, York. Walk trail through woods, open pavilions amid a million twinkling lights. Photo opportunities, miniature train display, food for sale. Timed-entry ticket sales begin mid-November at ChristmasMagicYork.com. No walk-ins.

MARYLAND

Home energy workshop

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

Chesapeake Bay Maritime Museum

Upcoming events at the Chesapeake Bay Maritime Museum in St. Michael's:

■ **Science Saturday:** 1-3 pm Nov. 11 (*Little Explorers*, ages 4-7) & Dec. 9 (*Curiosity Club*, ages 8-11) Hands-on activities incorporate science, art, museum exploration. Register: bit.ly/ScienceSaturdays2023. Need-based scholarships info: registration@cbmm.org.

■ **Free Fishing Friday:** 3:30-5:30 pm Nov. 17 (weather permitting). All ages (10 & younger w/adult) Drop-in program teaches fishing basics, identification. No fishing license required. Equipment, bait provided; participants may bring their own fishing pole. Info: Sophie Stuart at 410-745-4974 or sstuart@cbmm.org.

■ **Homeschool Workshop - Feather Weather:** 1-2:30 pm Nov. 29. Ages 5-8. Chart bird migration, design bird-inspired paper airplanes. \$15. Accompanying adult, nonparticipant children may explore the museum during program for \$5 (ages 6+). Ages 5 & younger, free. Register bit.ly/CBMMHomeschool. Info: Alyssa Zajan, azajan@cbmm.org, 410-745-4988

Patuxent Research Refuge

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

■ **Kids' Discovery Center - OWLS:** 9 am-12 pm (35-minute time slots, on hour) Tuesdays-Saturdays [S]. Ages 3-10 w/adult. Crafts, puzzles, games, nature exploration, free booklet. Group special arrangements possible. Registration strongly urged: 301-497-5760 (this program only).

■ **Screech Owl & American Kestrel:** 11-11:30 am Nov. 11 [S]. All ages. Meet live birds. No registration.

■ **Winterize Your Butterfly Garden:** 2-3:30 pm Nov. 11 [S]. All ages. Help pollinators overwinter; attractively provide native seedheads for wintering wildlife; learn seed collection/storage for next year's new plants. Free plants may be available.

■ **Winter Bird Search:** 8-11 am Nov. 12 [N]. Ages 10+ Search for overwintering birds. Beginners welcome. Some driving; some short walks. Weather-dependent. Bring water, sunscreen. Binoculars recommended.

■ **Family-Fun/TREE-mendous Trees!** Drop in 10 am-1 pm Nov. 17 & 18 [S]. Activities, crafts, games. Learn how trees help wildlife, people, Earth. No registration.

■ **North Tract Bicycle Trek:** 10 am-12:30 pm Nov 18 [N]. Ages 10+ See wildlife, plants, historical sites on 12-mile guided ride. Weather-dependent. Road may be unsuitable for narrow tires. Bring bike, snack, water bottle, helmet.

Anita C. Leight Estuary Center

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

■ **Family Feed:** 10 am-3 pm (choose time) Nov. 7, 9, 14, 16, 28, 30. Help behind the scenes, feed animals. Free. Register at least 24 hours before your selected date.

■ **Meet a Critter:** 1:30 pm Nov. 12, 19, 26. All ages. Meet a live animal. Free. Register by 48 hours prior.

■ **Middle School Homeschool/Fall Forest Ecology:** 3-session course meets 1:30-3:30 pm Nov. 14, 21, 28. Ages 11-13. Learn about hibernation, tree identification. \$45/child. Register by Nov. 8.

■ **Terrific Turkey Preschool Party:** 10:30-11:30 am Nov. 18. Ages 0-5 w/adult. Turkey-themed games, crafts, outside exploration. \$10/child. Register by Nov. 15.

■ **All About Owls:** 2-3 pm Nov. 18. Ages 8+ \$10/family. Register by Nov. 17.

■ **Critter Dinner Time:** 2:30-3:30 pm Nov. 25. All ages. Learn about turtles, fish, snakes while watching them eat. Free. Register by Friday before.

■ **Winter Wildflowers:** 1:30-2:30 pm Dec. 2. Ages 6+ Explore center's gardens, forest, meadows. Examine wildflowers' winter remnants. Create a bouquet. \$10/family. Register by Nov. 29.

Free museum passes at libraries

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

RESOURCES

WATERSHEDWIDE

UMCES online courses

Registration for the University of Maryland Center for Environmental Science's free, online courses: *Strategic Communication for Sustainability Leaders; Innovative Environmental Management Models: Case Studies & Applications; Story-telling with Data using Socio-Environmental Report Cards; and The Science Advisory Toolbox for Environmental Management*. Take a single course or all together as part of a Professional Certificate (nominal fee). Maryland teachers can take online, self-paced MSDE-approved professional development courses in both *Science Communication* and *Socio-Environmental Report Cards* that include lesson plans. Info: umces.edu/professional-studies.

VIRGINIA

Apply for runoff assistance

The Prince William Soil & Water Conservation District no longer requires application periods for the *Virginia Conservation Assistance Program*, which helps HOAs, homeowners, schools, places of worship and others with urban soil erosion and water runoff. Those interested can simply contact the district at 571-379-7514, pswcd.org/vcap, or Nicole Slazinski at nicolethier@pswcd.org.

Plant native black chokeberry and enjoy jelly from its berries



STEWARD'S CORNER

By Adam Miller

Imagine a plant that grows well in both wet and dry soil, plus thrives in both full sun and partial shade. Now imagine that this versatile shrub produces thick habitat for small animals, beautiful white spring flowers that attract bees and other pollinators, then red leaves in the fall.

And what if somewhere between those white flowers and vivid autumn colors, its branches droop from the weight of berries that are not only an excellent source of food for birds, bears and rabbits but are also considered a human superfood, offering high-antioxidant benefits?

It may sound too good to be true, but this super shrub — black chokeberry (*Aronia melanocarpa*) — is real, and its benefits don't stop there.

Native plants, in general, are what we should all be growing in our yards, parks and natural areas. As a rule, they require less maintenance because they've evolved



The black chokeberry bush bears clusters of fruit in midsummer. They are an edible antioxidant and can be used to make muffins, smoothies, syrup and jelly. (Alliance for the Chesapeake Bay)

to thrive in our climate. And, just as important, insects and animals have in turn evolved to depend on those plants. So, when in doubt, go native. And what could be better than a hardy native that, with very little work, gives you a tasty and healthful snack?

Not to be confused with chokecherry, a larger shrub and often a small tree with a slightly more northerly range (and leaves that are toxic to livestock and dogs), chokeberry is a mostly maintenance-free, pollinator-friendly shrub. It tolerates wet soil, making it popular for rain gardens.

Its mid- to late-summer berries are said to contain higher levels of antioxidants than any other berry!

The catch: Even when ripe, the dark purple fruit from the chokeberry packs a sour punch that makes even my sour-candy-loving 8-year-old daughter pucker up. But have no fear; you can get all the health benefits and none of the astringency by simply cooking them. Then you can turn the berries into a range of delicious foods, such as smoothies, muffins, syrups and — featured in this column — homemade jelly!

During a mid-July morning walk around the backyard, I noticed that our chokeberry shrubs were nearly hanging to the ground from the weight of hundreds of dark purple berries. A few hours later, I glanced up from the computer to see our daughter standing there with a jar full of berries and a smile stretching from ear to ear.

For the first half of the summer, she had started nearly every day with a dash to raspberry bushes. But the raspberries were long gone, and I guess she was missing this important part of her routine. So, determined to keep her backyard-to-plate summer tradition alive, I headed to the kitchen. It was time to make some jelly.

What You Need

- 4 cups of black chokeberries
- 2 tablespoons of pectin
- 1.5 cups of honey
- 1/2 cup of lemon juice
- Large pot
- Medium saucepan
- Fine metal strainer
- Small bowl
- Muddler (long-handled pestle for mashing)

Get busy picking

It's worth noting that we were a little premature with our mid-July berry harvest. Most chokeberries are ripe and ready to harvest in late August or early September. But our July jelly turned out just fine. The key is to pick berries that have lost all of their red hues and turned to a very dark purple.

Boil your chokeberries

After washing the berries thoroughly, place them in a large pot and cover with water. Bring the water to a boil, then cook for 30 minutes or until the berries are soft.

Muddle, muddle, muddle some more

Grab the strainer and saucepan. Place the strainer over the saucepan. Pour the berries and leftover water into the strainer. Now grab that muddler and get to work slowly pushing the softened berries through the strainer. Keep doing this until all that's left in the strainer is berry pulp. The material in the saucepan should be a thick, burgundy paste. Don't be shy about tasting it at this stage. I liken it to pomegranate juice.

Home stretch

Add the honey and pectin to the paste in the saucepan and simmer for 5 minutes. Allow your jelly to cool before carefully pouring it into a food-safe jar. There's nothing left to do now but to enjoy it with the special satisfaction that comes with eating something from your own backyard.

So, you can have a beautiful native plant that helps clean our water, provides pollinator and wildlife habitat and makes for a delicious snack. Filling our spaces with native plants gives us a sense of contributing to cleaner water in the Chesapeake Bay region and the satisfaction of knowing we're acting as good stewards. If we get a nice treat out of it, that's a bonus!

If chokeberry doesn't sound like your "jam," there are plenty of other native plants that can yield something delicious. Try an elderberry tea, a fresh blueberry pie, or the endless possibilities of one of my favorite native fruits, the pawpaw. Check out your local plant suppliers to find the best choice for your space and taste. ■

Adam Miller is the communications director for the Alliance for the Chesapeake Bay.



Chokeberries are mashed in a strainer. (Alliance for the Chesapeake Bay)



Jars of chokeberry jelly are ready for the cupboard. (Alliance for the Chesapeake Bay)

Return of the wild turkey, a conservation success story



ON THE WING

By Alonso Abugattas

The wild turkey has made an incredible comeback. Not that long ago, wild turkeys were all but wiped out by a combination of overhunting and habitat loss.

By the early 1900s, none remained in the District of Columbia and very few remained in the woods of Maryland, Virginia, New York, Delaware or Pennsylvania, to say nothing of the other 34 U.S. states that the birds were known to inhabit. They are thought to have vanished entirely in as many as 18 of those states.

Then, thanks to great restoration efforts by game commissions and hunting groups, wild turkeys were reintroduced into their former native range.

Early efforts to replenish populations with birds raised in captivity were largely unsuccessful. But “trap and transfer” programs begun in the 1940s — capturing wild birds and strategically relocating them — began to have the desired effect.

Turkeys are becoming increasingly more common. Plus, the land need not be that wild for them to survive. They’re found not only in suburban areas, but in major cities such as Washington, DC, and New York.

The wild turkey (genus *Meliagris*) is a “New World” bird, with two species found in North America: the eastern wild turkey (*M. gallopavo*), found in the wild in 38 U.S. states and several Canadian provinces, and the ocellated turkey (*M. ocellata*), found in central America. There are six subspecies of the eastern wild turkey, and interbreeding occurs.

According to the National Wild Turkey Federation, the one you’re most likely to see east of the Mississippi River is *M. gallopavo sylvestris*. Its subspecific name (*sylyvestris*) refers to the bird’s preferred environs: forests.

Wild turkeys are the largest and heaviest game birds and the heaviest of all so-called land fowl (order Galliformes), which includes chickens, pheasants, quails, grouse and many other species.



A wild turkey crosses a dirt road in Ontario, identifiable as a male by its prominent “beard,” the plume of hair-like feathers sprouting from its breast. About 20% of females have a smaller version of the beard. (Skip Russell/CC BY-NC-ND 2.0)

Male eastern wild turkeys grow to about 40 inches tall and weigh 17–21 pounds, according to the Cornell Lab of Ornithology. Females are considerably smaller, typically about 30 inches tall and 8–11 pounds. The heaviest known wild turkey weighed 38 pounds, yet it was a lightweight compared with the Guinness world record domestic turkey, which weighed 86 pounds.

While domestic turkeys are ungainly and flightless — having been bred to be meatier and heavier — the wild turkeys they descend from can run up to 25 miles per hour and can fly at more than twice that speed. Still, with their plump bodies, long necks and showy, rounded tails, even the wild birds don’t look like they can move that quickly, nor are they easily mistaken for other game birds.



A flock of male wild turkeys forages on a farm field in Queen Anne’s County, MD. Wild turkeys usually congregate in same-sex groups. (Steve Droter/Chesapeake Bay Program)

The male’s face can change color and has other interesting features, complete with interesting names. The flap of skin dangling from the bird’s neck is called a wattle or dewlap, as is its equivalent on a bovine. The sometimes reddish bumps on the male turkey’s neck and head are called caruncles, and the fleshy projection on top of its beak is called a snood.

Turkeys also have an assortment of names based on sex and age. Adult males are called toms or gobblers (because of one of the male’s common calls, though it has many others). Mature females are called hens, not surprisingly, but first-year females are jennies. First year males are called jakes. A very young turkey, regardless of sex, is known as a poult.

In the absence of disease and predation, wild turkeys can live up to 15 years. They subsist primarily on acorns and other tree nuts, as well fruits and seeds from shrubs and grasses. But they’re not entirely vegetarian; about 10% of their diet is made up of insects and even small amphibians.

For most of the year, these nonmigratory birds tend to form same-sex flocks, though the hens are solitary when nesting in the spring. After mating (late March to early April in the Mid-Atlantic), the hen makes her nest on the ground, usually no more than a shallow depression in dead leaves, often next to a live or fallen tree. She lays 8–12 eggs that hatch roughly a month later.

During incubation, when the hen leaves the nest to feed, she kicks leaves onto the nest, to hide the eggs from raccoons and other predators. The young all hatch on the same day and can fly just two weeks later.

It is great to know that conservation efforts and game regulations have increased the wild turkey numbers. As of 2023, the estimate for wild turkeys within the U.S. was 84.2 million, a robust enough number for the Cornell Lab to consider them a species of “least concern.” That’s not to say we can let our guard down. Even though hunting is well-regulated, habitat loss — courtesy of suburban sprawl and rampant development — continues to be a threat, as it is for so many of our native species. ■

Alonso Abugattas, a storyteller and blogger known as the Capital Naturalist on social media, is the natural resources manager for Arlington County (VA) Parks and Recreation. You can follow him on the Capital Naturalist Facebook page and read his blog at capitalnaturalist.blogspot.com

A healthy brook trout population equals a healthy stream



BAY NATURALIST

By Kathy Reshetiloff

The brook trout (*Salvelinus fontinalis*) is a small, brilliantly colored freshwater fish native to clear, cold streams and rivers in the headwaters of the Chesapeake Bay watershed. It is also the state fish of New York, Pennsylvania, Virginia and West Virginia.

Brook trout have a dark green back, covered with lighter worm-shaped markings. These markings, resembling the pattern created when the sun shines through rippled water, help to camouflage brook trout from predators such as larger fish and herons, and even anglers. The fish's bluish sides are sprinkled with yellow spots and red spots surrounded by blue halos. Its fins are starkly edged in white, something that sets it apart from other trout — nonnative brown trout being the most common in the Chesapeake Bay region.

Brookies thrive in clear, silt-free, well-shaded freshwater streams, ideally with numerous pools and a substrate of mixed gravel, cobble and sand. Brook trout are not tolerant of water temperatures above 75 degrees Fahrenheit and are rarely found in developed areas.

Not picky eaters, brook trout feed on a variety of prey — chiefly aquatic insects, like mayflies, caddisflies and stoneflies, but also nonaquatic insects that fall into the water, like ants and beetles. They'll also eat small crayfish and even consume small finfish like minnows, but only when they are easy to catch.

Brook trout spawn in autumn, mainly in late October and early November. The female uses her tail to create a shallow nest, or "redd," often near the lower end of a pool where the gravel is swept clean of silt and there's plenty of fresh, oxygen-rich water. There she deposits eggs, which the male then fertilizes. During spawning, the lower flanks of males become brilliant orange to red.

Once the eggs are fertilized, the female covers them with gravel. The eggs incubate through the winter months, hatching in



A brook trout swims in Seneca Creek, a Potomac River tributary in Pendleton County, WV. (Ryan Hagerty/U.S. Fish & Wildlife Service)

early spring. Brook trout mature in two to three years and live to about 6 years.

Most grow no larger than 9–10 inches, so a 12-inch brook trout, while not unheard of, is rare and considered a real trophy. Diminutive size notwithstanding, brook trout have always been prized game fish, an especially popular catch for anglers using fly rods.

They are also ecologically significant, if only as the proverbial canary in the coal mine. Because they require pristine, stable habitat with excellent water quality, their presence indicates a healthy stream ecosystem. As water quality in headwater streams declines, so do brook trout populations.

Urbanization affects brook trout through loss of streamside vegetation, loss of stream

shading, increased sedimentation, reduced flow and increased high-flow events. It also impacts brook trout by changing the physical makeup of streambeds, whether silted over from stormwater runoff or paved over in constructed channels or culverts.

Effects of agriculture on brook trout populations are like those of urbanization: increased water temperature, increased sedimentation, changes in hydrology and loss of streamside vegetation. Additionally, livestock can pollute water and damage stream banks, increasing the erosion of sediment into waterways.

Mining activities impact brook trout populations through acid mine drainage, hydrological changes and physical habitat

degradation. Nonnative fish, such as brown and rainbow trout, compete with native brook trout for food and habitat. Brook trout populations can also become fragmented and isolated by physical barriers like dams, which does long-term harm by limiting genetic diversity.

Recognizing the uniqueness of eastern brook trout and their decline in this region, an alliance called the Eastern Brook Trout Joint Venture formed in 2004. This partnership of state and federal agencies, regional and local governments, businesses, conservation organizations, academia, scientific societies and private citizens is working to protect, restore and enhance brook trout populations across their native range.

Whether you are an angler, landowner, business or conservation group, there is a variety of activities you can undertake to support and protect brook trout, including: identifying high-priority brook trout streams; restoring brook trout habitat using bank stabilization, in-stream structures or streamside plantings; removing dams and other stream blockages; and fencing off livestock to reduce erosion and fecal pollution.

For more ways you can come to the aid of current and future brook trout populations, check out Eastern Brook Trout Joint Venture at <http://easternbrooktrout.org>. ■

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



An angler casts into the cool, clear, trout-friendly water of West Virginia's Seneca Creek. (Ryan Hagerty/U.S. Fish & Wildlife Service)