CHESAPEAKE
BAY JOURNAL

June 2024 Volume 34 Number 4

Independent environmental news for the Chesapeake region

Will a focus on stream health boost the Bay?

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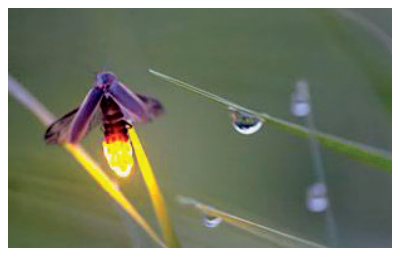
Poplar Island hosts its first successful eagle nest PAGE 10

NEW SHELL SOURCE

West Coast oyster shells will help build reefs in Bay PAGE 12

FEARS FOR FIREFLIES



Study finds threats to 'lightning bugs' in eastern U. S. PAGE 24

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Data shows that reducing nutrient pollution in the Chesapeake Bay is getting harder. Among the reasons: an increase in the region's farm animal population and greater use of fertilizer. Read the article on page 16. (Courtesy of the U.S. Department of Agriculture)

EDITOR'S NOTE

Powered by readers indeed

I often say that the *Bay Journal* is powered by our readers. The last two months have underscored that fact. Our spring fundraising efforts this year included an exciting opportunity: the Shared Earth Foundation generously offered to match reader donations, up to a total of $30,000. We are incredibly grateful to report that we not only reached but exceeded that goal. Special thanks goes to the Shared Earth Foundation for making it possible!

And readers responded quickly. Our mailbox was overflowing. Now, our list of donors in the print edition of the *Bay Journal* is overflowing too. I apologize that we couldn't fit everyone's names into this issue. If you don't see your name, please look again in the July/August edition, when we hope to catch up with all of the much-deserved thank-yous.

Please know that your kind donations go directly toward producing the environmental news and features that you read on these pages every month. Your support helps sustain this important work, and it helps build capacity for growth — to expand our coverage and to reach still more people who care about our shared natural resources. Students, teachers, lawmakers, faith groups, scientists, watershed organizations, business owners ... all these and more are among our audience.

You'll find plenty to explore in this month's *Bay Journal*. Two articles by Karl Blankenship dig deeply into challenges and opportunities for the Bay restoration. Tim Wheeler lays out a plan to import oyster shells from the West Coast to help restore oyster reefs in Maryland. Whitney Pipkin outlines criticisms levied in Virginia about state environmental justice efforts, and Lauren Hines-Acosta summarizes the successful oyster restoration work led by the Chesapeake Bay Program. Jeremy Cox wades into the world of mussels and gives us a peek at eaglets on a Bay island. Ad Crable looks at firefly research and a new use for former mineland.

That's just a sampling of the content within. So I hope you'll settle in somewhere comfortable, maybe a spot with a nice breeze, and enjoy the read. And as always, we encourage you to share the *Bay Journal* with a friend!

— Lara Lutz

ON THE COVER

John Jackson, Matt Ehrhart and Lamonte Garber, scientists from the Stroud Water Research Center, take a look at incised stream banks on White Clay Creek in Pennsylvania. (Dave Harp)

Bottom photos: Left by Craig Koppie/ U.S. Fish & Wildlife Service, center courtesy of the Maryland Department of Natural Resources, right courtesy of fireflyexperience.org

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BY THE numbers

458,890
Cigarette butts collected by three "trash wheels" near Baltimore's Inner Harbor in 2020

226,160
Plastic bottles collected by the three Baltimore "trash wheels" in 2020

80%
Amount of watershed residents who say they pick up litter when they see it

51 billion
Gallons of water entering the Chesapeake Bay each day from its tributaries

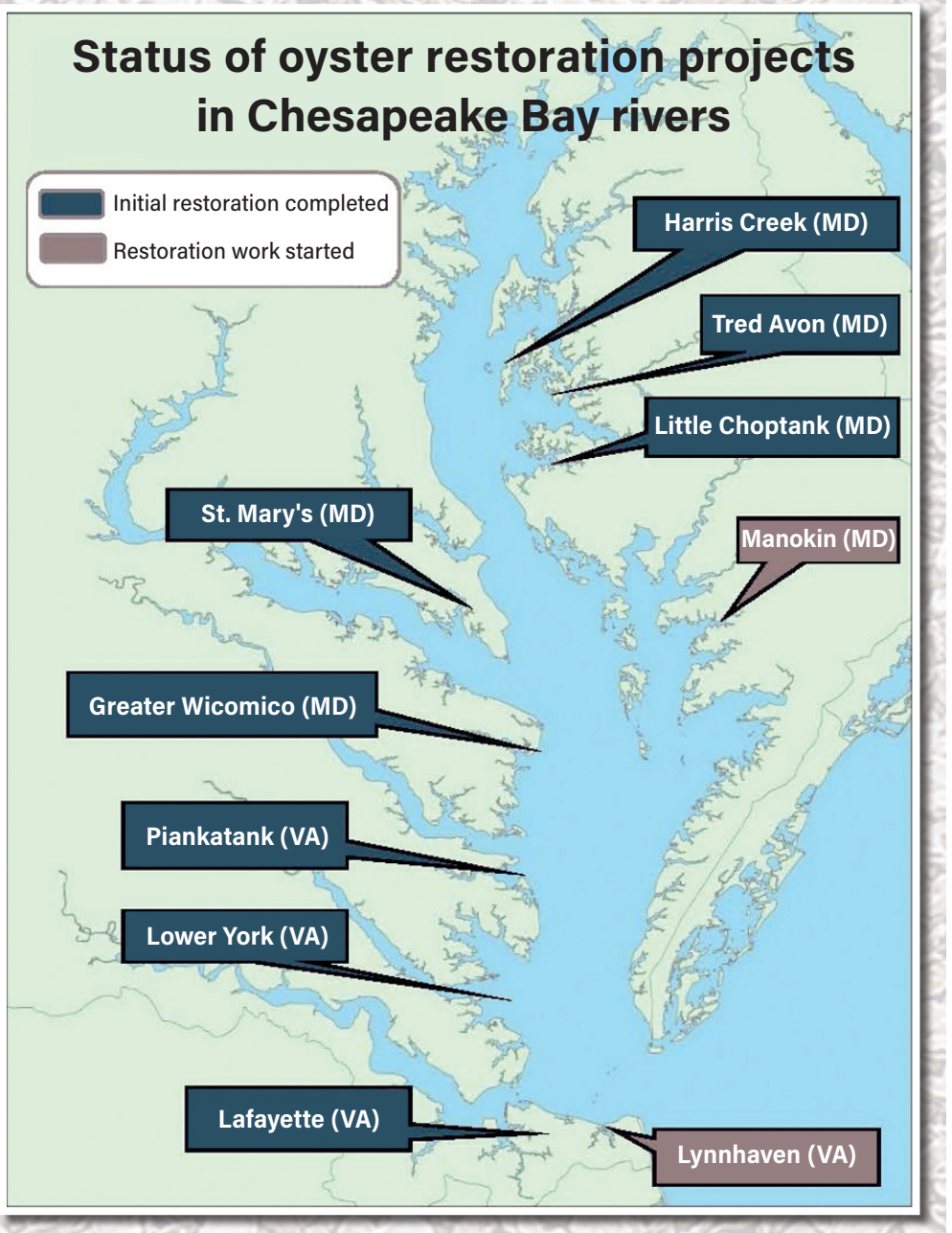
5.2 million
Tons of sediment entering the Bay in an average year, either from direct shoreline erosion or washing in from its tributaries

Oyster reef goal is within reach

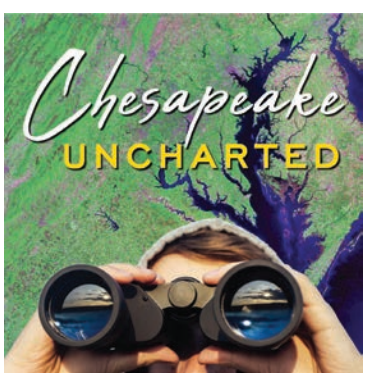
The Chesapeake Bay Program, the state-federal partnership that leads the Bay restoration effort, is on track to meet its voluntary oyster reef restoration goal by 2025.

Partners in the Bay Program agreed to restore reefs in 10 Bay tributaries — five each in Virginia and Maryland, plus the eastern branch of the Elizabeth River in Virginia.

With the recent completion of a project in the lower York River, work remains only in the Manokin River and Lynnhaven River. Progress is well underway in both locations.



(Map courtesy of the National Oceanic and Atmospheric Administration)



bayjournal.com/podcasts

LOOKING BACK

30 years ago
Striped bass population restored

Fisheries officials declared that striped bass were "recovered" from their depleted levels of the late 1970s and early 1980s after years of controversial harvest restrictions.

— *Bay Journal,* June 1994

20 years ago
Ambitious cleanup plans created for Bay rivers

River-specific plans called "tributary strategies" were being finalized, calling for unprecedented amounts of activity to reduce pollution.

— *Bay Journal,* June 2004

10 years ago
Scientists baffled by drop in crab population

The female blue crab population fell to its lowest level since 2002, and fishery managers made plans to slash harvest pressure.

— *Bay Journal,* June 2014

ABOUT US

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

The *Bay Journal* is available in print and by email and is distributed free of charge. The print edition is published 10 times a year, and bundles are available for distribution at offices, libraries, schools, etc.

The Bay Journal News Service distributes *Bay Journal* articles and opinion columns for free use in hundreds of newspapers across the region.

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Bay Journal managing editor Tim Sayles was on hand to accept awards from the Maryland-Delaware-DC Press Association for work produced by Bay Journal reporters in 2023. (Courtesy of T. F. Sayles)

A taste for excellence

Staff writer **Lauren Hines-Acosta** ventured onto Virginia's York River in May to report on the success of an oyster reef restoration project. Her trip sparked conversations among the staff about Bay seafood with revelations that surprised us and triggered an internal poll.

It turns out that about a third of *Bay Journal* staff doesn't care for eating oysters, while another third only likes them cooked. Veteran oyster reporter **Tim Wheeler** regaled the group about the many ways to enjoy them: raw, pan-roasted, grilled or in a rich stew, to name a few. But all staff members like blue crabs. About half have tried invasive fish such as blue catfish and snakehead, and most of them say they would go for more. Striped bass was an all-around winner.

Staff writer **Jeremy Cox** recently rescued his kayak from winter hibernation to explore an unhurried segment of the Patapsco River for this month's travel section. He later paddled the Wicomico River near Salisbury, MD, with *Bay Journal* columnist **Tom Horton** and journalism students from Salisbury University.

Staff writer **Ad Crable** grew wistful about his childhood memories while working on a story about fireflies. "I was struck by how indelible the childhood memories are of catching these bioluminescent beetles and watching their magical glow," he said.

Also in May, the *Bay Journal* team brought home awards from the Marland-Delaware-DC Press Association for work produced in 2023. Editor-at-large **Karl Blankenship** earned first place in environmental reporting for *Scientists say path to a better Chesapeake Bay is a slow one*, and Tim's article *Can Bay's blue catfish shift from disaster to dinner plates?* earned second. Jeremy snagged first in multimedia storytelling for *Officials spray mud to save imperiled saltmarsh sparrows*. Staff writer **Whitney Pipkin's** article *Options for 'green' burials grow in Chesapeake region* also earned first place in the feature category.

Here's to more award-winning articles in the year to come!

NEWS briefs

LOCAL
REGIONAL
NATIONAL

MD marks a milestone for land conservation

Six years ahead of schedule, Maryland's land conservation organizations have reached their goal for protecting nature from development.

Under the Maryland the Beautiful Act of 2023, the state set targets of conserving 30% of its land by 2030 and 40% by 2040. Democratic Gov. Wes Moore and other officials announced May 15 that the 30% goal had been met with a total of 1.85 million acres put under protection.

The Department of Natural Resources' public lands represent the largest sector of protected land at 502,307 acres, or about 33% of the total. That is followed by the Maryland Agricultural Land Preservation Foundation with 361,746 acres and then privately held lands where development rights were either transferred or sold through county preservation programs with 236,590 acres.

About 95% of the state drains to the Chesapeake Bay. Just over 30% of those lands within the state's portion of the Bay watershed have been conserved, according to an analysis by DNR.

Among the six states that drain to the Chesapeake and the District of Columbia, Maryland's conserved lands as a percentage of total watershed acreage is highest. It is followed by Delaware (28%), Pennsylvania (26%), DC (22%), Virginia (21%), West Virginia (16%) and New York (8%).

A decade ago, the multi-state and federal Bay cleanup campaign set a goal of conserving 2 million acres of land within the watershed by 2025. Through 2022, the states and DC were 82% of the way toward achieving that target. *— J. Cox*

VA program offers free streamside buffer plantings

The Virginia Department of Forestry has announced a new program that provides landowners with free, flexible plantings of streamside buffers. The program also includes a free year of maintenance.

As a watershed-based partnership, the Riparian Forests for Landowners program is run by the department, Alliance for the Chesapeake Bay, Friends of the Rappahannock, James River Association, Terra Habitat and York River Steward.

Streamside, or riparian, buffers are a mix of trees, shrubs and perennial plants along a waterbody. The buffers filter nutrients, pesticides and animal waste from stormwater runoff on farmland and developed areas. They also prevent erosion, provide wildlife corridors and help protect nearby areas, including cropland, from flood damage.

The program is open to all private property owners in Virginia. This includes homeowner associations and civic leagues. To qualify, the land must have less than 20% of invasive species coverage, and landowners must keep the buffer forested for at least 15 years.

Those interested in the program can apply by visiting dof.virginia.gov, clicking on Water Quality Protection and then Financial Assistance Programs. Look for the link to Riparian Forests for Landowners.

The program is supported by funding to the U.S. Department of Agriculture Forest Service and Virginia's Water Quality Improvement Fund from the Inflation Reduction Act. *— L. Hines-Acosta*

Plans dropped for fighter jet training in PA Wilds

After two years of backlash, the Maryland Air National Guard has dropped plans to fly training routes for fighter jets as low as 100 feet above the ground in the Pennsylvania Wilds eco-tourism region.

U.S. Sens. Bob Casey (D-PA) and John Fetterman (D-PA) announced the rescinded proposal on May 3. Both had joined state agencies and former Gov. Tom Wolf, as well as many residents and recreation promoters, in opposing the plans.

Still, the Maryland Air National Guard wing of the U.S. Air Force concluded in an environmental assessment that the flights would have "no significant impact" on noise, biological resources, land use, socioeconomics, safety, cultural resources, environmental justice or airspace management.

The training missions could have occurred up to 170 days a year and extended over a 2,287-square-mile region in six Pennsylvania counties and two New York counties.

"From the moment the Air Force's proposal was announced, I've been deeply concerned about how low, loud and frequent flights could disrupt livelihoods in a tranquil region that has built its identity on outdoor recreation," Casey said in a press release.

The 13-county Pennsylvania Wilds region contains the greatest concentration of public lands in the state and accounts for $1.8 billion annually in tourism revenue, according to state officials.

See **BRIEFS**, *page 6*

briefs

From page 5

An Air Force and National Guard Bureau spokesman quoted anonymously by the *Bradford Era* newspaper said the cancellation of the training plan was not due to local opposition.

Instead, it was a combination of Congress phasing out A-10 Warthog planes and a mission change for the 175th Wing of the Maryland Air National Guard, which flies the Warthogs from the Warfield Air National Guard base in Middle River, MD.

— A. Crable

Environmental groups send EPA lawsuit warning

The Environmental Integrity Project, on behalf of the Waterkeeper Alliance and Center for Biological Diversity, sent the U.S. Environmental Protection Agency a notice of intent to sue May 2. Among the Waterkeeper Alliance are 16 waterkeepers — advocates for various waterways — in the Chesapeake Bay region.

The organizations accuse the EPA of failing to provide Congress with regular comprehensive reports on the state of the nation's waterways as required under the Clean Water Act.

"The Clean Water Act can't live up to its promise if EPA won't report on polluted waterways, as required, or update its standards to keep pace with technology," said Meg Parish, senior attorney at the Environmental Integrity Project, in a press release.

The groups assert that the Clean Water Act requires the EPA to provide a thorough analysis to Congress on the condition of the nation's waterbodies at least once every two years. They contend that the EPA hasn't done so since 2017.

In a separate letter sent May 2 to EPA Administrator Michael Regan, 49 environmental groups from across the nation underscored concerns about the reports.

They also claimed that the EPA has not updated industrial pollution control standards as technology has improved, which is required under the Clean Water Act. For example, the EPA has stated that wastewater treatment systems can "commonly achieve" total nitrogen concentrations — a form of nutrient pollution in wastewater — at 8 milligrams per liter. But the Environmental Integrity Project identified 31 sites nationwide that exceeded that threshold, even though it isn't a legal violation. Among them is the DuPont Spruance site in Chesterfield County, VA, along the James River.

Many groups in the Chesapeake region, like Blue Water Baltimore, Chesapeake Legal Alliance, Friends of the Rappahannock and Waterkeepers Chesapeake, signed the letter.

The *Bay Journal* contacted the EPA for a response, but the agency declined to comment on the pending litigation.

— L. Hines-Acosta

VIMS study finds anglers value living shorelines

The Virginia Institute of Marine Science recently published a study that found living shorelines and marshes to be worth $6.4 million annually to recreational anglers on the Virginia Middle Peninsula. That is 3.5 times more than the estimated value of recreational fishing at sites with hardened shorelines like seawalls or bulkheads.

Living shorelines are stabilized coastal edges made of natural materials like plants, sand or rock. Hardened shorelines include bulkheads, sea walls and other hard structures. Both prevent shorelines from eroding, but living shorelines continue to grow, provide habitat and food sources for wildlife, and filter the water.

The study consisted of a survey that asked recreational anglers within the Virginia Middle Peninsula about what species they fish for, what bait they use and which habitats they visit. It also asked them to choose between hypothetical fishing trips that varied between habitat type, travel time and expenses.

The research team contacted about 10,000 recreational anglers on the Virginia Marine Resources Commission 2021 list of saltwater angling license holders. About 17% or 1,661 people answered at least one question.

According to the survey results, anglers preferred living shorelines and coastal marshes because they perceived those locations as better fishing spots and could travel there quickly and cheaply.

Andrew Scheld, VIMS professor and lead author of the study, described the $6.4 million economic value as a "dollar measure of people's happiness" derived from living shorelines and marshes. In other words, it's the monetary value of ecological services provided for free, but which some anglers would be willing to pay for — similar to a situation in which you might willingly pay for parking at an event but would appreciate a free spot.

The researchers plan on creating a shoreline restoration benefit calculator called SHORE-BET.

The study was funded by the National Oceanic and Atmospheric Administration and the VMRC.

— L. Hines-Acosta

New 'sentinel landscape' established in PA

Land that includes two military installations along Pennsylvania's Kittatinny Ridge has been protected by a federal-state-private program known as the Sentinel Landscape Partnership.

The newly designated Kittatinny Ridge Sentinel Landscape is one of 18 such sites across the nation that include military installations, managed with conservation and working farmland in mind.

briefs

The program was formed in 2013 by the U.S. Department of Defense, Department of Agriculture and Department of the Interior.

The new sentinel landscape in Pennsylvania includes Ft. Indiantown Gap, the nation's busiest National Guard training center with 17,000 acres along the Kittatinny Ridge.

Earth disturbance from artillery training at Ft. Indiantown Gap has created a unique grassland that is home to the only population of regal fritillary butterflies east of Indiana.

Also included in the sentinel landscape is Letterkenny Army Depot, an 18,000-acre facility that repairs and modernizes air and missile defense systems.

The site is where the Pennsylvania Game Commission recently released bobwhite quail in an experiment to re-establish a viable population in the state. *— A. Crable*

Gathering of bees draws interest at MD college

Bee researchers at Washington College on Maryland's Eastern Shore didn't have to travel far to make their latest discovery. It was waiting for them right on their own campus.

Anyone acquainted with the Chestertown campus had been aware for years of the ground-nesting bees dwelling on the college green in front of East and Middle halls. But only recently has the importance and sheer uniqueness of the site come to light, scientists say.

The area is home to multiple species of native mining bees nesting in the same spot. That behavior is unusual for those types of bees because they don't form colonies. If females build their nests close to one another, the gatherings typically aren't nearly as large as the one on the campus, experts say.

The presence of so many ground-nesting bees in one location raises many questions, said Beth Choate, deputy director of the Washington College Center for Environment and Society. She has published research on the abundance of wild bee populations in urban and rural settings.

"Ground-nesting bees need bare, minimally covered ground in order to dig into the soil. They also prefer sunny and well-drained soil, but it will be interesting to learn what is unique about the soil in this space and why the aggregation has become so large," Choate said.

The mass of bees might have gone unnoticed if not for the curiosity of one of the college's employees. Staff photographer Pamela Cowart-Rickman studied biology as an undergrad and developed a passion for photographing insects. As she spent more time photographing the bees, she realized she had stumbled onto something special.

She has tentatively identified several bee species at the spot: four members of the *Andrena* (mining bees) genus, one of the *Colletes* (cellophane bees) genus and likely three cuckoo bees in the genus *Nomada*.

Recently, one of the campus bee photos she posted to iNaturalist caught the attention of Cornell University bee expert Jordan Kueneman. A wider investigation was born.

Kueneman said he hopes the research yields insights into the nesting requirements for various bee species and what drives successes — and failures — for different nesting strategies. The Cornell lab is analyzing a soil sample taken from the Maryland site to determine its makeup and why the bees find it so hospitable. *— J. Cox*

RGGI officially removed from VA state budget

The Virginia General Assembly and Republican Gov. Glenn Youngkin approved the final state budget on May 13. Language that tied Virginia to the Regional Greenhouse Gas Initiative, or RGGI, did not make the final cut.

Programs partly or largely funding with RGGI revenue will lose that money, and people who benefit from flood mitigation and energy-efficiency programs may have to turn elsewhere for funds.

RGGI is an agreement between 11 states to reduce carbon dioxide emissions in the power sector 30% by 2030. To reduce emissions, states in the RGGI program make power plants pay a fee if they go over the emission limit.

Virginia was part of the initiative from 2021 to 2023. During that time, RGGI raised more than $800 million for flood resilience and home energy efficiency programs. It also reduced carbon emissions by 22% in the state, according to the Environmental Defense Fund.

The General Assembly and governor clashed over many aspects of the budget, from digital service sales tax to electronic skill games. The governor and legislative budget leaders reached a deal on May 9 to find a middle ground. The state government would have shut down if the budget wasn't approved by July 1.

As for the debate around RGGI, Youngkin said he took Virginia out of the program so monopolies like Dominion wouldn't have to pass the cost onto consumers. Lawmakers tried to keep Virginia in RGGI by amending language in the budget. But it was one of many aspects that budget leaders conceded on to get the budget approved.

— L. Hines-Acosta

VA battlefield lands on national list of places to protect

Forested area near Civil War site threatened with development

By Whitney Pipkin

An area near a historic battlefield in Orange County, VA, is on the National Trust for Historic Places' list of the 11 most endangered historic places in the country — for the second time.

Fourteen years ago, the property adjacent to Wilderness Battlefield made the same annual list when the proposed construction of a Walmart Superstore threatened to transform the historic landscape. This time, conservation and environmental groups are fighting the largest rezoning proposal in the county's history to accommodate a project that includes a mix of residential units and millions of square feet of data centers.

"The data center explosion is the new threat," said Don McCown, a land use field representative for the Piedmont Environmental Council.

Since its inception in 1988, the National Trust's list has galvanized public support for historic places of national significance that need restoration or protection from development.

The National Trust for Historic Places has come to the rescue of Chesapeake Bay area sites previously. The site of colonial Jamestown in Virginia made it on the trust's endangered list in 2022 due to threats from sea level rise.

The Tidal Basin in Washington, DC, made the 2019 list as it faced rising water and crumbling infrastructure. An estimated 158 cherry trees will be removed this year as part of a $113-million effort to make the Tidal Basin grounds more flood-resilient.

The Wilderness Battlefield area is considered significant because of the role the landscape played in the 1864 Battle of the Wilderness during the Civil War.

The American Battlefield Trust has preserved about 473 acres there, offering interpretation on the natural landscape where both Union and Confederate armies lost tens of thousands of lives. The trust, which focuses on preserving and protecting the country's war-storied landscapes, is the lead plaintiff in a lawsuit to overturn the rezoning of a property to accommodate development next to the battlefield.

Advocates for the site are concerned that a major development next to the preserved acreage could dramatically alter its character.

Developers asked county officials last year to consider rezoning the heavily forested property next to the battlefield to accommodate a mix of residential, commercial and light industrial development interspersed with parks and open spaces. Known as Wilderness Crossing, the development would happen in phases over the next 30 years.

In the months before the project was approved, the developer greatly expanded the amount of land within the project's footprint that could be used for data center development. Nondisclosure agreements between Amazon Web Services and the Orange County Board of Supervisors initially prevented citizens from knowing the full scope of the project or which company was behind it.

The American Battlefield Trust, joined by other nonprofits, filed suit against the board in May 2023, contending that the county made "substantive" procedural flaws while approving the largest mixed-use development project in the rural locality's history.

Opponents of the project also have been concerned about the amount of water that industrial users like data centers might pull from the Rapidan River, which is the source of the area's drinking water. The Rapidan Service Authority in August 2023 requested a steep increase in its water allocation from the river in anticipation of growth in the area. The Virginia Department of Environmental Quality instead approved the authority's resubmitted application in March at its current withdrawal levels, denying the increase.

Orange County's nearly 40,000 residents rely on the Rapidan River to supply drinking water. A severe drought in 2002 forced the county to enact water restrictions and to begin discussing the creation of drinking water reservoirs, especially as the county grows.

McCown said he wasn't sure what impact, if any, a lack of additional water resources might have on the proposed project. ■

PA gets boost for solar projects in low-income communities

Federal aid will help pay for installations on owned, rented homes

By Ad Crable

Pennsylvania, which lags behind most states in deploying solar energy, is getting $156 million in federal aid to put solar panels on more than 14,000 residential homes in low-income and polluted communities, in both urban and rural areas.

The money is part of $7 billion in grant awards, announced by the U.S. Environmental Protection Agency on Earth Day in April, that will be shared among states under the Solar for All program created by the Biden administration's Inflation Reduction Act.

In Pennsylvania, the aid will be used for loans, rebates, leases and subsidies to install solar panels on a home's rooftop or on the ground. Homes that are owned or that are rented, as with subsidized housing, will be eligible. The money can also be used for upgrades to make roofs suitable for a solar array or to install a battery to store solar energy.

Pennsylvania will get $156 million in federal aid to build more solar projects in low-income and polluted communities across the state. (Revolution Solar)

Occupants will see a reduced electric bill by partially producing their own energy, and they will help reduce climate change from fossil-fuel energy sources.

The funds will also be used to train workers to install the projects.

Henry McKay, a regional director for the nonprofit solar advocacy group Solar United Neighbors, which aided Pennsylvania with its application, said the federal aid "is a really big deal. It's a new world now."

"Thanks to these investments from the Biden administration, Pennsylvania will be able to build out reliable, sustainable and affordable solar energy infrastructure, which will help low-income Pennsylvanians save money on their electric bills, while also reducing pollution in our communities," Gov. Josh Shapiro said.

Because of high upfront costs, rooftop solar projects have mainly been embraced by higher-income households. Meanwhile, lower-income residents spend a higher percentage of their limited income on utility bills.

The grant was awarded to the Pennsylvania Energy Development Authority, an arm of state government. A co-applicant, the Philadelphia Green Capital Corp., is a nonprofit that has helped 2,700 households access solar energy since 2021.

The program will not be confined to metropolitan areas with low-income residents or communities with pollution burdens, McKay said, adding that communities near abandoned mine lands and industrial pollution are also eligible.

Community solar projects, though, will not benefit from the funding, at least for now. Those are projects that create one facility to serve a given area. Anyone in the community can subscribe, lowering their electric bills.

For several years, Pennsylvania legislators have failed to advance legislation to permit community solar installations, a practice popular in many states but opposed by many utilities.

The House of Representatives, however, recently passed a community solar bill, and it is now in a Senate committee. If passed and signed by Shapiro, community solar could be financially supported by the federal Solar for All grant.

According to a study by Forbes, only nine states have a lower percentage of their electricity powered by the sun than Pennsylvania. ■

A first for a reborn MD island: a nest of baby bald eagles

Successful nesting effort follows several years of failed attempts

By Jeremy Cox

Two eaglets are shown in a nest in May 2024 on Poplar Island in Maryland's portion of the Chesapeake Bay. They are believed to be the first bald eagles to successfully hatch on the reconstructed island. (Craig Koppie/U.S. Fish & Wildlife Service)

A federal wildlife official attached purple bands on the legs of two newly hatched eagles on Poplar Island to help identify them later. (Craig Koppie/U.S. Fish & Wildlife Service)

Some eagle-eyed wildlife biologists have made a surprising discovery at Poplar Island.

That's the island in Maryland's portion of the Chesapeake Bay that the U.S. Army Corps of Engineers and Maryland Port Authority have been rebuilding over the last 25 years. What was once almost entirely open water is now more than 1,700 acres of rock-ringed land.

One of the primary aims behind creating the island was to reestablish some of the habitat that waterfowl and shorebirds have lost around the Chesapeake to rising seas, erosion and shoreline development. According to the latest count, about 40 bird species have successfully nested on Poplar and produced young.

But one iconic species wasn't among them — until now.

On May 2 this year, veteran U.S. Fish and Wildlife Service scientist Craig Koppie shimmied up a cottonwood tree on a spit of higher terrain on the north side of the island. He peered into a stick-laden nest known to have been built by bald eagles the previous fall. Inside were a pair of newly hatched eaglets — a male and a female.

"It's that quote where 'If you build it, they will come,'" said Peter McGowan, a Fish and Wildlife biologist who has been involved in the Poplar project since the mid-1990s. "If you have this nice habitat, things will move in, and they will move in quick. You never know what's going to show up, and that's one of the great parts of the job."

McGowan said he isn't surprised that eagles would nest on the island. He thought it would only be a matter of time. Still, the dynamics behind the island's reconstruction didn't make it a likely candidate to host eagles.

The original Poplar Island once sprawled across more than 1,100 acres a few miles west of Tilghman Island on the Eastern Shore. At its height, Poplar was home to a population of about 100 people. There were several farms, a school, a church, a post office and a sawmill.

Like dozens of other low-lying islands around the Chesapeake Bay, though, Poplar was washing away. By the 1920s, the last of its residents had fled to higher ground. By the late 1990s, only a few acres of land remained.

Enter the Paul S. Sarbanes Ecosystem Restoration Project. Named after the U.S. senator from Maryland who championed the effort, the project is rebuilding the island using mud dredged from Baltimore's shipping channels to keep its port open to navigation.

The first mud delivery came in 2001, and the last is expected to arrive in the mid-2030s.

To make the island as hospitable as possible for water-loving birds, engineers designed Poplar to rise only slightly above the surrounding tide. The landscape is largely given over to marshes and mudflats. The only trees planted so far have been a handful in a small test plot.

That doesn't bode well for eagles, who generally seek out trees as their nesting spots. But nature appears to have intervened on their behalf, McGowan said.

The cottonwood tree that harbors the young eagles sprang up on its own. It's part of a small grove of trees on about an acre's worth of slightly higher ground surrounded by marsh. Despite the harsh environment, some have grown more than 60 feet tall, McGowan estimates. Cottonwoods — a type of poplar, aptly enough — are known to be fast growers.

Eagles have been spotted flying overhead and hunting around the island since the earliest days of its restoration, he noted. A stone's throw away from Poplar lies tree-lined Coaches Island and its cache of four eagle nests (two of which are active).

But McGowan and his colleagues had to wait about 20 years into the project before they noticed the first signs that eagles were trying to nest on Poplar. It started with a pair of eagles' effort to build a nest on the metal grate top of a water-control structure in 2020.

"Obviously, it wasn't the best place for an eagle to nest," he said.

The nest didn't last. A second attempt atop a spillway the next year also failed. Then, scientists noticed a mound of sticks growing larger in a cottonwood tree where a crow's nest had been. It was too big for the supporting branches and eventually tumbled out of the tree.

Another nest in the same tree started taking shape last fall. McGowan can't say for sure if its builders are the same eagles that had enlarged the crow's nest, but he suspects they are. This time, the nest was more centered over the trunk and less likely to fall.

By March, the amount of time the eagles spent perched on the nest suggested that there were eggs inside. Koppie's climb in May confirmed the presence of two eaglets. Before descending, he attached purple bands on their legs, identifying one bird as "09/E" and the other as "10/E."

The young birds will probably take wing this month, McGowan said. Will their parents try again in the future? McGowan is optimistic that they will.

"That's a good place to raise a family," he said. "So, they should come back next year and in following years." ■

States comply with new striped bass catch restrictions

Fishery managers may set more limits on recreational catch-and-release later this year

By Timothy B. Wheeler

With errant states falling in line with new striped bass catch curbs, East Coast fishery managers agreed last week to consider imposing still more limits on recreational fishing later this year to help the struggling fish recover.

The striped bass management board of the Atlantic States Marine Fisheries Commission, which regulates inshore fishing for migratory species, accepted revised plans May 1 from Maryland, Pennsylvania and the Potomac River Fisheries Commission for making required cutbacks in recreational and commercial harvests.

The board had rejected the three jurisdictions' plans in March, putting them in jeopardy of having the federal government shut down all fishing for striped bass if the deficiencies weren't corrected.

At issue for Maryland and the bi-state Potomac fisheries agency were their plans to delay action until 2026 if their 2024 commercial harvests exceeded the reduced level ordered by the Atlantic States commission.

The commission in January had ordered reductions in recreational and commercial catch amid concerns over an unexpected jump in recreational catch along the coast and surveys finding poor reproduction in the Chesapeake Bay, where most of the coastwide stock is spawned.

Under rules that took effect May 1, recreational anglers are limited to landing just one fish per day within narrow minimum and maximum size limits. The annual harvest quota for commercial fishers was reduced by 7% from the 2023 level.

The Atlantic States commission specified that any exceedance of the commercial quota must be corrected by deducting that amount from the quota for the following year. Maryland and Potomac fishery managers said they couldn't respond that quickly because of a months-long lag in compiling harvest reports.

But after the commission rejected their plans, the two jurisdictions' fishery managers submitted revised plans in April. They said they would track the commercial harvest more closely using preliminary weekly reports and by December would preemptively reduce the overall 2025 quota to offset any projected exceedance.

Commercial overharvesting isn't likely, given recent history. With one minor exception, commercial landings in Maryland since 2014 have been under the quota. The 1.2 million pounds harvested in 2022 — the most recent year for official figures — would still be below the state's reduced quota of 1.3 million pounds set for 2024.

Striped bass, also known as rockfish, are one of the most popular sport and commercial fish in the Chesapeake Bay and along the Mid-Atlantic Coast. Their population has been in decline for at least a decade. (Dave Harp)

Even so, "we're not going to be risky in our projection," said Mike Luisi, a fishery manager with the Maryland Department of Natural Resources and member of the commission's striped bass board.

The new catch limits have been controversial, especially in Maryland, where the Delmarva Fisheries Association and Maryland Charter Boat Association filed a federal lawsuit challenging the Atlantic States commission's orders. After hearing arguments in April, a U.S. District Court judge denied their petition for a preliminary injunction blocking the cuts from taking effect. The groups have appealed that ruling.

Pennsylvania sought to delay the new one-fish-per-day and size limits on recreational fishing, citing the administrative burden and potential for angler confusion of changing rules midway through its April-May striped bass season in the Delaware River watershed. After the delay was denied, the state Fish and Boat Commission adjusted its rules to comply, effective May 1.

If any of the three jurisdictions had failed to adjust their plans, the Atlantic States commission could have asked the U.S. Commerce secretary to impose a moratorium on all striped bass fishing until they came into compliance.

After accepting the revised plans, the striped bass board agreed to form a workgroup to explore options for reducing the number of striped bass that die after being caught and released — a common recreational fishing practice.

The Atlantic States commission in 2019 had ordered an 18% reduction coastwide in fishing-related mortality after studies showed that large numbers of striped bass were dying from catch-and-release in hot summer months when warm water temperatures stress the fish. The latest round of mandated reductions followed reports that the coastal recreational catch nearly doubled in 2022, threatening to derail efforts to restore striped bass abundance by the end of the decade.

The workgroup will examine the effectiveness of closing the striped bass fishing season during critical times of the year and of further barring "targeting" of the fish for catch-and-release during such closures. Maryland and the Potomac River commission have both imposed such closures during spawning season and the peak of summer, but other East Coast states have not.

The group will also evaluate whether certain types of fishing tackle are more or less likely to kill fish after they've been hooked and released.

The group is expected to report back to the striped bass board in October, which may lead to new rules addressing catch-and-release mortality.

Conservation groups welcomed the move to study further limits.

"We must all face the hard truth that striped bass are struggling," said Allison Colden, Maryland executive director of the Chesapeake Bay Foundation. "We're seeing continued low juvenile striped bass numbers, dwindling commercial catch and a trend of fewer large citation-size fish caught by anglers. Without getting striped bass management back on track across all sectors — commercial and recreational — there might not be a striped bass fishery in the future." ■

Bay's oyster shell shortage gets relief from the West Coast

MD firms win state approval to import 220,000 bushels from Washington state processor

By Timothy B. Wheeler

At water's edge in lower Dorchester County MD, two hulking mounds of oyster shells dwarf docked workboats and nearby storage sheds. John "Benny" Horseman, a waterman turned seafood industry entrepreneur, dubbed the larger pile "Mount Everest" — its peak could well be the highest spot in this low-lying area of the Eastern Shore.

Trucked cross-country from the Pacific Northwest, these shells will help relieve a chronic bottleneck in ambitious efforts to rebuild the Chesapeake Bay's oyster population. In Maryland, there aren't nearly enough oyster shells available to meet projected needs for restoring reefs in the state's oyster sanctuaries and replenishing others in public fishery waters.

Until now, the state has been getting about 230,000 bushels of shells a year for those purposes, most of them from Virginia. But in a report produced in late 2023, the Maryland Department of Natural Resources projected the need for up to 17.5 million bushels of shells over the next decade for oyster sanctuaries and public reefs and to support a growing aquaculture industry.

In response to that report, a task force created by Democratic Gov. Wes Moore has been studying how the state can meet that need, either with shells or alternate substrates such as stones, concrete, porcelain or even steel slag. It's tasked with providing recommendations to the governor by Dec. 1, 2024.

Help is already on the way, though. DNR has authorized the importation this year of more than 200,000 bushels of oyster shells from Washington state. That's where Horseman and his partners have tapped into a massive stockpile of discarded shells — millions of bushels that were otherwise destined to be ground up for hiking and biking trails, among other things.

"This is going to help majorly," Horseman said. Before the oyster spawning season begins this summer, he and his group intend to plant these shells on wild fishery reefs in three Eastern Shore counties. They hope to bring in even more shells in years to come.

The shells are from a different species of oyster than what grows in the Chesapeake and along the East and Gulf coasts. *Crassostrea gigas* are native to the Pacific coast of Asia but have been introduced throughout the Pacific and even in Europe. They are the most widely cultured oyster in the world and have been farmed on the West Coast for a century.

Approximately 200,000 bushels of Pacific oyster shells have been trucked from Washington state to Maryland's Eastern Shore, where they will be loaded onto boats for planting on reefs this summer. Some of the shells are stored at Farm Creek Oyster Farm, shown here, in Dorchester County. (Dave Harp)

Asian species eyed year ago

Twenty-five years ago, when diseases, loss of habitat and overharvesting had severely diminished the Chesapeake's native population of *Crassostrea virginica*, two Asian species — *C. gigas* and *C. ariakensis* — were considered as potentially disease-resistant replacements.

But scientists and conservationists opposed the introduction of nonnative oysters, warning that the newcomers could bring new parasites and diseases to the Bay and may not thrive here.

Ultimately, Maryland, Virginia and federal officials decided instead to redouble efforts to revive native oysters; in 2014 they committed to large reef restoration efforts in five Bay tributaries in each state. Meanwhile, the diseases afflicting oysters abated, and commercial harvests have in the past decade rebounded as the bivalve numbers recovered, though both abundance and harvests are still well below historic levels.

The large restoration projects strained the available supply of oyster shells, which have traditionally been used to provide a landing place or substrate where new generations of oysters grow. Oysters build their own shells, but to get started, freshly spawned larvae, or spat, generally settle on the shells of either dead or living oysters.

Because the diseases MSX and Dermo killed off many of the Bay's oysters from the late 1980s into the 2000s, though, there were fewer oysters reproducing or being harvested, leaving fewer shells for future generations to set on. Many existing reefs silted over, preventing spat from settling on the bottom.

In Maryland, the loss of habitat was particularly acute because declining harvests shuttered oyster processing facilities, reducing the supply of shells available for replenishing reefs. Shells from the few remaining shucking houses now go mainly to oyster hatcheries.

Now, up to 70% of the oysters harvested in Maryland get shipped to Virginia for shucking and packing, according to the DNR, and the shells only come back if paid for. The numbers returned to Maryland have been limited, both by the cost and by the Virginia oyster processors retaining shells to ensure they have enough for their oyster farms.

Virginia's shell squeeze isn't as tight because the state also dredges enough fossil shells every year from the bottom of the James River to replenish about 600 to 800 acres of mostly public fishery reefs.

Maryland also used to dredge up shells from silted-over reefs — up to 5 million bushels annually decades ago — for use in replenishing reefs worn down by harvest. The state stopped the practice in the early 2000s "in part due to a reduction in optimal areas to dredge," according to DNR. Also, the state's federal dredging permit expired, and for a time it did not pursue a new one.

In 2008, the Maryland General Assembly directed DNR to seek a permit to dredge shell from Man O'War Shoal, a moribund reef outside the mouth of the Patapsco River that's estimated to contain up to 100 million bushels. But recreational fishing groups, conservationists and even some watermen objected, contending that dredging would degrade rich underwater fish habitat there.

The U.S. Army Corps of Engineers finally authorized DNR in 2017 to dredge up to 5 million bushels, but amid continued opposition the state Board of Public Works has never voted to go forward.

Alternatives to shell

Meanwhile, federal and state agencies turned to alternate substrates to carry out Maryland's five large reef restoration projects because the need far exceeded the available supply.

Pacific oyster shells, like this one from the stockpile on Farm Creek in Dorchester County, MD, tend to be larger than those of native Eastern oysters and have more ripples on them. (Maryland Department of Natural Resources)

For a couple of years, DNR bought fossil shells excavated from a Florida quarry and used them in Harris Creek and the Little Choptank River. Hatchery-reared spat deposited on oyster shells were planted atop the Florida shells. But watermen objected, even staging a floating blockade in the Little Choptank.

The Army Corps, which took the lead in Harris Creek and the Tred Avon River projects, used clam and other shells bought from New Jersey, as well as granite stones. Those likewise garnered pushback from watermen, who cited instances of boats being damaged by stones being piled up too close to the water's surface.

Watermen maintain that oyster shells are the ideal substrate for oyster larvae. Some research supports that belief, but many other studies have found that other hard materials work as well.

With demand growing, the costs of securing enough shell or other substrates have mounted. DNR estimated it could cost $105 million over the next decade to acquire enough shell.

About 18 months ago, Horseman said, he and his brother Alex, also a waterman, teamed up with Nick Hargrove, owner of Wittman Wharf Seafood in Tilghman, to begin looking for other sources of shell. They found a massive stockpile at an oyster processing facility in South Bend, WA, owned by Oregon-based Pacific Seafood.

They visited the site a couple of times and struck a deal to purchase shells that they were told had been sitting there for a decade or more.

"It was a waste product," said Hargrove. "They were grinding it up and turning it into park trails."

"This project ... was definitely not for revenue purposes," said Jenn Allison, manager of the Washington processing plant. Company officials view it as a partnership to help restore Bay oysters and ensure the sustainability of the shellfish industry.

Horseman said he built a conveyor at the Washington facility to load the shells on trucks, then organized convoys of dozens of tractor trailers to bring them to Maryland.

The operation was privately financed, but they still needed approval from state and local regulators to bring the *gigas* shells in for reef restoration in the Bay.

"The first time we asked about it," Hargrove recalled, "DNR wrote back and said no." But he and the Horsemans refused to give up and pressed to win over state officials.

Brian Callam, DNR's aquaculture coordinator, said state officials initially rejected the idea of importing shells from the West Coast because they were concerned about the possibility that a relatively new disease in Pacific oysters might spread to eastern oysters. Studies later concluded there was little risk of that happening, he said.

Alex Horseman (left) and Benny Horseman stand by a high-pressure hose aboard a boat that will be used for planting Pacific oyster shells on Maryland oyster reefs. (Dave Harp)

Then, last year, with renewed requests to import Pacific shells, DNR relented.

"All the shellfish pathologists indicated that the risk of bringing in aquatic diseases on shells is low to begin with," Callam said. Furthermore, he said, keeping the shells on dry land exposed to the air and sunshine for months to years kills any pathogens and "essentially turns them into a pile of rocks. There's virtually no risk at all."

Permission granted

DNR issued the first permit last August to bring Pacific shell into the state, but the approval came too late to place the shells in the water in time for oyster spawning, which takes place in early summer.

This spring, though, DNR issued three new permits allowing the importation of 220,000 bushels of Pacific oyster shell this year. Two of the permits allow a combined 200,000 bushels for the Horseman brothers' Dorchester County businesses: Farm Creek Oyster Farm and Madison Shell Recycling.

The other permit authorizes 20,000 bushels of imported shell by the WRF Group, a Cambridge-based business that Maryland has commissioned to restore oyster sanctuaries in Eastern Bay as part of a sixth large restoration project the state has initiated.

Watermen have welcomed the imports, especially because the bulk of the shell is promised for replenishing reefs in public fishery areas, which they feel have been shortchanged in favor of sanctuary reefs.

"It's what we have to do if we want to continue growing," said Jeff Harrison, chairman of the Talbot (County) Watermen Association. This year, with the imported shells augmenting what's available closer to home, Harrison said his group will be able to plant twice as much as they would have otherwise.

The permits specify that the shells must be stored on land for an unspecified interval until the oyster tissue has decomposed and there are no other organic materials present. They also say the shells should be stored "far enough from Maryland waters such that any inadvertent introduction by storm or flood is unlikely." The latter condition is challenging, given the low-lying nature of Dorchester County. The stockpile on Farm Creek in Toddville is on gravel next to the water.

Allison Colden, Maryland director of the Chesapeake Bay Foundation and a fisheries biologist, said that with proper biosecurity precautions she's okay with using Pacific oyster shell in the Bay.

"As long as the material's inspected, and we know where it's come from," Colden said, "and that [it's determined to be] no risk, it can be useful because the demand for shell across all sectors is only continuing to grow."

After inspecting shells that have already arrived, DNR asked that dirt and debris, including bits of twine, be removed. On a recent visit to the Farm Creek stockpile, Horseman had an employee hand-culling the twine from the shells. Spring rains, he said, would wash out any dirt.

"As long as the economics support it," DNR's Callam said, "I think we're going to see continued interest in bringing this material in here until we generate enough of our own shells that we no longer need to import it. There are some people [who] have concerns about it, but I feel very confident that we are taking all the appropriate steps to make sure that the material that's coming in is as safe as possible."

Holding a Pacific oyster shell in his hand, Horseman said he thinks it may even be superior to native eastern oyster shells for converting oyster larvae to spat.

"These shells are better because they've got more ripples for the larvae to catch onto," he said. ■

Maryland has issued 2024 permits that allow the importation of 220,000 bushels of Pacific oyster shells from Washington state for use in rebuilding oyster reefs, mostly in public fishery areas. (Dave Harp)

Feds offer $90 million for vast solar array on PA mine land

Depressed coal-mining communities would reap some benefits

By Ad Crable

This undated photo from at least 24 years ago shows surface mining activity on a 2,700-acre property in northcentral Pennsylvania, where the state's largest solar array may be built. (Swift Current Energy)

The federal government is offering up to $90 million to a renewable energy developer to build Pennsylvania's largest solar farm on 2,700 acres of reclaimed coal-mining land along the West Branch of the Susquehanna River.

The $800-million Mineral Basin Solar Project in Clearfield County in north-central Pennsylvania, about 20 miles from State College, would produce 402 megawatts of electricity, enough to power 70,000 homes.

At the same time, the project could prove a valuable model for other state and federal initiatives.

There has been a broad push in Pennsylvania in recent years to repurpose the state's vast abandoned and reclaimed mine lands for renewable energy.

The Mineral Basin Solar Project, by Boston-based Swift Current Energy, is intended as a prototype that can be replicated in current and former mining communities across the country, according to the U.S. Department of Energy's Office of Clean Energy Demonstrations, which announced the proposed grant under the 2021 Infrastructure Investment and Jobs Act, also known as the Bipartisan Infrastructure Law.

Also, the Biden administration's new Justice40 Initiative seeks to make 40% of the benefits from federal clean-energy and climate investments flow to disadvantaged areas — in this case declining coal-mining communities. An estimated $20 million in project spending will go to worker training and community benefits.

Under the project's proposal, the developer would partner with a local community college and other education outlets to provide job training or retraining for residents in communities across a 27-county region in Pennsylvania and New York.

The solar project, if built, would boost Pennsylvania's relatively poor track record for adoption of renewable energy sources, but none of the electricity it generates will power Pennsylvania homes.

All of the electricity has been reserved for 20 years by the New York State Energy Research and Development Authority to help that state meet its goal of 70% renewable energy by 2030 and a zero-emission grid by 2040. It is the state's largest investment in renewable energy.

The project was one of five, selected from 98 candidates, that the DOE chose to receive up to $475 million to accelerate clean-energy development on mine land. The applicants have to meet various technical and community benefit standards all along the way to receive their money.

The other projects earmarked for infrastructure funding will develop geothermal heat and battery storage at copper mines in Arizona; create a pumped-storage hydroelectric project at a coal mining site in Kentucky; build a solar farm and battery storage on gold mines in Nevada; and build a utility-scale solar farm on coal mines in West Virginia.

The mostly open site in Clearfield County, PA, sits along the West Branch of the Susquehanna River and was mined until about 24 years ago. A power plant fueled by waste coal was once planned there but never materialized.

Permits for the solar project have sailed through Girard and Goshen townships and Clearfield County, though more are needed. Opposition from residents has not surfaced at public meetings on the project.

"I've been saying this for years. We were a coal economy, and we need to transition like everyone else to a clean, green community. This is a big step," said John Glass, a Clearfield County commissioner who grew up in the area. "I can't think of a better use of that land than green energy. It's a good project at a good time."

During the application process, U.S. Democratic Sen. Robert Casey sent a letter to DOE urging funding for the project. "If successful," he wrote, "this project could bring the opportunities of the green energy economy to the very coalfields that powered the industrial development of our nation."

The proposal also pleases the Eastern Pennsylvania Coalition for Abandoned Mine Reclamation, a nonprofit that works with state agencies to make mine lands a priority for clean energy siting. Pennsylvania has an estimated 352,000 acres of mine lands that are suitable for grid-scale solar and are within 2.5 miles of an electrical substation.

"Projects like this take the pressure off ag lands [to be used for solar]," said Robert E. Hughes, executive director of the coalition.

That's no small consideration, Glass noted. "If this was replacing good farmland," he said, "we wouldn't be supporting it. But this is reclaimed mine land in a remote area."

The ample community benefits required to receive the federal grant may also have solidified local support, said Rob Swales, CEO of Clearly Ahead Development, Clearfield County's economic development arm.

Swift Current Energy would annually pay $200,000 to the two townships to support local community projects and $1.1 million in annual tax revenue to the county, school district and local townships.

Swift is helping Clearly Ahead Development remove two low-head dams along the West Branch, part of a plan to create a new paddling destination and open about 100 miles of unimpeded river trails.

In addition to already being mostly open and graded, the Mineral Basin site has an electric transmission line from a recently closed coal power plant nearby. The land for the solar field would be leased for the expected 30-year lifetime of the facility.

Plans are to grow a mix of native plants under the solar panels to enrich the soil and attract insect pollinators. A Swift spokeswoman said "agrivoltaic" options, such as growing crops or livestock, also will be explored.

In addition to the solar array, developers are considering building a battery facility on a nearby property to store a portion of the electricity generated during the day, which would be dispersed to the grid at night or when it is needed most.

Since its founding in 2016, Swift Current Energy has built more than 2 gigawatts of utility-scale wind, solar and energy storage projects in the U.S., mainly in Texas and Illinois. The company said it plans to build an additional 2,000 megawatts of solar, wind energy and battery storage projects on former mine lands in Pennsylvania, enough to power about 344,000 homes.

Swift Energy officials said they want to start the Mineral Basin construction in 2025 and be generating electricity in 2027. The project would create six permanent jobs and an estimated 750 construction jobs. ■

Groups criticize environmental justice approach in VA

Some say governor's appointees may have conflicts of interest with board's mission

By Whitney Pipkin

Some environmental justice advocates in Virginia have denounced recent actions by Republican Gov. Glenn Youngkin that they say undermine efforts to protect vulnerable communities in the state.

The governor in March appointed a half-dozen members to the Virginia Council on Environmental Justice whose professional or business interests, advocates say, may put them at odds with the council's mission. The day before Youngkin made the first five of those appointments, he had vetoed a bill that would have given the council additional authority and more funding to travel around the state to communities affected by environmental justice concerns. It also would have required the governor to fill vacancies on the council by the end of August.

A fiscal impact statement for the bill suggested that the additional travel would have increased the council's travel costs from $1,500 to about $10,000 per year. The measure also would have required Youngkin to fill vacancies on the council by the end of August.

Former Gov. Ralph Northam revived former Gov. Terry McAuliffe's version of the council as an advisory panel to help the administration "protect vulnerable communities from disproportionate impacts of pollution." Northam signed a bill making it a permanent body of the executive branch in 2019 — as environmental justice issues in the state reached a boiling point over infrastructure projects with a disproportionate impact on underrepresented communities.

Virginia code states that the council should consist of 27 members, 21 of them citizens that represent American Indian tribes, community organizations, the public health sector and civil rights organizations, among others.

The appointees each work for companies or represent companies that are regulated entities whose projects — such as landfills and natural gas facilities — have historically impacted environmental justice communities.

"None of the … appointees represent any of the seven constituencies [that] council members are required by law to represent," the letter stated.

The governor's appointments include Lisa Kardell, director of public affairs for Waste Management Inc.; Courtney Malveaux, principal of Jackson Lewis PC; Eddie Ramirez of Ramirez Contracting, which specializes in construction site preparation; Morgan Whayland, director of government affairs for Virginia Natural Gas; and Ronald Olswyn White, vice president of Southside Electric Cooperative.

Fawn Dendy, a resident of Brown Grove in Virginia, talks with Adam Ortiz, director of the U.S. Environmental Protection Agency's Mid-Atlantic region, about pollution and land use concerns in her community. (Whitney Pipkin)

At the end of March, Youngkin appointed Elizabeth Cherokee Williamson, a partner at Richmond-based Balch & Bingham, LLP, who served as lead counsel in a case opposing Virginia's participation in the Regional Greenhouse Gas Initiative.

When asked how the appointees further environmental justice in the state, Youngkin's press secretary, Christian Martinez, responded via email.

"The governor's appointments reflect a variety of communities and stakeholders across Virginia who are committed to furthering Governor Youngkin's efforts to protect our natural resources and vulnerable communities throughout the commonwealth," Martinez wrote.

In his veto of the bill that would have expanded travel opportunities for the environmental justice council, Youngkin said that he opposed the specific provisions of the bill but recognizes "that environmental issues can have varying effects on different communities."

"In a broader context, however, the theory of the council conflicts with its duties as a state-level body capable of obstructing local projects," he wrote in the veto. "The proposed top-down approach would perpetuate past disparities, preventing the construction of infrastructure in underserved communities, hindering permits necessary for the advancement of clean energy and imposing regressive costs that disproportionately affect Virginia's poorest citizens."

Gov. Glenn Youngkin spoke at the Environment Virginia Symposium in Lexington, VA, on April 10. (Whitney Pipkin)

More than two-dozen environmental organizations and individuals signed a letter in late March condemning the governor's stance on environmental justice. Youngkin, they wrote, mischaracterized the role of the council as a body that is "obstructing local projects." Rather than wanting additional infrastructure projects, the letter pointed out, many "Black, non-White and low-income Virginians [have opposed] infrastructure projects that would pollute their communities, disturb or destroy cultural heritage sites and degrade their health and quality of life."

The letter pointed to recent examples in Virginia, such as local opposition to a gas pipeline compressor station at Union Hill, power plants and a landfill in Charles City County and a grocery distribution center in Brown Grove.

The letter urged Virginia's General Assembly to reject the governor's appointments and asked the governor to reappoint existing council members whose terms have expired but still wish to serve. The council, which currently has 20 out of 27 positions filled, held its most recent meeting including the new appointees on May 14. The meeting included discussion about community issues and a status update on the council's 2023 annual report.

Separate efforts to focus on environmental justice within the state Department of Environmental Quality also seem to have stalled out in recent years. The agency had appointed a director for a new office of environmental justice in 2021, but she left the position by late 2022. A guidance document detailing how environmental justice would be worked into the agency's permitting processes was completed in 2023, and the office of environmental justice is now run by a program manager, Danielle Simms. The guidance document is still waiting for review by the governor's office.

Melanie Davenport, director of regulatory affairs and outreach at DEQ — a position that includes oversight of the environmental justice office — represented the agency during a recent panel discussion on the subject as part of a virtual summit hosted by the U.S. Environmental Protection Agency.

"There's an interesting twist, in that our [environmental justice] statute is not within any of DEQ's organic statutes," she said during the panel, comparing Virginia's approach with that of other states. "It's in this general part of the code that talks about how we do business in Virginia, which means it's not quite as authoritative in terms of what [DEQ] can do and not do." ■

Bay cleanup faces headwinds in reducing nutrient pollution

Climate change, growth, increased fertilizer use offsetting restoration progress

By Karl Blankenship

Cleaning up the Chesapeake Bay is a lot like trying to sail into the wind. The heavy breeze keeps pushing back against efforts to make progress.

That's illustrated by recent data from the state-federal Bay Program, which shows that roughly half of the efforts by states to reduce nitrogen pollution during the last 14 years have been offset by headwinds created by growth, climate change and the filling of the reservoir behind the Conowingo Dam.

The result: After nearly a decade and a half of work and record spending, states are less than a third of the way toward achieving the nitrogen reductions needed to meet the Bay's clean water goals.

Further, the path forward is becoming more difficult, relying on pollution reductions from farms and development lands, where progress has been especially difficult.

New data from the Bay Program's computer models reveal a cleanup effort that is further off track than generally recognized and without a clear trajectory toward achieving nutrient pollution goals set in 2010.

To be clear, there have been some improvements, the models show.

The latest data indicate an uptick in progress in 2023, suggesting that the recent influx of state and federal money to bolster cleanup efforts is having an impact.

"We are making progress," said Lee McDonnell, who oversees science, analysis and implementation at the Bay Program. "But there are things that are making the job we [started] back in 2010 more challenging.

"Despite the increases we've had in population and agricultural production and impacts from climate change, we're not going in reverse," he said. "We're making some gains, but not as quickly as we'd like to. But again, we're fighting those headwinds."

In 2010, the U.S. Environmental Protection Agency established a total maximum daily load, or TMDL, for the Bay region. The TMDL specified the amount of nutrient reductions — nitrogen and phosphorus — needed in each state and major river to achieve Bay water quality objectives.

Nutrients spur algae blooms in the Chesapeake that cloud the water, killing underwater grass beds that provide critical habitat. When the algae die, they decompose in a process that removes oxygen from the water, making the water inhospitable or even deadly to aquatic life.

Updates to data used in the Chesapeake Bay Program computer models indicate that fertilizer applications in the region have increased. (Dave Harp)

The nutrient reductions prescribed by the TMDL were intended to fix those problems. But reaching those goals has proven more daunting than expected. And the EPA and Bay states have recognized they will fall short of their self-imposed 2025 deadline.

Adding up the offsets

Under the TMDL, states needed to reduce the amount of nitrogen reaching the Bay in a typical year by about 71 million pounds. Through 2023, they had taken actions to slash that by about 40 million pounds a year.

But several factors have offset much of that, according to Bay Program data.

- Climate change is increasing precipitation, which washes more nutrients off the land. That adds about 5 million pounds of nitrogen annually back into the equation.
- After many decades of trapping sediment and nutrients flowing down the Susquehanna River, the reservoir behind Conowingo Dam — about 10 miles upstream from the Bay — is essentially at capacity. As a result, nutrients and sediment are flowing downstream. It will require 6 million pounds of additional annual nitrogen reductions to offset the impact of the reservoir's filling.
- Recently updated data, which reflects greater numbers of farm animals, increased fertilizer use on farms, impacts from developed lands and a variety of other changes has effectively erased more than 8 million pounds of estimated annual nitrogen reduction progress.

Pollution from nutrients triggers algae blooms, which block sunlight from underwater grasses and rob the water of oxygen. (Dave Harp)

Taken as a whole, those headwinds offset nearly half of the nitrogen control actions taken by states since 2009.

And those trends are not expected to diminish. Agricultural intensification and development are projected to continue, and Bay Program computer modeling suggests climate change impacts on nutrients will accelerate.

Also problematic: Most nutrient reductions in the last 14 years came from wastewater treatment plant upgrades. Those are nearly completed. But state cleanup plans have suggested the amount of nutrients from those plants could eventually begin to increase because of expected population growth.

That means nearly all future nutrient reductions need to come from controlling runoff, or "nonpoint sources," from farms — the largest source of nutrients — and developed lands.

All states face challenges in controlling those sources, but the issue is most pronounced in Pennsylvania, which has far more farms and developed lands than the other states.

Overall, the latest Bay Program figures show the amount of nitrogen from nonpoint sources has changed little since 2009, leaving the region with no clear trajectory as to when its nitrogen reduction goal would be met.

A report from the Bay scientific community last year highlighted the problem, warning that current actions and programs aimed at controlling runoff are unlikely to achieve their goals.

"It's a nonpoint source game from here on out, in terms of making progress," said Kurt Stephenson, a Virginia Tech professor of agricultural economics and one of the authors of the report.

"It's hard to get enough implementation to move the needle in something that's so pervasive," Stephenson said. "That's not



Data shows that Bay cleanup progress is being greatly offset by more pollution from several sources. Population growth is creating more hard surfaces, increasing polluted stormwater runoff. More nutrient pollution is washing past the Conowingo Dam, and increased precipitation is also generating more runoff. (Left photo by Matt Rath, Chesapeake Bay Program; center and right by Dave Harp)

even opening up the question of whether we are actually getting the reductions we think we are."

Last year's report raised questions about whether actions aimed at controlling runoff are as effective at reducing nutrients as assumed in computer modeling.

It said those questions were particularly significant for phosphorus, the other key nutrient affecting Bay water quality.

States needed to reduce the amount of phosphorus reaching the Bay each year by about 4 million pounds. According to computer model estimates, they have made more progress on phosphorus than nitrogen — even when the "headwinds" are factored in. But they still have to reduce phosphorus by about 1.3 million pounds per year.

There is significant uncertainty about those figures, though, because there is a much greater divergence between model estimates and water quality monitoring for phosphorus than with nitrogen.

Last year's science report noted that monitoring shows "limited evidence of observable reductions in phosphorus concentrations." Many areas of the Bay watershed are showing either no trends, or increasing trends, for phosphorus.

What to make of models

The Bay Program models are the key scorecard used to assess progress toward meeting cleanup goals.

They use a vast amount of data about land use, farms, discharges from wastewater treatment plants, impacts from air pollution and other factors to estimate the amount of water-fouling nutrients that reach the Bay.

The models also use state-generated information about pollution control actions taken each year, such as wastewater treatment plant upgrades, streamside buffer plantings and the use of cover crops, to calculate how much those actions would reduce nutrients in the Bay.

Water quality monitoring is not directly used to evaluate progress because there are natural year-to-year fluctuations in nutrient runoff. Years with more rainfall have more runoff into rivers, while dry years have less. Also, it often takes many years before runoff control actions impact water quality. Much of the nitrogen reaches streams through slow-moving groundwater, and things like forest buffers can take years to become fully effective.

Modeling offers a way to assess how actions reported by states would be expected to affect nutrients levels in the Bay when they are fully effective and under "average" weather conditions.

Increasingly, though, states, local governments and agricultural groups have questioned the models, saying they do not accurately reflect the impact of pollution control actions, often pointing to the lack of agreement between monitoring results and modeling data at specific locations.

States and agricultural groups have strongly questioned the accuracy of some of the newest data, especially figures showing significantly increased fertilizer use.

Debate over the new data lasted nearly two years before states last fall signed off on their use in future modeling, with the caveat that related nutrient increases would not have to be addressed until after 2025.

Trust but verify

Joe Wood, senior scientist with the Chesapeake Bay Foundation's Virginia office, said the Bay Program needs a way to assess progress that ensures nutrient control actions are actually improving water quality rather than over-relying on model results.

Citing concerns raised in last year's report from the scientific community, Wood said it should not be automatically assumed that all runoff control actions are as effective as thought.

Some are likely more effective than others, and some are likely more effective in certain places than in others, he noted — yet they all get the same nutrient reduction credit in models.

"Fundamentally, I think it's really important that we don't treat nonpoint sources as a problem that we have all the answers to and [assume] that we just need to get more practices on the ground," Wood said.

Still, he said the models are helpful in assessing the relative level of effort states make each year as measured through data they report about the use of runoff controls.

Wood noted the uptick in actions in 2023 to control farm runoff, especially in Virginia and Pennsylvania, which he said were "a clear response from recent investments … It is important we acknowledge that, but we also have many issues with our current incentive programs that we must address, and it is going to take leadership and innovation to do so."

Despite improvements in 2023, when the models incorporate the latest data, it shows that the region has a long way to go.

Under the TMDL, the region needs to reduce the amount of nitrogen reaching the Bay by about 71 million pounds a year, to 199 million pounds annually on average, to achieve Bay water quality objectives.

Factoring in the latest data, along with the impacts of climate change, growth and the Conowingo dam, the watershed as a whole still needed about 50 million pounds of annual nitrogen reductions at the end of 2023.

The District of Columbia and West Virginia have met their goals, but all of the other states are off track.

Under current cleanup plans, more than three fifths of future nitrogen reductions would need to come from Pennsylvania, which has more agriculture and developed lands in the Bay watershed than any other state.

The latest data, for 2023, does show that Pennsylvania had the greatest estimated nitrogen reductions from farmland based on actions taken that year. The reductions — about 1.8 million pounds — reflect greatly ramped-up spending.

But the most recent computer model figures, released in late May, also reveal some troubling signs:

- According to previous models, states had taken enough actions since 2009 to reduce the amount of nitrogen running off farms each year by nearly 12 million pounds. But when new data were incorporated, reflecting increased fertilizer use and animal populations, along with other updates, the region as a whole had netted a combined reduction of only about 2 million pounds from farms. Those figures do not reflect the impact of the Conowingo Dam, which would require an additional 6 million pounds of annual reductions, mostly from Pennsylvania farmland.
- Nitrogen runoff from developed lands has increased by about 1.5 million pounds a year since 2009, as more land is converted to roads, buildings and parking lots.
- Nitrogen from septic systems has increased by about 250,000 pounds annually.
- On the positive side, actual measured reductions from wastewater treatment plants account for the vast majority of nitrogen improvements, slashing the amount reaching the Bay each year by 29.6 million pounds. ■

Frustrations mount with developer of MD data center complex

Citizens, conservation groups call for crackdown on pollution violations in Frederick County

By Jeremy Cox

Multiple pollution spills. Repeated stop-work orders. Failure to alert officials about an environmental violation.

Neighbors and environmentalists are losing patience with the developer of a massive, multi-tenant data center complex in Maryland. They're also directing some of that ire toward Democratic Gov. Wes Moore's administration, accusing regulators of failing to enforce environmental controls strictly enough against the developer, a Texas-based startup called Quantum Loophole.

"I want to see an enforcement action, and I want to see one that's large enough to get their attention," said Evan Isaacson, research director for the Chesapeake Legal Alliance, a nonprofit environmental law group. "The pollution of these waterways is not only a problem in and of itself. It's a matter of public policy. It's a private operator ruining a public resource for profit."

Quantum Loophole is installing roads, sewers and other infrastructure to support an industrial park exclusively for data centers on 2,100 acres near Frederick. Meanwhile, the company is also constructing a 43-mile fiber-optic cable line, called the QLoop, to link the Maryland facility with Northern Virginia's growing hive of data centers.

Inspectors with the Maryland Department of the Environment and Frederick County Division of Planning and Permitting have cited Quantum with dozens of construction-related infractions since it broke ground on the projects in mid-2022. To date, though, the environmental damage has not resulted in fines or any other significant forms of punishment.

"The fact that there have been so many violations is cause for concern, and there seems to be a lack of enforcement," said Anna Mudd, the Potomac Conservancy's policy director. "There has been documentation, but I haven't seen any consequences yet."

The Chesapeake Legal Alliance and Potomac Conservancy were among 35 conservation groups that signed on to a May 6 letter rebuking Quantum's behavior and criticizing how county and state authorities have handled the situation.

Citing "a pattern of misbehavior" by Quantum and its contractors, the authors wrote that the community "requires something more than platitudes and vague assurances. 'We promise to do better' is no longer sufficient. We expect rigorous enforcement of all environmental regulations. We hope that strict enforcement will lead to full compliance and prevent future violations."

Sediment-laden water escapes a containment area in April after a "frac-out" at the QLoop fiber-optic line construction site in Frederick County, MD. (Maryland Department of the Environment)

A Quantum spokesman acknowledges that the company has made "some mistakes" and vowed to implement processes within the organization and among its contractors to ensure future compliance. "We are a young company, and we are doing our best," said Rich Paul-Hus, Quantum's vice president of sales, public relations and lobbying.

MDE maintains that its records show that the agency has been doing its job. "The enforcement process for this project is the same as it is for any other project," spokesman Jay Apperson said in a statement. "Protecting the environment and public health is at the core of our mission."

There are signs that consequences may be forthcoming. Last September, MDE referred a series of ongoing pollution violations at the Frederick construction site to the state Attorney General's office. Apperson described it as an active enforcement matter that the agency is still pursuing. The AG's office declined to comment.

In separate violations involving the fiber-optic cable, MDE last November proposed a settlement to Quantum. The company would pay $130,000 in exchange for resolving the case without having to admit liability, according to a letter signed by Lee Currey, the agency's water and science administration director. That matter remains open as well, Apperson said.

Demand for data center storage is forecast to grow globally by about 10% a year until 2030, according to industry observers.

The warehouse-like, windowless buildings are filled with banks of routers and servers — the physical machines that act as digital storehouses for Google, Amazon and other tech-age titans. The Quantum project represents the first major expansion of the data center industry into Maryland, while just across the Potomac River lies the famed "Data Center Alley" in Northern Virginia.

At the complex under construction in Frederick County, Paul-Hus said the individual data center tenants will be able to share infrastructure, including the QLoop fiber line. That, he suggested, should result in a lower environmental impact, compared with each having to develop their projects from scratch.

"The ethos for doing good with the environment is there," Paul-Hus said, "but the issue we've had is process issues. It just needs some intention among all the things we're doing simultaneously."

Hardly a month has gone by without new environmental violations.

One of the first major offenses came in April 2023 at the construction site. Workers were piping sediment-laden groundwater to a permitted area equipped with filtration devices when the hose carrying the muddy water became disconnected, causing hundreds of thousands of gallons to gush into Tuscarora Creek, a Potomac tributary. Under pressure from authorities, the company halted work to address the problem.

Critics have said that such spills are a heightened concern because a portion of the complex site was once home to an aluminum smelting plant. Quantum must abide by an environmental covenant placed on the "brownfield" site in 2017.

The $130,000 settlement proposed by MDE stems from 25 inspections of the QLoop cable project between August 2022 and October 2023. Among other breaches of environmental regulations, the state alleges that four "frac-outs" occurred, in which mud and drilling fluids bubbled up out of the earth near where the company's contractor was boring for the fiber line, sending contaminants flowing into waters that feed into the Potomac.

The May 6 letter from three dozen conservation groups was triggered by yet another high-profile incident on March 30, when multiple frac-outs released sediment-laden water near the Monocacy River. According to MDE, Quantum's contractors failed to immediately notify the state about the potential pollution, as required. Also contrary to mandated protocol, workers continued drilling.

Paul-Hus said that rainfall masked the source of the muddy water, delaying its proper identification.

A county-issued stop-work order remained in effect for about two weeks.

Steve Black, who lives near the planned data center complex and heads a conservation group called the Sugarloaf Alliance, said he is fed up with the mounting violations.

"This is just an industrial activity that doesn't care," he said, "or it sure looks like they don't care." ■

Plan puts muscle behind James River mussel restoration

'Direct human action' required to restore freshwater bivalves

By Jeremy Cox

Tom Dunlap, wearing chest waders and carrying an orange mesh bag, sloshed through waist-high water with a purpose: to give nature a helping hand.

Freshwater mussels have all but disappeared from this shallow stream just beyond the southern city limits of Richmond. Dunlap, the James Riverkeeper since 2022, was part of a team of conservationists and federal wildlife officials working to fix that problem — by planting about 1,000 lab-grown specimens in the streambed.

Not just anywhere would do. The team needed to find the muddy pockets that are the most hospitable spots for mussels to grow. But the water in Falling Creek on this warm spring morning was too murky to see to the bottom.

"You can kind of feel it with your feet," Dunlap said. Having blindly located such a place, he stooped over to nestle one of the mussels from his bag into the coarse grains of sand.

If the mussel population is going to rebound here and elsewhere in the James River watershed, it will take many more projects like this, according to a report published in May by the nonprofit James River Association. The report includes what is believed to be the first comprehensive mussel restoration plan for a Chesapeake Bay tributary in Virginia.

And restocking with hatchery-raised mussels, as Dunlap and his team were doing this day, may be the key to success. Restoring habitat, improving water quality and protecting upstream land from development are important, but they won't be enough on their own to bring the bivalves back, the report asserts. It calls on officials and others to prioritize restocking.

"We can reliably say that mussels, which are known to be sensitive, can survive in many places throughout the watershed," said Jamie Brunkow, the association's head of river ecology, "but they're not going to get there on their own in many cases."

He added, "They can't walk up there on their own."

The overall number of mussels in the past were likely "at least a magnitude greater" in many places than they are now, but there is a lack of historical data to confirm that assumption, according to the association's report. Where mussels are found, there isn't as much species diversity. The James River basin once may have been home to up to 21 species of mussels, but only 16 are thought to still exist there.

Fish Biologist Jaclyn Zelko from the U.S. Fish and Wildlife Service (left) and Lucy Deignan, James River Association coastal restoration coordinator, plant mussels in Falling Creek, a James River tributary just south of Richmond on May 17. (Lauren Hines-Acosta)

Two of the species are listed as endangered by state and federal authorities: the dwarf wedgemussel (which is extirpated in the James) and the James spinymussel. The brook floater is listed as state endangered. Yellow lance and Atlantic pigtoe mussels are designated as threatened by both state and federal agencies. And the green floater is listed as threatened by the state but is still undergoing review for that classification at the federal level.

In the ecological world, mussel advocates have always struggled for attention and funding, Brunkow said.

"They're a critical part of the ecosystem that just haven't been a major priority," he said. "They're absent from a lot of conversations about conservation work happening."

Like oysters, their saltwater cousins, mussels are a key part of the food chain and function as natural water filterers. A single mussel, researchers say, is capable of cleaning up to 15 gallons of water per day.

"If we had a healthy abundant population of diverse mussel species, the river would be a lot better off," Brunkow said.

The mussel's decline in the James watershed is tied to urbanization and agriculture after European colonization, Brunkow said.

This alewife floater, stamped with a unique identification number, was among roughly 1,000 mussels planted by conservationists and scientists in Falling Creek in mid-May. (Lauren Hines-Acosta)

The bivalves are highly sensitive to pollution and were decimated by the influx of nutrients and sediment that followed.

Water quality has generally improved in the James and its tributaries in the last half-century, but mussels have shown no commensurate signs of recovery. The report concludes that "direct human action" is needed to increase their numbers.

And for that, Brunkow said, there had to be a plan. Most of the restoration work so far has come as required mitigation for an illegal discharge of pollution. As a result, those efforts have been haphazard and sporadic.

"That strategic sort of approach is what was lacking and made it really difficult to do anything. Now that we have this [plan], we can say to the state and grantmakers, there's a pathway here."

The report's development included two workshops in early 2023, as well as input from entities such as the U.S. Fish and Wildlife Service, Virginia Department of Wildlife Resources and Virginia Tech.

The 120-page document ranks stream sections by restoration priority, giving greater weight to those with higher habitat suitability, lower risk of nearby development and the potential to sustain a diversity of mussel species. Out of 28 waterways in the analysis, five were identified as "high priority": the upper Appomattox, Cowpasture and upper Rivanna rivers and Craig Creek, as well as the James River itself between Scottsville and the fall line in Richmond.

During the past five years, the James River Association has worked with the U.S. Fish and Wildlife's Harrison Lake National Fish Hatchery in Charles City to release about 15,000 mussels around the James watershed.

The process is painstaking. The protocol at Falling Creek was typical of other restoration sites. Mussels can't be just poured by the bucketful into the stream. Rather, a human must place each one on the bottom, taking care to make sure that the narrowest side of the oblong shell is pointing upward, because that's where the creature's mouth is.

"What you want to do in a sense is like you're planting seeds," riverkeeper Dunlap said.

The mussels don't seem to like dramatic swings in temperature. So they must be acclimated to the temperature of their receiving waters slowly. A few bucketfuls of water poured over the mussels in a cooler will do the trick.

Biologists don't want a single species to dominate in any given area, so the planters on this day carted in two types of mussels: alewife floaters and eastern lampmussels. Biologists selected this stream for restoration because of the documented presence of river herring, Brunkow said. Alewife floaters rely on herring species as a "host" to carry their larvae into new habitats.

Each mussel was stamped with a unique identification code. Even though mussels are generally stationary, they can move short distances using a "foot" that emerges from the shell, and they can be dislodged by fast-moving water. So about one of every 10 mussels planted in Falling Creek that spring morning was equipped with a tiny radio transmitter to allow researchers to keep tabs on it. ■

Will a focus on stream health help boost the Chesapeake?

Ag & the Bay
Sowing a Conversation

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

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

Previous articles in this series discuss difficult trade-offs with agriculture, the challenge of setting realistic goals, the effectiveness of best management practices, concerns about ag data used in Bay computer models and more.

You can find them at bayjournal.com.

By Karl Blankenship

A bit more than a decade ago, Josh Satteson was growing increasingly concerned about the large bites that Turtle Creek was taking out of his pasture.

The side-to-side movement of the badly eroded central Pennsylvania creek was eating away at its banks, causing walls of sediment to collapse and wash away. The stream bed between those banks had grown from 8 to 35 feet wide, leaving a muddy mess in between.

He visited the Union County Conservation District to get some help. Before long, he was talking to officials from state agencies and others who recommended a variety of fixes. Among them was planting trees along the stream and placing rocks and logs to stabilize its banks.

Today, Satteson said, "I have this awesome buffer." Sycamores reach heights of 20–30 feet, and fences keep his cattle out of the water. "I have this beautiful place now. The deer actually bed underneath my trees."

More than deer took notice. So did his neighbors, who became interested in doing similar work on their farms. "I never realized I was going to set the world on fire in this watershed," Satteson said. "I was just looking for financial assistance."

Partly because of what Satteson initiated, a throng of state officials, conservationists and neighbors gathered at a farm along Turtle Creek one morning in April to celebrate its improving condition — and a potential new direction for Chesapeake Bay restoration.

State department heads, elected officials and others held up individual placards with a message: "D-E-L-I-S-T-E-D-!"

That's because parts of the creek had recently been removed from the state's list of impaired, or "dirty," waters. The federal Clean Water Act requires each state to compile a list of stream segments that fail to meet its water quality standards and submit the list to the U.S. Environmental Protection Agency.

Of Pennsylvania's 85,000 miles of streams, its 2024 list estimates that 28,820 are impaired. Agriculture is the largest single source of impairment, accounting for more than 8,000 miles, mostly because increased siltation from farms renders the waterways unsuitable for anything other than the most tolerant insects, and those are not necessarily the species most critical to the aquatic food web.

The chain of events triggered when Satteson walked into the conservation district office led to about 2.2 miles of Turtle

Photo above: White Clay Creek in Chester County, PA, has benefited greatly from decades of tree planting and other work. (Dave Harp)

State officials, conservationists and others gathered in April along the banks of Turtle Creek in Union County, PA, to send a message — that part of the degraded creek had been removed from the state's dirty waters list. (Chesapeake Conservancy)

Creek's 8.8 miles of impaired waters being delisted recently because of increases in the number of "good bugs" they could support.

After his work was completed, other farmers began knocking on Satteson's door to look at the results. To capitalize on the interest, the Northcentral Pennsylvania Conservancy, a nonprofit organization, secured grants and worked with state agencies and the conservation district to conduct work on other farms. Stream improvements have since taken place on roughly 20 parcels.

With the Chesapeake region set to miss its 2025 goal for reducing nutrient pollution in the Bay, some are wondering if it's time to change emphasis. Would an approach focused on tangible improvements in streams like Turtle Creek produce better results — and more farmer cooperation — than focusing on the Chesapeake Bay?

The nonprofit Chesapeake Conservancy has advocated such an approach and, using high-tech data, has worked with local organizations to identify 30 Pennsylvania streams it hopes to delist by 2030, with another 27 slated for the future.

Lancaster County Clean Water partners, a network of organizations working to improve water quality in the Bay region's most intensive agricultural area, has a goal of restoring 350 of the county's 1,400 miles of impaired streams.

"This phenomenon is growing," said Joel Dunn, president of the conservancy. "And it's a great example for the whole Chesapeake Bay watershed of how to flip the whole effort on its head and make it hyper-local, but [to] deliver results for the whole watershed."

Indeed, cleanup approaches demonstrating more quantifiable local results got a boost last year when a report from the Bay's scientific community warned that efforts to control polluted runoff, especially from farms, have been less effective than thought and are unlikely to achieve the water quality goals in the Bay.

It said that focusing efforts to reduce nutrient pollution and improve habitats in shallow areas would yield more tangible results for various stakeholders than trying to improve oxygen in deep areas of the Bay, which has received the greatest focus.

That think-local approach was also embraced by Maryland's General Assembly, which this year passed the Whole Watershed Act, a pilot program that will target five small watersheds in the next several years to not only deliver measurable results for water quality, fisheries and wildlife, but to build resiliency to impacts of climate change, such as increased flooding.

Kristen Reilly, executive director of Choose Clean Water, a coalition of more than 200 organizations in the Bay watershed, including a number working on stream delisting projects, said it's critical that future Bay goals result in more tangible local outcomes than has been the case in the past.

Nearly everything is measured in White Clay Creek, which flows through Chester County, PA, to assess its health. Even falling leaves are collected in buckets. (Dave Harp)

"People want to see the result of all of this work," she said. "Nitrogen, phosphorus and sediment reduction is not something that's easily visible to anyone. More tangible results for people — things that impact their local community, waterway or farm — is where we need to take this effort. And I think that's how we become more successful."

'Mostly just words'

The Bay cleanup has long touted improved streams as a benefit of nutrient reduction activities that are ultimately aimed at clearing the Chesapeake's waters and reducing its oxygen-starved "dead zones."

The reality has been different. The EPA evaluates state progress by the pounds of nutrients — nitrogen and phosphorus — they keep out of the Bay, as measured by computer models.

That often encourages state runoff control efforts to focus on things like reducing tillage, planting cover crops, writing farm conservation plans and promoting nutrient management on croplands.

Those have relatively low costs and get nutrient reduction credit in Bay computer models but can be less helpful to streams.

Also, much of the Bay emphasis is on nitrogen, which has been particularly difficult to control but is especially impactful in salty Chesapeake water. Freshwater streams are more impacted by sediment and phosphorus, which attaches to sediment.

"Eighteen to 20 years ago, people sort of discovered that the Bay message didn't resonate all that well for lots of people, and they started to talk about streams more," said Matt Ehrhart, director of watershed restoration at the Stroud Water Research Center in Pennsylvania. "But it was mostly just words."

Actions more directly beneficial to stream health, such as vegetated buffers, especially forested ones, have had much lower implementation rates. Fast forward two decades, and the results — or lack thereof — have had consequences.

Despite ramped-up spending to control farm runoff over the last 15 years, computer models show only small pollution reductions from runoff control practices on agricultural lands, especially for nitrogen. That creates a circle of blame. Lack of progress puts more pressure on farmers, but farmers often blame the model for not accurately representing their efforts.

The lack of trust hurts Bay efforts because most future nutrient control actions need to come from farms, which contribute the most nutrients. The job is especially daunting in Pennsylvania, which has the greatest number of farms and generates more nutrients.

Now, some argue, focusing on local stream results could provide common ground. Instead of talking about nutrient reductions in a Bay many miles away, they can talk about improvements in streams where their kids and grandkids play. Maybe they can even bring back trout.

Those types of conversations can help break down some of the historic resistance to things like buffers, said Lamont Garber, watershed restoration coordinator with the Stroud Water Research Center.

"I can't tell you how transformative it is to be in a room full of farmers and to be talking about their streams versus the Bay," Garber said. "It is an entirely different discussion. For a very long time, it was always about the model, and who's to blame."

While computer-measured nutrient reductions have been small, there are many examples of how runoff control practices have resulted in direct improvements to stream health.

A vision of the possible

When Dick Stroud, a dairy farmer with an interest in science and the outdoors, donated a tract of land for a scientific research station on White Clay Creek in Chester County, PA, scientists had a request: that he put up a wire to keep his cows out of the water. "Is that a problem?" Stroud responded.

"That," said John Jackson, senior research scientist at what is now the Stroud Water Research Center, "was a dairy farmer's perspective in 1967."

It wasn't surprising. Over hundreds of years, the once-forested landscape had been transformed into a breadbasket for East Coast cities. The new normal was plowed fields or barren meadows where cows wandered in and out of streams with steep, eroded banks.

White Clay Creek now shows what other agricultural landscapes could look like, Stroud scientists say. They began planting trees along the creek decades ago and worked with farmers to build terraces and take other actions to curb erosion.

Today the creek is one of the region's best studied streams. Every large piece of wood that falls into the water is tagged so its movement and decay can be tracked.

Buckets catch leaves so scientists can estimate the amount falling into the stream and how far they travel before being consumed (typically less than 100 yards). They provide a food source not available in a meadow stream, thereby promoting a more diverse and stable base to the stream food web.

Left alone over time, the creek has widened and become shallower, creating more habitat for bottom-dwelling aquatic life. The fallen wood makes for a mix of pools, runs and riffles in the water. Logs and tree roots have stabilized eroding banks.

Stream life has responded. Trout, which once only occasionally reproduced there, now do so regularly. "Some years were too hot or something," Jackson said. "Now there's continuous reproduction. So we've cooled it, we've stabilized it, we buffered it."

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And there are more "good bugs" to feed the trout. White Clay Creek has about 350 species of stream-dwelling insects, including pollution-sensitive stoneflies, caddisflies and mayflies, widely considered to be essential building blocks for a healthy stream. Some of the most degraded agricultural streams in nearby Lancaster County have fewer than 50 species.

Research at the center has also shown that, as it improves, the stream itself can create conditions that more effectively remove nitrogen. Other pollutants, such as pesticides, are also reduced.

"I think the takeaway here is that this stream is what everybody is trying to get to throughout the Bay watershed," Garber said. "And we're able to show what is possible."

Today, he and others are spreading that message to farmers along streams, showing photos and bar charts of what a healthy stream — and the life in it — is like, compared with one in poor condition. "This is the kind of data that we're sharing with farmers on their own streams and saying, 'If we're successful with you guys, these graphs will go up.'"

A delisting strategy emerges

The idea of putting more focus on recovering degraded streams got a high-tech boost several years ago.

The Chesapeake Conservancy pieced together satellite and aerial images, along with a wealth of other data, to enable what they call "hyper-local" decisions about the Bay region's more than 100,000 miles of waterways.

Previously, land use imagery was available only at a resolution of 30-by-30 meters. Now, it's available at a single square-meter resolution, providing more precise information about land use and its impacts.

It can also identify pathways that water follows as it flows off streams, places that forest buffers exist and even sites where stream banks are rapidly eroding. That data can be overlain with information about the location of trout streams, areas that provide drinking water supplies, important habitats and more.

In fact, the high-res imagery provides so much information that it is was overwhelming for local groups to use in their work, recalled Carly Dean, director of the conservancy's Chesapeake tributaries initiative.

After working with local Pennsylvania organizations, they hit upon the idea of using the wealth of information to prioritize small segments of impaired or "listed" streams where, by working with a manageable number of farms, they had a chance to tip the scales toward delisting.

Students working at the Stroud Water Research Center in Pennsylvania examine samples of stream water for beneficial insects and invertebrates. (Dave Harp)

The targeted areas are typically stream segments that are only a couple of miles in length and drain watersheds of 1,000–5,000 acres with 10–15 landowners. That allows more focused work, which they hope will provide quicker and more tangible results, although it is likely to take a decade or more to fully realize.

"That size is more manageable for setting targets that are achievable," Dean said. "It's breaking the [Bay cleanup goals] down into something that individual human beings can see how they're working toward it."

The actual selection of targeted streams was left to local groups, though the conservancy — besides providing data — helps with coordination, fundraising and some monitoring to make sure that, once delisted, streams stay off the list.

Trade-offs

Just as focusing on Bay water quality never guaranteed that streams will improve, focusing on streams does not guarantee Bay goals would be met.

Streams in Pennsylvania are often delisted when their insect community reaches certain levels. That can happen by reducing sediment, which smothers stream bottom habitat, and by adding logs and rocks that create habitat diversity.

Nutrient reductions are not always essential for delisting streams, although they remain critical for the Bay.

Matt McTammany, an environmental studies professor at Bucknell University who lives in the Turtle Creek watershed and uses it for class studies, applauded work to improve the waterway but said dense mats of algae are still common. "It is eutrophic," he said. "It is loaded with nutrients."

Along some restored stream sections, cornfields are only a few feet from the water. And forest buffers are often less than the 35-foot minimum recommended to help control nutrients.

Satteson said that reflects the reality that many farmers simply cannot afford to give up more land. On his own farm, Satteson had to give up 2.3 acres of pasture to allow for a full 35-foot buffer, which others can't necessarily afford to do.

Crop farmers "want to be able to farm to right here," he said, standing only a few feet from Turtle Creek. They can lose $300 an acre in income by converting it to a buffer.

"You take away 10 acres, and that's a lot of cash," Satteson said. "That's crucial for farmers, especially when every acre of production equals income, equals staying on the farm or working two other jobs."

A long task

There is no one-size-fits-all approach to addressing stream health, and many biologists consider delisting to only be the starting point.

Producing more good bugs is a first step, but streams have been degraded by centuries of changes that have altered their temperatures, changed water velocities and added a broad mix of chemical contaminants in addition to nutrients and sediment.

Fixing all of that is a long job.

"In general, you have an impaired stream because you have an impaired watershed," Stroud's Jackson said. "So you have to fix the watershed to fix the stream."

In some small catchments, organizations are pursuing a "whole farm approach," which not only promotes forest buffers to improve the stream, but a whole range of conservation practices to control nutrients reaching the Bay, from adequate manure storage to managing barnyard runoff, reducing tillage and promoting cover crops.

"We try to be realistic with them about how fast the process is going to be, which is not very," Garber said. "But we are also realistic with them about the extent of the change that is needed."

Historically, agricultural conservation programs required farmers to share a portion of the cost. Because many of those stream improvements and other practices provide little direct benefit, and could even cost money, many farmers have been reluctant to participate.

Recent influxes of state and federal money to help meet Bay goals have enabled a broader approach. Many organizations are helping to foot the full bill to implement practices, handle the paperwork and even undertake buffer maintenance.

Still, there are many unknowns, such as how much of a stream needs to be addressed to move the needle on its overall condition. "We've seen a lot of places where they do 10% or 20% of the farms, and that's clearly not enough," Ehrhart said. "We're hoping that it's not 90% or 100%."

Some farmers, like Satteson, may be eager to participate. Others will wait and see. In one small stream where Garber and Ehrhart began working a decade ago, the last of the dozen farmers are only now starting to participate.

It is a process: gaining trust, improving the stream and waiting for results. As is increasingly the case with the entire Bay effort, it is one in which today's efforts are building blocks that may not be fully realized until future generations.

"There's no magic recipe," said Patrick Fleming, an associate professor at Franklin and Marshall College in Lancaster who operates a 99-acre beef and organic grain farm with his wife. "The building of trust is so important in this, and that takes work."

He's been working with an effort that seeks to engage enough of the 39 landowners along Indian Run, a small stream that drains a 3.2 square mile area in Lancaster County, to slash streambank erosion enough to remove its sediment impairment.

An important part of the process, Fleming said, is to not cast blame for the creek's condition, because the problems are from hundreds of years of farming, land clearing and the construction of sediment-trapping mill dams.

"We're working together to address an issue that we've inherited, to manage our streams sustainably for future generations," he said. ■

Bay Program on track to meet oyster restoration goal by 2025

Oyster partners complete reef work in Virginia's lower York River

By Lauren Hines-Acosta

Virginia marine police boats drifted against the dark blue tide of the York River. The boats carried members from almost every organization involved in restoring more than 200 acres of oyster reefs in the river. To celebrate, they emptied buckets of oysters overboard onto a reef on this year's Earth Day, April 22.

The achievement further signals that the Chesapeake Bay Program is on track to meet its goal to restore oyster reefs in 10 Bay tributaries by 2025. It's one of the goals from the 2014 Bay watershed agreement that the program will likely meet by the voluntary deadline.

"That's why we set goals, that's why we measure them and that's why we march to them," said Republican Gov. Glenn Youngkin. "… I'm a big advocate of working together, and it just shows that when we pull all of the capabilities together, we can do amazing things."

Oysters benefit the Bay in many ways. They filter water and help remove excess nutrients, which can reduce algae blooms that deprive the water of oxygen and kill fish. Oyster reefs also provide habitat for fish and crabs.

There's an economic benefit, too. The commercial harvest generated $59.6 million for Virginia and Maryland in 2022 alone, according to the National Oceanic and Atmospheric Administration.

The Bay Program aims to restore reefs in 10 Bay tributaries in Virginia and Maryland plus the eastern branch of the Virginia's Elizabeth River.

So far, the program and its partners have restored 891 acres in the Little Choptank, Tred Avon, Harris Creek and upper St. Mary's rivers in Maryland. As for Virginia, the program has restored 931 acres in the Great Wicomico, Lafayette, Piankatank and Elizabeth rivers and now the lower York River.

Work continues in Virginia's Lynnhaven River. NOAA and the Virginia Marine Resources Commission have restored 75% of their goal in the river. Adam Kenyon, chief of the shellfish management division for VMRC, said the Lynnhaven effort is on track to reach its 152-acre goal by 2025.

Officials from the Virginia Marine Resources Commission, the National Oceanic and Atmospheric Administration and other organizations planted oysters in the lower York River oyster reef on April 22. (John Wallace/Virginia Institute of Marine Science)

That leaves the Manokin River in Maryland. It is 50% restored and on track to meet the 441-acre goal by 2025, according to Gregg Bortz, Maryland Department of Natural Resources spokesperson.

The department released Maryland's 2023 fall oyster survey in January. Likely because waters were saltier than usual, due to below-average rainfall in 2023, the survey showed an abundance of juvenile oysters. But the higher salinity, along with warmer water, also likely led to an increase in diseases like dermo and MSX. Maryland's oyster mortality rate for 2023 was about 15%, which was higher than the previous year but lower than the average rate of 21%.

Bortz said that if existing oyster populations decrease, the substrate that makes up the reefs will remain and encourage future growth.

Kenyon said he is also seeing diseases on the rise in Virginia. But both Bortz and Kenyon pointed out that the prevalence is nowhere near the devastating levels from the mid-1980s and late 1990s.

The higher salinity created more ideal conditions for oyster reproduction. Maryland saw its fifth highest amount of spat, or baby oysters, in the last 39 years. Virginia's oyster population is the highest in 35 years. Bortz said the natural increase means it's more likely that the Manokin site will meet its restoration goal.

However, the Bay Program is unlikely to meet 13 of its 31 goals by 2025. The biggest challenge is reducing excess nutrient runoff, mostly from farmland.

As the program and other partners consider redefining the Bay effort beyond 2025, they're looking at how the oyster restoration work was able to succeed.

"There's no one size fits all," said VMRC commissioner Jamie Green. "We're willing to do what we know works and continue to do that, but also put resources toward trying new things … that may or may not have more bang for the buck."

Some aspects that made the oyster effort successful are specific to the species. They're iconic and have strong public interest. Also, smaller-scale oyster projects were already underway when the goal was set in 2014.

Stephanie Westby, NOAA oyster restoration program manager, said establishing success criteria early on, to define what a "restored" oyster reef looks like, made it easier to create realistic goals.

Partners also cite widespread collaboration as a reason for success. Academic institutions, commercial fisheries, federal agencies and state departments across the Bay region were included. NOAA provided significant funding.

"For better or worse, that collaboration hasn't necessarily translated as successfully across all of the other goals that we have," said Adrienne Kotula, Virginia director for the Chesapeake Bay Commission. "But we have this fabulous model to learn from moving forward." ■

Virginia Gov. Glenn Youngkin and other officials sign oyster shells on April 22 in Gloucester Point to commemorate the completion of 200 acres of restored oyster reefs in the lower York River. (Lauren Hines-Acosta)

Climate change poses growing threat to summer fireflies

Loss of habitat, pesticides also cited as 'lightning bug' dangers

By Ad Crable

Fireflies dance at dusk in a Pennsylvania meadow. (Peggy Butler)

A long exposure of a blinking firefly. (David Hughes)

When John Wallace was a kid, he saw the arrival of fireflies, blinking above the dewy grass at dusk, as the unofficial start of summer fun.

"We would collect hundreds in our little bug jugs and use them as lanterns for sleepouts, then turn them loose in the morning, only to go out on our lantern missions the next night," recalled Wallace, now a professor emeritus of biology at Pennsylvania's Millersville University.

That kind of wistful youthful memory resonates with millions of people, most of whom likely have been saddened to hear anecdotal reports that fireflies are declining throughout the Mid-Atlantic and other parts of the country.

Now, a study by researchers mostly from Penn State University concludes that habitat loss and pesticides — as well as climate change — do indeed present a threat to at least some species of the glowing beetles. Artificial light is another distrupter, researchers say, because fireflies use species-specific flashes to attract mates. The research claims to be the most comprehensive yet on what influences firefly populations in the eastern U.S.

"Lights are problematic not just for adults flashing and trying to find [mates], but also for larvae," said Christina Grozinger, a professor of entomology at Penn State and senior author of the study. Larvae tend to burrow farther underground when there's artificial light, she said, potentially impairing their development.

Another important problem is the loss of open ground to buildings, roads, parking lots and the like. Loss of pervious surfaces is pivotal because fireflies spend up to the first two years of their lives as larva on and under the ground.

Only in the last few weeks of their lives do they morph into the adult versions that blink their way to each other to mate on summer evenings, then lay eggs for the next generation.

One surprise in the study, which will appear in the June issue of *Science of the Total Environment,* is the growing import of climate change.

"An important implication from our model results is that climate change is likely a serious threat to North American firefly populations," the study concluded.

How?

How efficiently fireflies hibernate in the ground in winter, when they emerge to find mates and how long they survive in summer are all climate-dependent, researchers said. Weather fluctuations could throw off those ancient cues and trigger untimely releases of stored energy. Extreme rain could drown populations. Too much heat makes fireflies less active and less likely to find mates. Drought can make their larval homes in the soil unlivable.

"It is uncertain how firefly populations will be able to cope. In some places, habitat may become better. In others worse. But will fireflies be able to move to the new places? How far can they travel? Not much is known about dispersal of larvae or adults in most North American species," said Sarah Lower, assistant professor of biology at Bucknell University and a study co-author.

The study concluded that in some regions of the country, conditions may even boost firefly populations, but species elsewhere could disappear altogether.

Lack of data makes it especially difficult to predict the future for fireflies; their populations and life cycles have simply not been monitored in detail.

About 170 species of fireflies are found in the U.S., in every state except Hawaii, but mostly east of the Rocky Mountains. The state insect of Pennsylvania is, in fact, a firefly — with the apt scientific name of *Photuris pensylvanica* — one of 30 known species in the state. But little research has been done on the status of individual species. Fireflies may seem plentiful in one area, but they may be a common species, while others are struggling.

Researchers are beginning to get a handle on how some species are doing. When the International Union for Conservation of Nature examined 132 firefly species worldwide, it concluded that 28 were either threatened or in danger of extinction.

Yet, as an example of how scant reliable baseline information is, Christopher Heckscher, a Delaware State University professor looking for firefly species, fairly easily discovered four previously unknown species in Delaware, New Jersey and New York.

The study by Grozinger, et al., used a unique approach in its search to learn about factors that impact fireflies. The six researchers analyzed more than 24,000 firefly observations made by residents living east of the Mississippi between 2008 and 2016, as part of a citizen-science project known as Firefly Watch, now called Firefly Atlas.

Then the scientists dug up detailed information on the types of habitats, soil, weather conditions, amounts of artificial light and other factors of each observation. They were aided by artificial intelligence, remote sensing imagery and soil-type data.

Altogether, the study looked at 79 variables that could affect local firefly populations.

One hopeful finding for those living in rural areas of Pennsylvania, Maryland and Virginia is that farm fields are crucial habitat that allows large numbers of fireflies to find each other, even though potentially harmful pesticides are more likely to be present.

Insect-friendly conservation measures on the local level are important, researchers and firefly advocates say. Here are some actions they recommend.

- Keep part of your property unmowed or even grass-free. Leaf litter on top of bare soil is ideal habitat for the beetles.
- Don't use pesticides.
- Turn off outdoor lights during prime firefly mating season in June and July.
- Include a diversity of trees, shrubs and plants to provide cover and shade.
- Add a water feature.

To see fireflies fade to black would be a terrible blow to the country's collective consciousness, said Aaron Haines, a professor of biology at Millersville University.

"To lose them," he said, "would be to lose part of our identity." ■

Marine heat waves create habitat squeeze, research shows

VIMS scientists examine patterns, impacts of unusually warm water in Chesapeake

By Lauren Hines-Acosta

Unlike humans, who usually experience heat waves only in the summer, marine life can find itself in hot water, or marine heat waves, throughout the year. While the topic is well-researched in the world's oceans, little is known at a smaller scale.

The Virginia Institute of Marine Science wrangled 35 years of data to release the first study that analyzes marine heat waves below the first meter of water in an estuary, especially in the Chesapeake Bay. The study found that marine heat waves have seasonal patterns, which could lead to a habitat squeeze for fish and disrupt blue crab migration patterns.

"The only reason that we are able to do [that kind of study] is because of all of the monitoring programs in the Chesapeake Bay," said Nathan Shunk, who is the lead author of the study. "Everybody really cares about the health of the Bay."

Marine heat waves occur when water temperatures are warmer than 90% of previous observations for a particular location and time of year. They last 11 days on average in the Bay and can happen throughout the year. Wind, warm water from rivers, ocean currents and a warming atmosphere are all factors that cause this phenomenon.

According to the National Oceanic and Atmospheric Association, the world's oceans absorb 90% of the excess heat associated with global warming. In turn, marine heat waves are becoming warmer.

However, scientists in the field emphasize that marine heat waves are not so frequent and intense that oceans will be caught in a perpetual heat wave. Instead, a warming planet calls for a new definition of "normal conditions" and new thresholds that define heat waves.

"In reality, the impacts associated with global warming, which is a slowly evolving warming of the ocean, are going to be different than the impacts associated with short duration, high-intensity episodic events like marine heat waves," said Dillon Amaya, research scientist at the NOAA Physical Sciences Laboratory.

Certain studies, like the VIMS research, use a shifting baseline that accounts for ocean warming. That way, marine heat waves remain defined as exceptional and brief events.

A study from the Virginia Institute of Marine Science shows that blue crabs might change their migration patterns as water temperature increases before and after marine heat waves. (Will Parson/Chesapeake Bay Program)

The study found that the heat waves in the Bay show seasonal patterns. During the fall and winter, the phenomenon occurs throughout the water's layers. Increased temperature means there's less oxygen in the water. The study showed that the biggest decrease in dissolved oxygen took place in the winter and early spring.

"It would probably be more like going to a higher elevation," Shunk said. "There's less oxygen in the water, but it's nowhere near lethal levels."

During spring and summer, the water density was different throughout the Bay's layers, meaning heat waves only occurred near the surface at a depth of 5–10 meters. Flows from freshwater in rivers that merge into the Bay reach their peak in spring. Heavier saltwater falls to the bottom as lighter freshwater sits on top, trapping the heat because it can't sink to deeper levels.

The change in dissolved oxygen from the heat waves wasn't as large in spring and summer as it was in fall and winter. But dissolved oxygen levels are already low in the summer because of hypoxic areas or "dead zones," where the oxygen is depleted by decaying algae blooms.

"That's because, on the edges of the border of the hypoxic region, the dissolved oxygen is so low that just small changes kind of push it into levels that are potentially lethal for fishes and whatnot," Shunk said.

With the heat trapped at the top water layer, fish must swim lower. But hypoxic zones near the bottom limit where fish can escape.

Aquatic species are affected by marine heat waves differently. Some can easily recover from short periods of intense heat but die from constant heat exposure. Others can adapt to slowly increasing temperatures but die from heat shock. Some organisms move to a different area, while others can't.

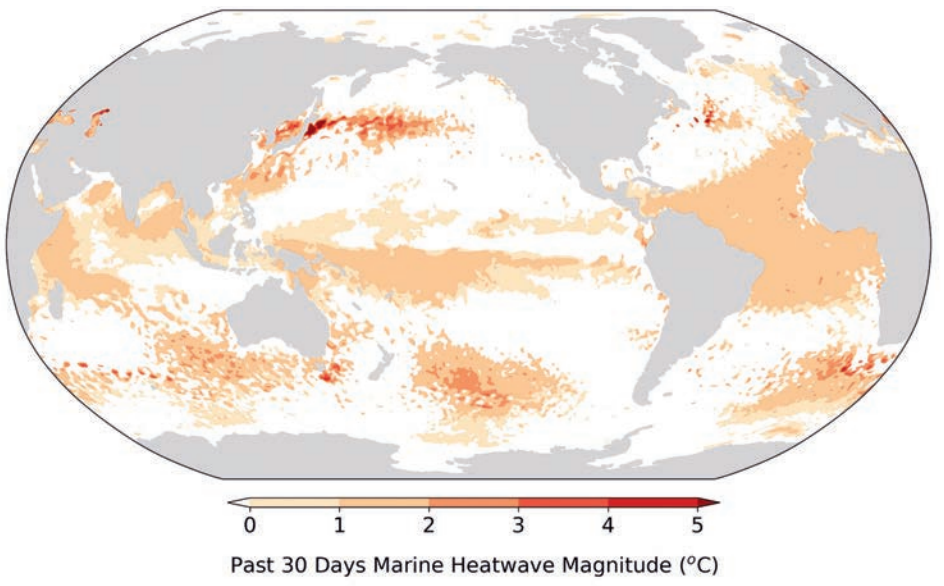
The study suggests that marine heat waves could change the migration patterns of blue crabs. Rom Lipcius, professor of marine science at VIMS, said blue crabs have naturally evolved to thrive in warm temperatures as a tropical marine species. But he also said that timing is everything. He has seen blue crabs' reproduction season start earlier when the water gets warmer, and marine heat waves could be a mechanism pushing that.

Female blue crabs in the Bay molt and mate starting in spring. Then, in late summer and fall, they migrate south to hatch their eggs near the mouth of the Bay. Lipcius pointed out that factors associated with heat waves, like hypoxic zones, could push blue crabs to the shallows or delay females from returning south to hatch their eggs. This could mean fewer crabs to harvest.

Heat waves can also be fatal to crabs that get caught in crab pots and can't escape to cooler water. If crabbers knew when a marine heat wave was coming, they could put traps in the shallows or temporarily stop operations to avoid harvesting dead crabs.

"If you want to predict what's going to happen, you have to have a very good understanding of the mechanisms in which [marine heat waves] are generated and their behavior in the ocean, or estuary in our case," said Assistant Professor Piero Mazzini, who supervised the study.

Shunk and Mazzini hope future studies look at what specifically triggers marine heat waves in the Bay and compare marine heat waves in different estuaries. ■



This map shows the magnitude of marine heat waves in the world's oceans over a 30-day period from April 9 to May 8, 2024. (National Oceanic Atmospheric Administration)

She caught the EPA by the ear, and officials listened

PA teen leads successful push for national youth advisory council

By Jeremy Cox

Editor's note: This interview is the sixth in a series highlighting professionals at work in the Chesapeake Bay arena. Listen to the full interviews in our Chesapeake Uncharted podcast.

Young people just don't care about the environment. They don't pay attention to what's going on around them. They'd rather be playing video games.

That's what Grace Ziegmont has heard adults say over and over again. She passionately disagrees.

"If you take the time and are willing to listen to youth voices, you'll find that's not the case," said Ziegmont, a 16-year-old with a growing resume of environmental advocacy. "It's just a lack of opportunity oftentimes."

Ziegmont lives in suburban Pennsylvania, not far from Harrisburg. And, yes, she's into nature. One of the highlights of her young life, as she tells it, was getting to see Atlantic puffins during a trip to Maine last summer. She enjoys archery, air pistol shooting and other outdoor pursuits.

She isn't afraid of a little work, though. Ziegmont is a state project ambassador for the Pennsylvania chapter of 4-H, the venerable youth organization that emphasizes experiential learning in the outdoors. She serves as the president of the Governor's Youth Council for Hunting, Fishing and Conservation.

What's more, she was instrumental last year in persuading leaders with the U.S. Environmental Protection Agency to create the agency's first National Environmental Youth Advisory Council.

The *Bay Journal* spoke to her about what inspires her advocacy and how she thinks adults can better engage Generations Z and Alpha on the environment. This interview has been edited for length and clarity.

Question: Can you tell us what you do as a 4-H state project ambassador?

Answer: State project ambassadors get professional development throughout the year. We have our monthly meetings, and we also provide youth feedback on the 4-H's programs — how we think it looks from a participant standpoint, how we think it can improve. And we also get to connect with people across the state so that we get to learn more about project areas that we're all passionate about.

Grace Ziegmont, a 16-year-old environmental activist from York County, PA, wants young people to have more say over society's environmental decisions. (Ad Crable)

Q: What is your favorite thing that you've done with 4-H?

A: My favorite activity, by far, was the national conference. You have 24 hours to work with other people your age to come up with a proposal to whatever government agency you're assigned. I was assigned to the Council on Environmental Quality within the Executive Office of the President. What we presented was a youth council under the EPA that would give feedback and advice, especially from college students who are currently researching these types of things. We got to go to the White House and present on it. It was accepted, and the first council started in October, which is super exciting to see.

Q: Why did your team settle on that as your idea?

A: All 20 of us had some sort of experience with leadership in 4-H. One thing we all agreed on was that our feedback has been beneficial, at least slightly, in our programs. So, we were like, this isn't really a thing that's in our government. There's never been a National Youth Council [within EPA].

Q: What does it mean to you that the EPA ran with your idea and created the council?

A: It's incredible. We were a group of 16– to 18-year-olds. We weren't confident that our idea was going to be taken seriously, especially in federal government. The people we were presenting to have been doing this longer than we've been alive. But seeing that they were so interested in our feedback was really empowering.

Q: While you're not a member of the council, what is the main issue you'd like to see them take on?

A: This all happened around the time that the train derailed in [Palestine, OH]. So, in that case, they could have given feedback on how we best think it could be cleaned up. Youth have a different standpoint — especially diverse youth from underserved communities — than a lot of these people and have ideas that might not have been even considered before.

Q: What do you think the Chesapeake Bay cleanup effort should focus on in the future?

A: I think one thing that's very important is diversity, equity and inclusion. A lot of groups are predominantly white, predominantly male. Especially as an autistic person, it can be harder to get these opportunities. If people hear I'm autistic, they might take me a little bit less seriously or make me prove myself, which shouldn't be the case. It should be an open playing field for anyone, regardless of your skin tone, or if you're disabled.

Q: How does being autistic impact you, if I may ask?

A: I'm very open about the fact that I'm autistic. There's a stigma to it, which I don't always like. The biggest thing for me is I struggle with communication quite often and getting my point across.

But people, especially in the environmental circles that I'm in, are starting to become more open-minded. I might not come out and say, like, 'I'm autistic,' right off the bat. I might wait a little bit and see, so that you get to know me. It shouldn't really be a deciding factor of whether or not I can do things. I don't need you deciding for me.

Q: Does being in nature help you?

A: Yeah, just being in nature, in general. Fluorescent lighting [gives off a ringing sound], and it drives me crazy. There's not going to be fluorescent lighting out on a hiking trail. So, it is very relaxing. There's not all the stimulation that comes especially from an urban community.

Q: What's next for you?

A: I don't know. I'd like to go to Penn State DuBois for wildlife technology. I've been kind of looking more into political science majors a little bit more recently.

Listen to the full interview at bayjournal.com/podcasts.

CHESAPEAKE CHALLENGE

— Kathleen A. Gaskell

Turtles are terrific!

A

B

C

The northern diamondback terrapin is thought to be the world's only turtle to live exclusively in brackish estuaries, salt marshes and tidal creeks. Learn more about these amazing reptiles by taking this quiz. Answers are on page 36.

1. What is the range of the northern diamondback terrapin?
A. Cape Cod, MA, to Cape Hatteras, NC
B. Delaware Bay, DE, to Virginia Beach, VA
C. Penobscot Bay, ME, to Albemarle Sound, NC

2. The word *terrapin* is derived from the Algonquin word *torope,* which is thought to mean:
A. Bay turtle
B. Edible turtle
C. Salty turtle

3. Male northern diamondback terrapins weigh, on average, 0.5 pounds and are 4–5.5 inches long. How large are females, on average?
A. 0.25 pounds, 3–3 inches long
B. 1.5 pounds, 6–9 inches long
C. Roughly the same as males

4. Terrapins were once so plentiful that they were fed to:
A. Chickens & pigs
B. Enslaved people on plantations
C. Troops at Valley Forge
D. All of the above

5. Hunted almost to extinction for their meat, northern diamondback terrapins are now protected from harvesting in most of their range. Which of these continues to threaten them?
A. Shorefront development and bulkheads, which destroy the beaches where they lay eggs
B. Crab pots, which trap and drown them
C. Both

6. Terrapins must drink freshwater to survive. How do they accomplish this?
A. They are able to skim fresh rainwater atop saltwater before the two mix.
B. They lift their heads out of the water to capture rainwater in their mouths as it falls.
C. Both

7. What do terrapins eat?
A. Underwater grasses
B. Fish, snails, clams, mussels
C. All of the above

8. What can the scutes (bony plates) on the terrapin's carapace (top part of shell) tell you?
A. Its age
B. Its sex
C. Both

Title image: *Box turtle. (Dave Harp)*

A *A diamondback terrapin hatchling. (Dave Harp)*

B *An adult diamondback terrapin. (Dave Harp)*

C *A pair of eastern painted turtles. (Dave Harp)*

D *An eastern box turtle. (Dave Harp)*

E *A snapping turtle hatchling. (Michele Danoff)*

D

Turtle tidbits

See you later, alligator: Turtles, which date back more than 200 million years, are one of the oldest reptile groups on Earth. They showed up before snakes and crocodilians and even survived the meteor hit that caused the mass extinction of most dinosaurs.

Homegrown: A turtle's shell is made up of more than 50 bones and grows along with the animal. It isn't just the turtle's "home" — it's part of the skeleton. So, contrary to cartoon depictions, a turtle is unable to leave its shell.

Nowhere to hide: Sea turtles are unable retract their flippers and head into their shells like other turtles.

Look ma, no teeth: A turtle rips its food apart using its beaklike mouth. This beak is made of keratin, the same substance as human fingernails.

Hot chicks & cool dudes: In most turtle species, incubation temperatures determine the sex of hatchlings. Eggs kept at comparatively warm temperatures become females. Cooler temperatures produce males.

Don't waste your breath! Turtles breathe oxygen and can hold their breath for long periods of time. But they must come up for air, and they can drown if trapped underwater too long.

E

Top photo: Bruce Clopein of Friends of Patapsco Valley State Park paddles his kayak on the Patapsco River near Daniels Dam in Maryland. (Jeremy Cox)

Inset photo: A hiking trail on the Howard County side of the Patapsco provides postcard-ready views of the shallow waterway near Daniels Dam. (Jeremy Cox)

Glide past history and nature at MD's oldest state park

By Jeremy Cox

Few natural areas in the Mid-Atlantic region contrast as sharply with their surroundings as Patapsco Valley State Park, especially around Daniels Dam.

The water was glassy calm. We didn't know it at the time, but on this segment of the Patapsco, these still-water days may be numbered. (More on that later.)

"You wouldn't know you were in the middle of all this development," said Bruce Clopein, effortlessly advancing a kayak along the park's namesake river. "Having grown up in Ellicott City, I can tell you there are more people all the time."

The Patapsco River serves as the boundary between Howard and Baltimore counties in Maryland. Since 2000, the number of people living in the two counties has surged by nearly one-fifth, raising the combined population to about 1.2 million residents.

Lurking just beyond the Daniels Dam area, the landscape is largely given over to house-lined cul-de-sacs, sprawling churches, scattered businesses and other suburban trappings. From all outward appearances, it's a pleasant place to put down roots — unless you're a tree.

The dam is perched along the river about 17 miles west of Baltimore, where the waterway spills into the Chesapeake Bay in a flourish of concrete, towering gantry cranes and globe-trotting cargo ships. (One of those ships, the *Dali*, thrust the Patapsco into the center of a national nightmare when it struck the Francis Scott Key Bridge on March 26, destroying most of the span and killing six construction workers.)

The balance of the Patapsco's mainstem, including in the vicinity of Daniels Dam, doesn't seem to have changed much from its natural state. The relatively narrow stream has scoured a gorge up to 200 feet deep beneath the surrounding terrain. Down in the cool valley, in the shade of an oak or hickory tree, the city feels far away, even if it's not.

On a picture-perfect spring morning, I paddled a few miles upstream and back, starting from the dam. Clopein was my cheerful guide. He's the president of the park's "friends" group and leads the nonprofit's efforts to host outdoors events for people with disabilities.

We took it slow, matching the river's own tranquil pace. The water owes its sluggishness to the presence of the 27-foot-tall Daniels Dam, which was built in the early 1800s to power nearby textile mills.

Here, you are enveloped by nature and history. The clutch of manufacturing facilities gave rise to a bustling mill town called Daniels, home to

The water is fast below Daniels Dam on the Patapsco River. Upstream, the river is placid and easily paddled. (Rachel Pierson)

dozens of families. One of mills in the area fashioned canvas tents for the Union Army.

But the last of the mills shuttered in 1968. Much of the fading community was destroyed by Tropical Storm Agnes' floodwaters four years later. Today, little remains of Daniels besides ruins slowly being reclaimed by nature.

The area's industrial legacy provides a boon to paddlers in search of an easy day on the water. The Patapsco rises from two separate branches that fuse together near Marriottsville, about 6 miles above the dam. For much of its length, the river runs briskly. There are even some Class II rapids.

Daniels Dam, though, creates about 2 miles of slack water upstream from its location, affording a calm experience. Of course there are times when things are not so calm. The Patapsco's floodplain is clotted with downed tree trunks, evidence that this normally serene stretch of river isn't always so.

On this day, however, Clopein and I had little trouble making our way against the gentle current. The only difficulty was to avoid running aground in the shallows. But the Patapsco doesn't get much more than 5 feet deep here, and the water column was remarkably clear on this day. So, we could see straight down to the silty bottom and generally avoid the places where the water was too skinny.

Still, it's a good idea to check online water gauges before setting out on a kayaking trip, Clopein told me, to make sure enough water is flowing.

Patapsco Valley State Park is the oldest in Maryland's inventory, dating back to 1907. And it's the state's largest, protecting 16,000 acres of nature along 32 miles of the river's twists and turns through four counties. Because of its proximity to several

The Patapsco bends on its course toward Daniels Dam near Ellicott City, MD. The area is a popular spot for swimming, hiking and fly fishing. (Jeremy Cox)

urban centers, the park is among the state's most popular, hosting more than 2.5 million visitors annually.

The Daniels area is one of eight developed access points managed by the Maryland Park Service along the river. Visitation more than doubled throughout the entire park during the Covid-19 pandemic and shows little sign of abating. It's all too common for park rangers to have to turn away incoming guests because one access point or more has reached capacity. That's especially the case on an inviting summer weekend.

There are only two small parking lots at the Daniels area, both extending just one row deep. So, unfortunately, it is typically among the first areas to close on such days. Clopein's advice: Try to visit on weekdays or, if the weekend is your only availability, arrive early in the morning or late in the afternoon.

Our visit took place on a Monday, so there was plenty of parking when we arrived.

"We wouldn't have been able to find a spot on the weekend," Clopein said as we took our first few strokes away from what the internet described as a "soft launch" but was actually just a shallow-angled spit of gravel. He added, "That's the challenge of the Patapsco. People love the park."

It's not hard to see why the Daniels area attracts so many people. As we inched our way upstream, we were engulfed in a panorama of trees and rocky bluffs. Dogwood trees flowered whitely. Eastern redbuds bloomed pinkly.

The only encroaching sounds from civilization belonged to the occasional jet overhead and the conversations floating over to us from a few hikers. Much more prevalent were the squeaks and calls of birds, such as cardinals, red-winged blackbirds and red-bellied woodpeckers.

The National Audubon Society has designated the Patapsco Valley an "Important Bird Area." The eBird website, which collects local bird-spotting reports, lists more than 170 entries from the Daniels area, including great blue herons, belted kingfishers, ospreys, bald eagles, Eastern bluebirds and Baltimore orioles.

Ironically, the state park owes its existence, in part, to humanity's attempts to restrain the river. Sure, the Patapsco Valley's benefactors in the early 1900s were moved by a desire to safeguard the acreage for the enjoyment of Baltimore's urban dwellers — and for nature's sake. But they also hoped that by shielding the steep landscape from agricultural tillage and development pressure, they could prevent sediment from building up behind the newly constructed Bloede Dam and its underwater hydroelectric facility.

The preservation efforts didn't work out so well for the Bloede Dam, which by 1927 was forced to shut down due to frequent clogging. But it worked out extraordinarily well for visitors like Clopein and me.

In 2018, authorities finally blew up the Bloede Dam, leaving the older Daniels Dam, 8 miles upstream, as the last major barrier along the Patapsco's mainstem.

And the Daniels Dam might not be around much longer either. News broke a few weeks after my paddling trip that the National Oceanic and Atmospheric Administration is awarding $1.8 million to the conservation group American Rivers to conduct the design and permitting for a project to remove that dam as well.

Doing so would open 30 miles of habitat to river herring and American eels, proponents say. But it would also very likely change the face of recreation along this section of the Patapsco. In the future, easy-peasy paddlers like me might have to look elsewhere for calm waters.

Today, there are few traces of civilization visible along the stretch of the Patapsco above Daniels Dam. Perhaps the most significant example involves the railroad tracks on the Baltimore County side of the river.

When you've returned to shore, you may also wish to try out some of the Daniels area's other recreational offerings. The Old Main Line Trail, which follows the former B&O railbed, flanks the river on the Howard County side of the waterway. Cyclists and hikers alike travel the trail's mixture of flat and steep terrain.

I walked a bit of the trail and was immediately charmed. Heading away from the parking lot on the right side, trees lean out over the river. On the left, rocky outcroppings beckon you to stop and contemplate the semi-hidden greenery in their rough folds. It's almost enough to make you want to trade in your paddle for some hiking boots. Almost. ■

IF YOU GO

Visiting the Daniels area at Patapsco Valley State Park

The Daniels area is located on the Howard County side of the river at 2090 Daniels Road, Ellicott City, MD.

Parking is limited to two small roadside lots.

A small canoe/kayak soft launch is available at the first parking area, just above Daniels Dam. Direct your craft upstream to the left. Heading off to the right will take you toward the dam and potential calamity.

The dam creates about 2 miles of slack water upstream that is easy for novice paddlers to negotiate.

Photo above: A kayak glides along the glassy surface of the Patapsco River near Ellicott City, MD. The Daniels Dam creates 2 miles of relatively slow, flat water in the area. (Jeremy Cox)

A Baltimore farewell — good-bye for now to the 'unsung' city

By Jake Solyst

By the time this article is published I'll have moved from Baltimore to Charlottesville, VA, a good 150 miles from the city I've lived in for 10 years, and from the waterfronts, seafood restaurants and maritime culture I've come to adore.

This move has me feeling pretty nostalgic, especially since the theme of this year's Chesapeake Bay Awareness Week (June 1–9) is "Unsung Heroes of the Chesapeake." So it seems like the right time to do a bit of my own singing about my home for the past several years.

When people talk about Baltimore, adjectives like "underdog" and "scrappy" are often attached. But there's one attribute of the city that I think is particularly undervalued, and that's our identity as a waterfront city.

From the lively boating life and dock bars along Bear Creek and the waterfront shops on Thames Street in Fells Point to the local seafood spots up north where the rivers run under highways and light rails, Baltimore has all the attributes of an iconic waterfront city. And in my opinion, the city will only benefit from deepening that connection to the water.

A twilight view of Baltimore's Inner Harbor includes the National Aquarium in the foreground, with the USS Torsk, a World War II submarine, docked alongside. (Sam Amil/CC BY 2.0)

First and foremost is the city's seafood. Since I've lived in Baltimore, I've seen an explosion of local seafood spots that get the majority of their products from the Chesapeake Bay and its tributaries. Dylan's Oyster Cellar, True Chesapeake and Urban Oyster are a few that come to mind, all of which are north of the Inner Harbor along Jones Falls, a 17.9-mile tributary that starts in Baltimore County.

Beyond these newer spots are the blue crab-serving mainstays like L.P. Steamers, Nick's Fish House, Rusty Scupper and Captain James. Head to Rusty Scupper or Captain James if you're looking for something downtown on the water; L.P. Steamers if you want to be nestled among the classic Baltimore-style rowhomes of Locust Point; or Nick's Fish House to see the crowded docks at the foot of the Hanover Street Bridge across the Middle Branch of the Patapsco River.

To burn off all that seafood, you can take advantage of Baltimore's growing waterfront recreation. The Canton Kayak Club, despite being named for a waterfront neighborhood east of the Inner Harbor, offers access to kayaks as far afield as the Conowingo Dam, some 30 miles northwest of the city. The club offers guided tours that will introduce you to places you had no idea were so close to Baltimore. (Hello, Hart Miller Island.)

In the not-too-distant future, there may be a whole network of kayak launches, water trails and historic sites along the Baltimore Blue Way, an ambitious project of the Baltimore Waterfront Partnership. This same organization puts on the annual Baltimore Flotilla in which hundreds of kayakers take over the Inner Harbor.

If you don't have your own boat or kayak, you can get on the water by way of water taxi — or rent one of the Living Classroom Foundation's four-passenger "Chessie" paddle boats or six-passenger electric "pirate ships." There's also the larger pirate ship experience from Urban Pirates, which offers kid-oriented cruises, birthday cruises and, for the grownups, evening BYOG (bring your own grog) booze cruises.

For something educational, Historic Ships in Baltimore offers tours of the U.S.S. *Constellation*, a Civil War era sloop-of-war; the U.S.S. *Torsk*, a World War II submarine; the U.S. Coast Guard Cutter 37, a Pearl Harbor survivor; and the lightship *Chesapeake*.

Living Classrooms operates a schooner, skipjack and buyboat that you can usually find docked outside the Frederick Isaac Douglass Maritime Park in Fells Point. Every December, local boaters take part in the Baltimore Lighted Boat Parade in Fells Point, where they show off creative designs and blast holiday music.

If you're interested in getting near the water but not on the water, there are several great parks to choose from. Fort McHenry, where Francis Scott Key wrote the *Star-Spangled Banner,* has an amazing view of the water and a preserved fort to explore. Canton Waterfront Park is a nice place to picnic and study the massive cargo ships across the water. For more seclusion — and top-notch birding — head to Masonville Cove, an urban wildlife refuge right off Interstate 895.

While these attractions make Baltimore a premier waterfront destination in the present, even more lies on the horizon.

The National Aquarium is in the process of building a 2.3-acre floating "Harbor Wetland" that will have bridges and viewing platforms within it. Proposed redevelopment in the Inner Harbor is expected to include more greenspace and tree canopy around the water.

To the southwest, across the peninsula that holds Federal Hill, South Baltimore and Locust Point, a community-led effort called Reimagine Middle Branch seeks to enhance the waterfront with parks, walking and biking trails, boat launches, boardwalks and, most importantly, wetland habitats.

When it comes to the actual health of the water in the harbor, environmental groups working under the Healthy Harbor Initiative say that bacteria levels are frequently low enough for safe swimming. This has come from a decade of restoration work that included upgrades to sewage lines, wastewater treatment plants and the city's green infrastructure.

With all of these projects in Baltimore's future, my departure from the city is even more bittersweet. I hope that with each return visit, I'll see the town taking more steps to being a swimmable and fishable destination, a true treasure of the Chesapeake Bay watershed. No longer unsung but sung the world over. ■

Jake Solyst is the Chesapeake Bay Program web content manager with the Alliance for the Chesapeake Bay.

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Menhaden science? No thanks, says VA, we'd rather not know

By Tom Horton

Turns out Virginia can be as irresponsible as Maryland in managing the Chesapeake Bay.

Eight years ago marked a low point in Bay fisheries management as the Maryland Department of Natural Resources, in the sway of Republican Gov. Larry Hogan, fought to avoid doing a critical study to see whether oysters were being overfished. You cannot manage species — DNR's legal mandate — if you don't know how many are there, any more than you can manage your money if you don't know how much you have.

By April of 2016 it had been around 130 years since scientists made a good cut at counting oysters. DNR didn't want to count because oystermen didn't want it to. Everyone knew there was a good chance it would point to some overfishing.

Ultimately, legislation requiring an oyster "stock assessment" passed the Democratic General Assembly. It turned out there was overfishing, but not everywhere; and I'd argue that eight years later Maryland's oystermen are doing okay and have forged working relationships with scientists and environmental groups.

Now, move south to Virginia, and shift from oysters to menhaden, an oily little fish that filters plankton from the water. It translates plant life into flesh for predators higher in the food web, from migrating loons and nesting ospreys to striped bass.

"All fish in the Bay are just menhaden in other form," wrote William K. Brooks, a Johns Hopkins scientist in the 1800s, extolling the abundance and importance of *Brevoortia tyrannus*.

Atlantic menhaden travel in large schools in the spring, summer and fall in the Chesapeake Bay, feeding primarily on phytoplankton and zooplankton. (National Oceanic and Atmospheric Administration)

Striped bass are in trouble these days, not reproducing well, prompting controversial new catch limits on anglers for whom they are fine eating and great sport, and who themselves are the economic lifeblood of the charter boat industry.

Throughout Maryland and Virginia there is a hue and cry, and legal actions, all insisting the problem is overfishing of that very important striped bass chow, the menhaden.

An inviting culprit for the overfishing is Canadian-owned Omega Protein in Reedville, VA, whose fleet of oceangoing vessels, aided by spotter aircraft, catches menhaden by the hundreds of millions of pounds annually.

Employing "purse seines," nets that encircle massive menhaden schools, their boats fish the Virginia Chesapeake and along the ocean coasts to supply the Reedville plant. Maryland bans such fishing.

Omega pulverizes menhaden into animal food products, oils and, to a lesser extent, the company says, feed for the farmed salmon of its Canadian parent company, Cooke, Inc.

The solution may seem obvious: Restrict politically powerful Omega, which has given $215,000 to Virginia legislators in the last three years.

But it is not obvious, because Virginia has never done the science to understand menhaden abundance in the Chesapeake, just as Maryland had not with oysters.

"They could be overfished," says Rob Latour, a leading fisheries ecologist with the Virginia Institute of Marine Science. "But the fact is we don't know."

Some complicating factors emerged from my conversation with Latour — factors that striped bass advocates sometimes overlook.

Menhaden as a whole, meaning the Atlantic coastal population, are clearly healthy, even as menhaden in the Bay appear to be down.

Long-term VIMS studies are indicating that at least seven other once-common fish species, like spot, croaker and flounder, seem to be avoiding the Chesapeake in recent years, even though their overall numbers are healthy.

One possible explanation for lower menhaden numbers in the Bay — an extrapolation, actually, because the studies don't involve menhaden — is warmer water, driven by climate change. When in the Bay, menhaden do gravitate toward the coolest portions.

And while menhaden are a very important food source for striped bass, perhaps even more important is a tiny species called the Bay anchovy, which is not harvested by humans and is abundant.

To remedy the knowledge gap, Latour and others — including Omega Protein, the Chesapeake Bay Foundation and Maryland scientists — held a workshop in 2023. They emerged with a proposal for a three-year, $2.7 million study that, Latour says, "won't put all concerns to rest, but would lead to an unparalleled advance in understanding what's going on with menhaden in the Chesapeake."

It was put forward in this year's Virginia legislature as HB 19. Latour was particularly excited by a representative of Omega, who he said pledged that if the bill passed, the company would give scientists access to its private catch data, a treasure for anyone who wants a good "count" of menhaden.

But when the bill came up for its first test this winter, it was summarily dismissed by the House Rules Committee. According to Virginia newspaper reports, the only reason given by the committee's chairman, Democrat Luke Dorian of Prince William County, was: "I did what I was told to do."

And so we remain awash in ignorance. For example, in April a petition from the nonprofit Chesapeake Legal Alliance to restrict menhaden fishing was denied by Virginia's Marine Resources Commission with this pitiable statement:

"We don't know if [the current cap on menhaden harvests] should be significantly lowered, increased or exist at all."

But the three-year study has to happen, says Latour, "or we're stuck where we are."

Ben Landry, a spokesman for Ocean Harvesters, which operates Omega's fishing fleet, said Omega was officially neutral on HB 19 and denied rumors that the company killed it behind the scenes.

"We generally agree that there's science that needs to be done on menhaden in the Chesapeake," Landry said. But he declined to endorse the study, even while saying "we have enormous respect for Rob Latour," who would lead it.

The bill will come up again in 2025, and here's one thought: It could be very much in Maryland's interest to go down to Richmond and offer to fund a study, to do the science if Virginia will not. ■

Tom Horton has written about the Chesapeake Bay for more than 40 years, including eight books. He lives in Salisbury, MD, where he is also a professor of Environmental Studies at Salisbury University.

Domestic geese head to a stream on a farm in Three Springs, PA. (Michele Danoff)

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An abandoned skiff molders in the mud among the marshes on Tangier Island, VA. (Michele Danoff)

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In shallows that even a kayak can't navigate, a paddler walks his boat toward deeper water on Raccoon Creek, a tributary of Maryland's Choptank River. (Dave Harp)

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Horseshoe crabs mate along the shore of the South River in Maryland. (Michele Danoff)

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Yes! I want to help the *Bay Journal* maintain and expand environmental reporting in the Bay region.
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The Bay Journal Fund does not share the names of its donors or their addresses with other organizations.

BULLETIN BOARD

VOLUNTEER OPPORTUNITIES

WATERSHEDWIDE

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 in these areas:
- *Sentinels:* Keep an eye on local waterways, provide monthly online updates. Web search "Susquehanna sentinels."
- *Water Sampling:* Web search "Susquehanna Riverkeeper Survey."
- *The Next Generation:* Many watershed organizations are aging out. Younger people are needed for stream restoration work, litter cleanups.

Individuals, families, scouts, church groups welcome. Info: middlesusquehannariverkeeper.org/watershed-opportunities.

Nixon County Park
Volunteer at Nixon Park in Jacobus. Info: 717-428-1961, NixonCountyPark@YorkCountyPA.gov.
- *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 trail improvements. Info: supportyourparks.org, select "volunteer."

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

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

VIRGINIA

Leopold's Preserve
The White House Farm Foundation has several opportunities at Leopold's Preserve in Broad Run. Register: leopoldspreserve.com/calendar. Info: whfarmfoundation.org.
- *Conservation Corps:* 8:30–11:30 am Fridays. Ages 13+ Maintain trails, restore habitat, remove invasive plants, clean up trash.
- *Trail Maintenance Workday:* 8:30–11:30 am and/or 1–3 pm May 18. Ages 13+ (ages 13–17 w/adult).

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.

Become a water quality monitor
Volunteer with the Izaak Walton League or train online to become a certified *Save Our Streams* water quality monitor. Follow up with field practicals, then adopt a site of your choice in Prince William County. Info: Rebecca Shoer at rshoer@iwla.org, 978-578-5238. Web search "water quality va IWLA."
- *Stream Selfies:* Collect trash data, take photos of local stream.
- *Salt Watchers:* Test for excessive road salt in a stream.
- *Check the Chemistry:* Spend 30 minutes at a waterway with materials, downloadable instructions.
- *Stream Critters:* Use app to identify stream inhabitants.
- *Monitor Macros:* Become a certified *Save Our Streams* monitor. Learn to ID aquatic macroinvertebrates, assess habitat, report findings, take action to improve water quality.

Pond cleanup programs
Join a Prince William Soil & Water Conservation District *One-Time Pond Cleanup* in fall or spring. Kayaks needed. Info: waterquality@pwswcd.org.

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

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

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

MARYLAND

Eastern Neck refuge
Volunteer with Friends of Eastern Neck Wildlife Refuge in Rock Hall:
- *Visitor Contact Station & Gift Shop/Bookstore:* Answer questions, handle sales.
- *Butterfly Garden:* Pairs of volunteers are assigned one of the plots to plant, weed, maintain spring through fall.
- *Outreach:* Staff information booth at community events. Info: Contact page at friendsofeasternneck.org.

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.

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

Chesapeake Biological Laboratory
Help the Chesapeake Biological Laboratory's Visitor Center on Solomons Island. Volunteers, ages 16+, must commit to at least two 3– to 4-hour shifts each month in spring, summer, fall. Training required. Info: brzezins@umces.edu.

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

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

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

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

National Wildlife Refuge at Patuxent
Opportunities at the National Wildlife Refuge at Patuxent near Laurel include:
- *Wildlife Images Bookstore & Nature Shop:* Work a few hours a week, a half day or all day 10 am–4 pm Saturdays; 11 am–4 pm Tuesdays–Fridays. Help Friends of Patuxent run register, assist customers.

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.
July-August issue: June 11
September issue: August 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. A
2. B
3. B
4. D
5. C
6. C
7. B
8. A

Ages 18+ (17 & younger w/parent). Visit the shop in National Wildlife Visitor Center, ask for Ann; email wibookstore@friendsofpatuxent.org.
■ *Kids' Discovery Center:* Help to develop curriculum activities or become a docent. Info: Barrie at 301-497-5772.

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

St. Mary's County museums
St. Mary's County Museum Division needs adults to help with student/group tours, special events, museum store operations at St. Clement's Island Museum or Piney Point Lighthouse Museum & Historic Park. Info: St. Clement's Island Museum, 301-769-2222. Piney Point Lighthouse Museum & Historic Park, 301-994-1471.

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

EVENTS / PROGRAMS

VIRGINIA

Let's Go Adventures series
Virginia State Park *Let's Go Adventures* series teaches the skills to participate in a range of outdoor activities. Learn the basics of each activity, how to select & use proper equipment, Leave No Trace Principles, park etiquette, safety guidelines. Activities include camping, kayaking, hiking, fly-fishing, orienteering and archery. Except for kayaking, events are free w/park admission fee. Space is limited. To register/learn about upcoming adventures: virginiastateparks.gov/lets-go-adventures.
■ *Let's Go Kayaking:* Pocahontas State Park, Chesterfield. 4–8 pm June 20 & July 10. Ages 10+ $15. Preregistration required.
■ *Let's Go Camping:* Sky Meadows State Park, Delaplane. 5–6 pm June 22.
■ *Let's Go Hiking:* Sky Meadows State Park, Delaplane. 9–11 am June 23.
■ *Let's Go Hiking:* Mason Neck State Park, Lorton. 10–12 pm June 26.
■ *Let's Go Camping:* Mason Neck State Park, Lorton. 1–2:30 pm June 26.
■ *Let's Go on an Archery Adventure:* Mason Neck State Park, Lorton. 10 am–12 pm & 1–3 pm June 27. Ages 10+ Preregistration required.

MARYLAND

CBMM Museum Master Camp
The Chesapeake Maritime Museum invites students entering grades 4–6 to *Museum Master Camp* 9 am–4 pm June 24–28. Participants go behind the scenes to learn about exhibits, then help create one. $375. Web search "CBMM museum camp."

Master Gardener clinic
Celebrate *National Pollinator Week* with the Queen Anne's County Master Gardeners 9 am–12 pm June 22 at Lowe's Bayshore Nursery in Stevensville. Ask questions and get tips on helping gardens flourish, troubleshooting tricky situations, creating the perfect garden for your space. Info: facebook.com/QueenAnnesCountyMasterGardeners or Rachel Rhodes at 410-758-0166, rjrhodes@umd.edu at least two weeks before event.

Pollinator garden tour
The Lower Shore Land Trust *4th Annual Pollinator Garden Tour* takes place 8:30 am–5:30 pm June 21 & 8:30 am–2:30 pm June 22. The tour of seven native private gardens in Somerset County also features a plein air artist at each site. Some locations include a workshop or speaker. $30. Info/tickets: lower-shore-land-trust.networkforgood.com.

Preschoolers' maritime class
Annapolis Maritime Museum & Park invites preschoolers and their parents to its *Bay Buddies Class* 10–10:45 am June 17 (ask which campus the event takes place at when enrolling). Included are songs, stories, lessons on area's maritime and ecological heritage, hike. Bring water, a blanket/towel to sit on. Rain/shine; dress appropriately. If severe weather cancels class, registrants receive an email the morning of. Class is designed for preschoolers, but siblings are welcome. Family: $10 (cash/card only). Info: amaritime.org/events.

Patuxent Research Refuge
Patuxent Research Refuge offers free public programs on its North Tract [N] and South Tract [S] units in Laurel. No preregistration except where noted. List special accommodation needs when registering: 301-497-5887. Info: 301-497-5772, www.fws.gov/refuge/patuxent-research/visit-us.
■ *Kids' Discovery Center:* 9 am–12 pm (35-minute time slots, on hour) Tuesdays-Saturdays [S]. Ages 3-10 w/adult. Nature exploration; free booklet. June: *Salamanders*; July: *Ospreys, Herons, Egrets*. Group arrangements possible. Registration strongly urged: 301-497-5760 (This number is only for this program.)
■ *Family Fun/Color in Nature:* 9 am–4:30 pm, Tuesdays–Saturdays. Drop-in/independent exploration. Staffed, 10 am-1 pm June 28, 29 [S]. All ages. Hands-on activities, games, crafts.
■ *Hollingsworth Art Gallery:* 9 am–4:30 pm, Tuesdays–Saturdays [S]. All ages. June: Bird paintings by Laura Wolf.
■ *How to Help & Attract Pollinators:* 2–3 pm, June 22 [S]. All ages. Learn how to invite pollinators to your property. Receive a free native plant; visit on-site pollinator garden. Registration required.
■ *Crisis in the Chesapeake Bay - Ospreys in Peril:* This Friends of Patuxent Program takes place 1:30–3:30 pm, June 22 [S]. Bryan Watts, director of the Center for Conservation Biology at William and Mary will present his research on Mobjack Bay, VA, where ospreys are producing only a fraction of the young needed to sustain their population. David Reed of Chesapeake Legal Alliance will introduce Bill McKeever's film, *The Biggest Little Fish You've Never Seen*. Free; donations accepted. Register/info for this event: https://friendsofpatuxent.org/event-5726783. Tickets, registration required.

DNR photo contest
The Department of Natural Resources is accepting entries for its photo contest until 5 p.m. (EST) Aug. 19. It's open to state residents and visitors, but only photos (birds, insects, flora, recreation, scenic landscapes or wildlife) taken in Maryland can win. The contest is judged by season: winter, spring, summer, fall. First, second, third place winners are selected for each seasonal category. A grand prize winner is selected from that group. Winning entries will be posted online and appear in *Maryland Natural Resource* magazine and the 2025 DNR wall calendar. The grand prize winner receives $700, one-year Maryland State Park and Trail Passport, free magazine subscription and five copies of the calendar. First through third place winners also receive prizes. Social media users can choose a "fan favorite" via facebook.com/MarylandDNR. Entry fee is $10 for up to three photos; additional photos are $3 each. FAQs/rules: https://dnr.maryland.gov/Pages/photocontest.aspx.

Youth Fishing
The Department of Natural Resources is working with organizations to offer free fishing opportunities for Maryland youths, ages 3–15. Participants learn basic angling skills, ethic of environmental stewardship. Registration required. Check with contacts for cancellations or rescheduling.
Frederick County
■ *Burkittsville Town Pond:* 10 am June 15.
Sam Brown at 301-606-5479.
■ *Nailin Pond:* 10 am June 22.
John Seat at 972-922-7689.
Kent County
■ *Cypress Branch State Park:* 10 am June 16.
Erin Gale at 410-820-1668.
Montgomery County
■ *DeSimon Pond:* 9 am June 15.
Sam Hunter at 240-243-2341.
Washington County
■ *Brownsville Pond:* 8:30 am June 15.
Steve Kidwell at 240-344-0585.
■ *Pangborn:* 9 am June 15.
Bill Beard at 301-745-6444.
Worcester County
■ *South Pond:* 9 am June 15.
Lee Phillips at 443-944-1095.

Drayden Schoolhouse Open Houses
Visit the African American Schoolhouse in Drayden during one of its free open houses 11 am–2 pm May, June 15, 16 & 19 and July 6, Aug. 3 & Sept. 7. Hear stories about how students learned in this school up until the mid-1900s. School, bus/tour groups or individuals who would like to schedule a visit outside of open house hours can contact the Piney Point Lighthouse Museum at 301-994-1471. Info: Facebook.com/DraydenSchool, 301-994-1471.

FORUMS/WORKSHOPS

MARYLAND

MD Historical Trust road show
The Maryland Historical Trust is going on the road to meet potential grant applicants 11 am–1 pm July 2 at the Community Foundation of the Eastern Shore. The free workshop includes presentations on programs, technical assistance and funding opportunities. Topics may include historic preservation capital and non-capital grants; African American Heritage Preservation Program grants; Maryland Heritage Areas; Maryland historic revitalization tax credits; architectural research and survey; historic preservation easements. Boxed lunch provided. Registration: info@beachesbayswaterways.org.

RESOURCES

MARYLAND

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

VIRGINIA

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

Don’t waste yard waste. When possible, return it to nature

By Katie Gardner

Last fall, did you rake all of your leaves, pack them into giant paper bags and leave them at the curb? Did you spend hours cutting a big branch that fell in your yard into smaller pieces so it would fit in a trash can, then slowly get rid of it over a course of weeks because your trash service will only accept limited amounts of yard waste at a time? Did you clear out your gardens, then burn it all? Or, to sum all that up, are you wasting your yard waste?

According to the Pennsylvania Department of Environmental Protection, “yard trimmings, food scraps and other organics make up about 34% of municipal waste landfilled in Pennsylvania.” This has both short-term and long-term costs for taxpayers. The trucks collecting yard waste cost money and burn fossil fuel, for starters. And the more quickly we fill up our landfills, the sooner new ones need to be created.

Maybe you won’t be able to completely reduce the amount of yard debris that you send away or burn, but the good news is that there are many simple ways to reduce your yard waste footprint — which is to say your carbon footprint — by returning fallen leaves, grass clippings and garden waste to the soil in your yard.

In a forest, trees and other plants take up carbon dioxide (CO_2) from the atmosphere and nutrients from the soil and incorporate it into their branches, leaves and other parts. When a plant loses its leaves and dies, the nutrients it contains are returned to the soil via the bacteria, fungi, earthworms and insects that break it down. As the soil organisms do their work, the carbon in the plant matter eventually returns to the atmosphere in the form of CO_2.

If no new plant matter is added to the ground, organic matter gradually disappears from the soil. But if plant material is added to the soil at a faster rate than organisms can decompose it, CO_2 is sequestered from the atmosphere and stored in the ground.

A goose peers over a wattle fence, a centuries-old technique of weaving fallen or pruned tree branches through upright stakes. (Elizabeth Waddington)

Using plant waste in your yard can build up healthy, nutrient-rich soil, save lots of money on mulch and fertilizer, and reduce greenhouse gases.

So, how do you do this? Here are a few ideas.

Use fallen leaves as mulch

Instead of bagging your leaves, rake them into garden beds or under trees to use them as mulch. If they fall in the woods or other places where you don’t necessarily want turfgrass, just leave them where they fall. For thin layers of leaves on the lawn, use a mower — ideally a mulching mower — to chop them up into tiny pieces and leave them in the grass. If you have more leaves than garden space, consider building a bin to compost leaves, which can be used as mulch or a soil amendment.

Mulch is valuable because it retains soil moisture, adds organic matter, moderates seasonal fluctuations in soil temperature, prevents weed growth and reduces soil compaction. Commercial mulch can be expensive, so why not take advantage of the free mulch that your yard provides? You can find out more by visiting *Horticulture* magazine’s website, hortmag.com, and searching “fallen leaves as mulch.”

Create a Hügelkultur raised bed

Hügelkultur (pronounced hyoo-gul-kulture) is a European gardening technique that uses logs, branches, leaves, manure, grass clippings and compost in layers to create a self-sustaining garden bed. The beds retain rainwater and decompose, making them both self-watering and self-fertilizing.

You can plant hügelkultur mounds with food crops or ornamentals, or create them in a naturalized planting area in your backyard. Did a big tree fall in your yard, and you don’t know what to do with it? Try hügelkultur. For information on this technique, visit Oklahoma State University Extension’s website, extension.okstate.edu, and search “hügelkultur.”

A corral-stye leaf composting bin occupies a corner of this yard, offering an alternative to bagging leaves and sending them to a landfill. (Lomi.com)

Make a wattle fence

Wattle fences are made by weaving thin branches between upright stakes to create a lattice. Europeans began making wattle fences thousands of years ago to contain livestock and as a base in building construction.

In modern times, people also use wattle fences to fence off gardens, create windbreaks or make a privacy screen. Use the fallen branches and trimmings from your trees and bushes to continue this ancient tradition. If you’re interested in building one of these fences, search “wattle fence” on ruralsprout.org for tips.

Build a dead hedge

Similar to a wattle fence but bushier, a dead hedge is made by weaving woody materials between upright stakes. Use your fallen branches or tree trimmings to create dead hedges in the woods or other parts of your yard to provide habitat for birds, beneficial insects and other small animals.

You can beautify your dead hedge by using it as a trellis for native vines like trumpet honeysuckle (*Lonicera sempervirens*), Dutchman’s pipe (*Isotrema macrophyllum*) or a native clematis.

Learn about dead hedges at John Horsey Horticulture’s website, johnhorseyhorticulture.co.uk. For information on native vines, visit the Alliance for the Chesapeake Bay’s Native Plant Center webpage and use the comprehensive filtering system to find the vine that’s right for you.

Create a compost pile or bin

A compost pile is a simple way to recycle nutrients from organic matter. If you don’t have room for a big pile of compost in your yard, or just don’t like the way that it looks, compact, premade bins are available commercially in a variety of forms. Put kitchen scraps, grass clippings, paper and plant material in your compost to keep it out of the landfill and create free fertilizer. You can also visit the Alliance for the Chesapeake Bay’s website, allianceforthebay.org, and search “composting” to find more resources.

There are plenty of actions we can take to ensure our waste “doesn’t go to waste.” Look into what would be best for your space, then discover different ways to make it more sustainable. ■

Katie Gardner is a seasonal reforestation specialist in the Pennsylvania office of the Alliance for the Chesapeake Bay.

Another cavity nester, this swallow comes early and stays late

By Alonso Abugattas

This month we continue our focus on spring and summer cavity-nesters of the Chesapeake Bay region, focusing this time on the agile aerial insectivore — the tree swallow, *Tachycineta bicolo*r.

It's a member of the Hirundinidae family (swallows and martins), and both its common name and scientific name tell you something about the bird. *Bicolor*, from Latin, of course means two-colored, and *Tachycineta* comes from the Greek word *takhukinetos*, meaning fast-moving, which they are indeed. And they're called tree swallows because they nest in tree cavities, even though you're much more likely to spot them in fields and marshes.

By late spring, in our neck of the woods, these striking two-tone birds may already have hatchlings or even fledglings to feed, because some mating pairs have been here since mid-March and produced a clutch of eggs as early as mid-April.

Adults have small black bills, small feet, a slightly forked tail and a wingspan roughly twice their head-to-tail length of 5.5–6 inches. Males and females are similar in size but slightly different in color. Adult males are iridescent blue-green on top, with a thin black mask and dark gray to black wings and tail. The females are a duller color on top and usually lack iridescence, especially when they're younger. Both sexes are bright white from below with gray wings and tails.

Some tree swallows go no farther south for the winter than coastal North Carolina. Most of the bird's eastern cohort winters in Florida, Cuba and in a tight circle around the Gulf of Mexico. But in the spring that population spreads across most of North America, as far west as the Rocky Mountains and well into Canada. A smaller western population winters in Southern California and western Mexico and travels as far north as Alaska to breed.

Tree swallows prefer woodland edges and open fields, often near water where flooding kills trees and tree cavities abound. While their first choice for nesting is natural cavities or abandoned woodpecker holes, they aren't above raising their families in well-placed bluebird or wood duck boxes. They've even been known to occupy abandoned cliff swallow burrows.

This male tree swallow was photographed in Lancaster County, PA, in mid-April. Tree swallows arrive at their breeding grounds earlier than most swallows. (Andrew Weitzel/CC BY-SA 2.0)

A female tree swallow perches at the opening to her nest, a tree cavity likely chosen by her mate but furnished entirely by the female. (Paul Danese/CC BY-SA 4.0)

Like most swallows, they prefer to feed on aerial insects — fly species in particular — which they generally catch on the wing. But they are somewhat less dependent on insects than other swallows, making them more adaptable to colder climates and able to migrate north sooner, when nesting sites are easier to find. They have also been known to go for larger prey like sand fleas, crayfish or even clams. And they've been observed raiding compost bins to get eggshells, especially when they need the calcium for egg laying.

The males generally arrive first in the spring to find nesting sites. Once a male has attracted a mate (or, less commonly, has reconnected with the previous year's mate), the female will spend about two weeks building the nest, lining the cavity mostly with grasses. But she will also use rootlets, moss, pine needles, animal hair and even the occasional cigarette filter or piece of cellophane. The male gathers feathers (mostly white ones, interestingly) for the female to use as she sees fit — often after the eggs have been laid, perhaps to provide warmth.

The female lays four to six white eggs (sometimes light pink at first), usually one per day, so the young don't all hatch at the same time. The eggs are incubated for 13–16 days, and the young fledge 16–24 days after hatching.

While females do most of the feeding of the young, males also pitch in. They may also be pitching in with another brood: Nearly one male in 10 are polygamous, especially when there is an abundance of food. A mating pair usually has one brood per year but occasionally has two.

The males shed their brown immature plumage after the first year, but the females keep it for two years or more — the only North American passerine (perching bird) to do so. Ornithologists speculate that this may allow females to trespass unchallenged onto other breeding adults' territories.

Tree swallows compete for nest cavities with starlings, house sparrows, bluebirds and wrens. They only rarely host brood parasites like cowbirds.

Adults often go back to the same area to nest year after year. But the young disperse widely, with only 14% of the females and 4% of the males choosing to nest near where they were born.

A tree swallow, likely a male, in flight. Young adult females have duller colors than their male counterparts, but they get more iridescent with age and become less distinguishable from the males. (Bear Golden Retriever/CC BY 2.0)

Under ideal conditions, tree swallows can live 8–12 years, according to the Cornell Lab of Ornithology, but the average lifespan is just 2.7 years.

They depart later in the season than other swallow species; some in the Chesapeake region don't head south until November. In their Canadian breeding grounds, meanwhile, the trip south may begin as early as July or August.

While these swallows are aggressively territorial during breeding season, they are quite social while migrating. They travel during the day and gather at night, sometimes by the hundreds of thousands, spiraling down tornado-style to form huge communal roosts.

According to its exhaustive profile in the Cornell Ornithology Lab's *Birds of the World,* the tree swallow is one of the most thoroughly studied of all North American perching birds, to the point that some researchers have referred to it as the "white rat" of passerines. Its estimated population of 20 million is down 30% since the 1960s, though the bird has expanded its range southward and remains a species of least concern.

But that doesn't mean you shouldn't be concerned. Got room for another nest box? ■

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All-important pollinators: We simply can't live without them

By Kathy Reshetiloff

Imagine a world without fruits, vegetables, fibers or flowers. That's what our world would be without pollinators: the insects, birds and other animals that pollinate our plants.

Three-quarters of flowering plants rely on them to move pollen from the male part of one flower to the female part of another flower — sometimes on the same plant, sometimes on a different plant of the same species — for reproduction to occur.

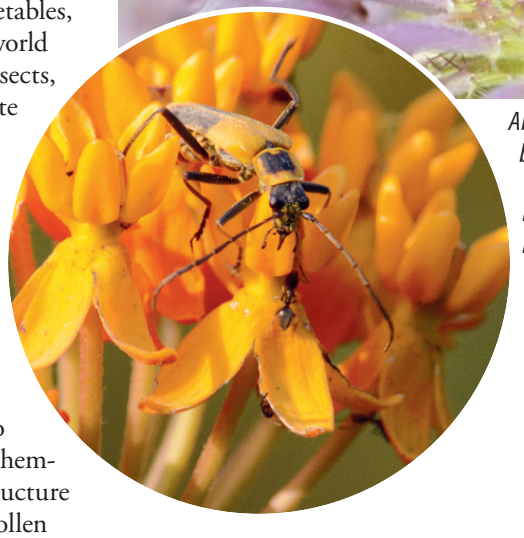
Most plants need to make seeds to reproduce. But many can't do it by themselves. To make seeds, the female structure in the flower, called a pistil, needs pollen from the male structure in another flower, called a stamen. Cross-pollination is the rule of thumb in the plant world. This means not only does pollen have to be transported from stamen to pistil but it also must come from separate flowers.

Some plants rely on the wind to do this. But many others depend on insects and animals. Pollen grains stick to the bodies of pollinators, like bees and butterflies. By moving from one flower to another, these insects transfer pollen to the pistils.

Insects (bees, wasps, moths, butterflies, flies, beetles) are the most common pollinators, but as many as 1,500 species of other animals help move pollen, including hummingbirds, perching birds, fruit bats, opossums, lemurs and even a gecko species.

Pollinators are critical to both our ecosystem and economy. Honeybees alone are responsible for as much as $5.4 billion in agricultural productivity in the U.S. alone. Most fruit, vegetable and seed crops, along with crops that provide fiber, drugs and fuel, are pollinated by animals.

We are not the only animal whose diet depends on animal-pollinated food. Many birds and mammals depend on fruits and berries.



Above: A bumblebee collects nectar from a fading wild bergamot blossom. (U.S. Fish & Wildlife Service)

Left: A goldenrod soldier beetle dines on butterfly milkweed blossoms. (Jim Hudgins/U.S. Fish & Wildlife Service)

Attracting Pollinators

Plants often help their specific pollinators find them. This codependence is exhibited in many ways. Many night-pollinated flowers close during the day, to prevent thieves from getting at their nectar and pollen.

The reverse is true for daytime-pollinated flowers that close at night. Flowers pollinated at night are usually white or pale yellow and very fragrant. This helps to advertise the flowers' presence. Darker-colored flowers, not as visible at night, are usually pollinated by day insects.

Bees, for the most part, prefer sweet-smelling, blue or yellow flowers. Butterflies rely less on scent and more on vision, seeking red, yellow or orange flowers. Moths are attracted to sweet-scented flowers that are typically large and either white or pale in color. Hummingbirds go for red, orange or yellow flowers.

Flowers help pollinators find where the pollen or nectar is stored. Flowers often have lines, dots or color variations that direct the pollinator. Flower shapes — bowl, cup, star or tube — attract specific pollinators and, in some cases, keep out unwanted pollen collectors.

Disappearing Pollinators

Despite their importance to our economy and lives, many pollinators are in trouble.

Honeybees, raised specifically to pollinate crops, are threatened by parasitic mites, disease and pesticide poisoning. Colony collapse disorder is a phenomenon in which honeybees leave the hive and do not return. Declines in these managed pollinators can affect the availability, price and quality of many fruits.

The causes of decline in wild pollinators vary by species. A healthy ecosystem provides pollinators with habitat for foraging, nesting, roosting and mating. Homes, businesses and roads are replacing the meadows, wetlands and forests that are home to pollinators. In addition, many of the wildflowers used by pollinators for food, nesting or egg-laying are rapidly disappearing.

A ruby-throated hummingbird drinks nectar from a Virginia lion's heart flower. (Jim Hudgins/U.S. Fish & Wildlife Service)

Pesticides are also a threat. Many pesticides used on farms and backyard gardens are broad-spectrum types, which means they can harm nontargeted species. Many insecticides that get rid of plant pests are toxic to bees and other beneficial insects.

Migrating pollinators such as bats, butterflies and hummingbirds face even more problems. These travelers need nectar-producing flowers all along their journeys. But wildflowers and natural habitats are being replaced by development, meaning less food and habitat for pollinators as they migrate. ■

A white-lined sphinx moth, also called a hummingbird moth for obvious reasons, feeds on a wildflower, collecting pollen in the process. (Tom Koerner/U.S. Fish & Wildlife Service)

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HOW YOU CAN HELP

- Replace part of your lawn with native, nectar-producing flowers. Go to pollinator.org/guides and type in your zip code. You'll get information about pollinators in your area plus a list of pollinator plants. You can also find common native plants for pollinators in your region at pollinator.org/gardencards.
- Leave some stumps, dead branches and leaves on your property, if possible. They provide nests for many native bees.
- Reduce or stop using pesticides in your yard and gardens.
- Pollinator Week is June 17-23. Go to pollinator.org for pollinator events, activities and resources.