CHESAPEAKE
BAY JOURNAL
March 2025 Volume 35 Number 1
Independent environmental news for the Chesapeake region

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Avian flu has spread rapidly this winter in the Bay region, hitting both poultry and waterfowl, especially snow geese, pictured here at Blackwater National Wildlife Refuge on Maryland's Eastern Shore. Read our story about it on page 13. (Dave Harp)

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ON THE COVER

A waterman works from his boat near Tangier Island in Virginia's portion of the Chesapeake Bay. (Dave Harp)

Bottom photos: left courtesy of Commonwealth Fusion Systems, center by Dave Harp, right by Matt Felperin

CHESAPEAKE BAY JOURNAL BY THE numbers

1
Independent news source dedicated entirely to environmental topics in the Chesapeake region — the *Bay Journal!*

250,000
Average number of times people encounter *Bay Journal* content each month

1,000+
Typical number of new *Bay Journal* subscribers each year

282
Articles produced by the *Bay Journal* in 2024

34
Years that the *Bay Journal* has been providing environmental news to the Chesapeake region

14,000
Number of times to date that people have downloaded our *Chesapeake Uncharted* podcast

45,000
Average number of *Bay Journal* website visits each month

4 million+
Number of times readers saw *Bay Journal* articles that were re-published by other media in 2024

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Together, we'll keep the news coming

EDITOR'S NOTE

To our Bay Journal readers,

Normally, page 3 is where we highlight a short environmental topic that relates to the flora, fauna and environmental health of the Chesapeake Bay watershed. This month, we're using the space to highlight concerns about the *Bay Journal* itself.

In this issue, you'll find an article about the freeze on federal grants that were approved and underway for states and nonprofit organizations working on the science and ecosystem health of the Chesapeake Bay watershed. According to the new presidential administration, those grants are under review and could be cancelled. The legitimacy of such cancellations is under debate. In the meantime, uncertainty abounds.

We note in the article that the *Bay Journal* also receives some support from a federal grant. But the focus of that article is not and should not be on the *Bay Journal*. So, here, I'd like to explain more and ask for your help.

The *Bay Journal* is a nonprofit (and nonadvocacy) news organization. You are reading this issue thanks to three sources of support: private grants, public grants and donations from readers. The federal funds, among the public grants, were awarded by the Chesapeake Bay Program to support its public engagement goals.

The Bay Program has never been involved with our reporting, editing or review process in any way. The terms of the grant specify this. If it didn't, we would decline the grant. Our editorial independence is nonnegotiable.

But the *Bay Journal*, too, has been impacted by the freeze. As this issue went to press, there were no funds and no communication about the status of the grant.

This means that we need to raise funds now, to buffer the *Bay Journal* against current impacts and potential impacts down the road. We won't close up shop, but the grant represents one-third of our budget. This is a serious situation and could lead to significant impacts.

We have already taken steps to trim costs while dealing with uncertainty. We have for now suspended bulk mailings of the *Bay Journal* to schools, libraries, nature centers, marinas and other businesses. And we have delayed filling the Pennsylvania reporting position, vacated when Ad Crable retired in January.

At the same time, we are determined to keep the *Bay Journal* as robust as ever. And we need help from everyone who cares about environmental news as much as we do.

Now more than ever, credible reporting matters — and the *Bay Journal* delivers it. We are the only independent news source dedicated entirely to environmental issues in the Chesapeake region.

And our spring fundraising campaign begins *now*.

You'll receive a letter from us soon. When you do, please consider a gift of support. Your generosity in any amount will help make a difference.

But why wait? The sooner you act, the better. Look below for ways you can support environmental journalism in the Chesapeake region and donate to the Bay Journal Fund today.

– Lara Lutz




How you can help

- Donate today to keep the *Bay Journal* strong and growing.
- Make a secure gift online by scanning the QR code or visiting bayjournal.com/donate. (Or mail a gift by using the form on page 34.)
- Businesses: Contact us for sponsorship opportunities, including a new season of the *Chesapeake Uncharted* podcast launching this spring!
- Community foundations, grantmakers, family funds: Contact us to learn more about supporting the *Bay Journal*.
- Questions? Ideas? Contact editor Lara Lutz at llutz@bayjournal.com.

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ABOUT US

The *Chesapeake Bay Journal* is published by Bay Journal Media, an independent 501(c)3 nonprofit news organization dedicated to environmental reporting in the Chesapeake Bay region. *Bay Journal* reporting reaches an average of approximately 250,000 people each month through news articles, columns, films, the *Chesapeake Uncharted* podcast and more.

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BAY JOURNAL NOTEBOOK

Ad Crable sent his regards, and this photo, from his time away in West Virginia. He retired from the Bay Journal in January. (Courtesy of Ad Crable)

Full spring ahead

The long months of winter may be behind us, but spring isn't the only good thing on the horizon. Staff writers **Jeremy Cox** and **Lauren Hines-Acosta** are hard at work on the next season of the *Bay Journal*'s *Chesapeake Uncharted* podcast. The new season will feature some of the Bay's most iconic critters, paired with the upcoming release of our new film, *Chesapeake Rhythms*, which explores the region's marvelous wildlife migrations. As you wait for them both, you can catch up on Seasons 1-3 of the podcast at bayjournal.com/podcasts or through your podcast streaming service.

Lauren also has been running around the Virginia State capitol in Richmond following bills that have bearing on water supplies, data centers and other issues that touch the Bay. She's been observing lobbying days, photographing rallies in front of the capitol building and taking notes at press conferences. She'll produce a recap article soon. Virginia's short legislative session wrapped up on Feb. 22 this year, while other state legislators elsewhere in the Bay watershed will continue meeting through the spring.

The On the Wing column this month — about the red-breasted nuthatch — isn't the only place you'll find birds in this issue. Staff writer **Whitney Pipkin** first reached out to Matt Felperin, a roving naturalist with the Northern Virginia Regional Park Authority, about bringing her kids to an evening owl prowl (*Owl Moon* by Jane Yolen is one of their favorite books). But when he shared photos of a rare "butcherbird" sighting in Maryland, she wrote an article about it for this issue.

Chesapeake Born columnist **Tom Horton** invited editor-at-large **Karl Blankenship** to speak to his class at Salisbury University in on Maryland's Eastern Shore in February, where he explained the relationship between agriculture and the Chesapeake Bay.

And *Bay Journal* staff took on an intense team effort to include in this issue the sweeping story of how proposed federal funding cuts and grant freezes are so far impacting Chesapeake Bay programs, farmers and funders. Editor **Lara Lutz** deemed the coverage "the most thorough, contextualized article out there on impacts to Bay-related work."

NEWS briefs

LOCAL
REGIONAL
NATIONAL

Bay states shatter warmth records in 2024

Five states in the Chesapeake Bay region in 2024 experienced their warmest year on record, according to the National Oceanic and Atmospheric Administration.

Maryland, New York, Pennsylvania, Virginia and West Virginia were among 17 states nationwide that set annual heat records. The only state in the Bay watershed that didn't have its warmest year was Delaware, which had its fifth hottest.

The nation as a whole also notched its warmest year in the agency's 130 years of recordkeeping, registering an average temperature of 55.5 degrees.

Baltimore and the District of Columbia tied a July record for having four consecutive days with temperatures of 100 degrees or higher. Baltimore went on to have a fifth day above 100, tying the highest number recorded for any month.

The year was also notable for being dry. October was the all-time driest of any month on record for Philadelphia and Allentown in Pennsylvania as well as Wilmington, DE. It was also Delaware's driest autumn on record.

Eastern West Virginia and western Maryland in July fell into extreme drought for the first time since 2010. Across the entire year, it was Maryland's 35th driest and Delaware's 17th driest on record.

Globally, 2024 was the warmest year since record-keeping began in 1850 — reaching 2.3 degrees above the 1900s' average. The planet's 10 warmest years on record have happened in the last 10 years. *— J. Cox*

State park added to last MD county without one

All but one of Maryland's 23 counties contain at least one state park. That is poised to change soon.

Wicomico County is home to more than 100,000 residents as well as the Eastern Shore's largest city, Salisbury, but no state parks — although one appears to be in the offing after a Feb. 12 vote by the Maryland Board of Public Works.

The three-member board, which is chaired by Gov. Wes Moore, approved the Department of Natural Resources' plans to purchase a 445-acre property along Wetipquin Creek for $3.3 million.

The property hosts a variety of ecosystems, including tidal marshes, oak and hickory forests, mixed pines and intertidal scrubland along the Nanticoke River tributary. But its centerpiece is a house built in the mid-1700s, known as Long Hill.

The centerpiece of a new state park that will be opened in Wicomico County, MD, is a house built in the mid-1700s, known as Long Hill. (Maryland Dept. of Natural Resources)

"Wetipquin Creek State Park will expand our state parks to every county in Maryland, an important milestone in our mission," said Maryland Park Service Director Angela Crenshaw. "Once open, the new park will provide recreational and educational opportunities for visitors to immerse themselves in the outdoor world by fishing and paddling [and] exploring trails that meander through forest, wetland and meadow habitats."

The Park Service said the proposal is still in the planning stages; there is no time frame for the park's opening. But officials say the property could offer interpretive and educational programs, including tours and events exploring the region's history, the lives of enslaved people at Long Hill and

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briefs

From page 5

the history of Indigenous peoples. The acquisition is expected to be finalized later in 2025. *— J. Cox*

DC sues feds for polluting the Anacostia River

The District of Columbia's Attorney General sued the federal government in January for what it called "150 years of polluting the Anacostia River."

The costly cleanup of the Anacostia River, which runs through the southeast side of the nation's capital, has been underway for years. And this isn't the first time the district has filed a lawsuit in an attempt to get a party responsible for polluting the river to help fund its cleanup.

In 2023, the Potomac Electric Power Co. (Pepco) settled a $57 million suit with the district to compensate for the company's historic contributions to the Anacostia's pollution woes.

Exelon, which owns the electric utility company Pepco Holdings in the district, is supporting a pilot program to test new solutions for removing toxic substances from the Anacostia River as part of its cleanup work near Pepco's Benning Road Transfer Station. Along with Washington Gas and the U.S. Navy, Pepco is among the parties that have signed consent decrees pledging to clean up pollution in the river generated by their facilities in the past.

But district Attorney General Brian L. Schwalb alleged in a suit filed Jan. 10 that the federal government has been the biggest driver of pollution in the Anacostia River over the years. For generations, federal facilities treated the river "as a cost-free dumping ground for the toxic waste and chemicals it generated," Schwalb said.

Contributors to that waste include the Washington Navy Yard along the river's banks, which already was a known source of polychlorinated biphenyl (PCB) contamination to the river. The federal government also operated a waste dump at Kenilworth Landfill that the suit alleges leached chemicals and metals into the river for 25 years. Federal printing facilities also released solvents, metal plating solutions and inks into the river through a drainage system that emptied into the Anacostia and Potomac rivers, the suit alleges.

— W. Pipkin

VA spends $2.3M to maintain forests in Bay watershed

The Virginia Department of Forestry is issuing more than $2.3 million in grants to help 60 localities support forested land in the Chesapeake Bay watershed.

The money is from the Forest Sustainability Fund, which the Virginia General Assembly established in 2022. The fund is designed to supplement local government revenues to support efforts to protect forested lands.

Forestland requires less investment from localities since it doesn't need as many services as developed properties. But forestland taxes are based on the land's productive value rather than its market value. This means local governments receive less revenue overall from forested lands.

"Maintaining land for forest use provides many natural resource and economic benefits," Matthew Lohr, state secretary of agriculture and forestry, said in a statement. "These include timber, wildlife and recreational values, as well as the benefits of watershed protection, cleaner air and scenic beauty."

Forestland can be used to grow and harvest trees, offer recreational services and conserve natural resources.

According to the state forestry department, city and county governments in Virginia could have received about $1 million in additional tax revenues if their forestlands had been put to different uses. The department gave each of the 60 localities $35,000 on average. The awardees can use the funding for public education, outdoor recreation or forest conservation projects.

—L. Hines-Acosta

Patawomeck Tribe reclaims ancestral land

The Patawomeck Indian Tribe acquired 870 acres of its ancestral homeland along the Rappahannock River in Spotsylvania and Caroline counties, VA, on Jan. 27.

This will be the second time the tribe has acquired land in the last six months. The state gave the tribe funding in November to acquire 14 acres along the same river. The more recently acquired site has forests, wetlands and a river shoreline.

"This property will be instrumental in maintaining our traditional cultural practices and instilling a deep connection to the lands and waters of our home within future generations of our citizens," Patawomeck Chief Charles Bullock said.

An anonymous landowner donated the property to the Nature Conservancy in the 1970s. The Trust for Public Land secured a North American Wetlands Act Grant through the U.S. Fish & Wildlife Service and a grant from the Virginia Outdoors Foundation. The Trust for Public Land used the funding to work with the Nature Conservancy and the tribe to facilitate the transfer. The Virginia Outdoors Foundation holds a conservation easement on the land, but the tribe will be its permanent stewards.

Patawomeck Indians have been present in what is now Stafford County, VA, since at least the 1300s and were instrumental in sustaining the Jamestown Colony, according to the tribe's website (patawomeckindiantribeofvirginia.org). Recognized by the state in 2010, the tribe operates a museum in Fredericksburg, VA. *— L. Hines-Acosta*

DC issues fish consumption advisory over PFAS levels

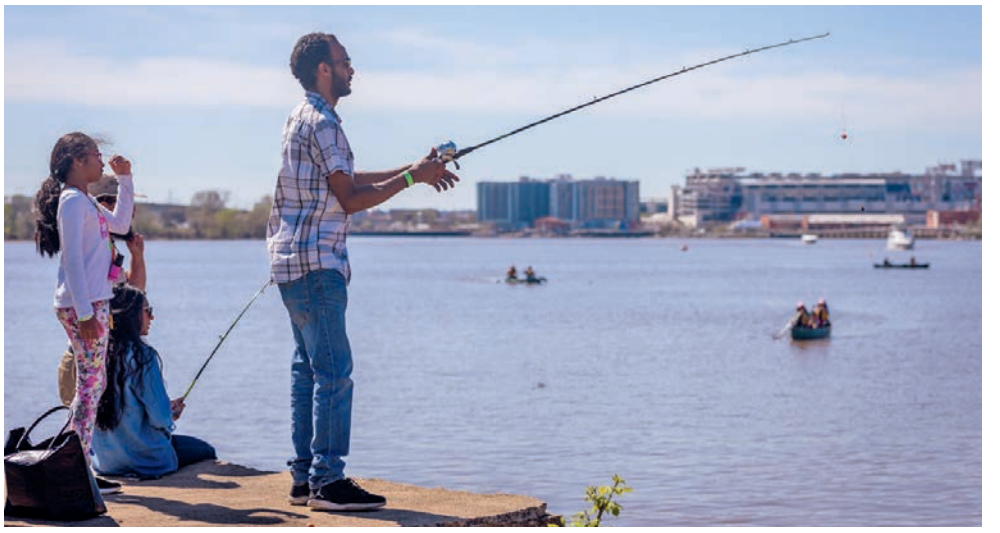
Agency warns to eat less or none of certain fish in parts of Potomac and Anacostia rivers

By Whitney Pipkin

The District of Columbia's environmental health agency has issued its first fish consumption advisory based on the presence of PFAS, or "forever chemicals," in fish caught in the rivers running through the nation's capital. The advisory warns people who eat fish caught from portions of the Potomac and Anacostia rivers within the district to consider eating less or none of certain fish.

Issued in December, the advisory is based on fish tissue studies conducted by the district's Department of Energy and Environment. For the first time, these studies tested for the presence of per- and polyfluoroalkyl substances, or PFAS, in addition to looking for PCBs (polychlorinated biphenyls), PAHs (polycyclic aromatic hydrocarbons), metals and certain pesticides. PCBs are also considered a "chemical of concern" in fish tissues taken from these same water bodies.

The group of synthetic substances known as PFAS are called forever chemicals because they do not break down in the environment.



Anglers fish in the Anacostia River along its shoreline in the District of Columbia. (Jeff Salmore)

Instead, much like other chemicals that can be toxic to both humans and the environment, they tend to accumulate over time. Long-term exposure to PFAS, including by consuming foods containing the chemicals, can pose health risks such as cancer, liver problems and decreased immunity.

PFAS have for decades been widely used in a variety of products, from firefighting foam to non-stick cookware, making it difficult to trace sources of the pollution.

The U.S. Environmental Protection Agency has published draft criteria for limiting certain PFAS in waters that support aquatic life but doesn't yet have final standards in place.

Studies are underway to better understand how much is too much when it comes to the ubiquitous chemicals. While federal drinking water standards for PFAS have been issued, the process of setting standards for fish consumption is complex.

The Department of Energy and Environment said its fish advisory notice for PFAS is "preliminary" because the EPA has not yet issued its final guidance.

The district's fish consumption warnings do not pertain to fish purchased from restaurants, supermarkets or fish vendors in the city.

For now, the agency advises the general public not to eat eel, carp, striped bass or largemouth bass from any DC waterway; to limit consumption of blue catfish to three servings per month; and to have no more than one serving per month of brown bullhead catfish, channel catfish, gizzard shad, smallmouth bass, snakehead, sunfish, white perch and yellow perch.

DOEE did not sample tissue from flathead catfish. ■

The invasive Bradford pear: still vilified after all these years

But an ever-expanding grove of these Asian natives, some say, beats a parking lot

By Jeremy Cox

Reviled. Despised. Singled out for eradication.

Woe to the Callery pear, possibly the most unloved fruit-bearing tree this side of the Garden of Eden. Sales of this Asian native and its best-known cultivar, the Bradford pear, have been banned in three states: Ohio, Pennsylvania and South Carolina. And other states may follow, or at least take steps to eradicate the invader. In Virginia, for instance, state forestry officials have launched a program that provides landowners with a free replacement tree in exchange for cutting down a Bradford pear.

The now ubiquitous tree was selectively bred as an ornamental tree at the U.S. Department of Agriculture's facility in Glenn Dale, MD, and introduced to the public in the 1960s. It was an instant hit, owing to its compact shape and dramatic displays of white flowers in early spring.

Since the 1990s, though, many horticulturalists have been raising alarms about *Pryus calleryana* 'Bradford' — which has spread rapidly into the wild, crowding out native species. It has also proved to be a less than perfect ornamental, mainly for its habit of losing major limbs in high winds and snowstorms. And it certainly doesn't help that its blooms give off an unpleasant, fishy scent.

Bradford pear trees bloom profusely in mid-March 2024 along Route 50 in Easton, MD. (Dave Harp)

"It seemed like the perfect landscaping tree," said Joan Maloof, a retired professor from Maryland's Salisbury University and author of several books about trees. "But once we had them in for a couple decades, we realized they weren't quite so perfect."

Yet some experts aren't ready to completely write them off yet. Maloof, founder of a national organization dedicated to preserving the oldest stands of native trees, would seem to be an unlikely candidate to offer kind words about the invader. But even she says it has some value.

"I'd rather have a field of Callery pears than a parking lot," Maloof said, "as far as nature and stormwater [are concerned]."

Like most trees, and unlike parking lots, Bradford pears can help stem the tide of soil erosion and soak up excess nutrients through their roots. Also, while it's true that a native oak tree, for example, has more to offer as a food source for wildlife, in winter some animals do eat the Bradford pear tree's small fruits if nothing else is available, said Katlin DeWitt, an invasive species coordinator with the Virginia Department of Forestry.

The first broad introduction of the Callery pear in the U.S. was in 1916 after pear orchards in Oregon were ravaged by a bacterial disease known as fire blight. Their Callery cousins were offered as alternatives because of their resistance to the scourge, Maloof said.

A thornless variety was developed at the USDA lab in Maryland in the 1950s and named after the former head of the station, Frederick Bradford, according to a passage in one of Maloof's books, *Treepedia*.

Bradford pears were bred to be sterile — that is, not capable of pollinating one another. But once the trees had established themselves in suburbia, researchers realized that they could cross-pollinate with any other variety of Callery pear tree that happened to be nearby.

That enabled the trees to set fruit. Birds ate that fruit, however grudgingly, and deposited the seeds far and wide. The Bradford invasion was on — especially visible where highway departments planted the tree along roads and in interchanges. Most of those initially modest plantings have since expanded into oceans of white blossoms in early spring.

Still, as Maloof and DeWitt see it, Callery and Bradford pears have some worth.

"It's not really giving much to the environment other than just being there," DeWitt said, "[but] from an ecosystems standpoint, it's still a tree."

For example, despite their relatively diminutive stature, Bradford and Callery pears still perform a critical function:

Bradford pear trees are early spring bloomers. (Dave Harp)

casting shade. They can help lower air temperatures in urban communities that suffer from excessive heat, Maloof said, admitting that she is accustomed to "thinking positive things about trees." Given their high adaptability to just about any soil or moisture scenario, Bradfords can thrive where many other species do not.

A long-term study of Baltimore's urban tree canopy illustrates some of the trees' benefits. Led by the U.S. Forest Service, the research found that from 1999-2014 the amount of acreage they covered within the city went up from 280 acres to 781 acres, a nearly threefold increase.

The scientists then calculated how much oxygen was produced by each major tree species and how much carbon they had diverted from exacerbating climate change in the atmosphere. During the final year in the assessment, Callery pears generated nearly 1,000 tons of oxygen and sequestered about 350 tons of carbon, they calculated. Both totals were higher than that of the native green ash, even though the ash covered nearly three times as much ground.

While Virginia technically doesn't ban the sale of Bradford pears, DeWitt said, she and her colleagues are doing what they can to abolish them from the landscape. Last year was the first time they offered a voluntary exchange program for native trees. The inaugural event resulted in 250 native trees being given away outside their department's Charlottesville headquarters.

For information about this year's exchange events, landowners can visit the department's website, www.dof.virginia.gov, or the agency's social media.

"I do understand people buying it because it doesn't get to be a huge tree, [and] it doesn't drop a lot of leaves or fruit," DeWitt said. "But I just think there are a lot of nice native trees you can plant instead." ■

Nonprofits, states scramble as funding freeze hits Bay work

Many clean water projects in Chesapeake region on hold as Trump administration reviews grants

By Bay Journal Staff

Efforts in recent years to accelerate the Chesapeake Bay restoration have run into a wall of Trump administration orders that halted payments for huge swaths of Bay-related work, raising doubt about the future of many projects.

Tens of millions of dollars for Bay-related work being carried out by nonprofits, farmers, churches, universities and states have been left in limbo. Some say the damage could take years to undo.

The uncertainty stems from a government-wide freeze on grants and contracts ordered by the Trump administration Jan. 27 intended to allow for reviews that ensure those expenditures "align federal spending and action with the will of the American people as expressed through presidential priorities."

Initially, that impacted about $3 trillion in funding nationwide.

The administration rescinded the "pause" less than two days later, unfreezing some but not all of the grants. A suit by 22 states and the District of Columbia followed swiftly, challenging the administration's hold on federal funds.

Yet more than three weeks later, despite several court rulings ordering an end to the funding freeze, many organizations and states in the Chesapeake Bay region said that some funding was still on hold and were not sure whether it will be restored. Some were advised to halt work.

The action has alarmed some lawmakers, including Maryland Sen. Chris Van Hollen, a Democrat, who said his office has received numerous reports that some organizations are still unable to access already-approved grant money.

"Holding these funds hostage jeopardizes countless jobs in Maryland and across the country and threatens our progress on improving the health of the Bay and our environment," Van Hollen said.

Billions of dollars of environmental funding directed toward states was on hold for weeks as well. Although much of it was eventually restored, it added to the confusion.

But nongovernmental organizations were hard hit. Smaller groups that operate with little financial cushion found themselves in financial limbo.

"Nonprofits are being forced to make impossible decisions related to their organizational priorities and staffing despite having binding agreements with the federal government," said Irena Como, senior attorney with the Southern Environmental Law Center, at a Feb. 20 news conference.

Federal grants support tree plantings that reduce urban heat stress, cool streams to support fish habitat, control erosion and reduce polluted runoff. (Chesapeake Bay Foundation)

Ripple effects

It's a huge setback for Bay restoration. Federal agencies are the largest funders for Chesapeake-related work, but much of it is carried out through grants and contracts. (The *Bay Journal* also receives some support from a federal grant.)

In recent years, with many key Bay restoration and pollution reduction goals off-track, federal agencies dramatically ramped up funding to accelerate progress, fueled by legislation passed during the Biden administration that made hundreds of millions of dollars available for work within the watershed.

Those funds are used to plant streamside forest buffers, restore wetlands, improve trout streams, build oyster reefs, reduce runoff from farms and developed lands, promote environmental education, plant trees in urban areas and support other efforts aimed at improving the Bay and its 64,000-square-mile watershed. The work touches Maryland, Virginia, Pennsylvania, West Virginia, Delaware, New York and the District of Columbia.

While some funds have been restored since the Jan. 27 order, many grant recipients still find their funding halted. In many cases, they are not being reimbursed for expenses they've already incurred.

"We have funds for one more payroll. If the funds don't start being deposited from the federal government, we will not be able to pay our staff nor our vendors," one organization reported to the Choose Clean Water Coalition.

The coalition, which includes more than 300 mostly small nonprofits working throughout the Bay watershed, is surveying members to gauge the impact of the disruptions.

Of the first 38 responses in the on-going poll, 23 reported that grants had been paused for at least some period of time. Many of the groups receive half or more of their funding from federal sources, putting their future at risk. Many have paused work.

"It's a very real example of what happens when this money doesn't exist," said Kristin Reilly, director of the coalition. "It really drives the point home about the importance of the federal partnership and the federal investment in this work. It really cannot move forward without that federal support."

Organizations contacted by the *Bay Journal* reported that they get as much as 80% of their budgets from federal sources. Some declined to talk on the record out of concern that they would be targeted for retribution.

The Chesapeake Bay Foundation, which is the largest nonprofit Bay advocacy group, gets about 12% of its funding from federal grants that support environmental education, conservation actions on farmland and other activities. The group expressed alarm about what a pullback in federal funding would mean for it and other organizations involved in restoration work around the Bay region.

"We can't restore the Chesapeake Bay and its rivers and streams without federal investment," said Keisha Sedlacek, the foundation's federal director. "These federal grants support farmers, state and local government programs, and community projects that benefit people, the economy and the environment."

Large amounts of approved federal funds that support climate-related practices on farms have been on hold, and their future is uncertain. (Dave Harp)

Kristin Reilly, director of the Choose Clean Water Coalition, discusses the future of the Chesapeake Bay cleanup effort. (Dave Harp)

Uncertainty abounds

While some organizations have seen funding restored for now, others remained in limbo as this issue went to press. Many are frustrated by the lack of guidance about how or why decisions are made or which programs are targeted.

"We've been trying to grapple with the news as it unfolds every six hours, every 12 hours," said Meenal Harankhedkar, executive director of Interfaith Partners for the Chesapeake, which helps congregations with environmental restoration projects. "I think we're all in the stage of monitoring and processing."

Her group is particularly concerned because diversity, equity, inclusion and environmental justice programs were specifically targeted for elimination in the executive orders from the White House.

Interfaith Partners has long prioritized efforts that promote equity, and last year it received a $1.8 million grant for "equity enhancement." The project's goal is to work with faith-based institutions to install green stormwater improvements and plant nearly 2,000 trees across 50 acres of urban and suburban properties.

Despite the "equity" label, Harankhedkar said "we're trying to make a universal impact through all these programs." She added that she feels confident, though, that her organization can ride out any rough waters because it receives funding from a variety of nonfederal sources.

Apart from diversity programs, much of the affected funding appeared connected to the Infrastructure Investment and Jobs Act and the Inflation Reduction Act. The latter was a major funding source for a variety of climate-related work.

Huge amounts of Inflation Reduction Act funding distributed by the U.S. Department of Agriculture — the largest financial source of Bay conservation work — were stalled for weeks.

The USDA on Feb. 20 restored funding for some of its core conservation programs. But that same day, the USDA National Forest Service ended support for a program that funded tree planting efforts in disadvantaged communities in the Bay watershed.

Left unclear is the fate of roughly $1 billion for various "climate smart" agriculture projects funded under the Inflation Reduction Act in the Bay watershed. Those projects seek to improve soil health, store carbon, control methane emissions from farms and promote more efficient manure and fertilizer applications, among other projects.

That's important for Bay restoration because many of those actions also reduce runoff of water-fouling nutrients. Agriculture is the largest source of nutrients to the Bay.

A USDA statement said it "continues to review IRA funding" to ensure it does not support diversity, equity and environmental justice programs or "far-left climate programs."

Hannah Smith-Brubaker, executive director on the Pennsylvania-based nonprofit Pasa Sustainable Agriculture, is managing millions of dollars of climate smart grants with 13 partner organizations in 15 states that currently involve 200 farms with another 750 applicants.

Work on many projects is underway, but it's unclear whether it will be reimbursed, Smith-Brubaker said at a news conference.

"We are every day fielding calls from farmers who are mid-project and their contractor wants to know when they're going to be paid," she said. "If this funding continues to be delayed or eliminated, these farmers stand to lose $20 million in direct payments and another $20 million in technical support."

Other USDA programs are affected as well. In December, work crews finished installing $100,000 worth of solar panels on Michael Protas's farm in Montgomery County, MD. The work was aimed at reducing costs for his subscription vegetable business by making it entirely solar-powered.

The project was approved under a USDA program for energy efficiency on small farms. But the grant that was to reimburse half of the cost now appears to be in jeopardy. If it doesn't materialize, Protas said, "I'm on the hook for the whole $100,000."

"Farmers are inherent risk takers," he added. "There are variables you sign up for. But the one thing that was not on anybody's bingo card was the government not paying on a contract that you already had."

Many who work on projects aimed at controlling farm runoff worry that the government leaving farmers stuck with the tab on projects will have a chilling effect on future participation that could take years to overcome.

"We work hard to build our relationships with farmers," said Kristen Hughes Evans, executive director of Sustainable Chesapeake, which works with farmers on conservation initiatives but has seen some of its funding frozen. "Farmers can be skeptical of the government, so the ones that come in the door are often ones you've worked hard with to build that trust.

"It's absolutely critical for our conservation programs that participating farmers have a good experience. When commitments are made to farmers, they have an expectation that those commitments are honored. When they are not, they remember."

Federal grants support stream restoration projects throughout the Bay watershed, including those that support brook trout habitat. (Steve Droter/Chesapeake Bay Program)

Reimbursements in jeopardy

A significant amount of money, especially the largest distributions, is sent directly from federal agencies to states, universities and larger organizations.

But funds for much of the Bay-specific work, especially for smaller organizations, are distributed through intermediaries such as the National Fish and Wildlife Foundation and Maryland's Chesapeake Bay Trust.

The Bay Trust awards $20 million to $30 million annually, about a third of which comes from federal agencies. Its president, Jana Davis, said the prospect that grants awarded in previous years may not be honored leaves the trust in a bind.

The trust awards grants based on the assurance that the federal government will follow through on promises. But it does not get reimbursed until grantees actually spend the money and report it back to the trust for payment. "We can't invoice the federal government until we expend the funds," she said. "So there's this weird moment of risk."

The trust's access to federal funds was restored shortly after the "pause" for all but one of the federal grants it receives. The exception was a $17.5 million grant from the U.S. Forest Service over four years to increase tree cover in disadvantaged communities.

The trust committed the first $1 million of that last year to eight groups, but invoices submitted in January for $250,000 have not been paid, Davis said in mid-February. In response to its queries about when it would be paid, the trust got an email saying that "these invoices have been placed on hold due to a presidential executive order. We are currently awaiting further directions."

Even for those grants restored after the initial hold, doubt lingers about whether they will be frozen again or possibly withdrawn altogether.

Davis said the trust has advised grantees to go ahead with the work it has already authorized and that the trust will cover the costs on its own, even if the federal money never materializes.

That's possible because the trust has its own dedicated streams of funding from the sale of Maryland Chesapeake Bay license plates and from the state's voluntary income tax checkoff to the Chesapeake Bay and Endangered Species Fund. But using those funds to cover unpaid federal grants comes with a cost to other programs that the trust normally supports, such as environmental education.

See **FUNDING FREEZE**, *page 12*

Solar arrays that power a cooling system at Michael Protas's Maryland farm were supported by a federal grant program, but his reimbursements are frozen. (One Acre Farm)

FUNDING FREEZE *from page 11*

"It's heartbreaking," Davis said of the disruption and uncertainty surrounding federal funding. "This is good work. This is like churches doing green things to their parking lots."

The National Fish and Wildlife Foundation, a congressionally created nonprofit, last year funneled more than $100 million in federal grants to dozens of organizations to support Bay-related work.

NFWF officials did not respond to a request for comment but several grant recipients interviewed by the *Bay Journal* said the funding outlook for many projects was in flux. Two weeks after the Jan. 27 notice that initiated the federal freeze, NFWF emailed some grantees advising them to halt work.

"As we are unable to reimburse you for costs associated with projects that include funding from one or more frozen accounts, we are recommending you cease all activities on the relevant grant(s)," the email said.

Weighing risk amid uncertainty

Even if funding is fully restored, many grant recipients express frustration about the future. Grants often cover projects that span multiple years, with money awarded one year at a time. So while the funds may be restored for now, the remainder might again be targeted in future years. That makes it difficult to decide whether to fill positions or award subcontracts for projects that may be abruptly ended.

ShoreRivers, an environmental group on Maryland's Upper Eastern Shore gets about a quarter of its $7.5 million annual budget from various federal grants that support work with farmers, environmental education and other initiatives.

Isabel Hardesty, executive director of the organization, said that while most of its federal funding had been unfrozen, "we are reluctant to advance funds or continue projects that might be impacted later this year.

"This is making us reevaluate our budget. We are also spending huge amounts of staff time trying to manage and plan for the impacts of funding uncertainty, instead of working toward our mission of thriving rivers and engaged communities."

That uncertainty seems likely to continue as the administration has thrust other uncertainties into the process. In a directive issued Feb. 6, the White House said that it intended to stop funding nongovernmental organizations "that undermine the national interest."

The two-paragraph memo tells agencies to review all funding to those groups to ensure future decisions align "with the goals and priorities of my administration, as expressed in executive actions; as otherwise determined in the judgment of the heads of agencies; and on the basis of applicable authorizing statutes, regulations, and terms."

Further, multiple reports suggest that many agencies have been told to expect budget cuts of 30%–40% when the administration's budget comes out in March. While Congress may reject the proposed budget, it casts more uncertainty about the future of projects that often span multiple years.

While the administration has said it is trying to improve the efficiency of programs, many say the uncertainty has the opposite effect. It delays decisions and work, and it drives up costs. Subcontractors may charge more if they are not certain they will be paid by groups that are supposed to be receiving grants.

"When there are unknowns, there's risk, and risk costs money," said Jay Bernas, CEO of the Hampton Roads Sanitation District, which is using federal loans to implement advanced water treatment technologies on its wastewater plants.

State and climate funding hit

The funding uncertainty was shared by the states. While Bay-specific support to states was not impacted, huge amounts of other environmental funding were on hold, much of which would benefit streams and help combat climate change — all issues that greatly affect the Chesapeake watershed.

Most of that money was restored by the end of February, but not until some projects had been halted.

Pennsylvania filed suit Feb. 13 over $2.1 billion in frozen environmental funding. That included $750 million for acid mine drainage remediation, which is a major source of stream degradation in the state. Another $400 million was slated to fix abandoned oil and gas wells in the state, which discharge pollutants into streams and are major sources of methane, a greenhouse gas.

Hundreds of millions of dollars in climate-related projects funded to improve energy efficiency and other initiatives that reduce greenhouse gas emissions were also frozen temporarily.

The money was freed about a week after the suit was filed.

Pennsylvania filed a lawsuit contesting the federal grants freeze. Some of the funds were committed to clean up the acid mine drainage that turns streams orange and lifeless. (Bobby Hughes)

Jana Davis, president of the Chesapeake Bay Trust, said that about a third of its annual grant awards comes from federal agencies. (Dave Harp)

In Maryland, a spokesman for the Maryland Department of the Environment said its access to about $15 million in grants from the U.S Environmental Protection Agency had been "suspended." Those funds covered a variety of environmental regulatory activities, including monitoring air pollution and overseeing mine safety. Also temporarily shut down were two multi-state grants aimed at reducing climate pollution by expanding electric vehicle infrastructure, planting trees and restoring wetlands and coastal habitats. Maryland's share of those grants was to total $130 million, said MDE spokesman Jay Apperson.

Most of that money was eventually restored, but $271,801 in grants to support the assessment, cleanup and redevelopment of contaminated sites remained frozen as the *Bay Journal* went to press.

Funding uncertainty was having trickle-down effects for some recipients.

Edwin Luevanos, CEO of Citizen Energy, a small clean energy company based in the District of Columbia, said he had to lay off 3 of his 11 employees when he was unable to recover $100,000 for work done last year to install electric vehicle chargers and solar panels in low-income communities nationwide.

Citizen Energy was awarded grants totaling about $10 million, one from the U.S. Department of Energy and another via the Maryland Clean Energy Center from the U.S. Department of Transportation. Half of that work was to be done in Maryland, Virginia and the District, he said, and he was planning to hire 40 or 50 people once all the approvals came in.

In late February, $43,000 of the frozen money was freed up, but the rest remained in limbo. "I'm hoping we will be paid for that, too," he said. But even if he recovers money for work already completed, Luevanos said he's unsure about funding for the rest of his grant. "What is not clear is whether we can continue work." ■

Bird flu's return raises concerns about poultry, waterfowl

Latest outbreak of deadly virus seen in Delmarva chicken houses, migrating wild birds

By Jeremy Cox & Timothy B. Wheeler

Young birds crowd the floor of a Delmarva chicken house. At least eight outbreaks of avian flu have been reported on the peninsula since early January. (Dave Harp)

Bird flu is back, sending shock waves through the Chesapeake Bay region's poultry industry and fueling concerns about wildfowl, as well as "spillover" infections in humans.

Suspected outbreaks had been detected at 15 commercial poultry operations in Bay states by mid-February — mostly on the Delmarva Peninsula, according to the U.S. Department of Agriculture and state reporting. In every case, the findings arose from routine testing, and the chickens were culled to prevent them from entering the food supply.

Nationally, authorities from the beginning of the year through Feb. 12 detected positive cases in 116 commercial flocks and 65 backyard flocks for a total of more than 27 million birds.

Detections among wild birds have been more widespread in the Bay region, sickening and killing snow geese, Canada geese and other waterfowl.

Since the current outbreak of highly pathogenic avian influenza began in 2022, the U.S. Department of Agriculture's Animal and Plant Health Inspection Service has confirmed the virus in more than 1,300 poultry operations nationwide.

But birds haven't been the only ones getting sick. The strain has moved into the dairy industry, turning up in nearly 1,000 cow herds across 17 states. And so far, there have been a total of 67 confirmed human cases nationwide with one death.

Despite evidence of a crossover into the human population, the U.S. Centers for Disease Control and Prevention considers the human health risk to be low.

The latest flare-up in the Bay region appears to be tied to the arrival of birds migrating south for the winter along the Atlantic Flyway, said Dr. Jennifer Trout, Maryland's state veterinarian.

"It seemed like once the flyway got going, everything followed suit," Trout said. Wild birds are suspected of helping spread the disease to domestic poultry flocks and livestock herds.

The first detected cases in the current Mid-Atlantic wave were in Delaware. Authorities reported 850 dead wild birds, mostly snow geese, on Prime Hook Beach in coastal Sussex County on Dec. 27.

Then came evidence suggesting the disease had moved into the commercial farming sector. Preliminary positive tests announced Jan. 3 for a meat-chicken operation with 125,000 birds in Delaware's Kent County raised alarms for the Delmarva Peninsula's $5 billion chicken industry. A second case was reported in the county on Jan. 9.

The first case involving a commercial poultry operation in Maryland was made public on Jan. 10 — this time in Caroline County, also on the Eastern Shore. Since then, five more poultry farms have tested positive on Delmarva, one each in Caroline, Dorchester, Queen Anne's and Worcester counties in Maryland and one in Accomack County, VA.

"This situation since early January is certainly novel for Delmarva chicken growers," said James Fisher, spokesman for the Delmarva Chicken Association, an industry trade group. "There hasn't been a month where we've had seven cases where we're at. That's concerning."

Pennsylvania's first case involving domestic poultry in the most recent outbreak was reported Jan. 27. Tests indicated that a 50,000-bird flock at a Lehigh County farm included positive cases, according to the Pennsylvania Department of Agriculture.

As this issue went to press, the state's case count had jumped to a total of seven commercial poultry flocks for the year.

In one of the most high-profile cases to date in the region, the Metro Richmond Zoo reported Jan. 20 that two cranes had tested positive and died. The cranes didn't live in an aviary that was open to the public, officials said.

In addition to monitoring the disease in farm flocks and herds, the USDA's animal and plant health service also tracks the virus in wild birds and animals.

Nationwide, the USDA service has logged reports of 11,000 infected birds, some in every state, from 2022 through 2024. In the Bay watershed, there have been about 50 reports of dead waterfowl and other wild birds in Maryland, about 100 in Virginia and about 140 in Pennsylvania. Those infected include bald eagles, peregrine falcons, vultures and crows.

The federal inspection service also has received a smaller number of reports of avian flu deaths in land mammals, including red foxes in Huntingdon County, PA, south of State College, and a bobcat near Binghamton, NY.

The virus has not been considered a critical threat to wild bird or animal populations — though the number of virus-infected wild bird deaths seems to have increased lately, wildlife managers report.

The onset of harsh winter weather in the region may be exacerbating the effects of the illness, suggested Josh Homyack, a biologist with the Maryland Department of Natural Resources.

The agency conducts an aerial survey every winter of migratory waterfowl. Officials haven't finished analyzing the data from the latest survey, Homyack said. If anything, though, he said he expected the that waterfowl counts might be higher than the last couple winters.

"Usually, in cold winters like this, our numbers are higher," he said, explaining that the low temperatures often prompt geese, ducks and swans to fly farther south to places such as the Delmarva Peninsula and North Carolina.

A discovery of seven dead snow geese in Dorchester and Worcester counties on Maryland's Eastern Shore in early January prompted the state to expand efforts to respond to calls about dead wildlife at least back to September.

Wildlife officials say hunting wild birds is still safe, though they caution against taking sick birds or handling any found dead. Even when harvesting seemingly healthy birds, authorities recommend using disposable gloves when handling them or thoroughly washing or sanitizing hands afterward. They also suggest keeping clothing, boots and tools used for cleaning game away from any domestic poultry or pet birds.

Waterfowl harvested for consumption should be cooked to at least 165 degrees to kill any viruses or bacteria. Authorities also say it's safe for homeowners to keep filling bird feeders through the winter because songbirds are thought to be at low risk of getting or spreading the virus.

While flu warnings have extended to dairy cattle as well, authorities maintain that pasteurized milk remains safe to consume. ■

Saltwater intrusion leads Bay area farmers to ponder 'switch'

Planting switchgrass where conventional crops are dying may have several benefits, researchers say

By Jeremy Cox

Farmer Wendell Meekins checks the soil on a field near Cambridge, MD, that is frequently inundated by saltwater. (Dave Harp)

As winter turned to spring, Wendell Meekins planted his corn crop and prepared for the stalks to shoot up tall and green, just as they always had. That didn't happen.

"The corn got up about maybe 2 inches tall, turned yellow and just died completely," the veteran farmer said as he tromped through the muddy field on Maryland's Eastern Shore nearly a year later. "No fodder at all was left of it. So, it doesn't even look like it's been planted."

The field lies within a couple hundred yards of the Little Choptank River, a Chesapeake Bay tributary that flows through this low-lying section of Dorchester County. During unusually high tides, saltwater backs up into the ditches and spills across the land.

Even in relatively low doses, salt is lethal to the crops that are typically grown on the Delmarva Peninsula — the corn, soybeans and wheat that become fodder for the region's $5 billion chicken industry. An expanding raft of research suggests that climate change is putting more farmers' livelihoods at risk here as higher seas and widespread storm surges become the norm.

Meekins walked on. At the far edge of the field, he found his way obstructed by a chest-high thicket of grass-like shrubs. They were yellow from their winter dormancy but otherwise seemed to be thriving in their saline environment.

"These are the remnants of a switchgrass crop that was planted here probably in 2014 or 2015 that have come back and reseeded after we tried to take it out," he said. "So, the switchgrass actually is working here."

Could it work on other farms impacted by saltwater intrusion? And if so, would there be a market for it?

For many coastal farms, the answers to those questions will go a long way toward determining whether they can stay above water financially in the coming decades, even as their land literally goes underwater. There are serious implications for the Bay's health as well.

Plan in motion

Switchgrass (*Panicum virgatum*) has the potential to help with both issues, said Jarrod Miller, a soil expert and agricultural consultant with the University of Delaware. He's part of a multi-university team of researchers that is racing to develop salt-tolerant crops for farmers losing land to saltwater intrusion.

"Most of these grain crops aren't adapted to salinity. You can already see the salt land is lost," he said. "So, this part of the project is looking at a replacement, something you can plant there that's going to last longer and give opportunities to maintain the field [in crop production]."

The University of Maryland Eastern Shore (UMES) is the lead recipient of a $5 million grant from the U.S. Department of Agriculture to conduct a five-year pilot project looking into whether switchgrass can be marketed as a feedstock for biofuel production.

Researchers have recruited about a dozen Eastern Shore farmers so far, mainly in Somerset County, to plant the seeds this spring on test plots. The effort, dubbed the Alternative Crops and Renewable Energy (ACRE) project, is also testing the viability of using standard cover crops, such as rye grass, as an alternative in salt-impacted areas.

But the central aim is to promote switchgrass. Farmers who choose to plant and harvest it are receiving $400 per acre while those who opt for cover crops are getting $150 per acre.

One reason for pushing switchgrass is that it tolerates salt better than just about any other potential commodity, said Kate Tully, a University of Maryland agro-ecologist who is part of the effort. She has authored or co-authored several studies about Delmarva's saltwater intrusion in the last five years.

Switchgrass is a native to the Chesapeake Bay region and grows in abundance along tidal waters. Further, the scientists say, it has several potential marketable uses, including as filler material for erosion-control mechanisms, poultry bedding and natural camouflage for hunting blinds.

Still, as of the 2022 USDA agricultural census, just 58 farms nationwide reported a switchgrass harvest. Among Bay states, Pennsylvania claimed 20 of those farms, New York had five and Virginia had two. There were none in Maryland.

The ACRE researchers believe the best hope for turning a profit on the Eastern Shore lies in combining the plant's carbon-rich shoots with nitrogen-laden poultry manure to create a well-balanced fuel source for anaerobic digesters that help produce energy. Switchgrass can grow 6 feet tall or higher, ensuring plenty of fuel for a hungry digester.

"It's not a corn, but can we create a market," Tully said. She added that another attribute in switchgrass's favor is that, unlike corn, employing the crop in the energy sector wouldn't interfere with the global food supply. (Humans don't eat switchgrass.)

Anaerobic digesters use bacteria to break down organic waste to produce biofuel. The technology is far from new. It's commonly used at landfills to divert food scraps and grass clippings from the waste stream. But it's less proven with using poultry droppings as its main fuel.

A digester owned by Chesapeake Utilities near Pocomoke City on Maryland's Lower Eastern Shore has been tapped to do the job.

The ACRE project could have several benefits beyond offering farmers a paycheck, said Jonathan Cumming, the UMES plant professor leading the study. He frames the effort as a means of removing carbon from the atmosphere while producing renewable energy.

Like all plants, switchgrass absorbs carbon from the air through photosynthesis and stores it in its tissues. Then, the digester converts that carbon into fuel — and, in turn, energy. "We're actually fighting climate change," he said.

The state of Maryland has been helping to offset the Pocomoke digester's costs since it began operation in 2017, totaling more than $1.5 million. Energy and agricultural regulators have long hoped that it and similar projects can be scaled up to provide an alternative destination for the region's chicken waste. In addition to the biofuel, the digestion process yields a nutrient-rich byproduct that can be used to improve a farm's soil.

Alison Schulenburg, who is writing up the research as part of her doctoral dissertation at the University of Maryland College

Park, is installing sensors at participating farms and on the Chesapeake Utilities digester to measure the greenhouse gas emissions involved in the process.

"I think it's promising," she said. "I'm hoping there are other benefits beyond just using it in the anaerobic digestion."

Threat to the Bay

If all goes according to plan, local water quality could be another beneficiary — because, unlike other crops, switchgrass can withstand salt enough to survive and do what plants do: absorb nutrients from the soil.

That could be a game changer in the region, researchers say. For several decades, farms spread more manure than their crops and the soil could hold. When it rains, those excess "legacy" nutrients get washed into nearby waterways and into the Bay, triggering algae blooms that upend the aquatic ecosystem. The expert consensus is that nutrient pollution from agricultural pollution is one of the biggest and hardest-to-address threats to the Bay's health.

Saltwater intrusion complicates the problem, Tully explained. Under normal conditions, the phosphorus in manure clings to iron molecules in the soil. When water covers the soil, resulting in a low-oxygen environment, the iron tends to eject the phosphorus particles.

When the inundation is freshwater like rainfall, it's only a temporary problem, Tully said — because the phosphorus can simply rebind with the iron once the water drains away.

But saltwater is another story, she said. Its sulphate tends to stick to the iron in the same spot where the phosphorus had been, permanently evicting it from the soil and setting it loose in the environment.

"It's kind of like musical chairs," Tully said. "The phosphorus is now bumped off, and it's hanging out in the water." From there, the receding tide can carry the phosphorus into nearby waters, upsetting their fragile nutrient balance.

It's unknown how much of a role saltwater intrusion plays in harming the Bay's health this way. But Tully suspects at the very least that local streams suffer from the deluge of excess phosphorus.

Saltwater takes over

What is known is that the amount of salt-impacted farmland is approaching epidemic levels on the Eastern Shore.

The Bay is bordered by land on three sides. But saltwater intrusion has been almost entirely confined to its eastern shoreline because the elevation of the Delmarva Peninsula is low, even well inland. During the Colonial era, farms sprang up near the water to ease the transport of commodities across great distances. And many have remained there due to the relative lack of development pressure.

Alison Schulenburg, a doctoral student at the University of Maryland College Park, tests soil from a field affected by saltwater intrusion to determine its phosphorus content. (Dave Harp)

But after centuries of cultivation, this land is under increasing threat of being swallowed up by the Bay. Climate change has caused the Bay to rise about a foot over the past century — about twice as fast as the world-wide average, studies suggest. And up to 5 feet of additional rise is possible by 2100, according to the University of Maryland Center for Environmental Science.

Tully and her fellow researchers have been working to quantify the region's growing salt problem. Aided by satellite imagery, they reported in 2023 that about 2,200 acres of farmland on the peninsula had converted to salt patches and another 20,000 acres had turned into marsh.

There aren't many government programs available to help farmers grapple with the financial blow from losing land to salt, experts say. The same 2023 study estimated that farmers' saltwater-related economic losses topped $100 million in the region in 2016-2017 alone.

"Change is coming, and we have to deal with this," said Cumming, the UMES researcher.

Schulenburg, Tully, Miller and two other researchers collaborated on a study published last August that looked at potential crop alternatives from an environmental angle. They planted different varieties of crops, including switchgrass, at three farms experiencing intrusion and a fourth far inland with no salt issues. Then, they waited for the plants to grow and analyzed how much phosphorus they soaked up from the surrounding soil.

Doctoral student Alison Schulenburg surveys a field at the University of Maryland's Lower Eastern Shore Research and Education Center where switchgrass is being studied for its ability to remove excess phosphorus from the soil. (Jeremy Cox)

In the salty fields, there was no doubt: Switchgrass was the best at removing phosphorus, outdoing saltmarsh hay, weeds and other plantings. When farmers harvest the switchgrass, they also take away the phosphorus that the plant took up.

Because switchgrass is a perennial, it can simply grow back, allowing it to continue absorbing nutrients for years (instead of a single growing season). Over time, the phosphorus in the soil appears to decline, the study found.

"The message is that there are options on the edges of these fields for something that can be planted," said Miller of the University of Delaware. "But the other side of it is 'Is there a market?' If there's no incentive to plant it, farmers will just let [their fields] go to weeds."

The costs associated with planting switchgrass are relatively low. The seeds have a comparatively small price tag, and there's rarely a need to apply fertilizers, he said.

But farmers aren't likely to see as big of a payday. The current market pays about $265 per acre for switchgrass while paying about $750 for corn and $400 for soybeans. And the switchgrass "market" is purely theoretical on Delmarva — at least for now.

But if the anaerobic digester shakes out as a viable solution both environmentally and economically, then coastal farmers on Delmarva might just have a new crop to plant.

Wendell Meekins can't afford to wait for that day. He leases the field where the corn crop failed. The only reason that switchgrass still populates the property today is because the landowner received a state grant to subsidize the planting.

The idea at the time was to ship the plant material two counties away to a manure-to-energy plant at a state prison. But the transportation costs turned out to be too high to sustain the farm's participation, Meekins said.

For the same reason, he isn't involved in the ACRE study either. Without some kind of intervention, Meekins said the fate of this once-fecund cornfield is sealed.

"Right now, if I look at this place," he said, "I have little to no doubt that it will be vacant in two to three years." ■

Video online bayjournal.com

Increasingly rare 'butcherbird' makes an appearance in MD

A loggerhead shrike spotted on the Eastern Shore was bred in captivity in Northern VA

By Whitney Pipkin

A songbird known for skewering its prey on thorns or barbed wire sent birders scrambling to Maryland's Eastern Shore when it showed up for a visit this past December and lingered into early January.

A loggerhead shrike sighting in the Chesapeake Bay watershed is rare these days. But this bird's tags told an even more unique story: The shrike was raised in captivity at the Smithsonian Conservation Biology Institute in Front Royal, VA, and released into the wild in Canada before making its way back south to Caroline County, MD.

"Everyone is so excited about that sighting, because, unfortunately, it's so rare to see this species anymore," said Erica Royer, an aviculturist at the Smithsonian.

Looking like a very large sparrow — about the size of a cardinal — the gray-and-white loggerhead shrike (rhymes with "bike") has a white throat, a gray crown and shoulders, and its wings and tail are black on top, with some white accents. A black "Zorro" mask across its eyes and reaching halfway back on its oversized head helps distinguish it from the similarly colored northern mockingbird.

The shrike's genus name, *Lanius,* is derived from the Latin word for butcher, a nickname the species has earned: "butcherbird." A sharp raptor-like hook on its beak enables it to snag insects, small vertebrates, amphibians, mice and even the occasional small songbird. But rather than devouring its prey immediately, the shrike will often impale it on thorns or barbed wire for a while, much like a butcher hanging meat in a larder.

"Chickadees and cardinals will eat insects, but they're not butchering other birds and sticking them on thorns," said Matt Felperin, a roving naturalist with the Northern Virginia Regional Park Authority.

An avid birder and photographer, Felperin raced from Northern Virginia to Caroline County, MD, to document the loggerhead shrike's winter visit.

Maryland used to support healthy populations of the loggerhead shrike, but the species is now listed as endangered in the state and appear only occasionally during their southward migration in the fall and winter. Of the 30 species of shrikes worldwide, the loggerhead is the only one found only in North America. The birds can still be found in parts of Virginia, mostly along the Interstate 81 corridor, but loggerhead shrikes are now considered a threatened species in Virginia, too.

A loggerhead shrike, photographed this winter in Caroline County, MD, perches on a branch next to an insect it has impaled on a sharp snag. (Matt Felperin)

The species's population has declined by as much as 76% across parts of North America since the 1960s, when the North American Breeding Bird Survey began tracking bird populations. According to the Cornell Lab of Ornithology, loggerheads in the northern parts of their range — the middle latitudes of the U.S. — migrate north to breed in Canada. Populations in the southern U.S. and Mexico, meanwhile, tend to be year-round residents.

They are most likely to be spotted on the wooded edges of grasslands, scrublands and farm fields, perching on low branches or barbed wire fences as they scour the landscape for prey.

The Smithsonian Conservation Biology Institute began breeding loggerhead shrikes in captivity in Front Royal, VA, in 2011 as part of a broader effort to boost the beleaguered bird's population. Other habitat-focused programs, like the Virginia Grassland Bird Initiative, are working to make the open, shrubby spaces these birds require more available.

The Smithsonian in Front Royal also raises rare birds like kiwis and Guam kingfishers. In the '80s and '90s, loggerhead shrikes would try nesting in its crane enclosure, making use of barbed wire around the edges. So, after their numbers sharply declined in recent decades, the facility became a natural home for the recovery effort of the shrikes, too.

Today, the Smithsonian raises and releases 20-30 juvenile shrikes per year. In the spring, crews drive them overnight to Ontario, Canada, where partner organizations release them at their main remaining breeding grounds in the province.

The birds are each banded with multi-colored rings that tell the story of where they've come from and where they've been banded along the way. Since the birds are not outfitted with continuous tracking devices, it often takes photographers with zoom lenses to report where they find the birds as they migrate south. (Tagged bird sightings can be relayed to a federal bird banding lab by filling out a form at reportband.gov.)

Several years ago, one of the birds born at the Smithsonian center was spotted making in Winchester, VA. But finding one of the Front Royal-raised birds in Maryland is even more rare. It's not that the birds are simply returning to their birthplace, said Royer, so much as "they settle on the first suitable habitat they come to, which nowadays is few and far between."

DJ Washington, the Smithsonian's loggerhead shrike keeper, said the impaling method serves a couple of purposes for the bird. Shrikes lack the strong talons of a larger raptor, so skewering their supper allows them to hold food steady while ripping off bites. Mounting prey on thorns or barbed wire spikes also enables them to save food for later or to share meals with a mate or young, turning a fence or shrub into a pantry.

Felperin said that, in one case, the method of leaving its lunch for later gives time for the toxins in an Eastern lubber grasshopper to break down before the shrike consumes it.

Washington said researchers have witnessed shrike chicks practicing the impaling technique even in captivity: Fledgling birds will use their hooked, tooth-like beaks to skewer leaves on twigs.

"Most people assume it's a behavior that's taught," he said. "Interestingly, it seems this piercing behavior is an innate, instinctive thing they do."

When Felperin hurried to Caroline County, MD, to find the loggerhead shrike in the wild, he got to see the impalement practice in action.

"I have a picture of it posing next to its grasshopper kabob," he said. "They are a gruesome little songbird." ■



Park Service works to change the future of failing forests

Most park forests in region face serious threats from hungry deer, invasives, lack of diversity

by Whitney Pipkin

What makes it hardest for forested parks to thrive, especially near urban and suburban areas? The answer is often too many deer — and not enough plant diversity.

These were among the findings of a 2023 study conducted by the U.S. National Park Service. Researchers looked at what was causing a large number of forested parks in the Northeast and Mid-Atlantic to be facing "imminent" or "probable" failure. Forest failure can occur after a wooded landscape's composition and diversity have declined so much that its trees and shrubs are no longer regenerating quickly enough to replace themselves over time.

The Park Service study examined 39 national parks of varying sizes in the eastern U.S., from Virginia to Maine, and placed each into one of four categories of health: imminent failure, probable failure, insecure and secure. Twenty-seven, or 70%, of those forested parks were diagnosed as facing either imminent or probable failure.

The forests of the Chesapeake and Ohio Canal National Historical Park and of George Washington Memorial Parkway, two DC-area parks popular with cyclists and runners, were both judged to be at risk of imminent failure. The forests of several historic battlefields, including Gettysburg National Military Park and Antietam and Monocacy national battlefields, fell into the probable failure category.

The study found that the greatest commonality among parks struggling with forest health was an overabundance of deer, which eat saplings and undermine a forest's ability to regenerate, causing noticeable gaps in the understory.

"Forest failure has a lot of causes, so you have to look at it on a park-by-park basis," said John Paul Schmit, a quantitative ecologist in the Park Service's National Capital Region Network. "[But] in our area, deer tend to be the worst problem. That's the first one to deal with."

A U.S. Forest Service study in 1993 found that forests could support the eating habits of up to 20 deer per square mile and remain healthy. Some of the national parks with at-risk forests see two or three times as many deer.

The solutions typically start with deer management. Several national parks in the Mid-Atlantic and Northeast now regularly cull deer to help keep their population at a manageable level. In the national parks of the nation's capital, deer culling is conducted with the help of nighttime sharpshooters about once a year. The deer meat is then tested for disease and donated to local food banks when possible.

Schmit said smaller parks are experimenting with fences to keep deer out of vulnerable forests. But even for small areas, fencing is not a perfect solution. It can be difficult and expensive to maintain, and determined deer find ways through or around them.

Still, less than two years after the study was released, parks that are actively managing deer are seeing forest improvements, staff say.

"The ones that have deer management are turning around," said Kate Miller, a quantitative ecologist for the Park Service's Northeast Temperate Network and Mid-Atlantic Network. "The ones that [don't have deer management] are either the same or getting worse."

After a forest's understory has a reprieve from the deer, it can begin to sprout seedlings that turn into saplings for tomorrow's trees — though it takes decades for deer management to result in more tree canopy and a healthier forest.

And that's if it isn't stymied by invasive species, another major contributor to forest failure in eastern national parks. Plants such as Japanese barberry, bittersweet and mile-a-minute weed can outcompete native species on forest floors where deer have wiped out saplings. The loss of natives can quickly upset the delicate balance of species that sustain the forest.

Strategies for removing and managing invasive species typically include applying herbicides and physically removing the plants. To be truly effective, the invasives must be quickly replaced by natives that once thrived there.

"If you treat invasives and there's nothing native to grow in their place, they'll just come back," Schmit said.

Catoctin Mountain Park in Frederick County, MD, was one of the forests identified in the study as near failure. But it's also a place where a combination of deer management, begun 15 years ago, and invasive plant controls are beginning to improve the forest's health.

People who live near national parks often don't realize that the nonnatives they plant in their yards often find their way to park woodlands, Miller said. Many landscaping plants, while advertised as "deer resistant," are invasives that can spread quickly into adjacent forests. A prime example is the fast-growing shrub *Euonymus alatus*, also called burning bush or winged burning bush — an Asian native that "escaped cultivation" in North America more than a century ago and now plagues many forests.

Deer and invasive species can chip away at a forest's health enough to make its trees more susceptible to pests and diseases too. That has been the case with the emerald ash borer, an Asian beetle that began to show up in eastern national parks about 15 years ago and has since wreaked havoc on native ash trees. The National Capital Region Network's monitoring data shows that ash trees in the region declined from an estimated 300,000 trees in 2009 to about 42,000 living ash trees by 2023.

Schmit said park staff are now monitoring the spread of beech leaf disease, another presumed invader, in Virginia's Prince William Forest Park. It has been detected there throughout the beech-dominant landscape as an emerging threat. Several other parks in the region are rife with beech trees, and treatment options for the disease are still in development.

Still, several parks that had been facing imminent forest failure are now seeing improvements, particularly through sustained deer and invasive management programs. A recent influx of federal funding for such programs has helped, Miller said.

Because "we're literally waiting for trees to grow," Schmit said, it will be a decades, not years, before there's any hope of saying, "We're done." ■

Photos: Left, crews assess the health of forests on National Park Service land, where a diversity of plants in the understory is a good sign of future forest health. Center, overly abundant deer and invasive species can contribute to forest failure in eastern national parks. Right, staff measure the growth of saplings in the understory of a national park forest to predict future forest health. (Courtesy of the National Park Service)

VA county looks to Rappahannock as groundwater runs dry

Caroline County seeks to bolster dwindling water supply with withdrawals from river

By Lauren Hines-Acosta

The groundwater supplies that growing communities east of Interstate 95 in Virginia have relied on for decades are beginning to dwindle. But some are concerned that turning Chesapeake Bay rivers into a secondary source of water for the growing region could put a strain on the larger system.

In Caroline County, VA, officials are decades into their search for future water supplies. Still, they are struggling to find a source that satisfies the county's farming and fishing communities while allowing for industrial and residential growth along the I-95 corridor.

According to the Virginia Department of Environmental Quality (DEQ), the county has experienced significant declines in groundwater over the last 20 years. Officials are concerned that it could run completely dry by 2055 — and that's if the water stays clean enough for use. Already, wells in the town of Bowling Green are contaminated with high levels of radioactive elements.

With supplies already low, the state's control over what remains is stringent. The county draws water from 21 wells in the Eastern Virginia Groundwater Management Area. This area covers most counties east of I-95 and the Coastal Plain aquifer system, and DEQ reduced withdrawal rates from that system between 2014 and 2017. The agency told the General Assembly in 2018 that still more reductions are necessary.

"[The aquifer] is super important to us, because it's the only water source that we have," Caroline County Supervisor Jeffery Sili said.

But now, DEQ is requiring the county to consider other options, including drawing water from nearby rivers.

The county's population has grown 7.5% between 2010 and 2020, but the number of connections to the county's water system has grown even more, quadrupling in the last five years, according to County Administrator Charles Culley. Even if the number of connections were to stay the same, the county estimates that it would need more than 3 million gallons a day of new water supply in 30 years. Culley credits the growth to businesses such as restaurants and gas stations catering to traffic from the I-95 corridor.

The sun rises over the Rappahannock River along Cory and Rebekah Garrett's farm in Caroline County, VA. (Courtesy of Cory Garrett)

Local officials have known they will need a steady water source outside the aquifer since the early 2000s. The Board of Supervisors has considered buying water from neighboring counties, adding water restrictions and withdrawing from the Potomac River. But other counties backed out of evolving deals, and Caroline County ruled out the Potomac option due to the cost of treating its water.

In 2004, the county set its eyes on the Rappahannock River instead and filed a permit application to request withdrawals. Now, county officials might be closer than ever to getting it.

Caroline County plans to withdraw 5–9 million gallons per day from the Rappahannock River using an intake facility and piping it 35 miles to a treatment plant. After customers use the water, it would be treated and then discharged to Polecat Creek, which feeds into the Mattaponi River.

"We've been working on this water permit for almost 20 years," Sili said. "We've spent millions. Every time we get to the end, there's one more thing."

Public pushback

More than 100 people attended the latest public hearing on the permit in September, where community members from Caroline County, the Rappahannock Tribe and neighboring counties spent almost three hours speaking out against the project.

They were concerned about the facility's effect on migratory fish and changes in salinity as well as changes that could be caused by moving water from one river to another. Language that dedicated water use to future data centers also raised concerns.

The Rappahannock River is considered critical habitat for migratory fish such as American shad and striped bass. Both are experiencing depleted stocks, according to the Virginia Marine Resources Commission.

The Virginia Institute of Marine Science conducted a study evaluating the proposed intake facility's impact on fish eggs and larvae, which found that losses of each were below 1%. VIMS Associate Director for Advisory Services Lyle Varnell recommended the state halt construction during fish migration, use a watertight enclosure during construction and keep the rate at which water is pumped low.

Rebekah and Cory Garrett stand along a cornfield on their farm with daughters Jena (left) and Palmer in August 2024. (Jonathan Hawkins)

Reginald Underwood (left) and Jeffery Sili (center), members of the Board of Supervisors in Caroline County, VA, talk with Sen. Richard Stuart (R-Caroline County) in Richmond about senate bill 923 on Jan. 21, 2025. (Lauren Hines-Acosta)

The Friends of the Rappahannock and the Mattaponi and Pamunkey Rivers Association, among other environmental groups, pointed out that, as freshwater is being pulled out, saltwater from the Bay could push upriver and impact aquatic habitat. Farmers who use the river for irrigation say more salt in the water could hurt their crops.

The engineering firms of Hazen and Sawyer and Draper Aden Associates conducted a salinity study for the project in March 2020. They found that the withdrawal will increase brackish water. However, they found that the salinity is not expected to impact freshwater wetlands or aquatic species downstream. Varnell from VIMS coordinated the review of the study and agreed with the findings.

While the county has tried to get this permit for decades, data centers have been a recent and controversial addition to the discussion.

Caroline County allocated 2.63 million gallons a day to data centers in the recent permit request. But the county reduced its proposed withdrawals from a maximum of 13.9 million gallons a day to 9 million after receiving pushback in September from the Rappahannock Tribe, Friends of the Rappahannock, farmers and residents from neighboring counties.

The allocation for data centers was originally for King George County when it agreed to be a water supply partner in 2021. But the counties decided to forgo the partnership when both parties learned about the lengthy studies required by DEQ for the water to be moved from Caroline to King George. So, Caroline County shifted the water to "industrial cooling" for future data centers.

These centers enable the world's internet traffic and generate tax revenue that could help pay for future water infrastructure costs.

"We're planning for the long term, both with the water and for economic development," Caroline County Supervisor Clay Forehand said.

But data centers often use large amounts of water to cool down their computer servers.

"This avalanche of [data center] expansion is dramatically changing our lands … [and] threatening our natural resources, including the water," Hill Wellford, director of the Essex County Conservation Alliance, said.

The county Board of Supervisors on Nov. 15 voted to remove the "industrial cooling" language from the draft permit, but DEQ has not yet updated it. The county will have to conduct its own salinity study with the new withdrawal amount at DEQ's request. Meanwhile, Caroline County is still considering three proposed data centers.

One resident would be personally impacted by a water withdrawal project.

In June 2024, the county supervisors exercised eminent domain to take 11 acres of Cory Garrett's land along the Rappahannock River for the water intake facility. According to Forehand, the county needs specific land along the river far enough from any sewage discharge or water intakes to serve as the site of its intake facility. The county must also add rights-of-way to access the station,

A July 2024 photo shows the Rappahannock River flowing past the Garretts' Caroline County farm. (Nutrien Ag Solutions)

which Garrett said would impact his ability to irrigate the rest of his farm. Garrett has a lawsuit pending with the county.

Looking ahead

If it goes forward, Caroline County's water intake facility would join neighboring counties who source their water from the Rappahannock River. The project has raised concerns over the future of water supply beyond Caroline County and what that means for the Bay's rivers.

State Sen. Richard Stuart (R-Caroline County) proposed a bill in early January that would address water transfer between river basins. On Jan. 28, the Senate Committee on Agriculture, Conservation and Natural Resources amended the bill to require the department to reject a surface water withdrawal permit if more than six million gallons of water per day would be returned to a different river. The committee sent the bill to the Senate Finance and Appropriations Committee, where it failed to pass.

"I'm trying to find the balance to make sure that we can protect water quality in both the Rappahannock and the Mattaponi," Stuart said.

Stuart also introduced legislation to study the cumulative impact of the surface water intakes on aquatic life and water quality, but that too failed.

A study conducted by Hazen in September 2024 that modeled the impact of discharging water to the Mattaponi River showed that the salinity levels "would not change appreciably."

"There are hundreds of intakes in tidal freshwater reaches in the Chesapeake Bay, and we're in the dark [about] the cumulative impacts," Varnell from VIMS said.

DEQ also has been trying to reduce additional use of aquifers in the Eastern Virginia Groundwater Management Area. Stuart and Garrett both expressed concerns as more counties like Caroline search for water somewhere else.

"What's going to keep us from running into the same problem with surface water that we have with groundwater, and 10, 15, 20 years down the road, being right back in the same position again?" Garrett said.

The department requested on Jan. 13 that the county complete an additional salinity study using the new water withdrawal amounts. The county has 60 days to complete it. DEQ will then review the proposed permit. ■

VA joins fusion race as region works toward clean energy

Firm aims to have fusion reactor online near Richmond by 2030s

By Lauren Hines-Acosta

The core of our Sun is a nuclear inferno so unfathomably dense that it strips atoms of their electrons and forms new atoms. And, in an attempt to meet its clean energy goals, Virginia hopes to wield this energy on Earth.

Virginia Gov. Glenn Youngkin announced on Dec. 17 that Commonwealth Fusion Systems (CFS) plans to build a commercial fusion power plant in Chesterfield County, VA. If the company succeeds, it could power about 150,000 homes by the early 2030s.

"It is probably the global race of our century, and for Virginia to be leading it is pretty cool," Glenn Davis, director of the Virginia Department of Energy, said.

Nuclear plants have been generating electrical power around the world since the 1950s — though they've fallen out of favor in the wake of Three Mile Island, Chernobyl and Fukushima, to name only the most infamous accidents. But, given the increasingly urgent push for clean energy sources, nuclear is getting a fresh look, if not a universally popular one, by the energy sector and regulatory agencies.

So far, the only practical atomic technology for power generation has been nuclear *fission*. The proposed Virginia plant will attempt to harness nuclear *fusion* — a long-sought but elusive alternative to fission.

Fission and fusion both produce massive amounts of energy from the nucleus of atoms. Fission happens when a neutron (a neutrally charged particle from an atom's nucleus) slams into a larger nucleus and forces it to split. As the atom splits into two light nuclei, energy is released. Fusion does the opposite. It happens when two light nuclei slam together to form a single, heavier nucleus. The reaction has two byproducts: a spare neutron … and energy.

Fission is carbon-free, but it generates nuclear waste that remains radioactive for millions of years. Fusion reactions, on the other hand, produce waste that decays quickly without the need for long-term storage. This means the waste could decay over decades, a vast improvement over the long-lasting waste products associated with other forms of power generation. Another advantage of fusion is that it doesn't rely on a chain reaction, as fission does, so it isn't subject to potential meltdowns.

Virginia Gov. Glenn Youngkin announced in December 2024 that Commonwealth Fusion Systems plans to build the world's first commercial fusion power plant in Chesterfield, VA. (Chesterfield County Constituent and Media Services Department)

That is, if the company can deliver.

The problem that has long stymied scientists, until very recently, is that no fusion process had been able to generate more energy than what is needed to create the reaction in the first place. To do so, scientists must convert hydrogen into helium, much like the Sun does. But protons (positively charged particles in these atoms) want to repel each other. The Sun has immense pressure, heat and density, which overrides this phenomenon. After that, the strong nuclear force glues the new atom together while releasing energy.

In 2022, the Lawrence Livermore National Lab in California was the first in the world to produce more energy than used to initiate the reaction. This breakthrough demonstrated that fusion is a viable source of energy on Earth.

"There's been a lot of progress, and we are on the shoulders of giants who worked before us," said Ben Byboth, director of Business Development and Strategy at Commonwealth Fusion Systems.

Locally, boosters of clean energy are intrigued by the technology's prospects.

"With CFS coming into play, this gives us another option of clean energy, which is something new and refreshing that our residents are excited to learn more about," said Nicole Martin, president of the NAACP Chesterfield County branch.

The fusion power plant will operate at the James River Industrial Center in Chesterfield County, about 20 miles south of Richmond. The area was the original site for a planned natural gas plant, though the company ultimately decided to build that plant at the Chesterfield Power Station, about a mile and a half farther south. Citizen groups in the area, including the local NAACP chapter, have been fighting plans for any new power plant in the area.

While the NAACP Chesterfield branch and Friends of Chesterfield haven't endorsed the fusion project, they're hopeful it could be a clean energy solution. Other environmentalists wonder if investment in fusion would be better spent on solar and wind energy.

But fusion would be more reliable than solar or wind, Davis said, because it can provide constant reliable energy. Davis also said fusion, compared to wind or solar, uses over 100 times less land for a higher amount of energy production.

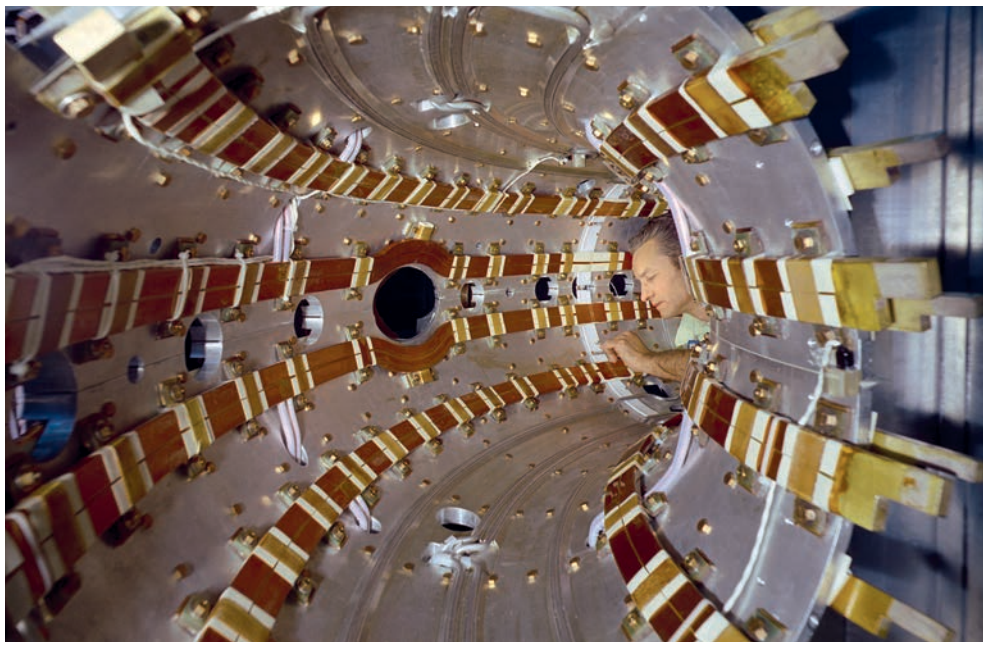
The Livermore lab used lasers to achieve ignition. But CFS plans to trigger the fusion reaction with a "tokamak" — a building-size, donut-shaped apparatus that uses 18 superconducting magnets. The technology has been around since the 1950s.

The device uses heat and a powerful electromagnetic field to turn different forms of hydrogen into plasma. The magnetic fields confine and shape the plasma, which circulates within the tokamak's chamber. Eventually, the device builds enough heat to fuse deuterium and tritium into helium. The reaction produces high-energy neutrons that heat a molten salt "blanket." The heat in the molten salt then boils water to create steam and turn a turbine.

CFS plans on producing plasma in 2026 in its prototype tokamak, called SPARC, at its headquarters in Massachusetts. Dennis Whyte, CFS co-founder and Massachusetts Institute of Technology professor, started the effort from his classroom in 2012. MIT and the company are working together to get ahead in the fusion field.

Unlike other tokamaks, the company and MIT developed a new class of superconducting magnets that produce stronger

This rendering shows the potential appearance of a new commercial fusion power plant planned for the James River Industrial Center in Chesterfield, VA. (Courtesy of Commonwealth Fusion Systems)



A researcher examines the Oak Ridge National Laboratory's first tokamak, a device that helps create nuclear fusion, in 1971 in Oak Ridge, TN. (Courtesy of the Oak Ridge National Laboratory)

magnetic fields. Larger fields mean less heat is lost and more energy is available to enable the fusion reaction.

Now that the technology has what scientists call a proof of concept, the next set of challenges is in maintaining a steady supply of the reaction's ingredients and a tight control of the plasma.

Troy Carter, director of the Fusion Energy Division at the Oak Ridge National Lab, said the private sector has helped address these issues. Companies can take on more risk and therefore conduct experiments quickly.

CFS expects to start producing power from the Virginia fusion facility by the 2030s.

"There's a lot of ambition, and they've got their work cut out for them to get to this result," Carter said. "But … we should work together to try to realize this because, if it happens, it's going to be such a huge impact on the U.S. and on the world."

Commonwealth Fusion Systems aims to generate energy from a nuclear fusion process using a tokamak, a donut-shaped container comprised of electromagnets that confine, shape and drive plasma. (Commonwealth Fusion Systems)

Commercial fusion energy has been just out of reach for scientists for years, and many observers are reluctant to call recent developments a definitive leap forward — but Virginia's legislators nevertheless recently passed a bill that adds nuclear fusion to the list of clean energy sources. And there's at least some hope that fusion technology will help the state reach its goal of 100% renewable energy by 2045, as mandated in the Virginia Clean Economy Act.

"The need to transition to clean and renewable sources is only going up, and the sooner you start, the better," said U.S. Rep. Jennifer McClellan, who represents Virginia's 4th District.

This project includes a $1 million grant from the Virginia Clean Energy Innovation Bank, and Chesterfield County matched it with a $1 million grant. The company pledged to pay for any other costs. ■

At a closed MD paper mill, a clash brews over priorities

Need for trout habitat, economic development weighed along North Branch of the Potomac River

By Jeremy Cox

More than five years after the closure of a century-old paper mill along the North Branch of the Potomac River, nature is showing signs of recovery, observers say. But recreational fishers and environmental advocates worry that the rebound could be short-lived.

That's because officials in Western Maryland's Allegany County are trying to partner with a private entity to acquire the 228-acre paper mill property in the small mountain town of Luke, about 20 miles southwest of Cumberland. They want to transform the site into a business park anchored by a new industrial tenant. The county's top economic official said the goal is to recuperate some of the 675 jobs lost when Verso Corp. closed the paper plant in 2019.

Details regarding the potential transaction and plans for the property's future are being kept confidential until the deal is finalized, said Jeffrey Barclay, the county's director of economic development. But he vowed that the North Branch's health looms large in the partnership's thinking.

"We're environmentally conscious," Barclay said.

Others aren't so sure. They fear that the opening of a new manufacturing facility along the North Branch would again lead to millions of gallons of industrial wastewater being released into the Potomac River tributary.

"I don't think we should sacrifice a healthy river for the sake of an industrialized economic player in that area," said Upper Potomac Riverkeeper Brent Walls.

For decades, the paper mill piped its wastewater to a treatment plant in nearby Westernport, which, as recently as the mid-2010s, released 20 million gallons of mill effluent into the river daily. Barclay said a new tenant likely will only require a discharge of 3–5 million gallons a day.

But that may be enough to upend the river's fragile resurgence of aquatic life, say Walls and other critics. Their biggest concern is whether the new wastewater discharges will be too warm for cold-water species, jeopardizing the river's recreational trout fishery, valued at about $3 million.

The plant's detractors have coalesced behind a proposal by Democratic Gov. Wes Moore's administration to classify a 20-mile stretch of the North Branch as a cold-water refuge — from just upstream of Luke, where the Savage River joins the North Branch, to Pinto, MD, about 10 river miles shy of Cumberland.

In this 2016 image, Upper Potomac Riverkeeper Brent Walls stands in the North Branch as steam rises from an underwater outfall containing treated wastewater from the Luke, MD, paper mill. (Dave Harp)

Certain segments, including the portion that flows past the former Luke paper mill, would receive the state's most stringent cold-water designation, prohibiting industrial discharges from raising the water temperature to above 68 degrees beyond the initial mixing zone. Other segments in the proposed action would be allowed to reach temperatures of up to 75 degrees. Under the river's existing classification, discharges can warm the water to as much as 90 degrees.

"The North Branch of the Potomac is literally trying to bounce back to life," said Randy Dwyer, chairman of Trout Unlimited's Mid-Atlantic Council, at a December hearing about the temperature reclassification. "I do not see this as a zero-sum situation, meaning environmental protections versus economic vitality. … The goals of one should not succeed in spite of the other."

County officials and their allies are calling for a "pause" on the designation until the paper mill site's redevelopment plans are sorted out. They worry that tighter temperature controls might tie the hands of a future tenant.

"I just don't want to do anything that's going to hurt future economic possibilities," said Republican state Sen. Mike McKay, who represents far Western Maryland.

If the new zones are enacted, developers seeking permits for new discharges to the river could be required to install extra equipment to cool discharge water, said Lee Currey, director of water and science for the Maryland Department of the Environment, which oversees temperature limits in the state.

"Through a permit process, there are ways to manage thermal impact," he said.

The push to redesignate the river isn't related to any specific development proposal, Currey added. Rather, it's a reflection of research showing that the river already meets the criteria for cold-water species. MDE issued guidance on making cold-water determinations in 2021 and has since added several waterways to the list.

The North Branch stays cold year-round thanks in no small part to two upstream dams, said Scott Shoemaker, superintendent of the Upper Potomac River Commission, which manages one of the dams as well as the Westernport wastewater facility. The reservoirs behind the dams store meltwater and frigid rain through the spring. Then, during the summer, the dams release the water from their icy depths, chilling the river downstream.

"The resulting river conditions are not natural. They are manipulated stream conditions and should not be the basis for regulatory change on the North Branch of the Potomac River," Shoemaker told MDE regulators at the December meeting.

He added that attracting a new wastewater customer is critical for the treatment plant's economic viability. After Verso's closure, the Westernport plant saw its usage plummet to 1 million gallons a day, causing annual revenues from operations to fall from $5.5 million to $1.4 million.

Its only remaining users are 1,300 residential customers, Shoemaker said. For now, settlement money from Verso's new owner, the Swedish pulp and paper company Billerud, is helping to sustain operations. But when that funding dries up at the end of this year, those customers could see their sewer bills balloon to nearly $100 a month.

"There is a timer that's ticking," said McKay, the state senator.

The future of the former Verso site is further clouded by the contaminants left behind from 131 years of operating as a paper mill. While most of the paper mill's buildings have been demolished, Barclay said, the county likely will apply for federal funding to help clean up pollutants on the property.

The North Branch's water quality has vastly improved over the last few decades, said Ken Pavol, a fishing guide who managed the Western Maryland fisheries for the state's Department of Natural Resources until his retirement in 2005. Millions of dollars invested in upgrades to the Westernport wastewater plant in the 1990s greatly increased water clarity. Efforts to remediate acid mine drainage have made it more hospitable to life as well.

"I think it's a huge success story," said Pavol, adding that the number of fishing guides working the river has jumped from one or two when he started two decades ago to at least 10 now.

The closure of the Verso mill has been a further boon to the river, he added. In 2021, Verso signed a consent decree and paid a $650,000 penalty to settle a federal lawsuit alleging that the site had polluted the river with "black liquor," a caustic byproduct of paper manu-facturing process.

When the mill was in operation, the trout swam in "perpetual twilight," Pavol said. Since the fish hunt by sight, they had trouble catching prey in the river. Also, sunlight can penetrate the clearer water and reach the river bottom, promoting algae growth on rocks and providing better habitat for the insects that the fish eat.

"Those fish are in tremendous shape," Pavol said. "They're fat, and they grow at the same rate they would as if they were in a hatchery."

MDE officials expect to submit their final recommendations for cold-water designations this spring for public comment. ■

Wetlands to return to Baltimore's 'forgotten waterfront'

Resiliency initiative targets 11 miles of shoreline on the Middle Branch of the Patapsco River

By Timothy B. Wheeler

The low, rock-covered berm juts like a crooked finger into the Middle Branch of the Patapsco River. It doesn't look like much now. When finished, though, this and other marine construction work underway in South Baltimore will become 10 acres of wetlands in a city desperately short of natural shoreline.

Roughly three quarters of Baltimore's waterfront is lined with bulkheads, piers and brick promenades, hardening that severely limits habitat for waterfowl, fish and crabs. The Hanover Street project is the opening salvo in an ambitious effort to restore more than 50 acres of wetlands along 11 miles of shoreline in the long-neglected southern part of the city.

"A year from now, you'll see a … freshly planted wetland that extends far out into the water," said Brad Rogers, executive director of the South Baltimore Gateway Partnership. In league with the city and another nonprofit group, Parks and People Foundation, Rogers' group is spearheading the restoration effort.

The Middle Branch Resiliency Initiative, as it's called, aims to protect disadvantaged communities in South Baltimore from increasingly frequent flooding and improve water quality there while also providing residents better access to the waterfront.

The initiative is part of a more expansive plan called Reimagine Middle Branch, a community-driven environmental justice movement to enhance the 19 neighborhoods in the area and reconnect them to the shoreline they've been cut off from for so long. The vision, Rogers said, is to transform what's been called Baltimore's forgotten waterfront into Baltimore's next great waterfront.

For as long as anyone can remember, the Middle Branch's shores have suffered from erosion, ship-channel dredging and filling of wetlands. People passing by on busy Hanover Street couldn't even see the water because their view was blocked by a forest of phragmites.

"It used to be this wide open, deltaic environment with reeds and birds," Rogers explained as he walked along the rocky berm under construction in the river.

Now, the invasive plants crowding the water's edge have been removed. The berm, once finished, will be topped with a layer of sand and organic material, into which wetlands vegetation will be planted. The berm and its plants will help dampen wave-driven erosion from storms and nuisance flooding, protecting a vital traffic artery. Gaps left in the offshore structure will provide access to quieter near-shore water for fish and waterfowl.

Brad Rogers, executive director of the South Baltimore Gateway Partnership, stands on a berm being built along the Middle Branch of the Patapsco River to help create about 10 acres of new wetlands. (Dave Harp)

For the time being, a floating yellow boom stretches out from the shoreline encompassing the area undergoing a nature makeover. But even before the first blade of marsh grass gets planted, the project is drawing a crowd — of birds and fish.

"You put in this boom and suddenly you see herons, cormorants and menhaden along the shore," Rogers said.

The Hanover Street wetland is expected to be completed later this year even as construction is planned to start on three other projects. Next up is rehabilitation of a 9-acre patch of marsh between two streets that parallel the river.

"What we're doing is restoring [its] connectivity to the Patapsco and restoring it as a more ecologically functional marsh as opposed to wet soils and phragmites," Rogers said.

After that, wetlands are to be added along the shore by MedStar Harbor Hospital, where flooding-aggravated erosion threatens the Middle Branch Trail along the waterfront and is crumbling three concrete piers standing forlornly in the water.

"We want to be able to expand and enhance that and make it a much more attractive place to spend time," Rogers said.

More wetlands are planned along a tract known as Spring Gardens, the ironically named site of a BGE liquefied natural gas tank farm. The final project would restore woods and marsh at Smith Cove, where two stormwater outfalls now dump runoff from the developed uplands. A boardwalk and environmental education center are also planned there to connect with a new half-mile long waterfront park in Westport.

With the Hanover Street Bridge in the background, a silt fence marks the boundary of a new housing, office and retail development under construction in Baltimore along the Middle Branch. (Dave Harp)

The waterfront park is to be built in conjunction with a new housing, office and retail complex called One Westport. The first phase of that project broke ground last year on a 43-acre swath of waterfront that has sat barren for decades awaiting redevelopment. A coal-burning power plant once occupied part of the site, and an unknown quantity of potentially toxic ash from the facility was buried at a spot now largely paved over, according to an inventory of coal ash disposal sites.

"For the first time in history," Rogers said, "[Westport residents] will have access to their own waterfront."

Unlike many previous urban redevelopment efforts, under Reimagine Middle Branch, the South Baltimore group has worked with leaders and residents of the area's neighborhoods to plan the Westport park's amenities, including a playground, outdoor gathering space, kayak launch and a memorial to the Black Sox Negro League baseball team.

"We're not telling them how they want to develop, and we're not telling them what kind of investment they're looking for," Rogers said. "We're helping them choose."

In conjunction with the physical upgrades, the partnership also has sponsored a series of activities and events, including boat cruises in warm weather and ice skating in winter, to encourage residents to come to and reclaim their waterfront.

The partnership has raised about $67 million just for the shoreline restoration work, with much more to be lined up for the Westport park and other elements of Reimagine Middle Branch.

About $40 million of the funds provided so far came from federal agencies. With the Trump administration trying to freeze or cancel many grants and Congress looking to slash spending overall, it's unclear how much more federal financial support can be counted on.

"It is a time of uncertainty," Rogers acknowledged, "and everyone involved in environmental restoration or economic development … is going to have to figure out how to be flexible and adaptive." But the need is so great, he added, "The work can't be stopped." ■

Small watersheds studied to ground-truth computer models

Facing mistrust of modeling, agencies launch controlled small-scale monitoring

By Karl Blankenship

Roughly a decade ago, when officials in Pennsylvania's York County were struggling to put together Chesapeake Bay cleanup plans, they ran into a problem: No one believed their numbers.

The county's plans were based on goals established by computer models from the state-federal Bay Program partnership. The strategy called for municipalities, agencies and farmers to sharply ramp up efforts to reduce nutrient pollution entering waterways from livestock manure and fertilizer.

But in meetings, local officials and farmers were skeptical about whether those figures reflected reality — or showed results of cleanup actions they had already taken.

"The model was not well believed. I'll say that," said John Seitz, a senior planner with the county planning commission. "Everybody, but farmers especially, were saying 'nobody wants cleaner water more than we do, but the model just doesn't fit.'"

It's not unusual for state and local government officials to dispute computer model figures used to set nutrient reduction goals and assess progress.

But the York County Board of Supervisors did something others rarely do. They contracted with the U.S. Geological Survey to install state-of-the-art water quality monitoring devices on six streams in the county to see if model figures were, in fact, reflecting reality.

Together, those sites capture stream data from about 85% of the 911-square-mile county. Two of the sites target very small watersheds dominated by agricultural operations and will provide a close-up view of whether actions taken by farmers are successfully stemming the flow of nutrients to streams.

"When you're out getting the data, that's the true story, right?" Seitz said. "It'll be interesting to see how the model story compares to the true story."

Taking a lead from that effort, the USGS last year partnered with the U.S. Environmental Protection Agency and U.S. Department of Agriculture to begin monitoring five very small agricultural watersheds elsewhere in the Bay region — typically 10 square miles or less — to get a better handle on the "true" water quality trends in those areas.

The upper Conestoga River in Lancaster County, PA, has shown greater improvement in water quality than computer models predicted. (Donald Kautz/CC BY-NC-ND 2.0)

They hope to answer the same question that York County officials were asking: Are conservation measures like planting nutrient-absorbing cover crops or streamside vegetative buffers producing water quality improvements?

"The York County gauges really propelled this idea," said John Clune, a former USGS hydrologist who helped establish the new system. "They have been so proactive on this, and it shows other areas what they can do."

Real-world implications

It's more than an academic question.

Billions of dollars have been invested in the Bay watershed in recent decades to fund manure storage facilities, stream fencing and other "best management practices" (BMPs) to help reduce polluted runoff.

While those efforts have shown some positive impacts like improved stream health, their impact on nutrient runoff is less clear. Despite ramped-up efforts, the Bay Program's models estimate that little progress has been made in the last 15 years, at least in part because of increased fertilizer use, more farm animals and generally more production.

But the question of whether those model estimates reflect reality is often the subject of debate, especially as the Bay Program will miss another nutrient reduction deadline this year.

USGS hydrologist James Webber, shown collecting a water sample in Virginia, has been involved in a multi-agency effort to install high-tech water quality gauges in five small agricultural watersheds. (Dave Harp)

In large rivers, modeling and monitoring results are often closely aligned. But in some places, like Pennsylvania's heavily agricultural Conestoga River in Lancaster County, water quality is improving at rates greater than what the model predicts. Elsewhere, like the Choptank River on Maryland's Eastern Shore, monitoring suggests worsening conditions while models predict improvements.

Understanding what drives those trends is difficult. The Bay Program partnership supports roughly 120 monitoring locations scattered through the Bay's 64,000-square-mile watershed where nutrient trends are assessed. But those sites cover large areas — sometimes hundreds of square miles — making it impossible, if a trend is detected, to determine the cause.

There's runoff from developed lands and roads, runoff from farms and discharges from wastewater plants and industries. Populations of humans and farm animals may increase or decrease. The types of crops grown may change. Forests may be converted to parking lots.

The Bay Program assumes that BMPs such as nutrient-absorbing cover crops or streamside buffers can offset some of the adverse impacts. But those assumptions are based on studies usually done on individual fields. Many scientists have questioned whether the real-world effectiveness of measures on farms is the same as results seen in carefully controlled studies.

The uncertainty was highlighted when a "showcase watershed" effort launched in 2010 by the USDA and USGS to monitor water quality in three agricultural streams in the Bay watershed failed to detect significant improvements after a decade — despite ramped-up BMP implementation. In part, that's because the watersheds selected were too large with many types of activities taking place, making apples-to-apples comparisons impossible.

Dialing in on small watersheds

That led to the USGS, USDA and EPA to support the 2024 installation of high-tech "super gauge" equipment that continually collects water samples in five small agricultural watersheds around the Bay region, ranging in size from five to 13 square miles, for a more precise understanding of what's happening.

The watersheds include Hammer Creek and Little Conewago Creek in Lebanon County, PA; War Branch in Rockingham County, VA; Bucks Branch in Sussex

County, DE; and Sams Creek in Frederick and Carroll counties, MD.

Each has different types of agriculture and slightly different geological settings, but they all reflect typical types of crop and animal-rearing activities in the Bay watershed, James Webber, a USGS hydrologist, said in a December interview.

"The goal here is to monitor conditions that are representative of what's happening throughout the Chesapeake," he said. "We didn't want an unusual kind of land use that may be a niche activity."

The use of BMPs will be ramped up in each. In addition, efforts have been made to assess what's happening on the land so scientists can determine whether any observed changes are the result of the BMPs or stem from other activity, such as changes in crop types or animal populations.

Before sites were selected, public outreach meetings took place to secure cooperation of landowners and coordination with conservation districts, nonprofit groups and others working in each watershed. "There's a big role for communication and outreach, of just having the community involved and engaged," Webber said.

The super gauges will collect real-time data about streamflow, dissolved oxygen, nitrogen, temperature, turbidity and pH.

In addition, USGS staff will visit each site at least 20 times per year — once a month plus eight visits during storms, when outsized flows of nutrients make their way into waterways — to collect samples and test for additional pollutants.

But small streams, just a few feet wide, can pose unique monitoring challenges. They're more likely to freeze in the winter or go dry in the summer. A locally intense thunderstorm can have dramatic impacts.

"The hydrology can be more dynamic," Webber said. "But we would not have picked these watersheds if we felt we weren't able to monitor them accurately."

More Pennsylvania sites

The Pennsylvania office of the USDA's Natural Resources Conservation Service is supplementing the effort by supporting similar monitoring on five additional small agricultural watersheds in that state, three of which are in the Bay drainage.

Denise Coleman, NRCS state conservationist, said in a December interview that the service has worked with USGS to document existing BMPs in each watershed and plans to support the increased use of conservation measures in coming years.

As with the other watersheds, she said the effort will lead to a better picture of what's happening. "We feel that at this point in time, the Bay model is not crediting everything that NRCS does," Coleman said. "Only about 60% of our practices get credit in the Bay model."

A small stream runs past a farm near New Market, VA, on its way to closely monitored Smith Creek, where computer models have produced contrary results. (Dave Harp)

Little Morgan Run on a farm in Carroll County, MD, is protected by cattle exclusion fencing and a newly planted riparian buffer. (Alicia Pimental/ Chesapeake Bay Program).

Another concern, she said, is that the Bay Program assigns nutrient reduction credits for individual BMPs. In contrast, NRCS and others typically encourage a "systems approach" where multiple practices are designed to work together. Those approaches, which will be emphasized in the targeted watersheds, are likely to show better results, Coleman said.

"We've been doing that for years," she said. "What came back to us is the frustration that some of these practices are not counting in the Bay model. So we said, 'We think that these practices provide significant benefits. We're going to see for ourselves.'"

Positive outcomes not guaranteed

While interest in monitoring is driven by distrust of the model, that doesn't necessarily mean the monitoring results will provide good news.

In a recent paper, USGS scientists reported that in Virginia's Smith Creek watershed, BMP implementation should have reduced nitrogen loads 20% from 1985 through 2020, according to the model. Instead, monitoring showed that nitrogen loads increased by 7%.

The paper suggested that intensification of farm activities, including increased animal populations, offset the impact of BMPs. The paper said, though, that trends would likely have been worse without the BMPs.

Seitz, of York County, PA, acknowledges that monitoring could ultimately show that nutrient trends are increasing rather than decreasing as he and others hope.

"The commissioners are taking a risk," Seitz said. "That's a potential. But I applaud the commissioners for saying, 'If we're going to manage watersheds, lets manage them scientifically the best we can.'"

But he and others say that there will be more confidence in monitoring results, whether positive or negative. Pennsylvania Agriculture Secretary Russell Redding said in a recent interview that more fine-scale monitoring will provide transparency and build trust within the farm community.

"An in-stream monitoring system is pretty honest in terms of where a problem is, what the problem is, and it also tells you with pretty good confidence what works," he said. "I think that's a key piece going forward."

Incentivize monitoring?

A major impediment to expanding local monitoring networks is the expense. The typical annual cost of maintaining a super gauge, collecting supplemental samples and having a laboratory analyze the results can come close to $100,000 per site. York County has committed about $500,000 a year for its sites.

And that commitment must be maintained to get meaningful results. The York County sites were installed in 2019 and 2020, but they are still years from providing enough data to assess nutrient trends. Because of the natural year-to-year variability in water flows, it typically takes about 10 years before an assessment can be made.

Still, Seitz said other counties might be willing to take on the expense if agencies were willing to use those results, rather than modeling predictions, to evaluate progress. Right now, local governments have to spend a large amount of time writing plans and reports and complying with Bay Program requirements that all BMPs be periodically inspected — a huge, labor-intensive task.

"If it becomes cheaper to do water quality monitoring than it is to do BMP verification and reporting, everybody would have [monitoring sites]," Seitz said. "If your monitoring data shows that your water quality trend is getting better, you're meeting your requirements, right?"

He's not alone in that idea.

A 2023 report from the Bay Program's Scientific and Technical Advisory Committee suggested that "policies that give credit based on monitored results rather than modeled results would incentivize more monitoring, potentially funded by cost savings in managing, counting and [verifying] BMPs."

For Seitz, evaluations based on monitoring also open the door for trying innovative approaches that benefit both local watersheds and the Bay. For instance, he would like to try boosting the population of water-filtering mussels in one of the county's streams to see if they make a detectible difference.

"The long-term vision for our watersheds is to improve and restore them," he said. "We know that data like this would help. And if we can save money by doing it in a better way, what would be the drawback?" ■

Gas plant in PA explores underground carbon storage

Operation producing natural gas from landfill methane begins test-drilling for CO2 sequestration

By Lauren Hines-Acosta

The ability to remove carbon dioxide from the atmosphere and store it somewhere else is a relatively new advancement in the U.S. But it's one companies are now putting to work for its potential to slow global warming.

In the Chesapeake Bay watershed, the technology is taking root in Pennsylvania and West Virginia. Archaea Energy, a Houston-based company that specializes in extracting methane from landfills to produce natural gas, is testing the viability of capturing the carbon dioxide in the extraction process and injecting it deep underground at its Assai Energy operation at a pair of landfills near Scranton, PA.

Carbon dioxide is a greenhouse gas that absorbs heat and emits it back toward the Earth's surface. According to the National Oceanic and Atmospheric Administration, atmospheric carbon dioxide is now 50% higher than it was before the Industrial Revolution. More carbon dioxide means a warmer Earth, which leads to extreme weather events.

Nature itself extracts carbon dioxide from the atmosphere and stores or "sequesters" it in a number of ways, most commonly with plants, which absorb the gas, use it as a fuel and exude oxygen. Humans are exploring ways to sequester surplus carbon in the atmosphere in a different way — by capturing it, compressing it into a dense liquid and then injecting it thousands of feet underground into porous rock, where it is trapped or in some cases converts to mineral form.

Carbon dioxide injection has been happening in the U.S. since the 1960s, initially as a way to access oil more easily from some kinds of porous rock. The practice is still in use, but the technology is increasingly looked to as a potential way to combat climate change.

"The advantage is obvious," said Emma Bast, a staff attorney with the environmental nonprofit PennFuture. "It helps us get to net zero [for carbon emissions].… Hypothetically, it can reduce some of the levels of carbon dioxide that have already been released into the atmosphere over the last 100 odd years."

The U.S. has 19 commercial facilities that can capture up to 22 million metric tons of carbon dioxide per year, according to the Global Carbon Capture and Storage Institute. But Jessie Stolark, executive director of the Carbon Capture Coalition, said the world needs to quadruple the current capture capacity to reach the global goal of capturing one billion tons of carbon by 2030.

A sign marks the entrance to Archaea Energy's carbon sequestration test site at its Assai landfill facility near Scranton, PA. (Jim Lockwood/Scranton Times-Tribune)

Pennsylvania's 2024 Climate Action Plan counts on carbon capture to help meet its goals. The plan aims to reduce its green house gas emissions 50% by 2030, estimating that he state has about 2.4 billion metric tons of carbon dioxide storage capacity underground.

Until last year, when Pennsylvania passed the Carbon Capture and Sequestration Act, companies intending to store carbon geologically needed a federal Class VI permit to do so. But the new law will gradually transfer permitting authority to the state, allowing it in a few years to directly manage storage operations. The U.S. Environmental Protection Agency recently approved a state authority request from West Virginia for Class VI permits.

Pennsylvania environmental groups support a clause that says if a project is in an environmental justice area, the permit for it requires additional impact assessments and more public participation.

The law also provides funds for projects but allows the state to charge a fee per ton of carbon stored. Conversely, capture and storage operations can earn federal tax credits — though other federal support, like funds from the Inflation Reduction Act, could be threatened due to the Trump administration's federal fund freeze.

"Regardless of what's happening at the national level and with federal policymakers, we know that there's a demand for these lower carbon-intensive products," Stolark said.

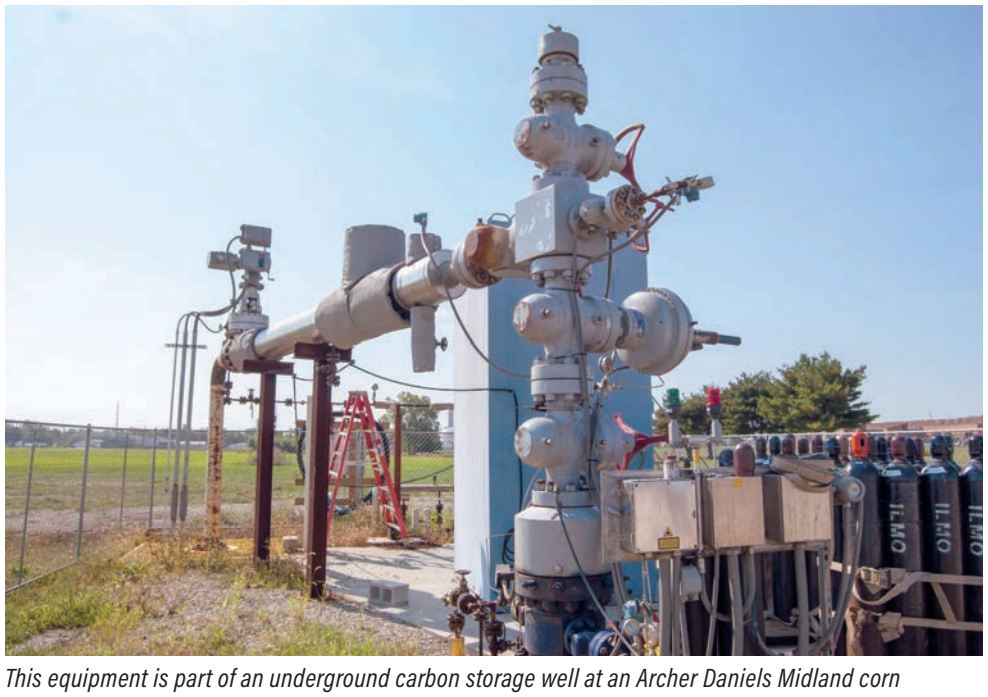
Archaea Energy, which is owned by the London-based oil and gas company BP, has about 50 sites throughout the U.S. that collect gas from decaying waste in landfills and filter out the methane to be refined and sold as natural gas. The facility outside Scranton has been extracting landfill methane since 2023 and has been exploring methods for keeping the carbon dioxide, a byproduct of the process, out of the atmosphere.

The company started drilling in February to gather data, perform analysis and conduct modeling — all necessary to test the site's suitability for carbon storage. For geologic carbon storage to work, according to Hélène Pilorgé, a research associate at the University of Pennsylvania, it needs to be at least 3,000 feet in a deposit of porous rock like sandstone and must have layers of impermeable rock above to trap it.

Complicating the issue is Pennsylvania's unmapped jumble of unplugged oil wells, which makes it difficult to ensure that carbon dioxide won't escape through unknown holes, said PennFuture's Bast. If the gas leaks, it can linger near the ground and threaten human respiratory health.

Bast said carbon storage is not a "silver bullet." It has yet to be proven to work at a large scale, and the permit process is lengthy. Bast also said solar, wind and other types of renewable energy are clean from the start and remain cheaper and more effective than carbon capture. But it is most helpful for industries like cement production where the essential chemical reactions create carbon dioxide.

Despite reasons to be skeptical of new technology, she said, "I hope that [carbon capture] works." ■



This equipment is part of an underground carbon storage well at an Archer Daniels Midland corn processing and ethanol facility in Decatur, IL. (Courtesy of Archer Daniels Midland)

CHESAPEAKE CHALLENGE

— Kathleen A. Gaskell

I've got newts for you about salamanders


A


B


C

North America is home to more than 245 salamander species and seven newt species. Although newts are a type of salamander, they have some distinctions that differentiate them from their amphibious cousins.

De-ponds on where they live: Most adult newts are aquatic or semiaquatic, while adult salamanders are usually terrestrial. Almost all of these two animals breed and lay eggs in water.

Starting off on the right foot: Their feet are adapted to their habitat. The webbed feet of newts help to propel them while swimming. Well-developed toes enable salamanders to dig, walk or climb.

Tails tell tales: The muscular, flattened tails of newts help them to maneuver through water. Salamander tails are rounder and longer.

More min-newt: Newts are usually smaller than salamanders, usually 3-5 inches long — though the largest of them, Britain's great crested newt, can grow to about 7 inches. Salamanders are typically in the 4- to 7-inch range with at least one outrageous exception: the Japanese giant salamander, which can grow up to 6 feet long.

Here's the skinny: Newt skin is typically rough and warty; salamanders have smooth and slick skin. Both creatures must keep their skin moist and could die if they get too dry or hot.

Title image: *A juvenile red-spotted newt, or red eft. (Dave Huth/CC BY-NC 2.0)*

A *A juvenile red-spotted newt is known as a red eft, even though its overall color is typically bright orange. (Michael Righi/CC BY 2.0)*

B *A red-backed salamander, a common salamander species in the Bay watershed. (Norman Walsh/CC BY-NC 2.0)*

C *An adult red-spotted newt, the only newt species found in the Bay watershed. (Brian Gratwicke/CC BY 2.0)*

D *The two rows of black-lined orange spots down the back of the red eft are the only colors that will remain after it transitions to the green and yellow adult stage. (Dave Huth/CC BY 2.0)*

Columnist Kathleen A. Gaskell served as the Bay Journal copy editor for more than 30 years until her retirement.


D

Can you spot the answers in this newt quiz?

Only one of North America's newt species is found in the Chesapeake Bay watershed: the red-spotted subspecies of the Eastern newt. Test your knowledge here. Answers: page 36.

1. The red-spotted newt has four life stages: egg, larva, juvenile (also known as a red eft) and adult. Which of these is terrestrial?

2. All newts are carnivores. Match each of the red-spotted newt's life stages with its preferred prey.

Larval	A. Leeches, crustaceans, insects, fish, amphibians, mollusks
Red eft	B. Aquatic invertebrates
Adult	C. Insects, spiders, mites, worms

3. Are red efts nocturnal or diurnal?
A. Diurnal
B. Nocturnal
C. Both, as long as the air and ground are moist

4. The brightness of red eft skin and the adult newt's skin of olive green with black-bordered, red-orange spots are a warning to predators to leave them alone. Why?
A. Their skin contains a neurotoxin.
B. They taste terrible for most predators.
C. They are toxic to many species.
D. All of the above

5. What do adult red-spotted newts do to avoid desiccation and heat stress when their pond dries up?
A. Bury themselves
B. Hide under plant clumps or rotting logs
C. Revert to the eft stage

6. Which two of these actions are used by a male red-spotted newt to attract a female?
A. Bring her prey
B. Nuzzle her nose with his chin
C. Wiggle his tail

7. A female red-spotted newt lays 200–375 eggs during the spring. How does she do this?
A. She lays them in a jelly-like mass under a large underwater rock or debris.
B. She wraps each egg individually in an aquatic plant.
C. She releases them into the open water.

8. Why are red-spotted newts important?
A. They eat mosquitoes and other aquatic insects.
B. Their presence indicates a healthy wetland or forest.
C. Both A and B

For unfettered nature near the beach, have a run at Redden State Forest

Top photo: A winter walker plies the trail on a sunny December morning in the Headwaters Tract of Redden State Forest in Delaware. The parcel sprawls across about 1,800 acres of mostly flat, pine-strewn terrain just north of Georgetown. (Dave Harp)

Right photo: A loblolly pine towers over deciduous trees along a trail through the Headquarters Tract. (Dave Harp)

By Jeremy Cox

It was midday. But with the winter solstice drawing near, the sun was close to its most southerly track and could only manage to produce a steady twilight beneath the evergreen canopy.

I ran on — over crushed gravel, then a quilt of pine needles, then sand packed as if it had been steamrolled. I ran through stands of pines blackened at their bases from long-extinguished fires. I ran past so many pine trees that I eventually stopped noticing them, allowing my mind to focus on my breath and maintaining an even gait.

Don't get me wrong: I like the idea of forest bathing, the practice of going into the woods, turning off your devices and tuning in to nature. Devotees typically sit in a selected spot, waiting for the serenity of their surroundings to clear their minds. Some might take a stroll.

But I guess I'm too restless to reach a meditative state through such stillness. I need to move. Running gets me there.

Luckily, the Chesapeake Bay region is strewn with places where it's possible — and pleasant — to run in nature. This is a story about one of the most inviting running experiences in the Bay's 64,000-square-mile watershed: Redden State Forest in Delaware.

What distinguishes this woodsy tract is the degree to which it dials up the positive aspects of trail running while turning down the negatives.

Nature, after all, can be good for your psyche while being bad for your body. You expect to encounter some challenges when you hoof it offroad: tree roots to trip you up, hills to test your endurance, rocks to turn your ankles, mud and "sugar sand" to slow your step. In that regard, there can be such a thing as too much nature.

Redden, though, gives you just the right amount. The state forest is composed of 18 separate tracts — some bordering each other, most not — sprinkled across Sussex County's rural interior across nearly 13,000 preserved acres. Here, I'm discussing the Headquarters Tract and its 4.6-mile Outer Loop Trail. The western half of the tract lies in the Chesapeake Bay watershed while the eastern side flows to the Delaware Bay.

The tranquil 1,800-acre landscape that awaits you is worlds apart from the high-end Jimmy Buffett vibe found only 20 miles east along

Delaware's beachfront. That contrast strikes at the heart of Redden's appeal, said Erich Burkentine, the state's southern regional forester.

"If you're an urban dweller and you don't just want to see the beaches in Sussex County," said Burkentine, who authored Redden's forest management plan in 2008, "this is what unfettered ground looks like. It's the closest that you're going to find to an undisturbed natural area."

Left: This former hunting lodge, built in 1903 at Redden State Forest in Delaware, is available for public use. Center: A vintage Smokey Bear sign greets visitors to the state forest's education center. Right: A boardwalk crosses a low area on a trail in Redden State Forest. (Dave Harp)

I met Burkentine in his office before setting out on my run. Deer antlers frowned down upon us from all four walls, the first and clearest sign that the room's occupant is an avid bowhunter (the Headquarters Tract being one of his favorite haunts).

When Delaware purchased the tract in 1936, it became the first chunk of state forest land in the First State. Officials named it after William O. Redden, a Civil War colonel on the Union side who, in private life, helped bring the railroad to the state.

I asked Burkentine for his thoughts on the perception that some people have about state-managed forests — that they're giant wood factories that don't cater much to the needs of the public or wildlife. He acknowledged that logging is still very much a part of the equation. But under his supervision, he added, no individual use is given preference over another.

Yes, loblolly pines are the primary tree species. When Burkentine began overseeing the forest 25 years ago, he inherited what was basically a pine plantation, he said. The trees were densely packed, numbering about 600 per acre.

He devoted his efforts to returning the landscape to some semblance of a natural forest. There's now a healthy dose of oaks, maples, gum trees and other hardwoods.

When he organized the tract into 46 different tree stands, he avoided drawing right angles and straight lines. Instead of clear-cutting stands after 30 years of growth, as was standard practice, Burkentine called for thinning out only the weaker specimens at first, allowing sunlight to reach the forest floor. That has enabled the brushy understory to reestablish itself, inviting more birds and wildlife back into the woodland, he said.

Burkentine's long, slow work has begun to bear fruit.

Recently, forestry staff discovered a rare orchid squirrels growing in the forest that had never been seen there before. And in 2021, state biologists deemed Redden's ecosystem healthy enough to host Delmarva fox squirrels. As of 2023, 30 of the formerly endangered squirrels had been relocated there from Maryland. The new population is showing signs of breeding, he said.

This forest, Burkentine said, is his legacy: "It's not something in passing for me."

The Headquarters Tract is about a 45-minute drive from my home. I doubt I would have considered running there if I hadn't signed up to participate in a running challenge. It's called the Tour de Salisbury, named for the Maryland city, the largest population center on the Delmarva Peninsula.

The tour rolls out twice a year over the summer and winter. For a fee of typically no more than $50, you receive access to running routes in various places around the peninsula.

There's usually a theme. This winter, the eight segments were loosely centered around quaint small towns known for their festive holiday displays, including Berlin and St. Michaels in Maryland and Onancock in Virginia. The legs ranged from 4 to 11 miles.

You can run the segments on your own schedule, but you must complete them by the deadline (typically over two or three months). You record your runs using GPS-enabled apps, such as Strava or Garmin, and log your results in the tour's web portal.

You may be asking, "Heck, why don't you just run for free?" Well, for starters, the entry fee for the winter challenge got you a racing bib and a knit beanie, emblazoned with the winter tour's motto, "Freeze While You Run."

But for me, the most valuable asset is that it opens the door to a community of like-minded runners whom you meet virtually and in real life. If that's not enough, the top finishers for each leg get award plaques.

In any case, I was feeling motivated to log a good time when I circled behind Burkentine's office to start my run.

The weather was just about perfect for me: fair skies and 60 degrees. The route called for running the trail counterclockwise. I started off strong, completing the first mile in under 9 minutes and 30 seconds. It was pretty much downhill from there.

The trail is popular for horseback riding. So, I focused on how long I could follow the solitary set of hoofprints in the trail. The answer: only as far as the terrain remained sandy.

This was a weekday, so I didn't see another soul until I reached the Redden Lodge, a structure built in 1877 now rented out for special events.

The trail is almost entirely flat, so you don't have to worry about tiring from the elevation. And it's wide enough that you don't have to worry about nicking your elbows on vegetation. The footing felt solid enough the whole way.

To an untrained eye, one tree looks like another. But there are subtle differences as you journey through the forest. Some places have taller, older trees. Some are thinner, newer and closer together. The view never intrudes but rather invites you to slow down and contemplate the simple beauties.

But I didn't have time for that. I returned to where I started in just over 46 minutes, good for an average pace of 10 minutes and 37 seconds per mile. But those were just numbers. My appreciation for this out-of-the-way corner of Delaware had grown at an immeasurable rate. ■

IF YOU GO

The Headquarters Tract of Delaware's Redden State Forest is at 18074 Redden Forest Dr. in Georgetown. Admission is free.

Eighteen primitive campsites are available. The Headquarters Tract is home to an education center that includes exhibits on forestry history in Delaware, insect pests and the importance of forests. The structure was built in the early 1900s as part of a hunting retreat for Pennsylvania Railroad officials.

Photo above: An annotated cross section of a loblolly pine is on display in the education center. (Dave Harp)

How hearsay kept me from a river that would change my life

By Will Gemma

I grew up in the foothills of Virginia's Shenandoah Valley, and the Shenandoah River was my river. It was the first river I swam in, the first I kayaked and canoed, the first place I saw a bald eagle soar overhead. The 'Doah, as those in the area called it, was the best of Virginia's rivers. The nearby Potomac or Rappahannock were acceptable alternatives for a day trip, but one would never venture down to the James River. That was out of the question; the James simply was not worthy. It was the worst river in Virginia.

How did I know this? Because that's what everyone told me throughout my childhood. The James was filthy, industrial and toxic to swimmers. Fish grew tumors and swam sideways. Human sewage floated on the surface. Bald eagles either perished or flew the coop in search of friendlier climes. I envisioned a bleak water world, shrouded in skeletal trees and permeated by yellow fog. This vision stayed with me for the first 30 years of my life.

In the winter of 2019, after nearly a decade away from Virginia, I moved back and landed in Richmond, a city bisected by the notorious James River. That spring, a crew invited me on a five-day canoe trip on the upper river. When they tried to convince me that this 65-mile section of the James compared favorably to stretches of the Shenandoah, I chortled into my Nalgene. But against my better judgment and despite the dented, aluminum-hulled canoes on offer, I agreed. A bad day on the river, even a polluted river, beats a good day at work. How bad could it be?

Our put-in was in Botetourt County — a gorgeous, rural and sparsely developed area, where the James River begins. As we left the Piedmont behind and drove deep into the mountains, I realized no one in my childhood had ever mentioned a mountainous section of the James. I began to feel the excitement of exploration, even if it meant eddying around the odd bit of excrement.

An hour later, I was floating on the James for the first time in my life. I rounded the first few bends, heard an osprey cry out and watched in awe as it swooped across a downriver view of the Blue Ridge Mountains that was as scenic as anything I'd seen on the Shenandoah — maybe, I thought in shock, it was even prettier.

Andrew Moonstone of Richmond paddles the upper James River near Glasgow, VA. (Will Gemma)

Not "maybe." It was. The rest of the trip proved it. On the last day, we ran the James River Gorge just downstream from Glasgow, VA, where close-shouldered mountains rise dramatically from the riverbanks. The water here is fast, narrow, boulder-strewn and, in aluminum canoes, a harrowing kind of fun. It was the exclamation point at the end of a very convincing argument for the glory of the James.

The drive home was muted by exhaustion, but I'd learned something fairly remarkable on that trip, which I kept turning over in my head: Five decades ago, the James was widely considered the most polluted river in the U.S., but now it's considered one of our most improved waterways. The apocalyptic vision from my childhood wasn't fabricated, just outdated. So, what changed? Why had I been misled? And, most intriguing of all, what was the rest of the river like?

I wasn't alone in my curiosity. The crew was keen to keep exploring, so we dove into research. Then we planned another trip. We found the next section of river to be, in its own way, just as profound, just as surprising as the last. Then more research, then another trip. We learned the epic, 50-year saga of the river's recovery, a story that is incredibly important, yet frankly too long to fit in this column. But it helped us identify what I consider a major problem: While those who lived near the James loved the river, those who didn't were far more likely to share the noxious vision from my childhood.

This revelation felt particularly urgent as the most recent scientific data on the James warned that its health was at risk of relapsing. People had to see it, just like I had, to believe it. And that is why we bought our first cinema camera.

With zero prior filmmaking experience, we have since produced three documentaries on the James with a fourth nearing completion. Together, we've paddled, filmed and researched nearly every part of the 350-mile river from the headwaters to the Chesapeake Bay.

We've seen the last of the bald cypress forests, witnessed endangered Atlantic sturgeon breaching at dawn, watched a coyote stalk its prey across a wetland and paddled past shoreline after shoreline crowded with bald eagles. We've had plenty of misadventures, too, cementing a bond we all acknowledge has been life changing. It has been one of those precious chunks of life that seem to make the rest of it worthwhile.

All this, from a river I wouldn't have wasted a day on 20 years ago. A river I will now care for and do what I can to protect for the rest of my life, all because I finally got over the hearsay and saw it for myself. It might be the only way to truly know if something is worth fighting for and if you are willing to fight for it. In this day and age, that's an awfully important thing to know.

So, the next time someone invites you on a hike, or a stroll by the river, or even a janky canoe trip, just go. Especially if it's somewhere you think you know but have never actually visited. Just go. How bad could it be? ■

Will Gemma is a writer and filmmaker based in Richmond. For information on the films, which will be aired in April on Maryland Public Television, go to headwatersdown.com.

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100 years of Bay research at the University of Maryland

By Tom Horton

Formal Chesapeake Bay science began a century ago with the study of oysters from an 8-by-10-foot fisherman's shack near the mouth of Maryland's Patuxent River.

Since then the University of Maryland's environmental research has evolved into an internationally significant, multicampus system, attending to everything from crab genetics and polar algae to climate change and sediment chemistry.

But there has scarcely been a year since 1925 that it did not still pay close attention to that foundational shellfish, *Crassostrea virginica*, the Eastern oyster.

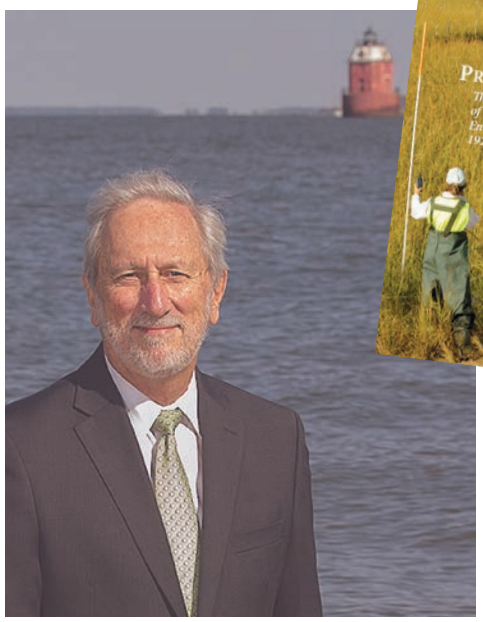
That balance between locally important and globally relevant is one of many informative threads that weaves together *Predictive Ecology*, Don Boesch's forthcoming history of the University of Maryland Center for Environmental Science, or UMCES.

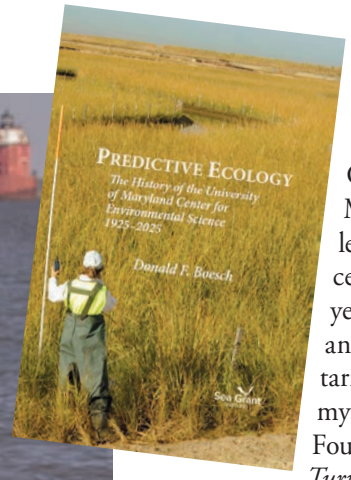
This recounting is somewhat personal for Boesch, who led Maryland's Bay research for 27 of its first 100 years — and for me, too, as my Bay writing was informed by such research. It should also be disclosed here that Boesch is a member of this publication's board of directors.

I learned early on that doing good science doesn't guarantee good results for the Bay. But *not* doing it does guarantee bad results. A reading of *Predictive Ecology* confirms this again and again.

The book made me realize that while I paid attention to Bay science, I underappreciated the internal struggles required of Boesch and his predecessors to keep Bay science afloat and relatively uncompromised by state and university power struggles.

Indeed, of the six men to have led Maryland's Bay science since 1925, three (not Boesch) were forced from their posts or departed sourly.





Donald R. Boesch is the author of Predictive Ecology, a history of the University of Maryland Center for Environmental Science, where he served as director for 27 years. (Dave Harp)

A fascinating thread of the book in this respect was the bitter interplay, stretching over decades, between Reginald Van Trump Truitt and Harry Clifton Byrd.

Truitt, who founded UMCES' predecessor, the Chesapeake Biological Laboratory, in 1925 and retired on his own terms in 1954, came from prosperous seaside oyster planters on Maryland's lower Eastern Shore. His family came to the region in the 1630s.

Good looking, great dancer, Army aviator, star athlete and son-in-law of Maryland Gov. Emerson Harrington (1916–1920), Truitt seems to have been everything that Byrd, from the rough-and-tumble Crisfield oyster tonging community, was not.

Still, Byrd was no slouch. He became a long-serving and successful president of the University of Maryland, but seemed to have detested Truitt, offering Bay research no support from the inception. As late as 1960, through a Crisfield cousin (J. Millard Tawes) who became governor, Byrd was still trying to rein in the autonomy of university research.

L. Eugene Cronin, a native of the upper Chesapeake (Aberdeen, MD), followed Truitt as leader of the research center and in his later years became my friend and mentor. He voluntarily, line by line, edited my 1991 Chesapeake Bay Foundation textbook, *Turning the Tide.*

The Cronin years saw research moving from Bay critters to "health of the Bay" issues like the impacts of channel dredging and power plants. He formed an informal triumvirate of Bay science leaders that included Bill Hargis, head of the Virginia Institute of Marine Science, and Donald Pritchard, who led Johns Hopkins University's Chesapeake Bay Institute.

Baywide scientific collaboration seems a no-brainer now, but Cronin labored for decades just to get the blue crab recognized as a creature whose life cycle did not observe state lines.

One of his boldest accomplishments had little to do with hard science. In the mid-'60s he hired a high school chemistry teacher, Tom Wisner, to be essentially the Chesapeake's original environmental educator.

He gave a long leash to Wisner, a gifted poet, singer-songwriter and storyteller, who would inspire generations of schoolkids and UMCES PhD.s alike, as well as Maryland Gov. Martin O'Malley, who gave Tom's eulogy in 2010. At a UMCES laboratory, "The Wiz" wrote the song *Chesapeake Born* — once proposed for the state anthem.

Cronin saw the Bay's future when he declared in 1967 that nutrient pollution "poses the greatest threat" to the Bay.

The overfertilization of the Bay, which we now take for granted as the Chesapeake's greatest health problem, must have been a head-scratcher in 1967. Only a quarter century earlier, Truitt had noted that farm fields were contributing lots of their nutrients to the water — a good thing for the Bay's productivity, he felt in those clearwater days.

The 1970s saw Peter Wagner lead the University's Bay research. Forced out in 1981, he was the shortest-serving head of the center, at the time called the Center for Environmental and Estuarine Studies.

But one of the center's finest moments came as Wagner resisted multiple attempts by state officials to silence his researchers, who were, as noted elsewhere in the book, "speaking truth to power."

Neither the state nor the U.S. Environmental Protection Agency at the time wanted to hear that restoring Bay health would be harder and more expensive, requiring big reductions in nitrogen from farms and sewage, as well as phosphorus.

Settling the issue took a federal lawsuit before Judge John Sirica of Watergate fame, in which UMCES scientists testified (successfully) against their employer, the state of Maryland.

Their work under Wagner's leadership became a model for restoring Bay health and managing coastal waters worldwide.

The Boesch decades were ones of great growth for UMCES and Bay science — Boesch himself writes. They actually were. He navigated perilous political waters, resisted powers that wanted to substitute high-tech hatcheries for enhancing natural reproduction of Bay fishes and dramatically expanded research linking land use in the vast Chesapeake watershed to water quality.

He closes by calling on scientists to become more active in providing solutions, as well as providing good science. That harks back to the founder Truitt, who called for aquaculture as a solution to oyster issues.

It is only a century later that we've actually acted on Truitt's visions. With climate change breathing down our necks and Bay cleanup progress lagging, Boesch says, we can't wait that long anymore. ■

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.

Snow geese take to the sky over Maryland's Blackwater National Wildlife Refuge. In March, they begin the long journey north to their subarctic and arctic breeding grounds. (Dave Harp)

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A male cardinal perches among fattening maple buds during an early spring snow. (Michele Danoff)

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In memory of
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from W. Grason Jones Jr.
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A white pelican, relatively rare in the mid-Chesapeake Bay area, tests its wings on the Blackwater River in Maryland. (Dave Harp)

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Willow Street, PA

Richard Insley
Toano, VA

Keith Jackson
Spring Hill, FL

Dan Jacobsen
Richmond, VA

Yvon Jensen
Georgetown, TX

Christine Jirikowic & Randall Orr
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White Stone, VA

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Wayne Koch
Chesapeake, VA

Kopel's Marina of Maryland
Coltons Point, MD

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Norman LaCroix
Jessup, MD

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BULLETIN BOARD

BULLETIN BOARD GETS NEW ADDRESS

The new address for submitting items to Bulletin Board is: bboard@bayjournal.com

EVENTS / PROGRAMS

DISTRICT OF COLUMBIA

Lahr Native Plant Symposium
9:15 am–3:45 pm, U.S. National Arboretum Administration Bldg. Auditorium. Learn about supporting native pollinators, uses of preserved specimens from the arboretum's herbarium, native species versus cultivars in regional trial gardens, backyard stormwater management and foraging locally. Suggested registration $95, but pay what you can starting at $50. Info and tickets: ticketstripe.com/events/1402106487574044.

PENNSYLVANIA

Amphibians and Vernal Pools
1–3 pm, March 23; Climbers Run Nature Center, Pequea. Join Lancaster Conservancy naturalists for an exploration of the frogs, toads and salamanders that use the temporary wetlands at Climbers Run for breeding. 3/4-mile easy loop trail. Ages 8+, under 18 w/adult. $7.18. Registration: lancasterconservancy.org/events.

Spring Wildflower Walk
10 am–12 pm and 1–3 pm March 29, Conestoga. Shenks Ferry Wildflower Preserve is a world-renowned site for spring ephemeral wildflowers, containing 70 species. Learn to identify common spring ephemerals on 1.5-mile out-and-back hike on gravel/dirt. Ages 8+, under 18 w/adult. $7.18. Registration: lancasterconservancy.org/events.

Woodcock Paddle
5–7:30 pm, March 7 and 22; Little Buffalo State Park, Newport. Join park guides for a special night kayak ISO the American woodcock. For experienced adult kayakers only with your own kayak, PFD and white light. Paddle to the other side of the lake, listening for calls and watching for sky dances. Free. Registration: events.dcnr.pa.gov/event/woodcock-paddle.

Celebrating the Susquehanna Bike Ride
12–3:30 pm, March 29; Riverfront Park, Marietta. Explore the history of Susquehanna River restoration and, in honor of Women's History Month, how women contributed. The 14-mile ride follows the Northwest River Rail Trail with stops at White Cliffs of Conoy, Falmouth Forest Garden and Conoy Wetlands Nature Preserve. $12.51. Registration: lancasterconservancy.org/events.

VIRGINIA

Virginia Osprey Festival
9 am–4 pm, April 12, Colonial Beach. The Virginia Osprey Foundation will host the 7th Annual Virginia Osprey Festival, offering expert speakers, exhibitors, live raptors and vendors. On Sunday, guided bird walks at George Washington Birthplace National Monument will be available. Free. Info: ospreycbva@gmail.com, virginiaospreyfoundation.org/2025-festival.

Dragon Run Kayak Trips
April 18 thru May 22. Each kayak trip is led by a nature guide who describes Dragon Run and its unique ecological and cultural significance. Guests get to see the incredible range of flora and fauna during a three-hour paddle. Ages 18+. $60 donation requested. No prior paddle experience required; all equipment provided. Registration available starting March 8 at dragonrun.org.

Hike with a Naturalist
10 am–12 pm, April 2; Leopold's Preserve, Broad Run. Join a professional naturalist and discover the flora and fauna on Leopold's Preserve. Free. Info: leopoldspreserve.com/calendar.

Dyke Marsh Invasive Plant Removal
10 am, March 15 and 29; Dyke Marsh Wildlife Preserve, Alexandria. Limited number of clippers and loppers are available. Wear sturdy shoes, gloves and dress for the weather. Training provided. Drop-ins welcome or register by noon on Friday before event. Info: fodm.org or email info@fodm.org.

Leopold's Preserve Tree Rescue Workday
Morning shift begins at 8:30, afternoon at 1:00 pm, March 15; Leopold's Preserve, Broad Run. Help remove fast-growing, invasive vines that choke and kill trees. Suitable for volunteers aged 13+, minors w/parent or guardian. Free. Volunteers can attend one or both shifts. Info: leopoldspreserve.com/calendar.

Spring Nature Walk
1–3 pm, March 23. A nature guide will describe the biodiversity found in Dragon Run's Bald Cypress swamp and conservation efforts to protect it. Enjoy spring ephemerals and nesting birds. Snacks provided after walk. Free for Friends of Dragon Run members and their guests — great for children. Membership $25. Registration: DragonRun.org.

Bird Walk with Loudoun Wildlife Conservancy
8–11 am, March 22; Sweet Run State Park, Hillsboro. Explore this beautiful 900-acre preserve to see its diverse habitats and wildlife. Download the Merlin app before arrival. Sturdy shoes, binoculars, bug repellent, sunscreen, water recommended. $10 parking fee. Info: loudounwildlife.org/events.

Bluebell Festival
10 am–4 pm, April 5; Shenandoah River State Park Picnic Area, Bentonville. In spring, Virginia bluebells blossom along the riverbank creating a beautiful carpet of blue and purple. Celebrate with food trucks, live music, craft vendors, nature walks, ranger programs. Free, but standard parking fees apply. Info: megan.goin@dcr.virginia.gov or (540) 622-2262.

MARYLAND

Blackwater Eagle Festival Cancelled
Scheduled for March 15, Blackwater National Wildlife Refuge. Cancelled due to avian flu at the refuge.

March on the Mattawoman River
10 am–3 pm, March 29; Smallwood State Park, Marbury. Celebrate the arrival of ospreys and start of spring fishing. Family fishing activities, return of the ospreys, hands-on kids activities, discovery center, food trucks, demos and more. $5 per vehicle. Pre-registration required: dnr.maryland.gov/publiclands/pages/southern/smallwood.aspx, "Event Notice."

Marshy Point Spring Festival
10 am–4 pm, April 12; Marshy Point Nature Center, Middle River. Celebrate the change of season with family-friendly activities for all ages including live music, animal talks, crafts, canoe rides, wood carvers and more. Individual costs for some activities. Free admission and parking. marshypoint.org/programs/event-calendar.

Birders of ALL Feathers
9–11 am, March 22; Jug Bay Wetland Sanctuary, Lothian. All are welcome to the sanctuary to learn about the world of birds and birding with a local naturalist guide. After an indoor session covering birdy basics, head out into the sanctuary to see who's flying around. Under 18 with guardian. Free w/$6 vehicle park admission. Info: jugbay.org/inspire_events/birders-of-all-feathers.

Great Garlic Mustard Pull & Pasta Party
10 am–1 pm, April 12; Jug Bay Wetland Sanctuary, Lothian. Learn to identify invasive garlic mustard and join staff naturalists in a single-day effort to remove as much garlic mustard as possible from the Glendening Nature Preserve. Then enjoy a pasta lunch with pesto made from the garlic mustard! Ages 8–14 w/adult; 15 and older, parents must complete a release form. $3/pp includes lunch and refreshments. Info: 410-222-8006 or email jugbay@aacounty.org.

Patuxent Research Refuge
Patuxent Research Refuge offers free public events and activities on its South Tract in Laurel. No preregistration required except where noted. List special accommodation needs when registering. Registration and info: 301-497-5772 or: fws.gov/refuge/patuxent-research/events.

Submission Guidelines

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

DEADLINES
The ***Bulletin Board*** contains events that take place (or have registration deadlines) on or after the 11th of the month in which the item is published through the 11th of the next issue. Deadlines are posted at least two months in advance.
April issue: March 11
May issue: April 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 bboard@bayjournal.com. Items sent to other addresses are not always forwarded before the deadline.

Answers to CHESAPEAKE CHALLENGE on page 27

1. Red eft
2. Larval-B, Red eft-C, Adult-A
3. C
4. D
5. B
6. B & C
7. B
8. C

BULLETIN BOARD

■ *Kids' Discovery Center:* 10 am–12 pm (35-minute time slots, on-hour) Wed. through Sat. Ages 3 to 10 w/adult. Crafts, puzzles, games, nature exploration. March: *Snails, Slugs & Worms*. April: *Grasshoppers, Praying Mantises & Walking Sticks*. Registration strongly urged.

■ *Film & Speaker Series:* 5–7 pm, monthly, first Fridays. All ages. Free movie screenings/Q&A with local wildlife professionals. April 4: *My Garden of a Thousand Bees*. Explore how special all the different kinds of bees are. Sam Droege, USGS Native Bee Inventory and Monitoring Lab, will lead Q&A. Prior to film screening take a guided wildlife exhibit tour. Meet in main lobby.

■ *"Wingspan" Game Days:* 10 am–1 pm, Mar. 14, 22 and April 11. Ages 12+. No experience needed. Play the award-winning board game; learn more about birds! Pre-registration required at front desk or online.

■ *Family Fun:* Staffed: 10 am–1 pm, March 14/15 and April 18/19; independent: 10 am–4 pm Wed.-Sat. All ages. Theme: Birds! Learn more about our feathered friends. Hands-on learning activities, games, crafts.

■ The Young Entomologists Group, *Scientific Illustration: Putting the 'A' in STEAM:* 1-2 pm, Mar. 15. All ages. Presented by Vichai Malikul, a scientific illustrator with the Smithsonian Institution.

Marsh Bloom Time Monitoring Training

2–5 pm, March 22; The Anita C. Leight Estuary Center, Abingdon. Learn how tracking the timing of plant life stages helps to study climate change effects. Volunteers must be able to safely and comfortably paddle a canoe — all monitoring by boat. Ages 14+, under 18 w/adult. Free. Must pre-register: otterpointcreek.org.

Field Day at Sassafras Creek Farm

10 am–1 pm, March 25, Leonardtown. Topics: cover crops, crop rotation and seed selection, high volume production of tricky crops like carrots and beets, managing nutrients, weather challenges, equipment and more. Free. Registration: futureharvest.org/programs/field-school/upcoming-events.

RESOURCES

MARYLAND

Bird Flu Reporting & Resources

Anyone who sees sick or dead birds in the wild should not handle or move the birds, but should report them by calling 1-877-463-6497. More info and the latest updates are on the Department of Natural Resources website (web search "MD DNR, bird flu). Anyone who owns poultry or has access to a backyard flock should be sure to register with the Department of Agriculture and follow important biosecurity measures to prevent the spread of HPAI: mda.maryland.gov/Pages/AvianFlu.aspx.

University of Maryland Extension Home & Garden Info

Submit your questions to a team of MD Certified professional horticulturists, Extension faculty and master gardeners, view gardening resources, connect with the Master Gardener Program for local classes and other in-person learning opportunities. Info: extension.umd.edu (Programs, Home & Garden Information Center).

Bay safety hotline

Call the Maryland Department of Natural Resources' Chesapeake Bay Safety and Environmental Hotline at 877-224-7229 to report fish kills; algal blooms; floating debris posing a navigational hazard; illegal fishing activity; public sewer leak or overflow; oil or hazardous material spill; critical area or wetlands violations.

Report marine mammal & turtle sightings & strandings

Anyone who sees a marine mammal or sea turtle (especially if stranded, dead, sick, injured or entangled) in Maryland waters is encouraged to report it via the Natural Resources Police Hotline, 800-628-9944. Use an online form to report deceased marine mammals or sea turtles: news.maryland.gov/dnr (enter "strandings" in the search box).

VIRGINIA

Marine mammal stranding response program

The Virginia Aquarium & Marine Science Center Foundation a stranding hotline and instructions for what to do if you encounter a stranded animal and a stranding hotline: virginiaaquarium.com/research-and-conservation/stranding-response.

Virginia DWR public lands search tool

With over 1,000 wild places to explore, *Explore the Wild* is your online tool to find the best public lands in Virginia to hunt, fish, boat, paddle, view wildlife, hike and go primitive camping: dwr.virginia.gov.

Apply for runoff assistance

The Virginia Conservation Assistance Program helps HOAs, homeowners, schools, places of worship with urban soil erosion and water runoff. Go to pwswcd.org to fill out a request form or contact the district at 571-379-7514, pwswcd.org/vcap or Nicole Slazinski at nicoleethier@pwswcd.org.

VOLUNTEER OPPORTUNITIES

WATERSHEDWIDE

Become a water quality monitor

Become a certified Save Our Streams water quality monitor through the Izaak Walton League of America and collect macroinvertebrates to determine the health of your local stream. Visit iwla.org/saveourstreams to get started. Info: vasos@iwla.org or 301-548-0150.

Potomac River watershed cleanups

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

PENNSYLVANIA

Middle Susquehanna volunteers

The Middle Susquehanna Riverkeeper needs volunteers. Monitor local waterways and provide monthly online updates: web search "Susquehanna sentinels." Water sampling: search "Susquehanna Riverkeeper survey." Stream restoration, litter cleanups (individuals, families, Scouts, church groups welcome): MiddleSusquehannaRiverkeeper.org/watershed-opportunities.

Nixon County Park

Volunteer at Nixon Park in Jacobus. *Front Desk Greeter:* Ages 18+ can work alone, families can work as a team. *Habitat Action Team:* Volunteers locate, map, monitor, eradicate invasive species; install native plants, monitor hiking trails. Info: NixonCountyPark@YorkCountyPA.gov, 717-428-1961 or supportyourparks.org (select "volunteer").

PA Parks & Forests Foundation

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

VIRGINIA

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.

Cleanup support & supplies

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

MARYLAND

Lower Shore Land Trust

The Lower Shore Land Trust in Snow Hill needs help with garden cleanups, administrative support, beehive docents, native plant sale, pollinator garden tour, community events. Info: fdeuter@lowershorelandtrust.org, 410-632-0090

Chesapeake Bay Environmental Center

Help with educational programs; guide kayak trips and 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. Participate in fundraising, website development, writing for newsletters, events, developing photo archives, supporting office staff. volunteercoordinator@bayrestoration.org.

Patapsco Valley State Park

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

Smithsonian Environmental Research Center

SERC in Edgewater is currently recruiting volunteers for the following projects: Chesapeake Water Watch, environmental archaeology, the SERC lab and the Chesapeake Bay Otter Alliance. Info: serc.si.edu/participatory-science/projects.

National Wildlife Refuge at Patuxent

Volunteer opportunities include: Kids' Discovery Center, bookstore & nature shop, events, hospitality, public conservation-education programs. Call 301-497-5772 during staffed hours (10 am-4 pm, Wed.-Sat.).

C&O Canal National Historical Park stewardship

Become a C&O Canal steward. "Adopt" a section of the park and throughout the year help ensure it remains clean and beautiful. Volunteers needed to adopt Cushwa Basin in Williamsport. Info on this and other C&O volunteer opportunities: canaltrust.org/programs/volunteer-programs.

Eastern Neck Refuge

Volunteer with Friends of Eastern Neck Wildlife Refuge in Rock Hall: Answer questions, handle sales at visitor contact station & gift shop/bookstore. Plant, weed Butterfly Garden. Staff information booth at community events. Info: Visit the Contact page at friendsofeasternneck.org.

Maryland State Parks

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

Annapolis Maritime Museum

Volunteer at the Annapolis Maritime Museum & Park. Info: Ryan Linthicum at museum@amaritime.org.

My, how the water flows: understanding our vast watershed

By John Montgomery

A stream flows toward the east branch of Codorus Creek in York County, PA. (Adam Miller/Alliance for the Chesapeake Bay)

A lot of us clean water enthusiasts have probably heard the word "watershed" countless times. But what does the word actually mean? Even though I'm a conservation professional, it took me longer than I'd like to admit to understand the complexity of the concept, just as it took a while to learn the seemingly endless acronyms like HUC (hydrologic unit code) and TMDL (total maximum daily load) — but acronyms are a conversation for another day. For now, let's explore what makes a watershed and why the Chesapeake Bay watershed is so important!

What is a watershed?

At its most basic level (no pH pun intended), a watershed is an area of land where all water, whether from rain, snowmelt, springs or streams, flows toward a common body of water, such as a river, lake or even an ocean.

Some watersheds can be very small, draining into a quaint nearby lake, while others, like the Chesapeake Bay watershed, can encompass thousands of square miles and include an endless variety of sources like streams, rivers, lakes, reservoirs and more. In any given watershed, water from up to thousands of sources can flow from smaller waterbodies on higher ground to progressively larger ones, all ending up at its final destination: the large waterbody.

Watersheds are ultimately determined by topography and gravity — with all water flowing to the lowest point it can find. That water in your local park or flowing down the street after a storm is all heading to the same place. That's why our collective efforts to manage water and reduce pollution are so important.

The Bay's myriad sources

Home to more than 18 million people and more than 3,000 plant and animal species, the Chesapeake Bay watershed spans 64,000 square miles, stretching across New York, Pennsylvania, Delaware, Maryland, Virginia, West Virginia and the District of Columbia. It's amazing that water from New York can find its way down to the Bay.

The Chesapeake can't boast the "largest watershed" award — that honor goes to the Mississippi River watershed. But the Bay does have the largest land-to-water ratio in the world: 14 square miles of land for every square mile of water.

If you've heard of the Susquehanna, Potomac, James, York or Choptank rivers, chances are you live in the Chesapeake Bay watershed and are supplied with fresh water by one of those sources. However, more than 150 major rivers and streams flow into the Chesapeake, with the Susquehanna River contributing nearly half of its freshwater supply.

Unfortunately, though, as water travels, it can pick up pollutants, moving down the line and ultimately into the Bay — something to consider seriously, as the rivers and streams in the watershed provide not only habitat for all aquatic life but also drinking water to millions of people. The health of the Bay is closely linked to land use practices within the watershed. Pollution from our homes, cars, cities, farms and industries all directly impair water quality.

The Chesapeake is also one of the most biologically rich estuaries in the world. Wetlands, forests and underwater grasses provide critical habitat for wildlife and help maintain clean water. Those are free benefits worth conserving! On top of that, the Bay is central to the region's economy, supporting industries like commercial fishing, tourism and agriculture. We all love the staple blue crabs and oysters with maybe a little too much Old Bay. Not only are these industries economically important, they're culturally important to us all.

The good news is there are plenty of actions we can take to help ensure cleaner water for all 18 million of us.

Make your own impact

Luckily, there are plenty of farmers employing conservation practices, homeowners using stormwater management techniques and local governments and municipalities asking the right questions to move forward sustainably.

These efforts are reducing nutrient pollution that would otherwise end up in the Bay. Excess nutrients from fertilizers, sewage and stormwater runoff lead to algae blooms, which create "dead zones" (low-oxygen areas harmful to fish and aquatic life). Urban development and deforestation are also reducing natural water filtration, leading to erosion and pollution.

Large-scale issues like these can seem daunting. I feel powerless sometimes, but I remember that our small actions can collectively contribute to the health of the watershed. Try something as simple as reducing the amount of fertilizer you use to minimize nutrient runoff, or being scrupulous about picking up pet waste to keep both nutrients and bacteria out of the waterways. You might also volunteer for streamside trash cleanups or tree plantings in your community.

The Chesapeake Bay watershed is a vital natural resource that provides clean water, supports biodiversity and sustains local economies. Let's all come together and do what we can to ensure clean water for us and for the flora and the fauna that make this one of the most special, beautiful and beneficial regions to call home. ■

John Montgomery is the communications and social media coordinator at the Alliance for the Chesapeake Bay.

Our nuthatch's red-breasted cousin, a visitor from the north

By Alonso Abugattas

Like its white-breasted cousin, the red-breasted nuthatch has claws on its feet that allow it to "walk" in any direction on a tree trunk. (Andy Reago and Chrissy McClarren/CC BY 2.0)

A red-breast perches on a tree branch, showing its very slightly upturned bill. (Peter Swaine/CC BY 2.0)

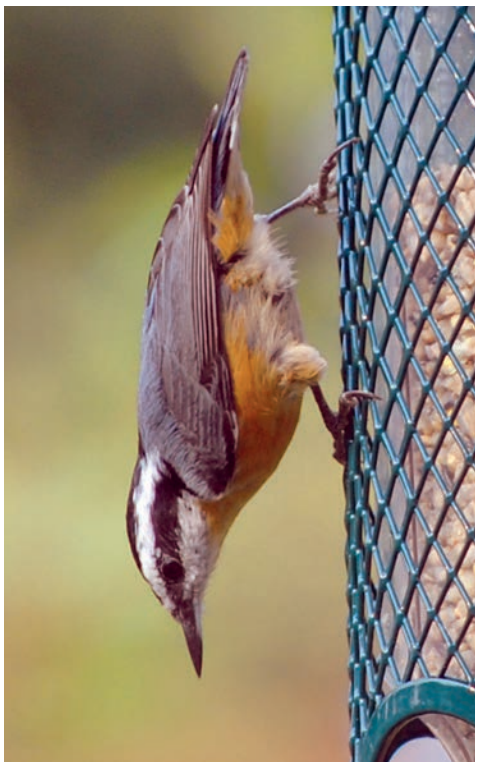
Some folks will say that you're not likely to see a red-breasted nuthatch in the Chesapeake Bay watershed because it's a denizen of the far north. Your own observations of the bird feeder might reinforce that notion, but it's not exactly true. Yes, the white-breasted nuthatch — the red-breast's close relative — is far more likely to show up at your feeder.

But, as the saying goes, never say never. Red-breasted nuthatches (*Sitta canadensis*) are indeed most common well up north in boreal and conifer forests, and there are year-round residents in higher altitudes of Appalachia as far south as Tennessee. But, as with many bird species, they break the rules periodically, usually prompted by a paucity of food, and migrate beyond their usual territories. It's called an "irruption," and ornithologists say it happens pretty frequently with *S. canadensis* — every 2-4 years — bringing them farther south than usual in the winter.

These sparrow-sized nuthatches, averaging about 4.5 inches from beak to tail, are a bit smaller than white-breasts, the latter being the largest of the four North American nuthatches. The red-breast has a very short tail, almost no neck and a dark, slightly upturned bill that's almost as long as its head. The males have black crowns, white eyebrows and wide, mask-like black eyelines. They're bluish gray on top and rusty colored below. Females are very similar but duller overall, with grayer caps and paler rusty underparts.

Like most other members of the nuthatch family, they come by their name honestly: They wedge large seeds and nuts into crevices and break them open. In older versions of English, it was called "nut hacking" or "nut hatching."

Like other nuthatches, they hunt for food in bark crevasses by descending the tree trunk headfirst. Their strong feet even allow them to walk underneath branches, giving them access to food not available to upright woodpeckers or creepers. They are also known to occasionally "hawk" for insects, catching them in midair.



Whether it's a tree or a bird feeder, the red-breast explores vertical surfaces by walking down them headfirst. (Alexandra MacKenzie/CC BY-NC-ND 2.0)

Sometimes called Canadian nuthatches or red-bellied nuthatches, they prefer coniferous forests normally found in Canada and high U.S. elevations, where they feed mostly on insects in the warm months and fir and spruce seeds in winter. They will cache both insect and seed food supplies under bark or even on the ground. When food is in short supply, they irrupt in large numbers and head south, again preferring conifers where they can find them. This may take them as far south as Mexico — and of course to any birdfeeders they encounter along the way. They are the most migratory of all our nuthatches and have even occasionally reached Europe. They will feed in mixed winter flocks along with other nuthatches, creepers, chickadees, kinglets and titmice.

Red-breasts are very vocal and inquisitive little birds. While they have as many as 13 different calls, their very high-pitched nasal *"yank, yank"* call, sounding like a tiny toy trumpet, is the one most often heard. Both sexes vocalize, though the males call more often — as many as 50 calls per minute when courting. Their courtship ritual includes singing, which other nuthatches don't do. Males raise their tails, droop their wings and ruffle their back feathers, all while swaying side to side with their backs to the females.

The female picks the nesting location and usually starts the excavation in April or May with some help from the male. They are one of the few non-woodpeckers that excavate their own nest holes in snags, stumps and soft wood trees, and rarely in existing woodpecker holes. Typically, the hole is anywhere from 5 to 40 feet high, though they have been observed as high as 120 feet. It takes them nearly three weeks to dig the hole, ranging in depth from 2.5 to 8 inches. They line the nest with soft bark, grass roots, conifer needles, fur and feathers. Red-breasts have an interesting behavior, not seen in most other birds: They line the entrance to the nest with sticky resin, possibly to deter predators and parasitic nesters. They are also one of the few tool-using birds, known to use a piece of bark to apply the resin. To keep the resin from affecting their own feathers, the parents fly directly in through the hole.

The female lays 5-6 white to pinkish-white eggs with reddish brown marks, and her mate feeds her during incubation, which takes about 12 days. The chicks fledge 14-21 days later with both parents feeding them, though the female usually feeds them by herself the first week or so. They have never been known to re-nest if something happens to the first nest.

Unlike most songbirds, according to Cornell, red-breasted nuthatches have been increasing over most of their range since 1966, and even expanding their range southward, particularly in the eastern U.S. They are considered a species of low conservation concern, with an estimated breeding population of 20 million. Still, they face issues with loss of habitat, including loss of snags and trees for nesting. ■

Alonso Abugattas, a storyteller and blogger known as the Capital Naturalist, 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.

For migrating fish, we need to keep their travel routes open

By Kathy Reshetiloff

A school of alewife swim across the rocky bottom of a stream on their way to spawning grounds. (Ryan Hagerty/U.S. Fish and Wildlife Service)

An illustration of a blueback herring by Duane Raver. (Public domain)

We've all heard the saying about March: In like a lion, out like a lamb, and vice versa. And it's true enough. Like Mars, the Roman god it's named after, March can be quite chaotic, weatherwise. But for some wildlife this time of year triggers an annual event that is anything but chaotic. Instead, it is determined and purposeful: the migration of fish upstream to spawn.

Some fish merely move up and down the same river to complete their life cycle. But for others, known as anadromous fish, they must journey from oceans to freshwater rivers and creeks to reproduce. The word anadromous comes from the Greek *anadromos*, meaning "running uphill."

What's really amazing about these migratory fish is that they usually return to spawn in the area in which they were born. How they accomplish this remains a mystery. Many scientists believe that this homing instinct may be due to an uncanny sense of smell and sensitivity to Earth's magnetic fields, polarized light and unique characteristics of the natal stream or waterway.

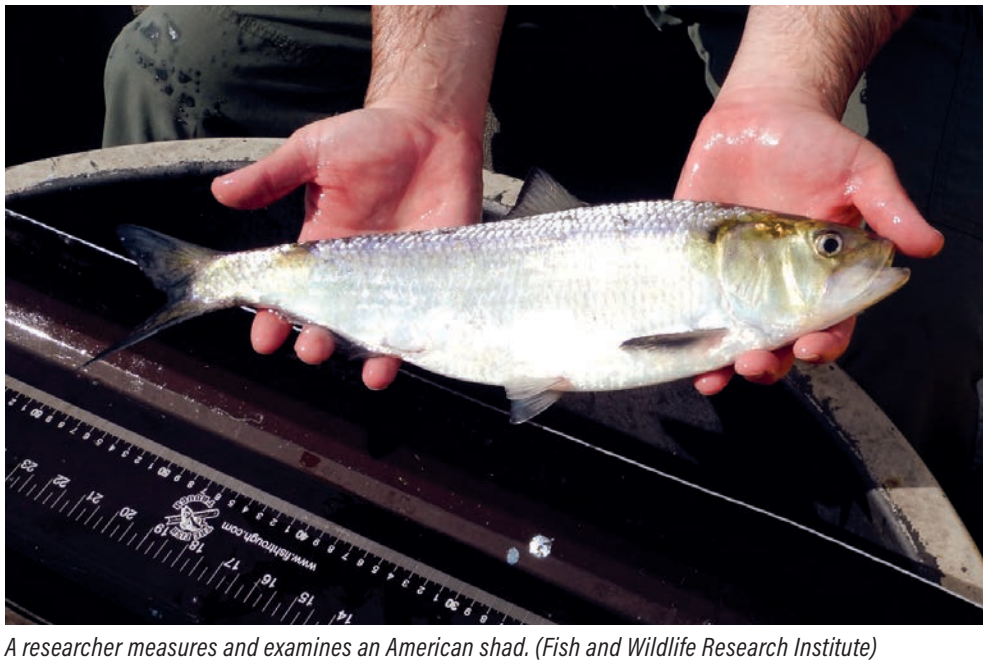
The Chesapeake Bay, a kind of watery interstate, is a vital corridor for migrating fish. Anadromous fish notorious for their spring spawning runs from the Atlantic Ocean to the Bay's rivers include blueback herring, alewife and hickory shad (all considered river herrings), as well as American shad.

True to its name, the blueback herring is silver with a bluish back while the alewife is silver with a bronze-green back. In both species the silvery scales scatter light, which is thought to confound the vision of potential predators. Both species share a single dark shoulder spot and vary in length from 12 to 15 inches when fully grown. Hickory shad are a bit bigger, reaching 20-23 inches.

The onset of spawning is related to water temperature and length of day. Alewife spawn from March through April in slow moving sections of streams. Blueback spawn from mid-April through late May and favor swifter water.

In the early fall, the new generations of blueback herring and alewife shad migrate out of the Bay and back to coastal waters, where they remain for 3 to 6 years. Then, reaching sexual maturity, these fish return to repeat the cycle.

American shad are larger than the river herring, up to 29 inches long. They are silvery-white on the sides and either green or blue above, which fades to brown as they migrate. They sport one large spot behind the gill followed by several smaller spots.



A researcher measures and examines an American shad. (Fish and Wildlife Research Institute)

Hickory shad are not just a bit smaller than American shad; they also have a more prominent lower jaw. They are gray-green along the back with iridescent silver sides and bellies.

Both herring and shad are prompted by rising temperatures to leave the ocean and return to the waters in which they were born. Both shad species generally spawn from March through June. Juvenile shad spend their first summer in freshwater. By autumn, the young shad gather in schools and swim to the ocean. They too live in the ocean from 3 to 6 years, then return to freshwater to spawn.

One of the biggest threats these fish face is barriers to migration. The most obvious barriers are large hydropower dams on major rivers. Migration can also be blocked by other structures. Smaller dams once used for water supply and powering mills still block many rivers.

And let us not forget the practically countless thousands of stream blockages around the watershed caused by culverts — those large steel or concrete pipes that allow water to flow under roads. However well they allow water to pass through, many culverts block the passage of fish either by being too high or low, relative to the water level, or by simply being too small and easily clogged by debris.

To improve aquatic connectivity, the simplest thing, of course, is to remove the blockage. Dam removal is the most effective solution, often opening up many miles of river habitat to migrating fish. In the many cases where dam removal is not an option — because the dam continues to generate power or because demolition is too expensive — the next best thing is a "fish ladder" or dam bypass of some type.

The solution with culverts is often to redesign them. In some cases this means making them larger and in others presenting less of an elevation change relative to the water level. Also, keeping them clear of debris on a regular basis can help solve the problem.

By restoring an uninterrupted river network, we help provide access to spawning areas needed by these marvelous and hard-traveling fish species. Human communities also benefit. Unblocked areas move water more efficiently and are less likely to flood. Opening up streams and rivers also provides additional areas to enjoy fishing, boating and other recreation. ■

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