CHESAPEAKE
BAY JOURNAL

April 2024 Volume 34 Number 2

Independent environmental news for the Chesapeake region

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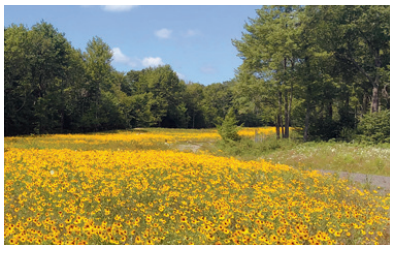

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Megan Kubala, a technician with the Maryland Department of Natural Resources, nets a bluegill sunfish in a mobile lab that helps propagate freshwater mussels. Mussel larvae spend time attached to fish until they grow large enough to survive independently. Read the article page 25. (Dave Harp)

EDITOR'S NOTE

Tragedy on the Patapsco River

On the morning of March 26, as the *Bay Journal* team prepared this issue for press, we learned of horrific news in Baltimore. The Francis Scott Key Bridge had been struck by a massive cargo ship and collapsed into the Patapsco River. Reports soon followed that two lives had been lost and four remained missing. I cannot begin to imagine the shock and grief that their families and friends are experiencing. My heart goes out to them and everyone for whom this has been a staggering, mournful event.

The tragedy will be a marker in the story of the Chesapeake Bay, too. Humans have viewed the Bay and its rivers as transportation corridors — especially for commerce — far more intensively than they've embraced it for recreation. Colonization thrived because of it. And even then, with smaller, wind-powered and often leaky ships, the Bay's watery network was not just a local thoroughfare. It connected the Bay region to the world.

No one could have imagined the dramatic ways in which commerce has changed and magnified over recent centuries. And I'm not sure that many people understand how it has changed in recent decades. Enormous cargo ships are travelling the Bay, docking in Norfolk and Baltimore. Ports have upgraded equipment to handle them. The *Dali*, which struck the Key Bridge, was nearly 1,000 feet long. Standing on end, it would be nearly as tall as the Eiffel Tower. It could carry approximately 10,000 20-foot-long containers: Picture 10,000 trucks hauling them on the highway. Some ships can carry more than twice that number. Akin to a neighborhood that transitions to skyscrapers, this has brought change to the character of the Bay.

But it remains true to the region's longstanding relationship with the water. It connects us all, for natural resources that we both need and cherish, and for the economy, commerce and transportation that knit our region to the world beyond. Now, in the wake of the Key Bridge collision, grief and reflection connect many of us too.

— Lara Lutz

ON THE COVER

Eastern hemlocks hug a trail in Susquehannock State Forest in Pennsylvania. (Nicholas Tonelli)

Bottom photos: Left by Dave Harp, center courtesy of the Pennsylvania Game Commission, right by Dave Harp

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BY THE numbers

62%
Increase since 1958 in the number of days each year that 3 or more inches of rain fall on the Chesapeake Bay region

3.11%
Projected average increase in annual precipitation in the Bay watershed from 1995 to 2025

257
Number of dams removed in Bay region from 1984 to 2021

12,047
Miles of river habitat opened to fish in the Bay region because of dam removals from 1984 to 2021

25-30
In parts per thousand, the average salinity of waters near the mouth of the Chesapeake Bay

<0.5
In parts per thousand, the average salinity of waters near the top of the Chesapeake Bay

Just say 'no' to wavyleaf basketgrass

Wavyleaf basketgrass is an invasive plant spreading through the Chesapeake Bay region and choking out native species. A genetic study showed that the plant found its way here from the Ural Mountains in Russia. Some localized dates of discovery include:

- 1996: First U.S. documentation in Patapsco River Valley State Park, MD
- 2005: Shenandoah National Park, VA
- 2016: Codorus State Park, PA
- 2022: Newark, DE

Wavyleaf basketgrass typically grows in mats along shaded forest trails. It has long, crimped leaves and hairy stems. Its sticky seeds spread by hitching a ride on bikes, people and pets.

Experts say there is still time to eradicate wavyleaf basketgrass from the Bay region.

- If you find a small patch, pull it out.
- Don't walk through it, especially in fall, when parts of the plant are sticky to promote seed dispersal.
- Remove seeds from clothes, pets, shoes and bike tires with duct tape or a brush.
- Don't compost the plant if it has a seed head.
- Check with your state or county natural resource agencies to learn how to report sightings.
- Share observations on apps such as iNaturalist.

(Photo by Margaret Chatham/CC BY-NC 4.0)

bayjournal.com/podcasts

LOOKING BACK

30 years ago

MD begins statewide survey of stream health

Maryland's new Biological Stream Survey was launched to help gauge the condition of more than 90% of the state's rivers and streams.

— *Bay Journal,* April 1994

20 years ago

Embry Dam destroyed to help fish move upstream

The removal of Embry Dam in Virginia made the Rappahannock the only free-flowing river from the mountains to the Bay.

— *Bay Journal,* April 2004

10 years ago

Many say draft Bay agreement falls short

A draft of new goals for the Bay restoration drew criticism for its failure to address toxics, climate change, fracking and environmental justice.

— *Bay Journal,* April 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.

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BAY JOURNAL NOTEBOOK

Bay Journal staff gathered for an in-person meeting on a sunny day in March—and grabbed a rare all-hands photo. (Dave Harp)

Making our way around the Bay

Bay Journal staff members are always happy to share what they're learning, whether that's in these pages, in-person or in a book.

Staff writer **Jeremy Cox** spoke to students in a graduate-level science communication course at Salisbury University in March. The topic: what future scientists should know about communicating with the media. After sharing some insider knowledge, Jeremy gave the students an in-class activity. Each had to interview a colleague and come away with a story idea. (He promises that the exercise was not an excuse to have other people do his work for him.)

Staff writer **Ad Crable** traveled to Huntingdon, PA, to spend a day in the dark with bats in late March. With the help of bat researchers working to fight white nose syndrome, Crable also got to hold a tiny bat that was being monitored. Look for his related article in our May issue.

Editor-at-large **Karl Blankenship** made a trip from the Pennsylvania portion of the Chesapeake watershed to the shores of the Bay in Annapolis in late February. He shared with the Eastport Yacht Club some highlights and lessons learned during three decades of work with the *Bay Journal*.

Staff writer **Tim Wheeler** contributed a chapter on Bay ecology to the *Maryland Naturalist Handbook*, which will be available soon from Johns Hopkins University Press. It will be put to use by the state's Master Naturalist program, which trains people to be stewards of natural resources through science-based education and volunteer service in their communities.

Staff photographer **Dave Harp** also hit the road for much of January and February in search of something he always considers worth the trip: tundra swans. The film footage he captured will eventually be part of the next *Bay Journal* film, which follows these elegant birds and other species that migrate across the region.

Staff writer **Whitney Pipkin**, based in Northern Virginia, is traveling to Richmond a little less now that Lauren Hines-Acosta, our newest writer, is settled in the Virginia capital. Lauren has been getting to know the area by meeting with sources and regularly jogging through the city — including up and down the Capitol steps. She said it's been good practice for the winter work of chasing down updates on environmental bills making their way through the legislature.

Speaking of travel, **Lauren, Karl** and **Whitney** will all be attending portions of the Environment Virginia Symposium in Lexington on April 9-11. Come say hello!

NEWS briefs

LOCAL
REGIONAL
NATIONAL

Cherry blossoms in DC face flooding frontlines

More than 150 cherry trees lining the Tidal Basin in Washington, DC, bloomed for the last time in late March. After years of twice-daily flooding from a rising Potomac River, the National Park Service will be removing trees closest to the water to restore the seawall that lines the roughly 100-acre basin just off the river.

This year's Yoshino cherry blossoms reached peak bloom (when an estimated 70% of the blossoms open) on March 17. That was a week earlier than predicted and the second earliest peak bloom since record-keeping began in 1921. The Park Service attributes it to a warming climate.

The U.S. Army Corps of Engineers built the seawalls in the late 1800s to contain water from the Potomac River. But now, with sea level rising and land sinking from development on the former wetland, the trees and benches are inundated with every high tide.

The cherry trees in the District of Columbia reached peak bloom on March 17, 2024 — a week earlier than the National Park Service predicted. (Rosie Mendoza/National Park Service)

The Park Service on March 13 announced its $113 million plan to repair the Tidal Basin and West Potomac seawalls by 2027. It aims to protect the memorials and cherry trees from sea level rise for the next 100 years. Construction will begin in May, starting with building a staging area in the adjacent West Potomac Park.

This first phase of the project won't limit visitor access. Crews will be removing 158 trees between the Thomas Jefferson Memorial and Franklin Delano Roosevelt Memorial. Plans call for the planting of 274 additional cherry trees out of the water's reach. The Park Service has a stockpile of trees grown from cuttings of the surviving trees, originally gifted by Japan in 1912.

In collaboration with the Park Service and the Trust for the National Mall, the National Trust for Historic Preservation created the Tidal Basin Ideas Lab in 2019. The lab gathered five landscape architecture firms to reimagine the Tidal Basin, where regular flooding has also eroded walkways and created safety hazards. The organizations will begin drafting a master plan this spring.

— Lauren Hines-Acosta

Protection expands for land in Shenandoah Valley

The Virginia Department of Conservation and Recreation recently added more than 35 acres to two natural area preserves in the South Fork Shenandoah River watershed.

The Shenandoah Valley is within the Chesapeake Bay watershed and supports rare biodiversity.

DCR bought nine acres of land along the South River next to the Cowbane Wet Prairie Natural Area Preserve last September, preserving an important

See **BRIEFS**, *page 6*

briefs

From page 5

Twenty-six acres were added to the Lyndhurst Pond Natural Area Preserve in Augusta County, VA, in January 2024. (Virginia Department of Conservation and Recreation)

buffer area between the river and a residential area. It also hosts a rare type of wetland called the Shenandoah Valley Prairie Fen. According to the U.S. Forest Service, fen wetlands take thousands of years to develop and are hotspots of biodiversity.

DCR also bought 26 acres next to the Lyndhurst Ponds Natural Area Preserve from the Quillen family on Jan. 31. The family, who owns Waynesboro Nurseries, sold part of their land to the state in 2020 to create the preserve. The new addition is home to sinkhole ponds and rare plants like Virginia sneezeweed and valley doll's eyes.

Funding for the acquisitions came from the 2017 DuPont Natural Resource Damage Assessment and Restoration settlement. Between 1930 and 1950, the DuPont company contaminated more than 100 miles of streams, rivers and floodplains in the South Fork watershed with mercury, and it continues to affect fish and wildlife. The settlement includes more than $42 million for restoration projects in the impacted areas. *— L. Hines-Acosta*

Controversial hydro project edges forward in PA

The Federal Energy Regulatory Commission has approved an application for a preliminary permit for a controversial 1,000-acre pumped-storage hydroelectric facility near the Susquehanna River in York County, PA.

The late January approval set off a 60-day public comment period, through March 31, before FERC rules on whether to grant York Energy Storage, LLC, a preliminary permit for the Cuffs Run project. If granted, that would give project developers up to four years to prepare detailed ecological and economic impact studies, after which FERC would rule on whether to approve the $2.5 billion project.

But opponents hope to stop the project from even getting a preliminary permit. On Feb. 13, nearly two dozen elected officials from York and Lancaster counties announced their opposition.

A range of citizen groups, land conservancies, trail groups, farmland preservation organizations and the Susquehanna Natural Heritage Area has also lined up against the project that would flood approximately 580 acres of farmland, residential areas and forestland in an area overlooking the Susquehanna River.

A 1.8-mile dam would be built on a plateau above the river to create a reservoir. Water pumped from the river would fill the lake, which in times of peak electricity demand would be released to flow downhill and power generator turbines.

This is the fourth time the Cuffs Run hydro project has been proposed in the last 13 years. Each of the last times, the project was dropped. However, there are new federal incentives for renewable energy, including hydroelectric sources. *— A. Crable*

Six billion oysters added to Bay watershed since 2017

The Chesapeake Oyster Alliance announced in early March that 6 billion oysters have been added to the Chesapeake Bay and its rivers since 2017.

To put that into perspective, if a person planted one oyster a second, it would take them 32 years to reach 1 billion. Partners in the alliance — a coalition of nonprofits, oyster growers, academic institutions and business owners — along with federal and state agencies have planted six times more than that in just seven years.

Oysters are a key species in waterways. They filter out excess nutrients like nitrogen and phosphorus and sustain local seafood markets. Their reefs provide habitats for fish and blue crabs. But according to the National Oceanic and Atmospheric Administration, only about 3% of the Bay's oyster population remains because of disease, overfishing and poor water quality.

The alliance, founded by the Chesapeake Bay Foundation, wants to see a total of 10 billion oysters added to the Bay by 2025. That number includes the progress from the 2014 Chesapeake Bay Watershed Agreement, in which Bay states pledged to restore oyster reefs in 10 Bay tributaries by 2025. As of 2022, seven of the 10, plus a bonus branch of the Elizabeth River, have been restored. The watershed

agreement goal is on track for 2025.

The oyster alliance attributes the accelerated restoration to help from state and federal agencies. Organizations like NOAA identify where reefs should be built using sonar. In areas where the bottom is hard enough, builders can create a reef structure of crushed stone or shell. If there is a natural or constructed reef with no oysters, hatcheries can use shells with attached larvae, or "spat on shell" to seed reefs.

The alliance also announced its fourth year of Oyster Innovation Grants. The $140,000 of grant funds went to 15 organizations in Virginia and Maryland for making progress in oyster technology, research and more. *— L. Hines-Acosta*

Alexandria stormwater tunnel complete, deadline extended

A tunnel-boring machine named Hazel came up for air March 21 after 16 months underground, reaching a new milestone in upgrading the combined sewer system in Alexandria, VA, which is a chronic source of pollution in the Potomac River.

Alexandria Renew Enterprises, or AlexRenew, the wastewater treatment company overhauling the system, announced on March 14 that it had finished drilling the 2.2-mile tunnel. It connects all four of Alexandria's Potomac River overflow points to the

A gigantic tunnel-boring machine, nicknamed Hazel, sees the sun for the first time in 16 months, having completed a 2-mile stormwater tunnel in Alexandria, VA. (AlexRenew)

treatment facility.

Combined sewer systems, which can be found throughout the Chesapeake Bay region, capture both sewage and rainwater and sometimes date back to the 1860s. They're often overwhelmed during heavy rainstorms. By design, sewage overflows into nearby rivers. The new tunnel in Alexandria will capture that overflow and hold it until it can be treated and released into the river.

The tunnel mainly parallels the river under Old Town Alexandria, turns west at Jones Point Park and runs another mile to the treatment plan just inside the Capital Beltway.

Now that the tunnel is complete, AlexRenew needs to complete a smaller sewer line near its treatment plant, build a 12-story underground pump station and renovate underground vertical passageways. The company hopes to finish the project by the end of 2025.

Virginia originally gave Alexandria a deadline to overhaul its sewer system by July 1, 2025. AlexRenew asked for an extension, citing supply-chain issues from the pandemic, the Ukraine war and the state's concrete shortage. Del. David Bulova (D-Fairfax) introduced a bill this session to extend that deadline to July 1, 2026. Gov. Glenn Youngkin signed the bill into law on March 20.

— L. Hines-Acosta

MD court rules on Baltimore-area stormwater permits

The Maryland Appellate Court ruled in favor of the state Department of the Environment on Jan. 31 in a case challenging the effectiveness of storm-water permits for Baltimore City and Baltimore County. The court said the new permits do meet water quality standards.

The Chesapeake Bay Foundation and Blue Water Baltimore filed the lawsuit in 2021. They argued that the permits lowered the requirement to capture runoff from pavement and buildings. Maryland had previously required its largest localities, including Baltimore City and Baltimore County, to capture or treat 20% of their stormwater runoff. The new permits for the city and county set that goal at 10%.

Most cities met that 20% target, but it was a struggle for many. Even though the new permits are not as strict, the court said it's allowed if "the cumulative effect will attain water quality standards." The court said this exception applies.

The environmental groups also said that the permits aren't doing enough to prevent flooding. The Bay Foundation said in a press release that the department is using "short-sighted and ineffective solutions" like street sweeping and storm drain cleaning. Instead, the groups want the department to use green infrastructure like rain gardens.

But the court opinion said the methods met state and federal water quality standards. The opinion also stated that the permit "leaves broad discretion" for the Maryland Department of the Environment to "establish and define programs" for stormwater permits.

As for climate change concerns, MDE said the "supporting data simply did not exist" and it could change the permits later if new information becomes available. The court agreed.

— L. Hines-Acosta

‘Perpetual offender’ plant in Hopewell, VA, seeks air permit

Environmental groups say the permit application is incomplete, ask state for hearing

By Whitney Pipkin

A chemical plant near the James River in Hopewell, VA, that was once the site of an environmental disaster is seeking to renew its federal air pollution permit.

The request has been in the works for a few years, but environmental groups say the application still doesn’t contain enough information for regulators to ensure it will protect local and regional air quality.

AdvanSix Resins and Chemicals LLC’s 482-acre facility along the James River in Hopewell is one of the largest single manufacturing sites for the fertilizer ingredient ammonium sulfate and for caprolactam, which is used to make a nylon resin for carpets.

The facility manufactured gunpowder during World War I. In 1928, Allied Chemical began building what has become the current plant that was later run by Honeywell and is now run by AdvanSix.

In the 1970s, the plant made a pesticide called Kepone. In the mid-1970s, its production was subcontracted to a small company called Life Science Products that ended up mishandling the dangerous chemical’s production, sickening workers and nearby residents and polluting the James River. The incident made national news and led to a $13 million settlement that went in part to establishing the Virginia Environmental Endowment.

“It is appalling that, [nearly] 50 years after the Kepone disaster, Virginia regulators cannot say it couldn’t happen again,” wrote Gerald McCarthy, the founding executive director of the endowment, in an email.

Today, the AdvanSix plant is the fourth largest emitter of nitrogen oxide in Virginia, according to the U.S. Environmental Protection Agency’s emissions inventory. It is also located near five other major sources of air pollution in Hopewell that together equate to 8% of toxic emissions in the state. The percentage of people living in poverty in Hopewell is twice the state average, according to the latest census, and the city’s population is 43% Black.

The former Allied Chemical plant, now called AdvanSix, in Hopewell, VA, produced a chemical called Kepone in the mid-1970s. Today, the plant produces fertilizer and materials for carpet. (Whitney Pipkin)

AdvanSix is seeking to renew its Title V air permit, which allows it to operate pollution-emitting machinery above federal thresholds but under certain limits and with monitoring. The company is also in the process of renewing the plant’s wastewater discharge permit.

In comments submitted at the end of February, the Southern Environmental Law Center, Chesapeake Bay Foundation, Hopewell-Colonial Heights NAACP, Sierra Club’s Falls of the James Group and Virginia Interfaith Power & Light each urged the state to require the company to submit a more detailed permit renewal application, including specific emissions data and monitoring plans.

A spokesperson for the Virginia Department of Environmental Quality said in mid-March that the agency was still reviewing public comments received on the application and had not finalized responses. Some of the comments asked the agency to hold a public hearing, and DEQ’s Irina Calos said the agency had not finalized a decision on that request either.

Mark Sabath, senior attorney with the Southern Environmental Law Center, was among those requesting a hearing and contending that the company’s application did not give enough information for feedback. While the application includes

some emissions limits, Sabath said more is needed to understand how much each unit at the facility is projected to emit. And, while the application addresses some monitoring provisions, "the vast majority of the units have no requirement that they monitor the emissions or periodically test the units to make sure they're complying," Sabath said.

"To realistically determine whether the permit does a good job or a bad job, DEQ needs to go back to the company and say, 'You need to provide this information,' and then redo the permit for public comment," he said.

Sabath said this permit, in particular, merits additional scrutiny because the plant has a history of violating the limits laid out in its most recent Title V permit issued more than a decade ago. In 2013, the company, then operating under the name Honeywell Resins and Chemicals LLC, agreed to pay $3 million in civil penalties for alleged violations of the Clean Air Act at the Hopewell site.

At the time, the EPA and DEQ found that the facility exceeded its emissions limits on several pollutants, including nitrogen oxide, and failed to upgrade and detect leaks in equipment in a timely manner.

Workers clean the Life Science Products building in Hopewell, VA, in January 1976; the plant was later destroyed. (Don Long/Richmond Times-Dispatch)

In 2014 and 2017, the plant was also found responsible for chemical spills released into Gravelly Run, a tributary of the James River, that resulted in fish kills. The company worked with DEQ and the U.S. Fish and Wildlife Service "to compensate for injuries to natural resources."

"You're talking about a facility that has a terrible compliance record and frequent releases of gases and other emissions into a community that is probably one of the most environmentally burdened in Virginia, in Hopewell," Sabath said. "That is the important background for why we think DEQ should take an extra close look at this type of permit to make sure it's strong enough to make sure the facility does a better job going forward of adhering to its limits."

As part of the 2013 consent decree, Honeywell did not admit liability for the violations but certified that the plant was back in compliance with regulations that same year. In 2016, Honeywell spun off its resins and chemical business into a separate entity, AdvanSix, which operates at the same Hopewell site.

AdvanSix's 2019 Sustainability Report states that the company "has substantially reduced" its emission of total criteria pollutants (including nitrogen oxides, carbon monoxide, particulate matter and others) since 2014. In 2019, the company converted some coal-fired boilers to natural gas, which further reduced emissions as part of a $100 million capital investment, their report states.

Still, Sabath said, "This facility is a perpetual offender and it's unacceptable. A weak permit with vague and unenforceable monitoring requirements risks making things worse for the residents of Hopewell." ■

Cleanup plan for Bear Creek stirs questions, concerns

EPA proposes dredging, capping toxic sediment by Sparrows Point in MD

By Timothy B. Wheeler

Everyone agrees: Bear Creek needs to be cleaned up. How to go about it is another matter.

The tidal tributary of the Patapsco River near Baltimore is one of the most contaminated water bodies in the Chesapeake Bay region, the toxic byproduct of more than a century of steel manufacturing on the adjoining Sparrows Point peninsula.

The old steel mill was demolished years ago. But near-shore bottom sediments are riddled with hazardous polychlorinated biphenyls (PCBs), heavy metals and enough oil and grease that you can smell and see it whenever the water is stirred up.

Bethlehem Steel Corp., which caused the contamination, agreed in a 1997 consent order to clean up the similarly tainted soil and groundwater on Sparrows Point, but it managed via bankruptcy to shed responsibility for offshore problems. Now, decades later, the U.S. Environmental Protection Agency is planning a federally funded cleanup of a portion of the creek under its Superfund program.

The EPA has proposed dredging up some of the most tainted sediments and covering a 60-acre patch of fouled creek bottom with a thick layer of clean sand. At a cost of about $45 million, the work can be done in 18 months, the EPA said.

Not so fast, say residents of Turner Station. The historic African American community across the water from Sparrows Point has a complicated history with the peninsula. Founded in the late 1800s, Turner Station was home to the families of African American workers at the steel mill during a time when housing was racially segregated. Residents suffered from the air and water pollution generated by the mill, and the community struggled to overcome decline and official neglect as the industry withered.

Cleanup of the former mill site has gone on for years under federal and state supervision, and remedial work is complete on Tin Mill Canal, which once emptied into Bear Creek. But lingering poisons in the creek bottom have been a source of worry for years.

A view across Clement Cove, off Bear Creek. The homes in the distance are part of the historic African American community of Turner Station, just outside Baltimore. (Dave Harp)

Gloria Nelson, president of Turner Station Conservation Teams, stands with Larry Bannerman, a former longtime resident of Turner Station, MD, on a former fishing pier over Bear Creek. (Dave Harp)

Still, at least some residents are hesitant, if not outright skeptical, about the EPA's plan. They want more information.

"No one is opposing the cleanup," said Gloria Nelson, president of the nonprofit Turner Station Conservation Teams. "They just want to make certain it is done with a safe method."

Turner Station residents have good reason to be wary, said Doug Myers, a senior scientist with the Chesapeake Bay Foundation. The creek bottom off Sparrows Point contains "probably the most toxic stuff that we've seen anywhere," he added. An analysis that the EPA commissioned found the sediments consist of up to 14% oil and grease, and Myers said it reported "through the roof" levels of organic chemicals, most notably PCBs.

Once widely used as machine lubricants and electrical insulators, PCBs were banned nationwide in 1979 after animal studies found they likely caused cancer, weakened the immune system, caused learning deficits and harmed reproduction. They do not break down readily in the environment, and they can accumulate in plants, food crops and fish. Now found almost everywhere in soil and water, PCBs are the leading cause of fish consumption advisories in Maryland, including Baltimore Harbor.

The EPA looked at several options for dealing with the contaminated sediments, said Mitch Cron, an agency remedial project manager. This approach, he added, offers the "best balance" between protecting the health of nearby residents and the environment while getting the cleanup done relatively quickly.

The agency considered capping the entire 60 acres without doing any dredging. That would have cost less, about $30 million. But it would fill in about 6 acres of open-water habitat while presenting a greater risk of re-exposing toxic sediments if the sand cap washes away over time.

The EPA also weighed dredging the entire 60-acre area, then capping it. But that would cost about $70 million and be much more complicated. It would take about six months longer to organize and carry out. Even so, it wouldn't be that much more protective, the agency said.

Under its preferred option, the agency plans to dredge 30 acres of bottom hydraulically, meaning sediment would be suctioned up and dried out on Sparrows Point before being transported offsite for disposal. A floating silt "curtain" would be suspended around the work area to keep stirred-up sediment from spreading.

Similar removals have been carried out at other Superfund sites around the country, said Kate Lasseter, another remedial project manager.

But Myers said the Bay Foundation does not believe the EPA has sufficiently justified doing any dredging there, nor has it adequately considered all of the risks involved. For instance, he said, while a floating silt curtain may keep disturbed sediments from spreading, some of the toxic heavy metals buried in the bottom — including cadmium, chromium, copper, nickel, silver and zinc — could dissolve in the water and slip through the curtain.

If not properly dealt with, the contaminants in Bear Creek pose health threats to Turner Station residents even if they don't go near the water or eat locally caught fish or crabs, Myers said. The community routinely floods, with the creek at times backing up through storm drains into the streets. The EPA's analysis did not consider the risks posed to Turner Station residents, he said, who walk through floodwaters tainted with toxic chemicals.

"We just thought their analysis did not consider the community that the project is in," Myers said.

Adding to residents' concerns are plans by Sparrows Point's current owner, Tradepoint Atlantic, to dredge a channel for container ships at nearby Coke Point. The project has yet to be approved, but EPA officials note it is in the Patapsco River outside of Bear Creek.

"Because of the legacy of Sparrows Point," said Nelson of the Turner Station conservation group, "people have a lot of questions when you say 'dredge' anywhere in the Bear Creek area. The community's residents want to make sure this doesn't impact any more on their health and safety as well as the environment."

After a February meeting at Turner Station, the EPA extended to April 9 its window for taking public comments on the proposed cleanup. The EPA aims to finalize its plan by the end of 2024 and start work in 2025.

That timeline alone "is really stressing out community members," said Gussie Maguire, another scientist with the Bay Foundation. "We don't want to totally shut it down, but there's a lot to think about." ■

VA session ends with bipartisan support on 'green' bills

Lawmakers send tree-planting measures, regs for ‘forever chemicals’ to governor’s desk

By Lauren Hines-Acosta

Virginia lawmakers raced to push forward more than 2,200 bills before the General Assembly session ended on March 9 with hopes that the legislation would land on Gov. Glenn Youngkin’s desk.

This year’s legislature saw a partisan shift as Democrats took control of the House of Delegates, giving the party full control of Virginia’s legislature. Virginians are also seeing an increasing presence of environmental issues at their doorsteps: flooding in Norfolk, “heat islands” in Richmond and fish advisories in rivers. This combination might be why lawmakers passed bills on tree plantings, toxic chemical regulations and environmental funding.

“The immediacy of seeing something in your face … that can take someone from an appreciator of nature to an advocate,” said Jay Ford, Virginia policy manager for the Chesapeake Bay Foundation.

The governor has until April 8 to sign off or veto bills. Then the General Assembly returns April 17 for a veto session.

Multiple bills for more trees

Trees can do a lot for urbanites, like filtering rain, cooling cities and cleaning the air. But the 2014 Chesapeake Bay Watershed Agreement’s goal to expand urban tree cover is moving in the wrong direction. According to the Chesapeake Bay Program, the region has seen a net loss of approximately 25,000 acres in the last decade.

To combat this, the General Assembly passed bills focused on preserving or planting trees in urban areas.

Four similar bills expand the authority of cities and counties statewide to require developers to conserve or replace trees on their project sites. If they can’t do either, developers can pay into a “tree bank” or plant trees elsewhere. The bills also allow localities to require developers to have a certain percentage of tree canopy on their site 20 years after development. Localities can seek up to 30%, depending on the site’s zoning and acreage. Tree funds can also be used for tree maintenance and planting on public and private lands.

Regulation of toxics

Two bills aimed at regulating and monitoring toxic chemicals passed through both chambers.

Trees in urban areas like Richmond can filter rain, clean air and cool cities. (Virginia Department of Forestry)

One bill regulates polyfluoroalkyl substances or PFAS, often called forever chemicals because they take decades to deteriorate naturally. PFAS are harmful to humans at certain levels. The bill directs any facility that could be a large source of PFAS in public water to report its manufacture or use of PFAS within 90 days after the Department of Environmental Quality’s request. The measure also establishes a PFAS Expert Advisory Committee to help DEQ and the Virginia Department of Health.

Another bill deals with the viscous black liquid that seals cracks in roads. The bill prohibits companies from selling pavement sealants that contain toxic chemicals called PAHs, or polycyclic aromatic hydrocarbons, at certain concentrations after July 1. A company can still sell its remaining inventory after that date, though. No one is allowed to apply the sealant after July 1 of next year.

Menhaden study delayed again

Menhaden are a food source for other wildlife in the Bay region, like osprey and striped bass. Anglers use them for bait and Virginia-based Omega Protein harvests tens of thousands of tons of them to make fish oil and other products. While studies indicate that menhaden are not overfished along the Atlantic Coast, it’s unclear how the fish is faring in the Bay or if it’s tied to a decrease in other animal populations.

To assess this, lawmakers introduced a bill in the 2023 session to create a study focusing on the state of menhaden in Virginia’s portion of the Bay watershed. It was then reduced to only creating the study’s framework. This year, a bill was introduced to fund the study for three years. But the House Rules Committee voted to push it to the 2025 session with no discussion.

Ford pointed out that Omega Protein employees were part of the workgroup that designed the study but “seemed to walk back” on their position by advocating against the study they helped design. Monty Deihl, CEO of Ocean Harvesters, which is the fishing subsidiary of Omega Protein, has said that Omega did not lobby against the bill but felt that the study framework didn’t answer key questions.

Environmental justice vacancies filled

In 2017, then Gov. Terry McAuliffe created an Environmental Justice Advisory Council, since renamed the Virginia Environmental Justice Council. Its purpose is to advise state agencies on environmental issues that disproportionally harm vulnerable communities, including low-income and marginalized populations.

But many of the council members’ terms expired, and Gov. Youngkin had not appointed anyone new for months. So, the council couldn’t complete basic tasks.

Del. Michael Jones (D-Richmond) filed a bill requiring the governor to fill any vacancies on the council by Aug. 31.

It passed in both chambers, but the governor vetoed the bill on March 14. He explained in a memo that he vetoed the bill because of provisions to increase taxpayer-funded reimbursements and expand the council's authority over the state's natural and historic resources departments, despite its status as an advisory body.

On March 15, the governor appointed five new council members.

RGGI budget amendments

The budget amendments include language that requires Virginia to rejoin the Regional Greenhouse Gas Initiative or RGGI.

"The General Assembly sent me more than a thousand bills plus backward budgets that need a lot of work," Youngkin said in a statement.

The initiative includes 10 states that agree to reduce carbon dioxide emissions in the power sector by 30% by 2030. When Virginia was part of the initiative, the state made power plants pay a fee if they exceeded the emission cap. The money went to flood resilience and home energy efficiency funds.

Youngkin took Virginia out of RGGI so monopolies like Dominion wouldn’t have to pass on the cost to consumers. Youngkin allocated $100 million to the Community Flood Preparedness Fund for the first year. But environmentalists say it’s not enough without steady RGGI funding. ■

MD community turns up heat in effort to fend off rising water

Crisfield plan draws attention to see if small Eastern Shore town can muster big resources

By Jeremy Cox

Despite forecasts suggesting that nearly all of Crisfield, MD, will be underwater in a matter of decades, local officials and residents of the Eastern Shore town have decided to make a stand. They have coalesced behind an ambitious plan to transform the small municipality into a fortress against heavy rains, high tides and hurricane-whipped storm surges.

"Flooding was something we were taking for granted, but it has taken a major toll on our city," said Crisfield Mayor Darlene Taylor, who was elected to the post in 2022. "When I was running for office, people were telling me, 'You can't take care of anything until you fix the flooding.' "

The primary aim of the massive reconstruction is to make it harder for water to barge into town. When the Tangier Sound rises and threatens to flood the area, a perimeter barrier of berms, elevated roadways and bulkheads will hold off water up to 5 feet above sea level.

But if floodwaters manage to get in, a series of tide gates will fly open to drain it away. Three new pump stations will help drive out the water faster. Wetlands will be carved out of the landscape to collect any remaining stormwater.

The town is seeking a $38 million grant from the Federal Emergency Management Agency's Building Resilient Infrastructure and Communities (BRIC) program to finance the southern half of the project. As that work progresses, local officials expect to apply to the federal agency for a second grant requesting roughly the same amount of money for the northern half.

The effort in Crisfield, population 2,500, is attracting attention nationally. Observers view it as a test to determine whether small, economically disadvantaged enclaves can marshal the resources necessary to survive climate change.

"Other communities can look at this framework and say that these are the parts we need to put together to get from point A to point B," said Bhaskar Subramanian, who co-leads the adaptation sciences research program at the National Oceanic and Atmospheric Administration.

Crisfield in 2021 was among the inaugural group of recipients of a NOAA grant that covers the costs of developing resilience strategies for coastal places with "vulnerable" populations, such as communities of color and those having low incomes.

Census figures show that about 35% of Crisfield residents are Black; nationally, they represent about 13% of the population. And family incomes, in general, in the town have been crippled over the years by declines in the seafood and manufacturing industries. Households had a median income of $38,000, which was less than half the amount of the typical Maryland household, according to 2022 Census data. The poverty rate was nearly three times higher than the state average.

The town used the $292,000 NOAA grant to bring in experts from the Nature Conservancy, the University of Maryland Environmental Finance Center and George Mason University to develop a framework for climate-related decisions. Their final report isn't expected to be released until later this spring. But earlier drafts helped form the foundation of the extensive flood plan submitted to FEMA.

"Crisfield is showing it can be done," said Celso Ferreira, the environmental engineer at George Mason who developed the local flood modeling for the planning effort. "I think this is the poster child for climate adaptation."

Rising tide

Crisfield has a fraught relationship with water.

It provided the bounty of oysters that transformed the Somerset County hamlet into the "Seafood Capital of the World" in the late 1800s. The population boomed to more than 25,000 during the first decade of the 1900s, making it Maryland's largest city after Baltimore.

But as the health of the Chesapeake Bay deteriorated, so did the city's economic fortunes. Today, watermen still haul oysters and crabs into Crisfield's harbor, but the industry is a shell of its former self.

Meanwhile, the water has been showing its ugly side with greater frequency.

Most of the land beneath the city is less than 3 feet above sea level. High ground is so scarce that much of the downtown was constructed atop oyster shells discarded during the harvest's heyday.

Growing up in Crisfield, John "Buddy" Ward hardly ever saw standing water. Now, it's just about a weekly occurrence, he said.

"I don't remember 50, 60 days a year with nuisance flooding," said Ward, 58, formerly president of the Crisfield Chamber of Commerce. "It's certainly gotten worse over the years. It takes next to nothing now [to flood]."

Nuisance flooding, also known as "sunny day" flooding, is generally not driven by storms. It usually refers to high tides overtopping sea walls or rainwater backing up through storm grates into city streets. The water rarely rises high enough to inflict serious property damage, but it often leads to traffic snarls and other headaches.

Like many coastal communities in the Bay region, Crisfield's flood woes are expected to worsen in the coming years as climate change causes seas to rise further and

Top left photo: This 2010 image of Crisfield, MD, shows the harbor, Daugherty Creek and marshes of Janes Island. Beyond that is Tangier Sound. (Dave Harp)

Top right photo: Mayor Darlene Taylor (right) of Crisfield, MD, and city grants administrator Jen Merritt stand on 4th Street, one of the lowest lying parts of town. (Dave Harp)

increases the frequency of intense rainstorms.

"The flooding [in Crisfield] is getting so frequent, it's really interfering with people's lives," said Stephanie Dalke, who was part of the University of Maryland research team that performed the cost-benefit analysis of the proposed flood strategies. "And it's only going to get worse. The future projections can get really scary."

In 2021, the city experienced 88 floods with water levels of 1.5 feet, said Elizabeth Van Dolah, a Nature Conservancy scientist. Another six days were wracked by at least 2.5 feet in flooding, enough to swamp a car. At some point between 2050 and 2080, Van Dolah and her colleagues expect those 2.5-foot floods to become a daily scenario.

Taylor said the increasing flooding is already hampering the city's economic growth.

"It creates not just an inconvenience," she said. "It's a deterrent for businesses to come into our community. They don't want to come into a place where their merchandise can become compromised or nobody can access it."

For many residents, Hurricane Sandy in 2012 was a wake-up call. The "superstorm" swept nearly 5 feet of storm surge into the town, flooding hundreds of homes and businesses. Millions of federal dollars flowed into Crisfield to rebuild and raise buildings.

But a comprehensive flood-adaptation program has eluded the community — until now.

Building a partnership

From Norfolk to Baltimore, many large urban centers in the Bay region have immersed themselves in planning and building for a future under climate change. They can do so because of their robust tax bases, which help fund large public works projects.

Many advocates in the emerging field of climate adaptation fear that while some small towns face many of the same climate threats, they don't have access to the same resources and might be left to fend for themselves.

"These kinds of communities fall through the cracks sometimes," said Dalke from the University of Maryland.

With its stable of outside partners — advisors from the state and federal government as well as from nonprofit groups and university research labs — Crisfield has pushed against that tide. In comments to the audience of town residents at the start of an October workshop about the resilience plan, Mayor Taylor gestured toward the top scientists and policy experts at the head of the room.

"Crisfield has never seen an opportunity like this," she said. "There's big money

Flooding inundates 9th Street in Crisfield, MD, after a storm in January 2024. (Dave Harp)

that's happening on the Western Shore. They're getting these types of projects all the time. But here we are with the opportunity to get that type of support."

As the Nature Conservancy-led research effort began churning out computer flood models and cost estimates for various strategies, the town worked with a team at FEMA to turn those proposals into a citywide plan.

Meanwhile, the U.S. Environmental Protection Agency's research and development division has been studying how to protect the community from future storm surges with "green" projects, such as restoring marshes and natural shorelines.

The EPA and another environmental group, Interfaith Partners for the Chesapeake, are planning to host training sessions in environmental leadership for residents.

The impetus behind Crisfield's progress so far, according to several observers, can be traced to one city employee: grant administrator Jennifer Merritt. Her experience includes working in a circuit rider program as a part-time assistant city manager for Crisfield and as development coordinator for a local land trust. She joined the town in her current role in November 2022.

Merritt's knowledge in grant writing and the inner workings of local government cleared the path for other groups and agencies to join the endeavor, Taylor said. "She's that person who understands what the needs of the community are and [how to] match that with the resources that are available."

Authorities in Crisfield, MD, often close roads to nonresidents because of floods. (Dave Harp)

Many smaller communities hit a roadblock when they try to fund big climate projects. Normally, Crisfield would have been on the hook for covering 25% of the FEMA construction grant's total. That would have amounted to more than $9 million of the overall $38 million tab.

But a 2022 federal law led to the Crisfield area becoming designated as one of 483 "community disaster resilience zones" nationwide. Those areas are eligible for paying just 10% of the total price tag. As a result, the town government now would only have to foot $3.8 million of the bill.

Merritt said the town will seek a 1% interest loan from the Maryland Department of Emergency Management to cover that expense. Town leaders, she added, expect to avoid raising residents' taxes in paying back those loans.

The flood-resilience project had to be separated into two phases because the applicable FEMA grant program has a cap of $50 million, Merritt said. Crisfield's Chesapeake Avenue, two-thirds of a mile from the city dock, forms the boundary between the two sections.

The work will address one of the town's longstanding infrastructure problems. There are tide gates already in place around the community, but some have failed over the years from lack of maintenance or a buildup of debris obstructing water flow.

Merritt said some tide gates were installed in such remote, marshy areas that it's all but impossible to keep tabs on them, let alone operate them during an unfolding emergency. The project will add six new gates where they can be more easily accessed.

The project is getting a boost from a flooding fix already in progress. An earlier $1.4 million FEMA grant is helping to finance the design and construction of two of the three pump stations called for in the city's flood plan.

Construction is set to begin on those two pumps in early 2025. If the town gets the $38 million grant, which will be decided later this year, the first phase or work is expected to move forward as early as 2026.

Merritt has been a fixture at public meetings, working closely with the Nature Conservancy on the creation of a community advisory committee.

Frances Martinez Myers, one of the committee's regulars and president of the Greater Crisfield Action Coalition, said she can't wait for construction to start. "It will get messy, I'm sure, when they're doing it," she added, "but I believe it has given us all hope." ■

New report details levels of PCBs in James River watershed

Next phase of cleanup process will better identify sources and corrective action

By Lauren Hines-Acosta

Balcony Falls in Rockbridge County, VA, is one portion of the James River watershed impaired by PCB contamination in fish tissue. (Virginia Department of Environmental Quality)

The Virginia Department of Environmental Quality held a public meeting Feb. 15 to share the latest phase of its work to establish a TMDL, or total maximum daily load, for PCBs in the James River watershed.

The draft study presented at the meeting looks at the amount of PCBs in sediment, fish tissue and water samples collected from segments of the James River and two of its tributaries, the Jackson and Maury rivers.

Researchers found that of the 34 sites where PCB fish tissue concentrations were tested, 23 were above DEQ's threshold, the state Department of Health's threshold or both. The thresholds are different because DEQ focuses on water quality while the health department focuses on keeping people safe when consuming fish.

One key takeaway from the study is that PCB concentrations in fish increase in the James River as it gets closer to Richmond. Samples from Richmond showed the highest concentrations at over 250 parts per billion, which is more than double the health department's threshold.

"One of the messages there is that PCBs are not going away," said Mark Richards, DEQ team leader for the cleanup effort. "They're still in the system. They're very resilient, persistent and need to be addressed."

PCBs, or polychlorinated biphenyls, are harmful to humans at certain levels. They take decades to break down naturally and have been described as "forever chemicals," a phrase also applied to a group of chemicals known as PFAS.

Manufacturers used PCBs in products like electric transformers and paint because they're fire-resistant and resilient. The U.S. Environmental Protection Agency banned them in 1976. Today's PCBs are mostly remnants of these products, but a small percentage comes from current industrial processes.

"Communities that rely on fish from the river as a food source face health risks as a result of widespread PCB contamination," said Shawn Ralston, vice president of programs for the James River Association, in a statement. "Addressing this legacy pollutant has been a goal of the Virginia Department of Environmental Quality for years, and we are encouraged to see a draft report outlining a plan to address PCB contamination in the James."

DEQ recommends that adults do not eat more than three 8-ounce meals per month of fish from these rivers, while the health department recommends no more than two 8-ounce meals per month. Anglers can check the health department's website for the current fish advisories.

The PCB cleanup process for the James River watershed began in 2021 because portions of the rivers didn't meet water quality standards.

The new study is a part of that process, looking only at the James system upstream of Richmond. Researchers used sediment, fish tissue and water samples from 1995, 2016–2019 and 2021 to assess specific PCB levels, identify general sources of the problem and calculate the amount of reductions needed to reach safe levels.

They found that the chemicals are coming from a variety of sources. They include streambed sediment; regulated facilities like wastewater treatment plants and industrial sites; old industrial and spill sites; unregulated sources such as stormwater runoff; and areas DEQ hasn't yet identified.

The biggest contributors are from either regulated sites or stormwater runoff. DEQ plans to decrease concentrations from both. Its next step is to pinpoint sources more specifically and develop cleanup guidance for permitted sites.

PCBs have also collected in river sediment, often leaving bottom-feeding fish like carp highly contaminated. But Richards said water systems like the Jackson and upper James rivers don't have many areas where sediment accumulates, so it's ubiquitous and impractical to remove.

The department plans to reduce PCB levels from regulated sites by 56–99%, depending on the river segment. This could mean removing old electrical systems that have PCBs, finding and addressing old spills at these facilities and reducing stormwater overflows. DEQ is also requiring facilities to collect samples that will provide more recent data the next time they have to renew their permits.

Facility managers who attended the public meeting understand they will have to start screening for PCBs but are unsure as to how.

"I think they've identified the problem," said Andrea Johnson, CEO of van der Linde Recycling. "The problem is that the fish are getting sick, and how to stop that is a harder issue."

Richards from DEQ said they're still developing details on what permitted sites will need to do. However, each facility can set its plan and timeline for removing any sources of PCBs with DEQ approval.

"Just make sure that the schedule is moving forward, that you're actually doing some thing to address the problem," Richards said at the meeting. "Just show some progress as opposed to an actual numerical limit."

Public comments were invited through March 18, and the department is now determining whether revisions are necessary. Then, the State Water Control Board will review the regulatory parts of the plan. If accepted, the board will send the cleanup plan to the EPA for final approval. Richards said the process could take six to 12 months.

"I would certainly hope that by the time this TMDL is approved, that guidance should exist," Richards said. ■

Higher temperatures leaving some plants, trees in the dust

Half of U.S. has shifted to warmer zones in latest plant hardiness zone map for gardeners

By Jeremy Cox

In the middle of the night about five years ago, the towering red oak tree in Jenny Willoughby's yard came crashing down, narrowly missing her house.

"It shook the ground it was so big," said Willoughby, who lives high up on a mountain in western Maryland.

Red oak trees are well-suited to the icy chill that often grips such high elevations, said Willoughby, an avid gardener who, as the sustainability manager for the city of Frederick, often grapples with climate matters. So, she was surprised when she saw warmth-loving white oak tree saplings springing up in the vacated spot instead.

"Something is shifting on the mountain in a quick way," she said.

Hers is a familiar tale across the Chesapeake Bay watershed and elsewhere. Greenhouse gases are warming the planet at unprecedented rates, and colder seasons are heating up faster than warmer seasons. The result: In many locations, plants and trees that prefer cooler weather are getting squeezed out by flora better adapted to warmer temperatures.

The latest Plant Hardiness Zone Map, the nationwide guide showing which plants are likely to thrive in a specific location, illustrates those changes. The color-coded map divides the country into 10-degree temperature zones based on 30-year averages of the lowest annual winter temperature.

It has 13 zones in all, ranging from Zone 1 with average winter extremes ranging from -50 to -60 degrees Fahrenheit (parts of Alaska on the Arctic Circle) to Zone 13 with average winter lows of 60–70 degrees (parts of Hawaii and Puerto Rico).

It further divides those extremes into 5-degree "half zones" designated "a" and "b." For example, if a location's typical lowest winter temperature is between 0 and 5 degrees, such as Gettysburg, PA, it is in the "7a" zone. If the lowest temperature falls between 5 and 10 degrees, as in Richmond, it is in the "7b" zone.

The U.S. Department of Agriculture published the new map last November. It shows that about half of the country shifted to one half-zone warmer since the agency's last map in 2012. A switch to a warmer half zone indicates that a location's lowest average temperatures increased between 0 and 5 degrees.

American beech trees are expected to struggle and decline slightly in number as temperatures increase in the Mid-Atlantic. (Dave Harp)

Some notable locations sliding into new zones in the Bay watershed included downtown Richmond, from 7a to 7b; DC's National Mall, from 7b to 8a; Harpers Ferry, WV, from 6b to 7a; Gettysburg, from 6b to 7a; and Binghamton, NY, from 5b to 6a.

Just because a location didn't get absorbed into a new zone doesn't mean it's necessarily in the clear. Some locations have warmed but not tipped into the next threshold.

The scientists responsible for the mapping caution against blaming climate change entirely for the shifts. The 2023 map drew data from 68% more weather stations than its 2012 counterpart, so some of the differences may be attributable to having more localized information, said Chris Daly of the Oregon State University research team that has worked with the USDA on the past two versions of the map.

Furthermore, the average extreme low is based on only 30 years' worth of records, he noted. So, it wouldn't have taken many cold snaps during the 1991–2020 period on which the new map is based to bring down the average figure.

That said, climate change is likely to have had some influence on the numbers, according to Daly. "We can't say with certainty that the changes we see from one map to the next is solely due to climate change," he said, "but we can feel confident that it's a likely contributor."

The U.S. Forest service rates eastern hemlock as "very poor" candidates to survive the warming underway in the Chesapeake Bay region. (Dave Harp)

Nationwide, the typical coldest annual temperature warmed by about 2.5 degrees, Daly said. In the Chesapeake Bay region, those coldest spells ranged between 2 to 5 degrees higher compared with the 2012 map, ranking it among the fastest warming areas in the country.

Some of the most drastic shifts in the Bay region have been in Pennsylvania. Zone 5a, where temperatures could plunge as low as -20, appeared in a handful of the state's northernmost counties in the 2012 map. As of the 2023 version, that zone had been extirpated from the state.

Between the two Pennsylvania maps, zone 5b (where temperatures range between -15 to -10 lows) contracted considerably — from covering nearly the entire northern half of the state to barely holding on in the state's north-central and northeastern quadrants.

"I was a little bit taken aback by how quickly it happened," said Michael Shepard, a master gardener and environmental professor at the Commonwealth University of Pennsylvania-Bloomsburg. "Those zones have probably been stable for centuries before that."

The retraction of extreme cold puts more of the state's 300 million ash trees at risk of deadly infestations by emerald ash borers, experts say. The invasive insect's larvae don't die off in the winter unless temperatures plunge to about -10 degrees.

The USDA created its first plant hardiness map in 1960. Since then, many locations have shifted a full zone warmer or more. Between 1990 and 2023, for example, Norfolk, VA, moved up from zone 7b (a low of 5–10 degrees) to 8b (a low of 15–20 degrees).

"It's just another sign of climate change, and I don't think it's positive news," said Les Parks, director of horticulture for the Norfolk Botanical Gardens.

Southeast Virginia has gotten so warm in recent years that gardeners have been able to grow sabal palmetto trees without taking measures to shield them during the coldest winter nights, Parks said. Also known as cabbage palms, sabal palmettos are the official state tree of Florida and South Carolina.

Meanwhile, Parks worries about cold-adapted species getting forced out of Virginia entirely, especially white pines and Carolina hemlocks. Now more than ever, experts advise gardeners to consult a resource such as the U.S. Forest Service's Climate Change Tree Atlas to determine which tree species are likely to thrive or struggle in their locations in the decades ahead.

The warming is likely to make the Bay region more hospitable to invasive plants as well, experts say. Kudzu, English ivy, Japanese honeysuckle and others are expected to flourish amid the warmer temperatures, wetter weather and increased carbon dioxide concentrations in the atmosphere.

"It's tough on gardeners because we've got more weeds to pull," said Sara Tangren of the National Capital Partnership for Regional Invasive Species Management. ■

VA lawmakers pass bill requiring Native input on permits

Federally recognized tribes would be consulted on projects that could impact their land or communities

By Lauren Hines-Acosta

The Virginia General Assembly passed a bill on March 6 that requires state agencies to consult federally recognized tribes on permitted projects on lands that impact the tribes. The governor has yet to review the bill.

If the governor signs the bill, it will further demonstrate the sovereignty of Virginia's federally recognized tribes. With federal status comes more capacity for tribes to steward their lands and advise state agencies on land use.

Virginia and New York are the only states with federally recognized tribes in the Chesapeake Bay watershed.

"I believe that the bill we're talking about today is, in many respects, doing nothing more than asking for the commonwealth to honor the obligations that they've already made," said David Darling, a tribal council member of the Nansemond Indian Nation.

The bill directs state agencies to treat federally recognized tribes as separate sovereign nations. Those agencies include the Department of Conservation and Recreation, Department of Environmental Quality, Virginia Institute of Marine Science and Department of Historic Resources.

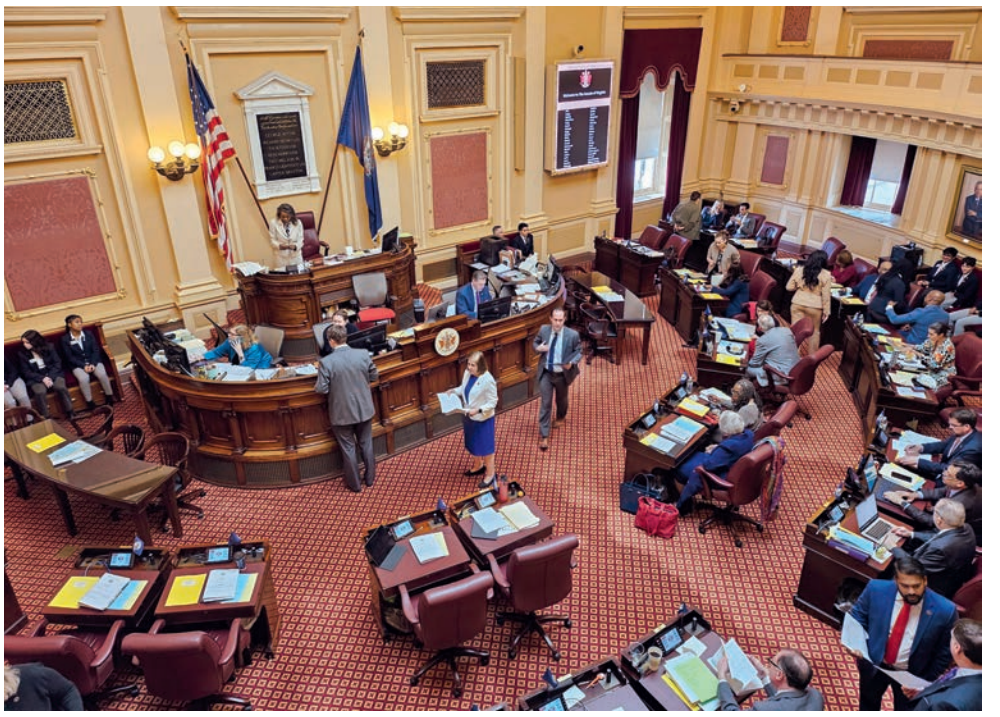
While the bill emphasizes concerns about burial sites and human remains, it also allows tribes to give input on environmental concerns when it comes to permits on lands that impact them.

"It's going to give us the opportunity to protect the environment over land where we have stewardship, and that is super important," Darling said.

Tribes can't veto projects or change deadlines. But it does give them a chance to advise agencies on environmental concerns and what to do if Indigenous remains are found. It could also be more cost-effective for developers to address these issues early in the planning stage.

The obligations Darling mentioned include agreements like the 1677 Treaty, rights that come with federal recognition and a 2021 executive order to mirror federal requirements. The treaty between English colonists and certain tribes, including the Nansemond Indian Nation, says tribes have hunting and fishing rights plus control over their land.

Out of the 11 tribes in Virginia, seven recently achieved federal status in 2016 and 2018. The five state-recognized tribes are not included in the bill. Sen. Tara Durant (R-Fredericksburg) said the state-recognized Patawomeck tribe in her district took issue with the bill during a senate session on March 6 because it failed to include state-recognized tribes. Sen. Dave Marsden (D-Burke) said they could be included in a different bill next year.



The Virginia Senate met on March 5-6 to vote on various bills before the end of the session on March 9. (Lauren Hines-Acosta)

The challenges in securing federal recognition can be traced back to Virginia's 1924 Racial Integrity Act, which ordered birth and death certificates to list any Native American descendent as Black. This made it difficult for people to find accurate information about their heritage and enroll for citizenship.

Now that seven Virginia tribes are federally recognized, the state needs to update its processes to interact with them as self-governing nations.

"They are sovereign peoples here with their own citizens, and it's time for Virginia to respect that and treat them as such," said Del. Paul Krizek (D-Fairfax), who is sponsoring the bill.

Three years ago, former Gov. Ralph Northam issued an executive order to update how the state interacts with tribes on permitted projects. This bill was made to codify that order, but it failed to make it past the Republican-led House in the last two years.

Rassawek, or Point of Fork, was a site of contention between the James River Water Authority and the Monacan Nation around 2018. The James River Water Authority received a permit from DEQ to build a water pump site there, but the Monacan Nation identified the site as an important tribal capital and burial site.

Point of Fork, or Rassawek, is a site in Virginia where the James River Water Authority tried to install a pump station until the Monacan Indian Nation identified it as an important cultural site in 2017. (Christine Grubbs/Cultural Heritage Partners)

It cost more than $20 million to move plans for the pumping station to a different location, said Justin Curtis, James River Water Authority attorney. Krizek's office pointed out that this bill could help avoid such costly changes. There is disagreement, though, on when the best time would have been to consult the Monacan Nation.

Many tribes are active in land stewardship. The Nansemond Indian Nation operates oyster restoration projects. The Rappahannock Tribe focuses on its river's fish and water quality. The Upper Mattaponi Tribe plans on operating American shad fish hatcheries on riverfront property it acquired in May 2023.

"We just have generations of knowledge of the rivers and the environmental issues that we have lived to see," said Upper Mattaponi Chief W. Frank Adams. "So I think just going off native cultural experiences would be a tremendous benefit for folks as they start making plans to do things."

Adams cites how American shad and other native fish might have a greater presence in rivers if the Upper Mattaponi tribe had been consulted about the state's decision to introduce invasive blue catfish as sportfish.

The Chesapeake Bay Foundation, Virginia Conservation Network, National Parks Conservation Association and Nature Conservancy endorsed the bill in a senate subcommittee meeting on Feb. 27 or through written comments.

"Tribal nations are the original stewards of our lands," said Michaela Pavlat, Indigenous Partnership Field Representative with the National Parks Conservation Association. "So they should, again, like we were saying, have a seat at the table, and then should be leading in these decisions."

Because the bill went to the Senate floor less than a week before the session ended on March 9, the governor had 30 days after the closing to sign the bill into law. If the bill goes into effect, the secretary of the commonwealth will choose a liaison by Sept. 1 who will create a list of areas the tribes will consult on by Jan. 1, 2025. ■

Data center battle in MD gets early preview in rural county

Frederick County Council says 'no' to more development restrictions around Sugarloaf Mountain

By Jeremy Cox

With nearly 300 data centers on the ground and dozens more on the way, Northern Virginia is home to the world's largest concentration of those sprawling facilities. On the opposite side of the Potomac River in Maryland's Frederick County, local officials, real estate developers and environmentalists don't talk about *whether* data centers will leapfrog over the river but *where*.

"Strategically, the county happens to sit in a place where it can take advantage of a big opportunity," said Tom Natelli, a local real estate magnate and board member of a company pursuing a 2,100-acre data center park in the county. "But in order to do that, it's going to have to identify the places where additional development is appropriate."

That tension has been on full display in Frederick County over the fate of 20,000 acres of picturesque farmland, rolling hills and a beloved mountain park. The ensuing debate, which pitted grassroots community organizations against powerful economic interests, offered a preview for how the data center dilemma might unfold across suburban Maryland in the coming years.

A proposed zoning amendment, or "overlay," would have prohibited most types of large commercial and industrial developments, including data centers, in an area it dubbed the Sugarloaf Treasured Landscape. Beginning in 2020, county officials convened dozens of public gatherings with local landowners, business leaders and others to craft a management plan for the mostly rural southeastern region of the county.

After several contentious meetings, the Frederick County Council delivered the apparent final death knell to the concept in December, with a majority rejecting the development limits. Conservationists say they are now more worried about the region's future than ever. "'Crestfallen' is a good way to describe it," said Steve Black, president of the Sugarloaf Alliance, a local conservation group.

The area is home to Sugarloaf Mountain, a popular destination for hiking that is open to the public but owned by a private foundation. Supporters said they hoped that passing the proposed zoning overlay would stanch the flow of development toward the mountain and its surrounding landscape

Steve Black, president of the community group Sugarloaf Alliance, is strongly opposed to data center development in the farm-dotted region around Sugarloaf Mountain in Frederick County, MD, visible in the background. (Jeremy Cox)

from the nearby Interstate 270 corridor.

"It's a spectacular view up there," Councilman Steve McKay said during the deciding hearing about the overlay in December. "That's what makes it cherished and treasured. The last thing you want to do is to look down and see warehouse-like buildings right there at the base of the mountain."

Demand for data centers has surged worldwide, fed by the pandemic-induced spread of remote work and the proliferation of content-streaming on mobile devices. To make this modern internet possible, a growing phalanx of windowless, warehouse-like buildings has popped up along the fringes of many cities, each stacked with routers and servers.

Public officials often see the projects as an economic boon because of the millions of dollars in tax revenue they generate without requiring many costly public services in return.

To rev up the sector, the Maryland General Assembly in 2020 passed a tax exemption on data center equipment and appliances that significantly reduced the cost to construct the facilities in the state. And Democratic Gov. Wes Moore is championing a measure in the current session to shield proposed centers from review by the state's top electricity use regulator.

Frederick is doing the right thing by taking a measured approach to data centers, said Kelly Schulz, head of the Maryland Tech Council, a pro-data center trade group. Schulz, a Frederick County resident, was part of an 11-member workgroup appointed last year by County Executive Jessica Fitzwater to recommend how and where the facilities should be developed. As part of its deliberations, the group toured Loudoun County, the epicenter of Virginia's data center boom.

"Everyone agrees we don't want Frederick to look like Loudoun," Schulz said. "Even the folks in Loudoun County would say that if they [could do it] over again, they would have done more placement planning and sustainability planning. Now, Maryland has a chance to learn from what Loudoun County has experienced over the last 20 years."

Environmentalists cite several drawbacks with data centers. They are drains on the electricity grid, requiring up to 50 times the energy per floor space of a typical office building. High volumes of water are piped in to keep their servers cool, with some facilities needing the equivalent of what a city of 50,000 residents uses in a day. And, if that power goes out, they turn on large banks of emergency generators that burn diesel or natural gas, releasing pollutants into the air.

Steve Findlay, president of the Sugarloaf Citizens Association, a conservation group founded in 1973, said his organization's opposition to data centers is rooted in maintaining the area's bucolic charm. "This is a rural agricultural area, and that's the way people want to live here," he said.

The county currently is home to two small data centers: one owned by Fannie Mae and one by the Social Security Administration, both in Urbana. But a project under development in Adamstown on the site of a former aluminum smelting plant could put Frederick firmly on the data center map.

Partnering with Natelli, the Texas-based startup Quantum Loophole has been pitching the property to potential tenants as a park of data centers. But the project hit a roadblock last October when its first tenant, Aligned Data Centers, lost its case before the state Public Service Commission for a waiver from state and federal environmental rules to equip the operation with 168 backup diesel generators.

Conservationists were alarmed in 2022 when word spilled out that Amazon Web Services had been in talks with the county about developing at least one data center just west of Interstate 270 within the Sugarloaf Treasured Landscape boundaries. The proposal fell through, but the episode, they said, underscored the urgency behind enacting the zoning overlay.

The county council approved a comprehensive land use plan for the Sugarloaf area in 2022. But without the next layer of protection — a zoning overlay — development opponents must remain "consistently on the hair trigger to fight these [data center] proposals," Black said.

Natelli owns a large swath of land along the west side of I-270 that is within the Sugarloaf plan limits. He said he hopes the county will consider making it possible to construct data centers along the highway because of its proximity to needed infrastructure available on the opposite side of the road.

The rest of the Sugarloaf area should be allowed to retain preservation-oriented development regulations, he added.

Nearly the entire area around Sugarloaf Mountain is zoned for agricultural or resource conservation uses. But conservationists contend that developers could get around that by having parcels within the Sugarloaf area redrawn into a more-lenient planning area — or by pursuing "piecemeal zoning," which sanctions new developments in the event of a purported flaw in the original zoning or a change in the community's character.

In its final report, published March 1, Fitzwater's workgroup urged the county to mandate a ceiling on data center development based on metrics such as the total square footage of all facilities or energy usage by the sector. But the group didn't prescribe any specific limits, leaving that to be decided later.

The workgroup also identified three potential growth areas for the facilities in the county's southern tier: Adamstown, Brunswick and Urbana. While the report didn't recommend data centers in the sensitive Sugarloaf region, it left the door slightly ajar, noting that its proposed locations were "neither exhaustive nor exclusionary." ■

Predatory bugs, 'bulletproof' survivors may save hemlocks

Multi-pronged attack may eventually control harmful insects, save keystone tree species

By Ad Crable

The fight is far from over, but scientists are increasingly optimistic that the once-ubiquitous eastern hemlock trees might, with help, bounce back from a 50-year assault by invasive woolly adelgids.

The aphid-like insects, native to the Pacific Northwest and Asia, found their way to the eastern U.S. in the early to mid-1900s and have been spreading and killing hemlocks by the millions ever since.

But a combination of bio-controls, insecticides, habitat doctoring and a disease-resistant hemlock hybrid — plus the discovery of native trees that are somehow immune — may keep the beloved and valuable tree from disappearing in eastern forests. That's an outcome that arborists would not have predicted with confidence 20 years ago.

"It's a long game, but it's a long game we are going to win," said Tammara Van Ryn, director of the Nature Conservancy's Adirondack Park Invasive Plant Program. The conservancy, along with the U.S. Forest Service, has embarked on a Trees in Peril program to find, monitor, research and breed pest-resistant hemlocks, along with efforts for similarly imperiled native beech and ash trees — even the nearly extinct American elm.

"I am sure the hemlock is going to stay on the landscape," she continued. "We've learned a lot of lessons from mistakes with the American chestnut that we're not repeating. We're using every tool to keep as many hemlocks alive to get to the point where we can breed more-resistant trees and get them out into the forest."

The primary tools that will buy that necessary time are chemical treatments, which keep the insects at bay for several years per treatment, and promising biological controls: nonnative insects that feed on the adelgids. Forest managers and scientists have been experimenting with predatory beetles for decades. Recently, they've added adelgid-eating silver flies to the experimental arsenal.

Wooly adelgids do their often-fatal damage by sucking nutrient-rich fluids from hemlock needles, weakening the tree and reducing foliage. The bugs, with two egg-producing life cycles per year, have rapid population growth.

In Pennsylvania, where the eastern hemlock is the state tree and represents about

This stand of healthy hemlocks is part of Pennsylvania's Tiadaghton State Forest. (Nicholas Tonelli)

A woolly aldegid infestation is easy to spot, with waxy-woolly masses at the bases of tree's blade-like needles. These house the eggs and immature stages of the insect. (USDA Forest Service)

A silver fly that feeds on woolly adelgids in the Pacific Northwest is being released into Chesapeake Bay states to help save hemlocks. (Cornell University Insect Collection)

15% of all forest trees, woolly adelgids are found in all 67 counties.

In Virginia, where the eastern U.S. infestation is thought to have begun, foresters estimate a loss of roughly 2% of its hemlocks annually. Shenandoah National Park has been particularly hard hit, though. According to the park trust, 95% of the property's mature hemlocks have died during the last 25 years.

In Maryland, the hotspots appear to be the state's four westernmost counties. Catoctin Mountain Park in Frederick County has lost a significant portion of its hemlocks, important for shading and cooling the park's trout streams, in recent decades.

Climate change could complicate matters. Substantial cold kills the woolly adelgid, so warmer winters generally work to its advantage — and may extend its range northward.

"For a long time, we had a series of really cold winters that kept adelgids at bay," said Justin LaMountain, a U.S. Forest Service silviculturist at Pennsylvania's Allegheny National Forest, which has hemlocks up to 300 years old. "Since 2017, we have had much milder winters and the pest has really expanded significantly to the point where we have an infestation [here]."

"It all comes down to the level of stress on a tree. As the climate warms or changes, it makes the trees susceptible to other stressors," said Rosa Yoo, forest health manager in the Pennsylvania Department of Conservation and Natural Resources' Bureau of Forestry.

Despite the new headwind, the once widely accepted possibility of hemlock extinction in the region is giving way to optimism, as promising advances emerge on several fronts in the fight against woolly adelgids.

"It is important to tackle these challenges on a landscape scale," LaMountain said. "Anything less than a collaborative effort is going to have a high probability of failure."

Unleashing predators and chemicals

The newest biological controls to be thrown into the battle are two species of silver flies. The insects, each about the size of a grain of rice, feed on adelgid larvae that infest western hemlocks in the Pacific Northwest.

The two species feed exclusively on woolly adelgids, and scientists conducted tests to make sure the nonnative insects wouldn't bring unintended consequences to East Coast forests.

The silver flies will not replace the predatory beetles that have been deployed until now. Instead, they will supplement them, giving the biological attack a seasonal one-two punch. Scientists have found that the beetles only prey on the first of the adelgid's two yearly generations, in the fall and winter. Silver flies eat the eggs of the second generation in the spring.

The Forest Service released 2,800 silver flies, provided by Cornell University, into the Allegheny National Forest in November 2023. The flies joined forces with an estimated 3,500 predatory beetles grown at Virginia Tech that have been unleashed there since 2020.

Other releases of silver flies are occurring in Bay drainage states. A location in Giles County, VA, is the first to host both species of predatory beetles and both kinds of silver flies.

In a huge development, new generations of silver flies are being found at release sites throughout the region, showing they are making themselves at home and surviving by eating adelgids. King William and Wythe counties in Virginia were the first to provide proof that both fly species were reproducing after a release.

Remains of hemlocks toppled by woolly adelgids lie in the Tuscarora State Forest of Pennsylvania. (Lara Lutz)

As of January 2023, 46,000 silver flies of both species had been released at 65 sites in the eastern U.S.

"I'm optimistic that bio-controls will definitely provide some control of the woolly adelgid, but bio-control takes a long time for these populations to build up. We need to keep hemlocks alive in the short term," said Nicholas Dietschler, research support specialist with the New York State Hemlock Initiative.

One short-term fix that forest managers have recently turned to is "habitat adjustment" — clearing away other tree species to give hemlock stands more sunlight. Hemlocks are famously shade-tolerant, but, like nearly all trees, they grow better in direct sunlight. And adelgid growth appears to be less robust in direct sun.

Insecticide treatment is an even more immediate and widely practiced short-term approach. Like habitat tweaks, though, it is not practical for remote stands of hemlocks. Still, where it can be done, each injection of the right chemical into the soil under hemlocks, or directly into the trunk, has been shown to prevent infestation for five years or more.

Until recently, the treatments have mostly been used to save well-known groves of hemlocks and trees in public areas, such as around campsites and in parks. But efforts are increasing to treat mature hemlocks deep in the woods — particularly where the trees perform a crucial ecological service — like preserving wild trout habitat by shading and cooling streams.

Hybrids and 'bulletproof' natives

A single pocket of hemlock trees left standing after a large die-off in New Jersey has been a beacon of hope.

Dubbed the "bulletproof stand," a grove of hemlocks near the Delaware Water Gap survived an adelgid infestation that killed surrounding trees. Scientists aren't sure why, though recent research found tree stems with elevated levels of a possibly insect-repellant terpene — a class of compounds found in most plants, often responsible for smell or color.

Cuttings from New Jersey hemlocks that were not killed by woolly adelgids await planting at a research facility in Ohio. (Holden Forest & Gardens)

Pesticide is injected at the base of an eastern hemlock in a Pennsylvania state forest to ward off woolly adelgids. (Pennsylvania Department of Conservation and Natural Resources)

Cuttings from the New Jersey trees are being grown at research nurseries and in forest settings in several states. Some are deliberately infected with adelgids to see if the resistance holds up in different locations.

If the resistance persists and the trees are mass produced, they could replenish forests depleted of hemlocks. So far, the trees are growing well and staying healthy.

But vetting is still in its early stages, cautions Rachel Kappler, forest health collaborative coordinator at Ohio's Holden Forests & Gardens, where some of the trees are being tested.

"We're going to be awhile [getting to] that mass production," Kappler said. "We're also looking for different trees, other than ones in New Jersey."

Indeed, everyone from land managers, conservation groups and the public are invited to find other adelgid-resistant hemlocks in Bay drainage states to increase genetic diversity.

As part of its Trees in Peril project, the Nature Conservancy is promoting TreeSnap, an app that collects reports of so-called "lingering trees." Anyone who finds apparently healthy hemlocks living among others that are dead can use the app to report the location and other details. (Free download is available at treesnap.org.) This spring, researchers will start venturing out into the field, checking out the reports.

Another hemlock breeding project involves hybrids. The U.S. National Arboretum research facility in Beltsville, MD, has created a cross between an adelgid-resistant Chinese hemlock and a Carolina hemlock that closely resembles the eastern hemlock but can better tolerate infestations.

Two specimens, called Traveler and Crossroad, were planted and evaluated in several states, including Pennsylvania, Virginia and Maryland.

Root cuttings from the two trees are now being distributed to commercial nurseries so they can be grown for eventual sale. It's likely to be five years or so before there are enough trees old enough to be widely available to the public.

The hybrids would most likely be used in landscape settings. Although there is the possibility that hybrids could be used to replenish hemlocks in forests, there are some unknowns, notes Susan Bentz, horticulturist at the National Arboretum.

In addition to the challenge of growing enough trees, Bentz said, there are questions about whether young hybrids could survive deer browsing or dry periods in a forest. And, she added, "Some organizations may decide not to plant nonnative hemlocks in a forest."

There is no widely agreed-on order of battle for the multifaceted defense against the woolly adelgids, but a united front appears to be taking shape among federal and state agencies, universities and private partners in the Mid-Atlantic states. A tide of hope is rising that the eastern hemlock may not be doomed.

That's encouraging to people on the front lines of the battle, like the Nature Conservancy's Van Ryn. "The hemlock, if you will, is a tree of my heart," she said. "There is something majestic about the tree, and there is something almost magical about wandering among a hemlock grove." ■

Striped bass fishing in limbo for much of Bay region

Threat of shutdown possible as Atlantic board rejects plans by MD, PA, Potomac commission

By Timothy B. Wheeler

All fishing for striped bass in Maryland, Pennsylvania and the Potomac River could face a shutdown, unless fisheries managers in Atlantic coast states can resolve issues over how to meet new catch curbs.

After an at-times testy debate, the striped bass management board of the Atlantic States Marine Fisheries Commission voted March 26 to reject plans by Maryland and the Potomac River Fisheries Commission over how they would meet required commercial catch reductions. It also rejected Pennsylvania's plan because it sought to delay imposition of mandated recreational catch limits.

The Atlantic states commission, which regulates inshore fishing for migratory species, voted in January to curtail both recreational and commercial catches of the fish commonly known in the Chesapeake Bay region as rockfish. They did so in response to a worrisome spike in the recreational catch along the coast in 2022, along with a five-year stretch of poor reproduction of the fish in the Bay, their primary spawning and nursery grounds.

Under rules scheduled to take effect May 1, recreational anglers will be limited to just one fish per day within narrow minimum and maximum size limits. Commercial fishers face a 7% reduction in their annual quota.

The cutbacks are particularly controversial in Maryland, where on March 8 groups representing commercial watermen and charter fishing businesses filed a federal lawsuit challenging their legality. The case is pending.

At its March 26 meeting, the striped bass board approved all but three of the affected East Coast jurisdictions' plans for tightening catch rules.

At issue with the plans for Maryland and the Potomac River were provisions for delaying action until 2026 if their 2024 commercial harvests exceed the 7% cutback. Under the rules, jurisdictions that exceed that limit would have to offset the overage the following year with further reductions.

But Maryland and the Potomac fisheries agency said they wouldn't be able to make adjustments until 2026. Because of a lag in reporting, they said, they won't know until spring 2025 at the earliest if the 2024 commercial harvest overshoots the quota.

Striped bass, also called rockfish, are a popular species for anglers on the Chesapeake Bay and its rivers. (Will Parson/Chesapeake Bay Program)

Other states' board representatives were unmoved and criticized the stance of Maryland, which has the largest commercial striped bass fishery on the East Coast. The Baywide commercial catch quota for this year under the new rules is nearly 2.8 million pounds, with Maryland allotted nearly half, Virgina one-third and the Potomac River about one-fifth.

"It seems to me there's an opportunity to take action in 2025 for Maryland," said Emerson Hasbrouck, a board member from New York. "They're just not willing to do it."

Mike Luisi, a board member and Maryland DNR fisheries manager, countered that his agency lacks the resources to move that quickly. He said later that DNR has just one full-time employee assigned to manage the commercial striped bass fishery of some 900 license holders, each allocated an individual transferable catch quota.

Moreover, Luisi argued that the "administrative burden" was not warranted. Maryland's commercial harvest has usually been below the annual quota, he said, so the number of fish at stake was likely to be "biologically insignificant." Coastwide, recreational anglers are estimated to be responsible for 90% of the striped bass mortality, both from harvest and from fish dying after catch-and-release.

Maryland, Pennsylvania and the Potomac River Fisheries Commission have until April 12 to submit plans that comply with the new rules.

But Dennis Abbott, a board member representing New Hampshire, warned against making exceptions, saying the striped bass stock has been experiencing "death by a thousand cuts."

"I think it's imperative," he said, "that we stick to the management plan, and states, fortunately or unfortunately, do what they have to do to be in compliance."

The Virginia Marine Resources Commission had already handed out tags for tracking each fish caught commercially before the commission decided to cut the quota by 7%. But Pat Geer, Virginia's deputy fisheries chief, said the state requires commercial fishers to report their catch electronically, so his staff can monitor the harvest and close the season early if it appears the quota may be exceeded.

Maryland DNR doesn't require commercial harvesters to report their catch electronically, so it lacks the ability to track numbers so closely, Luisi said. Legislation is pending in Annapolis that could change that.

Pennsylvania drew disapproval because it sought to delay imposition of the new one-fish-per-day and size limits because it would otherwise take effect midway through its April–May season for striped bass fishing. It argued that the change would be procedurally burdensome, confusing and could result in fishing violations. But the board denied the request and directed the state to try to get the new rule in place by May 1.

The board gave Maryland, Pennsylvania and the Potomac fisheries agency until April 12 to submit revised plans that comply with the new rules. If any of the plans fail to do so, then the board at its May 1 meeting could decide to ask the U.S. Commerce Secretary to impose a moratorium on all striped bass fishing for individual states deemed in noncompliance.

Robert T. Brown Sr., president of the Maryland Watermen's Association, said the stance of the Atlantic states commission is "unjust, unfair and uncalled for."

The Maryland Charter Boat Association and the Delmarva Fisheries Association, which represents commercial harvesters, have petitioned a federal court to block the new catch limits entirely, arguing they are unwarranted and could impose severe hardship on their members.

Representatives of recreational fishing and conservation groups called on Maryland to meet the commission's requirements.

"Failing to do so could trigger a closure of the fishery in state waters and a massive economic hit for Maryland's recreational fishing and boating economy," said David Sikorski, executive director of the Coastal Conservation Association Maryland.

"With striped bass being at the level they are," said Allison Colden, Maryland director of the Chesapeake Bay Foundation, "it's ever more important that we are doing as much as possible [and] that we are reducing fishing mortality in the timeline set by the board."

Luisi told the board before its vote that he wasn't sure Maryland could offer any revision to satisfy the critics, but he indicated afterward that the state would try.

"How we're going to put together a new approach has yet to be determined," he said, but added, "We're going to fall in line and do what they asked us to do." ■

Read more about the striped bass lawsuit at bayjournal.com

As rain fell, sewer systems across the Bay region buckled

Millions of gallons of diluted raw sewage entered waterways

By Jeremy Cox & Ad Crable

Intense rainfall Jan. 9–10 represented a real-life stress test for sewage treatment systems across the Chesapeake Bay region. Many failed.

Millions of gallons of diluted raw sewage gushed out of faulty pipes and antiquated collection systems. The cumulative effect was like a gigantic toilet flushing into the streams and rivers that drain into America's largest estuary.

Wastewater treatment plants are often cited as one of the region's biggest success stories as state-of-the-art, pollution-scrubbing technologies installed at hundreds of facilities have reduced their nitrogen discharges by 45% since 2009, according to the state-federal Chesapeake Bay Program.

But many cities and counties rely on outdated "combined sewer" systems to transport wastewater to treatment plants. These systems also collect rainfall that flows into storm drains along city streets, combining it with everything that's flushed down toilets or washed down indoor drains. Under normal conditions, the combined stormwater and sewage systems flow to wastewater treatment plants before getting discharged into a river.

But to prevent backups into people's homes or at wastewater facilities during monumental rainfall events, those systems are designed to let the watered-down sewage overflow into local waterways.

Other, more modern "sanitary sewer" systems keep stormwater and sewage separated but can still be vulnerable to rain-induced overflows. Rainwater can seep into the systems through some combination of cracked pipes, faulty manhole covers or improperly connected downspouts.

The *Bay Journal* obtained sewer overflow records through public information requests from the three states with the most territory within the Bay's drainage basin: Maryland, Pennsylvania and Virginia. The analysis concentrated on the Jan. 9–10 storm as an example of the rainfall expected as extreme storms become more common.

Over a span of about 14 hours, the storm dumped up to 3 inches of rain. That's about as much precipitation as the Bay region would typically get during an entire January.

Warning signs were posted along a small creek at the National Arboretum in the District of Columbia after a sewage overflow. (Dave Harp)

Across the portions of the three states lying within the Bay's drainage area, municipal wastewater facilities released at least 296 million gallons of sewage-laden stormwater during the storm and its aftermath, the records show. The actual total is almost certainly higher because several communities said they lacked the means to estimate how much wastewater escaped, often citing logistical problems with accessing spill locations during flooding.

Pennsylvania led the way, with 58 municipalities reporting the release of about 240 million gallons of mixed stormwater and sewage. Maryland recorded about 36 million gallons in spills, followed by Virginia with 20 million gallons.

Pennsylvania's outlier status owes largely to its having more combined sewer systems than any state — about 17% of the nation's total.

The state Department of Environmental Protection says it has made significant strides in reducing the amount of raw sewage overflows. For example, the number of combined sewer systems in the state has been reduced from 150 to 120, said DEP spokesman Neil Shader. And the number of discharge points where overflow pollution is released has fallen from 1,900 to 1,584.

But the two-day January rainstorm highlighted just how much tainted water still escapes the systems.

The combined sewer systems accounted for 236 million gallons, or 98%, of the total amount spilled in the state during the storm. Altoona released almost 59 million gallons, Hazleton 56 million gallons and Harrisburg 48.6 million gallons.

Sewage-tainted stormwater backs up onto a street in Cambridge, MD, after a rainstorm in January. (Dave Harp)

"These sudden bursts of storms … can just wipe out all the [combined sewer] improvements we've seen in a year," said Charlotte Katzenmoyer, CEO of Capital Region Water, which is under a consent decree to reduce combined sewer overflows from the Harrisburg area into the Susquehanna River. "We're fighting climate change."

Still, the impact on the Bay is relatively small. Bay Program computer models suggest that combined sewer overflows contribute an average of 1.2 million pounds of nitrogen annually to the Bay, about half of 1% of the total. That's down about 30% over the past few decades because of actions such as decoupling the wastewater and stormwater systems and expanding holding capacity.

But the spills can inflict serious environmental damage to local streams and rivers. And the bacteria-laden slurry can pose serious health threats to people and pets that come into contact with water.

Shader said DEP anticipates municipalities will account for stronger storms as they adjust their long-term plans to control overflows in coming years.

Those changes come at a cost, though.

The EPA and DEP sued Capital Region Water, resulting in a modified consent decree in 2023. Capital Water agreed to develop a plan to drastically cut sewer overflows by separating some sewage and stormwater pipes, replacing or lining leaking pipes, and adding temporary underground storage for stormwater so it won't mix with untreated sewage during storms.

According to Katzenmoyer, the utility has spent $200 million over the last 10 years on the combined sewer overflow problem and plans to spend $250 million more over the next 10 years, with a particular focus on "green infrastructure" to absorb stormwater. But she stresses that Harrisburg is a cash-strapped city, and the immensity of the problem simply can't be borne by ratepayers.

"Yes, EPA is pushing us. That's their job," she said. "And we want to do the right thing. It's just a matter of what we can afford."

In most communities, there's no easy fix. Nearly every city with sanitary or combined sewer overflow problems faces obstacles with acquiring funding and overcoming the complexities involved with overhauling a sewage system often built many decades ago. Efforts to stop the spills can drag on for years, according to a U.S. Governmental Accountability Office report released last year.

One of the places highlighted in the report was Cumberland in Western Maryland. The city of 45,000 people first submitted a plan to the state in 1994. The plan has evolved into a series of projects that seek to eliminate or capture at least 85% of the combined sewer discharge. Over the years, the city has invested about $60 million and, as of the report's publication, expects to spend another $90 million to finish the work.

"Our best guess for the start of construction is 2028 and final completion in 2031," said City Administrator Jeffrey Silka in an email. "The city will need several more years in order to finish our work due to the massive scope/cost of the projects."

A combination of rainfall from the Jan. 9–10 storm and snow melt overloaded Cumberland's beleaguered wastewater system, resulting in nearly 7 million gallons of spilled sewage. ■

Scientists work to address pollution from Bay region's springs

Bioreactors seem a promising option, but incentives for landowners are needed

By Karl Blankenship

There's not much that seems special about the water gurgling out of the ground at Peyton Yancey's farm in Virginia's Shenandoah Valley. It is clear and cool. At times, the area around the spring is full of salamanders. Last year, it attracted nesting geese.

"This is Smith Creek right here — the origin story," said Kurt Stephenson, as he knelt by the remains of the springhouse foundation.

The spring is, indeed, the starting point of a 35.5-mile waterway that flows to the North Fork of the Shenandoah River.

Along the way, the rivulet is joined by other creeks and springs as it drains more than 100 square miles of forests and farmland. It also gathers nutrients — nitrogen and phosphorus — from those areas, much of which will eventually work its way to the Chesapeake Bay. There, they contribute to algae blooms and poor water quality.

But part of the "origin story" at the spring is that Smith Creek is polluted with high levels of nitrogen before it even begins, much of which likely originated many miles away and many years ago.

"What is coming out of this spring, on average, is about 16,000 pounds of nitrogen a year," said Stephenson, a Virginia Tech professor of agricultural economics.

That, he noted, is nearly three times as much as the amount discharged annually from the Strasburg wastewater treatment plant farther down the Shenandoah Valley, which serves about 7,000 people.

The spring's water went untreated until four years ago when an underground bioreactor was built on the farm. Now, about 20% of the spring water is diverted through a white plastic pipe to a buried bed of wood chips. About a quarter of the nitrogen that flows into the pipe is removed before the water is returned to Smith Creek.

After years of monitoring and tinkering with the device, Stephenson and colleague Zach Easton, a Virginia Tech professor of engineering, think bioreactors could be installed at many springs throughout the Bay watershed.

The spring on the Yancey farm is only the tip of the iceberg when it comes to nitrogen bubbling out of the ground. The U.S. Geological Survey has identified 1,034 springs in Virginia, Maryland, Pennsylvania and West Virginia — not all in the Bay watershed — and has monitored nitrogen concentrations at 644 of them.

Smith Creek already carries high levels of nitrogen when it emerges at a spring on a farm in Virginia's Rockingham County. (Dave Harp)

Stephenson and Easton calculate that those monitored springs pump out more than 13,000 pounds of nitrogen a day, or around 4.9 million pounds a year — more than the 2.9 million pounds discharged from the District of Columbia's Blue Plains Wastewater Treatment Plant, by far the largest treatment plant in the watershed.

The actual amount would almost certainly be higher if nitrogen data was available for all of the sites. Further, the USGS figures don't include all of the springs in the Bay region: Easton recently found an additional 600 listed in a Virginia database.

"It's a big potential contribution [of pollution], and we're probably only scratching the surface of the total," Easton said. "They're all over the place. These are only the ones that have been identified by state and federal agencies."

Treating spring discharges with bioreactors wouldn't solve the Chesapeake's nutrient problem but, with the region needing tens of millions of pounds of additional nitrogen reductions to meet cleanup goals, it could help.

The idea is gaining traction. Virginia's Bay cleanup plan calls for achieving 300,000 pounds of nitrogen reductions annually using bioreactors at springs. Officials estimate that would require about 100 installations, with several slated to go in this year.

The state is supporting ongoing research by Easton and Stephenson to help devise a program that could encourage landowners to install bioreactors. Other states are showing interest as well, Easton said.

Zach Easton (left) and Kurt Stephenson of Virginia Tech are learning how bioreactors at springs, like the one at the beginning of Smith Creek in Virginia, might help reduce nitrogen loads to the Bay. (Dave Harp)

Attacking a long-standing problem

It is a way to address at least a portion of the "legacy" nitrogen in the Bay watershed.

Much of the nitrogen in streams does not run directly off the land. Instead, it seeps from farm fields or septic systems into the soil until it reaches groundwater. Then, it moves — often great distances — until the groundwater intersects the bottom of a stream or emerges at a spring.

That journey can take years, even decades. Treating legacy nitrogen is difficult and often impossible. In places, the roots of a mature forested stream buffer can reach far enough to pull some of it out of the water table, but most evades management actions.

Groundwater that gurgles out of springs is different, though. It often contains significant amounts of nitrogen and is concentrated at a specific point, almost like a pipe out of the ground. That presents a unique opportunity to capture the water and treat it with bioreactors.

Bioreactors are a relatively simple technology. A trench is excavated, lined and filled with wood chips. Then water is piped in. Carbon in the wood chips provides fuel for microbes that break down nitrogen in the water, transforming it to nitrogen gas that eventually escapes to the atmosphere, where it makes up most of the air everyone breathes.

Kurt Stephenson of Virginia Tech examines data collected by instruments that continuously monitor how well a bioreactor in Rockingham County, VA, removes nitrogen from a stream. (Dave Harp)

Bioreactors themselves are nothing new. They've been around for several decades in Canada and the Midwest, mostly to treat water from drain tiles under farm fields before reaching drainage ditches.

About a decade ago, they started to be used in the Bay region, mainly on the Eastern Shore, to treat farm tile drainage systems and, in some cases, ditches.

Drew Koslow, a former Choptank Riverkeeper in Maryland, worked with farmers on some of the first installations and later helped with bioreactors in Virginia, where he met Easton.

Easton had installed a bioreactor at a Virginia Tech test site outside Blacksburg in 2015, which was the first attempt in the region to use the device on a small spring.

Impressed with that potential, Koslow, then working with the nonprofit Ridge to Reefs, joined the Virginia Tech researchers and others to secure roughly $70,000 for a larger spring project.

Ultimately, the U.S. Department of Agriculture's Natural Resources Conservation Service helped to identify the spring on the Yancey farm. The Yanceys were willing partners, having participated in several NRCS conservation projects on their 225-acre, fourth-generation farm.

"The water is clear and cool and looks just beautiful," Koslow said of the spring, which pumps out about a half-million gallons a day on average. "Yet it's got that pretty heavy nitrate load, really discharging like a wastewater plant."

No one knows where that originates. The area is underlined by karst geology where water flows through a maze of cracks, caverns and gaps in limestone rock before it emerges, often many miles from where it entered.

Built in 2020, the project included the design, engineering and construction of the 50-by-150-foot bioreactor with a 2-foot layer of wood chips topped with 6 inches of soil — along with the piping needed to carry the water, spread it through the reactor and return it to the stream. It reduces the amount of nitrogen flowing downstream by about 1,200 pounds a year, with the potential to reduce more.

It requires little maintenance and is expected to last for about 15 years, when the carbon from the wood chips will be fully consumed. At that point, the chips will need to be replaced.

Although it has high upfront costs, Stephenson and Easton estimated that the nitrogen removal cost over the lifespan of the bioreactor is only $8–$12 a pound.

That's roughly the same or less than the cost of many other agricultural nutrient reduction practices, and it's significantly less than the costs of installing most urban stormwater controls. Unlike some practices, like planting nutrient-absorbing cover crops, it does not need to be repeated each year.

"It's a tool that shows good promise for treating a source of nitrogen that has been otherwise untreatable," Easton said.

Paying for performance

Despite the potential, landowners are not flocking to install bioreactors.

On Maryland's Eastern Shore, only a handful have been installed in tile drainage systems, even though the state helps farmers with the expense — which can help pay for costly tile repair and maintenance.

Bioreactors on springs, by contrast, usually provide no direct benefits to the landowner. The nitrogen emerging from springs — unlike that found in tile drains and ditches, which originated on adjacent fields — often comes from someplace else, so landowners essentially are paying to clean up someone else's pollution.

But Easton and Stephenson say there is a way to make bioreactors more appealing: Pay landowners for the amount of nitrogen removed.

Most nutrient reductions on farms are achieved through programs that pay landowners a portion of the cost to use "best management practices," such as cover crops, streamside buffers and fencing to keep livestock out of streams.

The nutrient reductions from those practices can vary widely from place to place, and it is often unclear if they are performing as well as anticipated.

That's created more interest in "pay for performance" systems, in which someone is paid for actual nutrient reductions — not assumptions about how a practice *might* perform.

Stephenson and Easton say that spring bioreactors are ideal candidates for pay for performance because the nitrogen removal is easily measured. They have established a monitoring system at the Smith Creek site that provides regular measurements of the water and nitrogen going in and out.

It shows that such near-constant monitoring is largely unneeded. The percentage of nitrogen removed remains mostly unchanged, regardless of other factors such as flow, Easton said. So only periodic sampling may be required to determine how much nitrogen is removed, and how much to pay a landowner.

Easton and Stephenson are also looking for ways to get even better results. In December, they placed a pond liner and sandbags around the spring box to better trap the water and push more through the pipe to the bioreactor. At a cost of roughly $300, it doubled the flow — and greatly increased nitrogen removal.

"That's an example of an incentive that a pay-for-performance type program would offer," Easton said. "You could double your load removal and also double your 'income' from the project."

Water from Smith Creek in Rockingham County, VA, flows over a rock pile as it exits a bioreactor and returns to the creek. (Dave Harp)

Still, bioreactors are no silver bullet for the Bay's nutrient problem. They require willing landowners and the right site characteristics. There needs to be enough slope to allow water to flow downhill to and through the bioreactor and then drain into the stream.

The amount of the spring water that can be treated is also limited; state guidance only allows half of the flow to be diverted.

"You're always going to be limited by landowners, you're always going to be limited by the landscape and where you could actually build one," said Kevin Tate, director of conservation with the Alliance for the Shenandoah.

The nonprofit organization has funding from the National Fish and Wildlife Foundation to install two bioreactors. But, Tate cautioned, while it's part of the solution, "it's not going to fix everything."

Bioreactors don't resolve the core problem: Too much nitrogen is being put on the landscape, which eventually leads to elevated concentrations at springs. And bioreactors don't provide additional benefits as other on-farm practices do. Cover crops can help improve soil health, for instance, while forested buffers improve the aquatic health of streams.

"Bioreactors are very pointed to this nitrogen issue," Tate said. "I know that's something we need to solve, but I don't want to redirect all of our focus on that when we could be gathering tons of other benefits from the other types of best management practices out there." ■

CBF equity director wants Bay advocacy as diverse as nature

Carmera Thomas-Wilhite, the foundation's first DEIJ chief, wants 'all eyes' on the issues

By Jeremy Cox

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

When Carmera Thomas-Wilhite speaks, her voice is backed by an organization with more than 250 employees, 13,000 volunteers and more than $125 million in total assets. Which is to say that it carries some weight.

The Chesapeake Bay Foundation hired Thomas-Wilhite in January 2023 as its vice president of diversity, equity, inclusion and justice.

Thomas-Wilhite, who is Black, became the first to hold that title in the nonprofit's nearly 60-year history. And given the group's status as the largest independent environmental organization dedicated to saving the Bay, she has became a leading regional voice on the critical topic.

"I think of my role as working with people, partnerships and places," Thomas-Wilhite said.

She addresses issues with diversity and inclusion within the Bay Foundation and around the 64,000-square-mile watershed. She works to ensure that the foundation engages itself authentically with community groups and that its environmental education programs more fully reflect the stories of the region's diverse population.

Her most recent position was director of urban conservation initiatives for the Conservation Fund. But this marks her third separate stint with the Bay Foundation. She interned with the group in 2010 as part of the inaugural class of Chesapeake Conservation Corps members. She was later hired as its full-time Baltimore program manager.

Her interview with the *Bay Journal* has been edited for length and clarity.

Question: It sounds as if you're like an actor who gets to originate a role. There's no playbook for you. What has that been like?

Answer: It is really exciting because I get to make it my own. I'm leading with my own style of leadership and making sure that I'm being empathetic, taking care of people the way that I would like to be treated.

Q: What is your Chesapeake Bay origin story?

Carmera Thomas-Wilhite is the Chesapeake Bay Foundation's first vice president of diversity, equity, inclusion and justice. (Dave Harp)

A: I grew up in Maryland. Both my parents are from Annapolis, and both of sets of grandparents lived in Annapolis. My mom's parents were both 4-H leaders. My grandfather was an extension agent for the University of Maryland and Anne Arundel County. We were gardening, fishing and swimming in the Severn River and the Bay.

Q: You've said that a book called *Black Faces, White Spaces* had a big influence on you. What's that book about and what did it mean to you?

A: Carolyn Finney is the author, and she writes about the Black experience in predominantly white spaces like national parks and while camping and hiking. I love new experiences outdoors. I never thought of it as being something that I wouldn't do. So, when I read that book, it made me think, 'Yeah, I've done a lot of these things when I'm hiking [or] going to different parks.' I don't usually see a lot of people who look like me or families who look like me. So how can I change that?

Q: Have you ever had that experience of being uncomfortable in an outdoor space?

A: For sure. My husband and I like to go camping a lot with our friends, and most of the time we're at state parks or national parks. A lot of times, we get the question: "Is your first your first time camping?" We have all the skills and gear and everything. But we always get some questions or a look.

Q: You were part of the inaugural class of the Chesapeake Conservation Corps. How did that influence you?

A: When I was selected, I had no idea what I was getting myself into. But my mentor was just like, "I am excited to have someone who's interested in the Bay." So, that program, to me honestly, was life-changing and career-changing, because it really set the trajectory for me.

Q: Three or four years ago, many environmental groups began paying attention to environmental justice like never before. What did that moment mean for you?

A: It was a larger group of people, not only in the U.S. but globally, really seeing with all eyes on this issue. When environmental organizations saw what was happening, they also had to be a part of it and make statements and dedicate themselves to understanding what that means as a part of their own organizations.

That also meant looking at who they were, including the erasure of some communities that they were doing in their environmental work. And then, they're holding themselves accountable.

Q: How can a mainstream organization like the Chesapeake Bay Foundation build credibility with marginalized populations?

A: It's all about relationships and trust. When you are working with different groups in different communities, it's not a transactional relationship. It's something that you're going into together.

I think that, as we move forward and we think about centering people, it's really about how to build those relationships with trust and acknowledge some of those wrongdoings. [We can say] OK, yeah, maybe we didn't do it right in the past and maybe we stepped on toes. But how do we shift that, rebuild relationships and really think about what is best not only for the community, but for the Bay? ■

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

Have mussels, will travel: New mobile lab gives bivalves a lift

Scientists use a modified race car trailer to boost numbers of filter feeders in MD rivers

By Timothy B. Wheeler

Freshwater mussels, unassuming filter feeders that help keep rivers and streams clean, are among the nation's most endangered organisms. So, the Maryland Department of Natural Resources is trying to give them a "lift."

DNR has set up a mobile mussel propagation laboratory in a large trailer originally designed to haul race cars. With it, state biologists aim to boost the natural reproduction of freshwater bivalves wherever needed, enhancing water quality and aquatic habitat in the process.

"We're trying to essentially just increase mussel biomass and filtering capacity in the wild," explained DNR biologist Matt Ashton, who specializes in freshwater mussels.

Oysters are the better-known filter feeders in the Chesapeake Bay watershed, but freshwater mussels are no slouches, with some able to process about 20 gallons a day under ideal circumstances.

They have a complex reproductive cycle, which requires them to implant their larvae, or glochidia, in the gills of an eel or other fish until the young grow large enough to sustain themselves. Then, they drop off. That hitchhiking phase may be a factor in their shrinking populations and range, especially in rivers that have dams or other blockages to fish passage.

There are 16 species of freshwater mussels native to Maryland, and all but two are in peril because of habitat loss and poor water quality. Maryland classifies six as threatened or endangered, and two are federally endangered.

DNR has tried restoring freshwater mussels by transplanting some from Deer Creek in Harford County to the Patapsco River west of Baltimore. The agency also cultures mussels at its Brandywine fish hatchery in Charles County.

This spring, the new mobile mussel trailer is parked at Susquehanna State Park along Deer Creek, a tributary of the Bay's largest river.

On one sunny March morning, Ashton and natural resources technician Megan Kubala worked to "inoculate" some bluegill sunfish with the larvae of an eastern floater mussel.

The oval-shaped eastern floater, collected from the Susquehanna Flats off Perryville, is one of the few mussel species not in trouble in Maryland or most of the Bay watershed.

Maryland Department of Natural Resources biologist Matt Ashton uses a turkey baster to squirt mussel larvae into a bucket of fish while technician Megan Kubala looks on. (Dave Harp)

"We want to focus on this species because it's easy to culture," explained Zach Taylor, DNR's freshwater mussel hatchery manager, "and frankly it produces a lot of juveniles."

But a mussel known as the tidewater mucket, another species that the DNR pair had on hand, is comparatively rare. Its range is limited to the tidal freshwater areas. Although the mucket hasn't declined enough to warrant listing as a threatened or endangered species, it is a prime candidate for the lab's help, Ashton said.

"It'll cost us a lot less to improve their populations now," he said, "than in 10 to 15 years if things are dire."

First, the scientists must persuade the mussels to give up their tiny offspring, harbored inside their shells since spawning last fall. They normally do so on their own when the water climbs above 50 degrees Fahrenheit. But on this day, Ashton pried open an eastern floater's shell and inserted a syringe filled with water to flush the larvae out. Thousands dribbled into a petri dish, looking like orangish grains of sand.

Peering at them through a microscope, Ashton said, "they look like little Pac-mans" as they open and shut their translucent shells.

Microscopic larvae are carefully flushed from an eastern floater mussel using a water-filled syringe. (Dave Harp)

"You see them moving?" he asked. "These are great. These are ready to go."

Next, he poured larvae into water-filled buckets holding four or five sunfish and stirred the water every so often. After about 20 minutes, Ashton examined the fish to confirm that speck-sized larvae were clinging to their gills. The fish would then stay in tanks lining the trailer wall until the larvae develop enough to drop off and go it alone, which can take one to three weeks.

At that point, they will sift the still-tiny juveniles from the tank and take them to the Brandywine hatchery to grow larger. After they reach about the size of a quarter, they'll be released in the Susquehanna River.

It's an involved, labor-intensive process developed in part through trial and error, Ashton said.

"This is a field that has as much artistry, maybe, as science," he said. Eastern floaters need less than nine months to reach releasable size, while tidewater muckets take twice as long.

But transforming the larvae by hand and rearing them at the predator-free hatchery until larger improves their odds of surviving in the wild.

The mobile lab is a byproduct of an agreement reached in 2019 between Maryland and the owner of Conowingo Dam to relicense the hydropower facility on the lower Susquehanna. Under the deal, the dam's owner, now Constellation Energy, pledged to underwrite efforts to restore freshwater mussels in the river.

That deal has since been revoked by a federal court, after environmental groups filed a lawsuit challenging it for other reasons. But before that happened, Constellation had paid the first installment of $2 million.

DNR had planned to use the promised funding to build a new mussel hatchery. Design work is ongoing, though further funding is in limbo while the parties negotiate the dam's relicensing. So DNR opted to start with a mobile lab.

Ashton said he knew that race car trailers are roomy because he has an uncle in motor sports. This new one cost the state $95,000 and another $47,000 to equip it with fish tanks, piping, refrigerators and other equipment.

"It makes our efforts efficient and places mussels where they are of most need," Taylor said.

The trailer's mobility also enables DNR to take it on the road to help educate the public about the importance of freshwater mussels. The trailer has large flaps on the side that can be opened to display the fish tanks and show biologists at work inside.

"It's providing some level of production," Taylor added, "but it's also forward facing." ■

Power, pipeline corridors are becoming wildlife habitat

Mowing and spraying give way to sowing and planting

By Ad Crable

No one particularly likes electric transmission lines and gas pipelines marching through communities and fragmenting forests. But some believe these linear strips collectively offer the last best hope for fostering fast-disappearing pollinator insects and grassland birds.

Spurred on by a more environmentally attuned public, as well as stockholders and the promise of saving money, more utilities and pipeline companies are grooming the tens of thousands of miles of rights of way in Chesapeake Bay drainage states to benefit wildlife and increase biodiversity.

The conventional practice of maintaining ground under power lines and over pipelines as close-cropped grass, with weeds controlled by mowing and heavy doses of herbicides, is getting an overhaul.

Federal law has long required controlling vegetation under power lines, and regulations were tightened further in 2003, after a widespread power failure in the northeastern U.S. and Canada — at least partly caused, investigators said, by improperly managed tree growth in rights of way. Gas pipeline rights of way must also have low-growing vegetation to keep an open line of sight for spotting gas leaks.

The easiest — and initially cheapest — method of complying with those laws is to mow and apply herbicides.

But now, a more environmentally friendly approach known as integrated vegetation management, or IVM, is taking root.

First, invasive trees and plants are removed by pulling them up or spot-spraying with a small amount of environmentally safe herbicides. This allows native plants to increase their foothold or clears the way for seeding meadow or prairie plant communities.

For electric transmission lines, plants in the so-called wire zone must be kept low to the ground to avoid interfering with the power lines. But outside of that zone, native tall grasses, shrubs and small trees can offer different habitat.

Together, these types of vegetation provide food for pollinators such as bees and butterflies, egg-laying sites for ground-nesting birds, safe cover for insects and small mammals, basking spots for snakes, habitat for reptiles and amphibians, and a home for rare plants.

Integrated vegetation management replaced mowing and heavy spraying of herbicides on this Baltimore Gas and Electric Co. transmission line right of way in Howard County, MD. (IVM Partners)

What's more, with climate change, scientists say long, unimpeded corridors of vegetation are important for plants and animals that can only survive by migrating to cooler conditions. The strips can also help rare plant communities from being genetically isolated. And they allow wildlife to travel between otherwise disconnected landscapes, even if they aren't migrating north.

"There are 60 million acres of rights of way in the United States. All of it has to be maintained, and all of it is potential pollinator and wildlife habitat. That's bigger than the national parks system," said Rick Johnstone, president of IVM Partners, a Delaware-based nonprofit that works with utilities and others to adopt IVM practices.

There are 19,647 miles of transmission line rights of way in Pennsylvania, 11,727 miles in Virginia and 4,047 miles in Maryland, according to PJM Interconnection. There are thousands more miles of pipeline corridors in the three states that could be valuable wildlife habitat.

The initiative is still in its infancy. Rights of way under mowing and spraying protocols far exceed those that have been converted to managed wildlife habitat, but the idea is gathering steam.

Baltimore Gas and Electric Co., an Exelon subsidiary, has installed native habitat on 2,800 acres in its service territory so far in central Maryland. The goal is to convert another 800 acres from mowing to IVM by the end of 2025.

The Maryland sites include Patuxent National Research Refuge in Laurel, South River Greenway Partnership in Davidsonville, Liberty Reservoir in Baltimore County, Flag Ponds in Calvert County, American Chestnut Land Trust in Prince Frederick, Morgan Run Natural Environment Area, Soldiers Delight Natural Environment Area, Patapsco State Park, Gunpowder Falls State Park and the Torrey C. Brown Trail.

A diluted herbicide is sprayed on an invasive shrub under a transmission line on State Game Lands 33 in Centre County, PA. (Penn State University)

At one revamped corridor in Anne Arundel County, researchers discovered 10 species of bees that had never been recorded in the county before.

"This conversion also improves the water quality of the Chesapeake Bay by improving water holding and filtration capacities and reduces our carbon footprint by reducing the need to use fossil fuel-powered tractors in mechanical mowing," said BGE spokeswoman Stephanie Ann Weaver.

In 2023, the Maryland General Assembly helped advance IVM by passing a law that exempts power companies from local weed-height ordinances.

As forester for Delmarva Power's properties, Johnstone persuaded the electric and gas utility to adopt IVM on its rights of ways.

FirstEnergy, which provides power to parts of Maryland, Virginia, Pennsylvania and West Virginia, has developed its own pollinator-friendly seed mixes, with more than 20 flowering species native to those the states.

FirstEnergy is one of eight utilities in the U.S. so far to earn certification from the Right-of-Way Stewardship Council. The nonprofit was created in 2013 by environmental groups, academia, the utility vegetation management industry, utilities and the federal government to promote IVM and best management practices.

The Central Virginia Electric Cooperative, which serves portions of 14 counties, has adopted IVM for new transmission corridors and is in the process of converting old ones into meadow environments.

The Pennsylvania Game Commission, which owns 1.5 million acres of land that is open to public use, has an estimated 841 miles of power line rights of way and 1,015 miles of gas pipeline swaths. That's 12,688 acres of potential wildlife habitat for the agency responsible for overseeing the state's wild birds and mammals, both those hunted and those not.

All disturbances to game lands are required to be managed for wildlife, said Scott Bearer, the agency's chief land manager.

"What we push for, and like to see, is as much habitat as possible. These pipeline and power corridors are great habitat for nongame. They are continuous travel corridors for our tree bats, and they can offer woodrat and pollinator habitat that is the basis for the food chain for all our migratory songbirds, and everything in between."

Bearer said the agency's commitment to creating more nongame habitat has evolved

A gas line is buried on state game lands in Pennsylvania. (PA Game Commission)

A meadow mixture for pollinators grows in a Pennsylvania pipeline corridor. (PA Game Commission)

A researcher collects pollinators under a transmission line in Centre County, PA. (Carolyn Mahan)

over time. For example, in the early 1950s, sportsmen became worried that herbicide being applied on game lands under transmission corridors was harming habitat for rabbits, deer, turkeys, grouse and other game.

In response, a study was launched in 1953 on 3.5 miles of rights of way through State Game Lands 33 in Centre County. That initial study has turned into 70 years of continuous monitoring and experimentation with IVM practices, providing a knowledge base for managing land for wildlife. Partners include utilities, Asplundh and nonprofits.

Studies there and elsewhere are confirming the benefits of a more holistic approach to vegetation under power lines and along pipelines.

A 2019 study on the game lands reinforced previous studies that have found that pollinating insects can survive small amounts of herbicides, used to selectively kill invasive and nonnative plants.

Another study, published in 2019 in *Biodiversity and Conservation*, compared the presence of pollinator bees on sites where IVM was used in power line rights of way in Maryland's Anne Arundel, Prince George's and Howard counties. They were compared to 29 sites subject to conventional mowing.

Butterflies swarm pollinator plants cultivated under a Baltimore Gas and Electric Co. transmission line. (Courtesy of BGE)

The IVM sites had "significantly higher abundance and species richness," according to the study. The researchers noted that the newly created habitat also benefitted butterflies, birds and small mammals.

"Transmission line easements should stop being viewed solely as scars on the landscape and instead be viewed as potential linear wildlife preserves," the study concluded.

Still, utilities and IVM advocates sometimes hear complaints when mowing is stopped. "For every person that's thrilled to see native plants and meadows, there's someone who says it looks messy and our kids are going to be covered in ticks," said Carolyn Mahan, a professor of biology and environmental studies at Penn State Altoona and the current overseer of Game Lands 33 research.

And IVM proponents say they sometimes struggle to convince utilities and companies that IVM saves stockholders and customers money in the long term by cutting back on mowing and herbicides. There is an initial investment to get a new array of plants established. But once the ecosystem takes hold, they say, it sustains itself with only occasional maintenance afterward.

"It requires professionalism, dedication and knowledge of the landscape to do it properly, but it can be done," Mahan said.

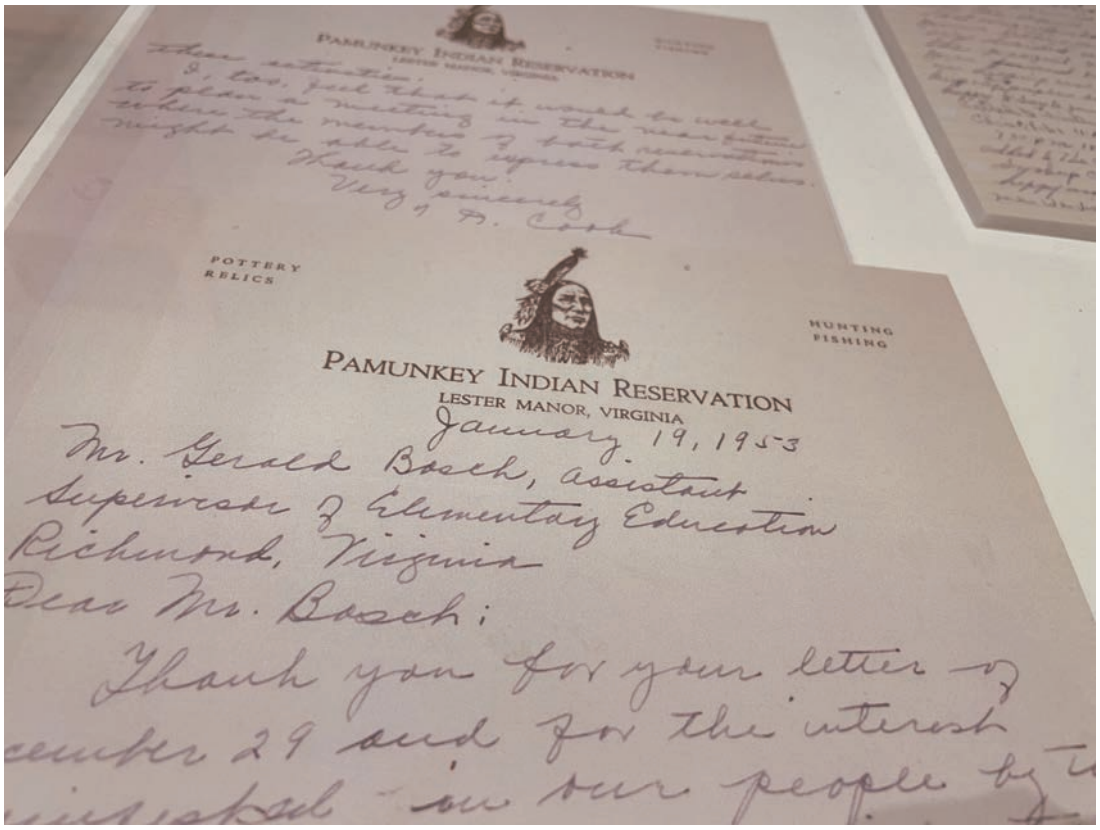
She would like to see tax incentives that encourage utilities to participate.

Although use of herbicides in IVM is minimal, some agencies and land managers still are uneasy about using them at all.

But Johnstone said it's a necessary evil. "We can't manage without herbicides," he said. "We need the conservation and environmental organizations to get over the 'we don't want any [herbicides].' Make it difficult to use, but don't ban it."

With the growing push for right of way owners to support sustainability, Johnstone and others predict that IVM will continue to spread across the landscape.

"The native stuff is lying there in the soil waiting for the right opportunity. They're there waiting to come back." ■



Top left photo: This 1953 letter on Pamunkey Indian Reservation letterhead, normally kept in the Library of Virginia's archives, is on display as part of the library's Indigenous Perspectives exhibit. (Whitney Pipkin)

Top right photo: Brad Hatch, a Patawomeck tribal council member, is one of two eel pot master makers and has two apprentices. (Pat Jarrett/Virginia Humanities)

Bottom right photo: A decorated bark basket made by a citizen of the Mattaponi Indian Tribe is on display at the exhibit. Baskets like this one were made of strips of bark and used to carry berries and nuts. (Whitney Pipkin)

Tribes share stories of life and landscapes in new VA exhibit

By Whitney Pipkin & Lauren Hines-Acosta

Tucked into the back of the Library of Virginia in Richmond is a small exhibit with a pretty high aim: to help tribal communities based in the state tell the stories of their present-day lives.

The library's Indigenous Perspectives exhibit does not show visitors what life was like for tribes in pre-colonial times. There are plenty of other museums that tell that story, including the Virginia Museum of History & Culture, also in Richmond. Rather, this exhibit focuses on the stories of Indigenous people after the arrival of Europeans, tracing a history of their presence that was nearly erased at several turns. It also focuses on what present-day life is like for the communities that have remained and how tribal members today want their stories to be told.

In video interviews included in the exhibit, Chief Steve Adkins of the Chickahominy Tribe explains why it's important for him to identify as an American Indian and not simply as a person of color, for example.

"I don't want people to be colorblind. I want people to look at me and respect me for the differences I bring to the table while understanding the commonalities that exist," he said.

The perception that Indigenous people living across parts of Virginia were gone by statehood? That's false, said Barbara C. Batson, exhibit coordinator at the Library of Virginia — and the library has long had the documents to prove it.

"They are there in the record," she said. "You just have to be looking."

The library began collecting the many documents that tell this story after starting a conversation with tribal representatives about three years ago. The staff was curious about whether they could do a better job educating teachers on the history of Indigenous people in the state. But they found far more.

Ashley Craig, community engagement and partnership specialist for the library, created a "monstrous" spreadsheet with 54 tabs, and counting, to keep track of all the relevant materials contained in the institution's archives.

"We have over 130 million printed resources and items in our collection that span from the Colonial period up until modern day," she said. These letters, artifacts and court documents demonstrated that tribes in the state "were active, writing letters to the governor, going to court, writing legislative petitions."

Many of these documents had become vital to tribal leaders in recent years as they demonstrated their historical presence in order to receive federal and state recognitions. There are 11 tribes in Virginia recognized by the state or federal government today, many of them acknowledged as recently as 2018 under the Thomasina E. Jordan Indian Tribes of Virginia Federal Recognition Act.

But Indigenous stories had for too long not been fully told. Library staff reached out to tribal leaders in the state to ask if this was a story they were interested in telling, both for their own sakes and for the sake of the broader public.

Barbara C. Batson, left, and Ashley Craig of the Library of Virginia worked with tribal members and leaders in the state to create the library's Indigenous Perspectives exhibit. (Whitney Pipkin)

"I think it was good for us to listen, rather than to tell," Batson said.

The Indigenous Perspectives exhibit at the library today, which opened in December and runs through mid-August, is the fruit of those conversations.

The centerpiece of the exhibit is a series of videos featuring tribal members telling their stories. The longest of those focuses on what it means to have and maintain a tribal identity across time and cultures. It runs about 20 minutes. Several of the videos can also be viewed on the Library of Virginia's website with a library card.

Many of the maps and documents on display are from the library's archives, and they are accompanied by artifacts that belong to the tribes and are on loan to the exhibit. Tribal members helped develop the language interpreting each of the items on display as well.

One example is a photo that had been in the library's archives, labeled as depicting a Pamunkey powwow. But, when Chickahominy first assistant chief Wayne Adkins saw the photo, he said, "Well, he's Chickahominy and he's Chickahominy and he's Chickahominy," strongly suggesting that the people in the photo had been misidentified. Library staff have also learned that items that go in a medicine bag should not be on display *in* the medicine bag, which often has spiritual significance to the tribes when it is filled.

"Museums need to be talking to Indigenous communities to get their perspective on what [is in their] holdings," Batson said. "For museums that have cultural artifacts, that's really important."

Some documents that the library had taken for granted, such as Capt. John Smith's iconic map of the region, had unique layers of cultural significance to the tribes as well. Smith's map and journals, in particular, validated much of the oral history and village locations of tribes, like the Rappahannock, that had interacted with him.

An interactive map in another corner of the exhibit shows the locations of several "Indian schools" that operated across the state at various points in its history. Craig also found documentation of a little-known piece of history: Virginia had been home to at least one Federal Indian Boarding School, in Hampton Roads. Those now-infamous schools were established starting in the 1800s to assimilate Indigenous children into the broader American culture by removing them from their families and cultures. In 2021, the U.S. Secretary of the Interior Deb Haaland announced a Federal Indian Boarding School Initiative to recognize the "troubled legacy" of the schools and to address their multi-generational impact.

Today, the tribes' painstaking efforts to maintain their culture and its ties to the landscape is on full display at the exhibit. One case offers close-up views of powwow clothing, drums and a quilt. Another features a pot and a basket, each made from strips of tree bark and used for fishing and gathering food.

Brad Hatch, a Patawomeck tribal council member and exhibit collaborator, is one of two master eel pot makers in the tribe, a skill he teaches to other members. He said the library's exhibit showcases the tribes' long history of land stewardship, despite the challenges presented by colonialism. And that's worth noting.

"Indigenous ways of understanding how we interact with the environment are starting to become seen more," Hatch said. "I think it's worthwhile for scientists, legislators, and others to perhaps listen to the people who have lived here and interacted with the landscape for over 15,000 years. I think we've got a thing or two that we could contribute to the discussion."

The exhibit also invites visitors to continue to learn more not only about what the past was like for Indigenous people, but what it's like to maintain their culture in the present.

"Something that one of the women in the tribe said to me, after viewing the interviews from the exhibit," Hatch said, "was that it really underscored for her how important intertribal connections are to Virginia Indians." ■

Madeline Pleasants of Richmond looks at artifacts on display as part of Indigenous Perspectives, an exhibit at the Library of Virginia that runs through mid-August. (Whitney Pipkin)

IF YOU GO

The Library of Virginia is located at 800 E. Broad St. in Richmond. The exhibit is open Monday through Saturday from 8:30 a.m. to 5:00 p.m. It will be available until Aug. 17. Admission and parking are free.

The library's exhibit is just one of the places in Virginia where people can learn about Indigenous stories and places. Here are a handful of others:

Patawomeck Museum and Cultural Center in Stafford. Artifacts, a living village and events. General admission $10. Open 12–5 p.m. Monday, Wednesday and Friday.

Monacan Indian Nation Museum in Amherst. Artifacts, a historical Indian mission school and items for sale. General admission $5. Open 10 a.m.–3 p.m. Tuesday–Sunday, except on the third Saturday of every month.

Historic Jamestown in Williamsburg. Re-creation of the first permanent English settlement in North America and the site of some of the earliest interactions between Indigenous peoples and European settlers. Free admission. Open 9 a.m.–5 p.m. daily.

Gloucester County Visitor Center in Gloucester. A Werowocomoco exhibit and tourist information. Free admission. Open 10 a.m.–4 p.m. Tuesday–Saturday and 1–4 p.m. Sunday and Monday.

Jamestown Settlement in Williamsburg. Museum and outdoor living history areas that explore the convergence of Powhatan, English and West Central African cultures in the early 1600s. Admission: $18 for adults and $9 for children. Open 9 a.m.–5 p.m. daily.

Machicomoco State Park in Hayes. On land associated with the network of tribes connected to the Powhatan alliance and the first state park dedicated to Virginia's Indigenous peoples. Parking: $5.

Virginia Museum of Fine Arts in Richmond. Native American art from Indigenous tribes in Virginia and globally. Free admission. Open 10 a.m.–5 p.m. Saturday–Tuesday and until 9 p.m. Wednesday–Friday.

CHESAPEAKE CHALLENGE

— Kathleen A. Gaskell

Shrinking Violet?


B


C


D

Hardly. This plant provides pollinator punch.

Violets, which symbolize modesty and humility, won't tell you how wonderful they are, so we will.

Roses are red, violets are blue: And purple. And yellow. And white. And lavender.

The birds ... Songbirds, wild turkeys, grouse and mourning doves eat violet seeds, leaves and rhizomes. So do small mammals.

... and the bees: If you are thinking of getting rid of violets in your lawn, know that violets have evolved to be in bloom when spring's earliest pollinators emerge. They are the only source of food for ground-dwelling mining bees and the larvae of many fritillary butterfly species.

Warm welcome: Bees favor purple violets growing in the sun. The dark color retains the sun's heat, which keeps the flower and nectar warm on cool days.

Wildflower wigs: Have a bald spot in your lawn? Violets are an excellent ground cover, especially where it's shady.

A violet is a violet is a violet ... or not. Estimates on the number of species in the Violaceae family range from 700 to 1,000. What experts do agree on is which "violets" are actually not in the Violaceae family — namely, the African violet (Gesneriaceae) and the dogtooth violet (Liliaceae), also known as yellow trout lily.

Title image: *This sweet white violet was photographed in Howard County, MD, for the U.S. Geological Survey's Bee Inventory and Monitoring Lab. (USGS/Helen Lowe Metzman)*

A *Blue violets like these grow in full or partial shade throughout the eastern U.S. (Famartin/CC BY-SA 4.0)*

B *Downy yellow violets grow in clumps in shady areas. (Ryan Hodnett/CC BY-SA 4.0)*

C *Sweet white violets appear in early spring in forested wetlands throughout North America. (Doug McGrady/CC BY 2.0)*

D *Violets are perennial, returning each year. (Joshua Mayer/CC BY-SA 2.0)*

E *A downy yellow violet emerges from leaf litter. The species gets its name from the yellow hairs growing at the base of its petals. (Doug McGrady/CC BY 2.0)*


E

Voluminous words for the wee violet

A violet may be tiny but the words to describe it are not. Give yourself a bouquet if you can match up each term to its definition. Answers are on page 35.

Chasmogamy	Cleistogamy
Elaiosome	Ionone
Myrmecochory	Zygomorphic

1. This is a term for flowers that can self-fertilize without pollinators. Pollen is transferred to anthers on the same flower or another flower on the same plant. In addition to the flowers we see, violets also have hidden underground flowers that never open but produce viable seeds. It's a backup plan in case the visible flowers are eaten (or mown) before they can produce seeds. Other flowers with this feature include those of peas, peanuts and pansies.
2. This is the aroma compound that gives a violet its scent. It stimulates scent receptors, then binds to them, causing ansomia, or the loss of the sense of smell. It only lasts for a few moments before the receptors recognize the violets' scent again.
3. This term describes flowers that have petals in various sizes that can only be bisected into equal sections from top to bottom. These flowers are also known as bilaterally symmetrical. Other flowers with this feature include lady slippers, cardinal flowers, irises and sweet peas.
4. This term describes plants that depend on ants to disperse their seeds. Other plants that have this mutually beneficial relationship include wild ginger, bloodroot and trailing arbutus.
5. These flowers are dependent on pollinators to reproduce. They have brightly colored, showy petals. The flowers contain nectar and are open to better attract pollinators. Other examples include sunflowers, swamp rose-mallow and pickerel weed.
6. These are variously shaped fleshy appendages attached to the seeds of many flowers. These "food packages" contain abundant amounts of lipids and proteins that attract ants, which feed these structures to their larvae. The seeds themselves are not eaten, just dispersed in the process. Other flowers with this type of structure include trillium, Dutchman's breeches, trout lily, hepatica, bleeding heart and squirrel corn.

This spring, let's celebrate Karen Davis, champion of chickens

By Tom Horton

You probably like chicken. But chickens? Karen Davis, who died this past November at her little poultry sanctuary on Virginia's Eastern Shore, dedicated her life to fierce and intelligent advocacy for the billions of chickens and turkeys slaughtered annually by the modern meat industry.

Her passing, from breast cancer at age 79, was marked with full obituaries in the *New York Times* and *Washington Post*.

More than anyone in the international animal rights movement, the native of Altoona, PA, pioneered compassion for farm animals — particularly chickens, whose numbers constitute some 90% of all animal abuse.

To enter Karen's world, half an acre of fenced poultry yard and big trees shading a weathered farmhouse off Seaside Road near Machipongo, was to see life through an unaccustomed lens — not dissimilar to how environmental writers strive to show readers a world where humans are a part of nature, not apart from it.

Unconfined by cages or windowless coops, a hundred or so chickens of all shapes and sizes, with a scattering of ducks and turkeys, ran giddily, scratched the dirt for insects, dust-bathed luxuriously, spread their wings to soak in sunlight, and socialized. "Joyful" is how Karen would describe the scene.

Against a background of crowing and cackling, an errant piece of straw stuck in her jet-black hair, she'd lecture my Salisbury University students about how, for all our prodigious breeding to maximize breast meat, rapid growth and egg production, the traits of the original, wild chickens had not been bred out.

Karen Davis embraces a beloved rooster at her home and chicken sanctuary on Virginia's Eastern Shore in 2006. (Dave Harp)

She'd point out how the "rescue" birds brought to her Eastern Shore sanctuary quickly reverted to the socially complex and intelligent fowl that evolved to survive for millennia in their native southeast Asian jungles (where these wild forebears of all modern chickens still thrive).

Karen would joke about being "that crazy chicken lady." She'd been called far worse as she took the battle to the heart of enemy territory, serving tofu chicken nuggets for years at the industry's annual Delmarva Poultry Festival ("featuring the world's largest frying pan").

But she was far more than a bleeding heart. She combined her Ph.D. in literature (dissertation on "musical structures and tragic elements in Thomas Hardy") with her deep compassion to write books that ranged from *Prisoned Chickens, Poisoned Eggs* to *More Than a Meal: The Turkey in History, Myth, Ritual and Reality*. Also a children's book, *A Home for Henny*, and scholarly writing that explored the parallels between misogyny and animal abuse.

Privately, poultry industry officials conceded her research was solid, even impressive, though they did not share her commitment to eliminating raising animals for meat.

And starting from her life-changing adoption of one badly damaged commercial hen, found wandering in her suburban Maryland neighborhood in 1985, Karen built United Poultry Concerns into an influential nonprofit with an operating budget of more than $300,000 a year, with an additional million dollars in reserve funds. (She herself worked for $14,000 a year until her death; I once lugged an old window AC unit from my garage to cool at least one room in her farmhouse).

The organization has a robust website and publishes the quarterly, *Poultry Press*. One issue, which you will get after just about any donation, may give you more than you wished you'd known about where those chicken nuggets and egg McMuffins originate.

Until I wandered into Karen's place some 20 years ago, I'd have said I knew more than most about chickens. I grew up in the poultry business and in 1968, just out of college, was managing a million laying hens in caged confinement in the Midwest. It paid enough that I was shopping for a Corvette — until I got my draft notice, did my four years and wound up a Prius-driving journalist.

As an environmental writer who routinely aspires to "save the world" (and routinely falls short), I had instant empathy for a lady like Karen, who devoted her life to what seems like the most daunting of causes.

"Even a lost cause can be a good cause," she would tell my students. But she never wavered in thinking the day of a meatless world, a world with less suffering, would come. It would just take a while, until we loved chickens more than chicken.

And she just really, really loved the company of chickens.

I don't run my environmental studies classes at Salisbury University to create animal rights activists or vegetarians, though we discuss the real environmental benefits of reducing meat in the marketplace as it's currently raised.

But people like Karen Davis, I felt, were part of a well-rounded education, especially at our college, where, within a 50-mile radius, hundreds of millions of chickens live and die annually, and where a majority of the big buildings are named for poultry money.

Liquin Cao, a longtime board member who has assumed the presidency of United Poultry Concerns, said Karen will be an impossible act to follow. But, as long as donations and bequests keep coming, the organization should remain strong. Three employees currently maintain the sanctuary.

May 4 will not just be Star Wars Day — as in "may the fourth be with you" — it will also be International Respect for Chickens Day. (Guess who established it in 2005?) And in my mind it will be International Respect for Karen Davis Day. She was a Chesapeake region original. ■

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

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A honey bee in search of nectar hovers at a cherry tree blossom in Anne Arundel County, MD. (Michele Danoff)

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A young osprey perches on a snag along Blackwalnut Creek in Annapolis. (Dave Harp)

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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."

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

PENNSYLVANIA

Alliance tree plantings
Help the Alliance for the Chesapeake Bay plant trees. Volunteers must wear long pants, clothes that can get dirty, close-toed shoes (boots are best). Hat, sunscreen, gloves recommended. Bring water bottle. Registration required: Web search "alliance for bay events." Exact location is given after registration. Rain or shine.
- *Mechanicsburg Riparian Forest Buffer Planting:* 10 am–12 pm April 16.
- *Mount Joy Lawn Conversion Planting:* 10 am–12 pm April 18.
- *Oxford Park Tree Planting:* 10 am–12 pm April 20.
- *Guilford Riparian Forest Buffer Planting:* 10 am–12 pm April 24.
- *Christiana Riparian Forest Buffer Planting:* 10 am–12 pm April 27.

Susquehanna volunteers
The Middle Susquehanna Riverkeeper is looking for volunteers in these areas:
- *Sentinels:* Keep an eye on local waterways, provide monthly online updates. Info: Web search "Susquehanna sentinels."
- *Water Sampling:* Web search "Susquehanna Riverkeeper Survey."
- *The Next Generation:* A growing number of watershed organizations are aging out. Workers are getting older; younger people are needed to help with 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.
- *Spring Habitat Action Days - Earth Day Habitat Projects:* 9–11 am & 1–3 pm April 20, 27 & 9–11 am April 21, 28. Projects will be matched to age/age range of participants/ family/group. Register in advance so suitable project is ready.
- *Habitat Action Team:* Volunteers work to 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.
- *BioBlitz:* 9 am–12 pm May 11. All ages, experience levels. The foundation and its partner, Northern Virginia Conservation Trust, are recording plants, animals on the property using iNaturalist.
- *Earth Day Tree Planting:* 8:30–11:30 am & 1–3 pm April 20. All ages (17 & younger w/adult). Join for one or both shifts restoring a 10-acre woodland.

Alliance workdays
Help the Alliance for the Chesapeake Bay maintain plantings in Richmond. Volunteers, ages 18+ (ages 10+ w/adult), will plant native plants, weed, prune, water, spread mulch. Supplies, tools provided. Wear long pants, clothes that can get dirty, close-toed shoes (boots are best). Hat, sunscreen, gloves recommended. Bring water bottle. Registration required: Web search "Alliance for Bay events." Rain or shine.
- *Lois H. Jones Elementary Reforestation Area Maintenance Day:* 9–11 am April 25.
- *Dogwood Middle School Garden Maintenance & Cleanup:* 9–11 am April 26.

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 identify 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. Volunteers also needed to take on longer-term commitments on a variety of waterways. 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.

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

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

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

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.
May issue: April 11
June issue: May 11

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

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

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

Answers to CHESAPEAKE CHALLENGE on page 30

1. Cleistogamy
2. Ionone
3. Zygomorphic
4. Myrmecochory
5. Chasmogamy
6. Elaiosome

BULLETIN BOARD

MARYLAND

Eastern Neck refuge
Volunteer with Friends of Eastern Neck Wildlife Refuge 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 booths at community events.

Info: Contact page at friendsofeasternneck.org.

Stream Link tree workdays
Stream Link Education needs volunteers to help establish 21 acres of resilient, biodiverse forest in Emmitsburg. Workdays take place 9–11 am. Info, registration: streamlinkeducation.org.
- *Tree Plantings:* April 13, 20, 27 & May 4. Plant, stake, shelter trees.
- *Nursery Teams:* May 11, 18, 25. Grow, prep trees at outdoor nurseries.
- *Tree Teams:* May 11, 18, 25. Maintain trees in ground.

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. Volunteering more than 100 hours per year earns a free one-year family membership. 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.

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

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.

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

Ruth Swann Park
Help the Maryland Native Plant Society, Sierra Club and Chapman Forest Foundation remove invasive plants 10 am–4 pm the second Saturday in April, May and June 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.

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

St. Mary's County museums
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.

Lower Shore Land Trust
Help the Lower Shore Land Trust in Snow Hill with events. Info: Beth Sheppard at bsheppard@lowershorelandtrust.org.

Win cash for snakeheads
The Maryland Department of Natural Resources and U.S. Fish and Wildlife Services have tagged 500 northern snakehead in Gunpowder River, upper Chesapeake Bay tributaries, Mattawoman and Nanjemoy creeks of the Potomac River. Harvest a yellow-tagged fish to receive $10, or $200 for a blue tag. Report tag number to the phone number on tag, then email a photo of harvested, tagged snakehead to DNR. Only harvested snakeheads (those removed from the water & not returned) with a tag number reported by the end of 2024 qualify for rewards. Web search "DNR snakehead incentive."

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

EVENTS / PROGRAMS

PENNSYLVANIA

York County parks
Attend a free event at a York County park. No registration. Info: YorkCountyParks.org, click on park events calendar on left.
- *Wetland Frog Walk:* 2–3:30 pm Nixon Park, Jacobus. All ages.
- *Master Gardener Native Plant Sale:* 8:30 am–2 pm Rudy Park, East Manchester Township. Educational booths, *Ask a Master Gardener*, food, children's activities.
- *Sunset Scramble Bike Rides on Heritage Rail Trail:* 6:30 pm April 16 (Glatfelter Station); April 23 (Seven Valleys); April 30 (Hanover Junction); May 7 (Railroad). Helmets mandatory. No earbuds. Bring water, basic repair kit.

VIRGINIA

Let's Go Adventures series
Virginia State Park *Let's Go Adventures* series teaches first-time participants the skills to confidently 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. Space is limited. To register, learn about upcoming adventures: virginiastateparks.gov/lets-go-adventures.
- *Let's Go Camping/Intro Course:* 2–4 pm May 4. Powhatan State Park, Powhatan. Free w/park admission fee.
- *Let's Go Orienteering!* 10–11:30 am May 5. Belle Isle State Park, Lancaster. Ages 10+ Free w/park admission fee.
- *Let's Go on an Archery Adventure!* 1–3 pm May 5. Belle Isle State Park, Lancaster. Ages 10+ Free w/park admission fee.
- *Let's Go on an Archery Adventure!* 10 am–12 pm May 11. First Landing State Park, Virginia Beach. Free w/park admission fee.

Leopold's Preserve walks
The White House Farm Foundation and Bull Run Conservancy are offering free naturalist-led walks at Leopold's Preserve in Broad Run. Registration required: leopoldspreserve.com/calendar.
- *Spring Birds & Blooms:* 10 am–12 pm April 14. All ages. Look for ephemeral wildflowers and bluebird at boxes (it's their nesting season).
- *Nature Hike:* 10 am–12 pm May 1. All ages. Guided naturalist hikes offered first Wednesday of month through November.

Hoffler Creek Wildlife Preserve
Take a walk at Hoffler Creek Wildlife Preserve in Portsmouth. Registration required for each walk: Web search "Hoffler Creek events."
- *Arbor Day Tree Walk:* 10 am–12 pm April 26. Learn to identify trees. There is a limited supply of trees to plant at home. $15.
- *Go Birding Day Talk & Walk:* 10 am–12 pm April 27. Introductory course covers basics. Test your new skills on trail. $15.

MARYLAND

Queen Anne's County plant sale
Queen Anne's County Master Gardeners 's *Ninth Annual Plant Sale takes* place, rain or shine, 8:30–11:30 am May 11 at the University of Maryland Extension-Queen Anne's County Office in Centreville. Get advice about flowers, fruits, vegetable beds, providing wildlife habitat during the *Ask A Master Gardener Plant Clinic*. Info: facebook.com/QueenAnnesCountyMasterGardeners or Rachel Rhodes at 410-758-0166, rjrhodes@umd.edu.

Lower Shore plant sale
Lower Shore Land Trust's 17th Annual Native Plant Sale is open at lowershorelandtrust.org. Selection includes native plants, trees and shrubs. Supplies are limited; orders must be placed by April 28. Plant pickup is 8:30 am–5:30 pm May 3 and 8:30 am –2:30 pm May 4 at the trust's office in Snow Hill. Proceeds help the trust create or preserve pollinator habitat for bees, birds, butterflies, bats. Info: lowershorelandtrust.org, 443-234-5587, info@lowershorelandtrust.org.

Gunpowder Watershed Challenge
The Gunpowder Valley Conservancy's *Explore the Gunpowder Watershed Challenge* is a 40-day event (April 22–May 31) that encourages people to go outdoors and appreciate the natural beauty, historic sites, region's local businesses. Participants earn stickers in a free Gunpowder Passport or challenge coins by visiting designated sites and/or volunteering with the conservancy for a chance to win a *Gunpowder Getaway* grand prize.

There is also an *Activity Challenge* of completing 35 miles of activity at your own pace. Info: gunpowdervalleyconservancy.org.

Eden Mill Nature Center

Attend an event at Eden Mill Nature Center in Pylesville. Preregistration required for all programs: edenmill.org.
Info: edenmillnaturecenter@gmail.com.

- *Owl Prowl:* 7:30–9 pm April 12, 26 (ages 8+) & May 3 (all ages). Pavilion. Learn about native owls while calling, searching for them in woods. $14 per date.
- *Preschool Nature Series:* 10–11 am May 7, 8, 14, 15, 21, 22. Ages 2–5 w/adult. Nature games, activities, story, craft, snack & (weather permitting) short hike. $11 per date.
- *Homeschool Environmental Study Series/ James Audubon:* 12:30–1:30 pm May 1, 8, 15. Ages 6–11. Learn about Audubon through literature, journaling, activities, hikes. Reflect on his impact, ways to continue his efforts. $33.

Oregon Ridge Nature Center

Attend an event at Oregon Ridge Nature Center in Cockeysville. Registration required for each program: Web search "Oregon Ridge wild apricot," then scroll down to desired event. Info: OregonRidgeNatureCenter.org.

- *Council Speaker Series/Building Forest Resiliency at Catoctin Mountain Park:* 1:30–3 pm April 14. Nature Center Auditorium. Adults. Lindsey Donaldson, Catoctin's chief of resource management. Will discuss how the park is building forest resiliency, addressing invasive nonnative plants, deer overpopulation, restoring native species diversity. Learn about tree species expected to be resilient to climate change. $10.
- *Earth Day Scavenger Hunt:* Drop in 11 am–3 pm April 20, 21. Nature Center. All ages. Follow clues on hourlong self-guided hike park to learn about Earth. Return to center to check answers, receive prize. $2 donation suggested.
- *Nature Book Club/Nature's Best Hope*: *A New Approach to Conservation That Starts in Your Yard*: 7–8 pm April 22. Adults. Douglas Tallamy's book shows homeowners how to turn yards into conservation corridors that provide wildlife habitats. This approach relies on the initiatives of private individuals that are immune from government policy. Free; donations appreciated.
- *International City Nature Challenge/Birds on the Ridge:* 9–10:30 am April 26. Adults. Look for, identify birds on easy hike. Free, donations appreciated.
- *International City Nature Challenge/The Amazing Nature Race:* 10 am–2 pm April 27. All ages. Learn to use the iNaturalist app to identify plants, animals. Hit the trails to use this knowledge. Later, collect a reward at the center. Free; donations appreciated. Program is for individuals/families. Other groups should register using the Group form: oregonridgenaturecenter.org/programs-and-special-events.
- *International City Nature Challenge/Wildflower Walk:* 10 am–12 pm April 28. Easy-moderate hike highlights spring ephemerals, their lore. $6.

CBBM Patriot cruises

Take a cruise on the Miles River aboard St. Michael's' Chesapeake Bay Maritime Museum's *Patriot*, a 65-foot, two-level vessel modeled to resemble a Chesapeake steamboat. Narrated *Historical Cruises* highlight region's beauty, history through stories about historic homes, wildlife along the route. *Island Music Cocktail Cruises* include fitting soundtrack. Reservations: patriotcruises.com. Combo tickets for historical cruise & CBMM general admission are also at the website and will be sold at the ticket booth during the season. Info: cbmm.org/cruises.

Patuxent Research Refuge

Patuxent Research Refuge offers free public programs on its North Tract [N] and South Tract [S] in Laurel. No preregistration required except where noted. List special accommodation needs when registering. Register: 301-497-5772 (9 am–4:30 pm). Info: https://fws.gov/refuge/patuxent-research/events. Join PRR's listserv: michael_cangelosi@fws.gov.

- *Kids' Discovery Center:* 9 am-12 pm (35-minute time slots, on hour) Tuesdays–Saturdays [S]. Ages 3–10 w/adult. Crafts, puzzles, games, nature exploration; free booklet. April: Rabbits. May: Insects/Ladybugs. Group arrangements possible. Registration strongly urged: 301-497-5760 (for this program only). If no answer, call 301-497-5772; leave info for Barrie.
- *Family Fun/Habitats & Adaptations at Patuxent and Around the World:* 9 am–4:30 pm, Tuesdays–Saturdays (drop-in/independent exploration); 10 am–1 pm, April 12–13 & May 10–11 (staffed) [S]. All ages. Hands-on learning activities, games, crafts.
- *Photo Adventure Scavenger Hunt:* Drop-in 9:30 am–1 pm April 20 [N]. Ages 10+ Starting at Visitor Info Station, use clues to hunt for sculptured stones, mystery objects, plants, animals. Learn about the refuge's history/features. Requires driving 1–2 miles, walking short distances. Bring camera/cell phone.
- *North Tract Bicycle Trek:* 10 am–12:30 pm, April 20 [N]. Ages 10+ Meet at Visitor Info Station. See wildlife, plants, historical sites on 12-mile guided ride. Weather-dependent. Road may be unsuitable for narrow tires. Bring bike, snack, water bottle, helmet. Registration required.
- *Raptors Rock!* 10:30 am & 11:30 am, April 20 [S]. All ages. Meet an American kestrel.
- *Vernal Pools - Gems of Nature:* 2 pm–4 pm, April 28 [N]. All welcome (aimed at ages 3+) Sign in at Visitor Info Station, then meet at Wildlife Viewing Area restrooms. Learn about vernal pools, creatures that live in them. Story, short hike, campfire w/marshmallow roast. Outdoors, rain/shine.
- *Wild Bee & Flower Festival:* 10 am–2 pm May 11 [S]. All ages. Learn about native bees from USGS' Native Bee Inventory & Monitoring Lab experts; receive native-plant gardening tips. Nature walks & talks, crafts, native-seed planting activities.

Free museum passes at libraries

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

Museum Passport

The Beach to Bay Heritage Area's *Museum Passport* includes historic sites and museums throughout the Lower Shore – from the Smith Island Cultural Center to St. Martins Church in Showell; from Pemberton Hall to Ocean City Lifesaving Station. Visitors can get their passport stamped for prizes. Info: 410-251-3163.

Ladew Topiary Gardens

Take part in one of offerings at Ladew Topiary Gardens in Monkton. Web search "Ladew Gardens events."

- *Nature Therapy:* 5:30–7 pm Tuesdays, April 23–May 28. Ages 18+ Program integrates nature's connection with mindfulness and other resiliency practices to help regulate stress, anxiety, depression, pain. Learn guided relaxation, breathing exercises, forest bathing. $200 payment due in advance.
- *Wild Walk/Spring Bird Count:* 9:30–11:30 am April 30. Ages 13+ Walk through meadows and Nature Walk to glimpse migrating warblers and resident birds. $25. Info: Rachelle Fowler at 410-557-9570 x225, rfowler@ladewgardens.com.
- Garden Festival: 8 am–4 pm May 4. Rain or shine. More than 30 vendors from across the eastern seaboard will offer hard-to-find perennials, specialty annuals, small trees, container plants, garden furniture, urns, architectural pieces. Tickets, $20–$75, are timed and must be purchased in advance. They will not be sold at the gate.

RESOURCES

PENNSYLVANIA

Clean Water Legislative Briefing

The Choose Clean Water Coalition, Coalition for the Delaware River Watershed and PennFuture have released the *2024-25 Pennsylvania Clean Water Legislative Briefing Book*. The book is a tool to educate state legislators, media, the general public on the most urgent clean water needs in the state. Each of the legislative requests in the book highlights a return on investment for rivers and streams. This resource is particularly relevant given that while Pennsylvania has the highest density of stream miles per acre of any state in the continental United States, one-third of stream miles are listed as impaired and unsafe for their intended use. Web search "Pennsylvania Clean Water Legislative Briefing Book." It will take you to the websites of several organizations that have a link to the pdf.

MARYLAND

Invasive Species Tool Kit

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

Farm tool, equipment sharing forum

Future Harvest/Chesapeake Alliance for Sustainable Agriculture's tool & equipment sharing platform provides farmer-to-farmer lending, renting or custom hiring. Farmers fill out, submit a form that sets lending terms: fee; length of rental; pick-up/delivery options; custom hire availability. There are five categories: hand tools, tractors, implements, shop tools and other. Users locate nearby equipment that meets their needs. Farmers who would like to try out equipment before buying are also encouraged to browse the list. The site is regularly updated. Info: Lisa Garfield at Lisa@futureharvest.org.

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.

Conservation Careers Guide

The Maryland Department of Natural Resources' new online *Guide To Conservation Careers in Maryland* presents career options for young adults and career changers who want to make a difference, enjoy being outdoors, are passionate about the environment. The guide reminds readers that conservation careers are not limited to life science and geosciences but include a wide range of disciplines that support action to protect, preserve, restore, conserve natural resources. To read the guide, web search "guide to conservation careers in Maryland DNR."

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.

Move over Miscanthus! Plant these native grasses instead

By Emily Broich

Nonnative species aren't inherently bad, and they don't all become invasive. But we should thoughtfully consider our landscaping choices, particularly when heading to the local garden center.

A cheerful grouping of blooming tulips with origins in Eurasia isn't likely to creep into our meadows and forests to form a monoculture. Nonetheless, if we read the landscape across many areas of the Mid-Atlantic, we'll easily find other plants from the nursery trade that have escaped cultivation and are growing where they weren't planted.

English ivy, Japanese barberry, periwinkle and burning bush, as well as many other familiar culprits, have escaped garden cultivation — and quickly displaced native plants. The online Mid Atlantic Invaders Tool identifies more than 600 invasive and potentially invasive plant species in our region. More than half of these species have origins as landscape ornamentals.

Unfortunately, a surprising number of plants with invasive tendencies have not made their way onto state agency lists that would restrict their sale or propagation and are readily available at nurseries — unless they are nurseries that specialize in natives.

Here, I'll focus on ornamental grasses, particularly native species to consider instead of widely available invasives, such as maiden grass (*Miscanthus sinensis*) and fountain grass (*Pennisetum alopecuroides*), both native to Asia.

With an upright growth habit and showy plumes, maiden grass, also known as Chinese silver grass, was introduced to the United States in the 1800s. It has gained popularity as a specimen planting and has naturalized in countless places, often at the expense of native bunch grasses.

Maiden grass is "self-incompatible," which means that, even though it has male and female structures in the same plant or flower, it cannot pollinate itself — so it's unlikely to produce viable seeds when planted in isolation. But the proximity of other individual plants increases the likelihood. When that happens, wind can carry upward of 1,000 seeds per plant into the surrounding landscape.

Little bluestem is an attractive native grass with blue-green summer foliage, turning in the fall to various shades of red. (Christa Shoreman/PennState Extension)

A quick search on a local garden center website revealed a stock of more than a dozen maiden grass cultivars for sale this spring. A few of them are promoted as noninvasive and sterile, but I'd rather exercise caution and dedicate that space in my garden to a native grass that supports more wildlife instead.

Just like native trees, shrubs and herbaceous perennials, native grasses are important host plants for butterfly and moth larvae. They can play just as important a role as flowering perennials in supporting pollinators. The structure of native bunch grasses also provides winter shelter and nesting habitat for other insects and native bees.

Maiden and fountain grass, among others, have been widely planted in residential, commercial and public spaces. Meanwhile, a few native grasses are quietly asserting their places in the standard garden center lineup of nonnative options — with good reason, aesthetically and ecologically. Let's take a look at a few of them.

Little bluestem

A warm-season native bunch grass growing 2–4 feet tall, little bluestem (*Schizachyrium scoparium*) is a lovely addition to any landscape, with its blue-green summer foliage shifting into rich fall hues of copper, pink and burgundy.

Switchgrass is more tolerant of soil moisture than many grasses, making it ideal native choice for rain gardens. (Dave Lage/CC BY-SA 2.0)

Whimsical, fluffy seeds persist into winter and are valuable to songbirds and small mammals. The Xerces Society, which advocates for invertebrate conservation, reports that little bluestem is a larval host plant for nine species of skipper butterflies.

Once established, the plant is very drought tolerant, with fibrous roots going as deep as 5 feet. Happiest in full sun and well-drained soil that is low in nutrients and organic matter, little bluestem is compact, clumping and hard not to love. Well-behaved in small spaces, it is beautiful grown on its own but can also add vertical structure and movement to a mixed planting.

Switchgrass

Another warm-season bunchgrass with deep roots, switchgrass (*Panicum virgatum*) is easy to grow. Growing a bit taller than little bluestem, at 3–6 feet, it is a solid native replacement for maiden grass. Its high ornamental value makes for a great herbaceous border or privacy screen anywhere with full sun. More tolerant of soil moisture than other grasses, switchgrass also has a functional value in rain gardens. Its airy panicles form small seeds that are attractive to songbirds. Avoid fertilizer or soil amendments, which can cause flopping.

Bottlebrush grass

Cool-season bottlebrush grass (*Elymus hystrix*) grows when temperatures are lower in the spring and fall. It's a nice, textural addition to areas with dappled sunlight under trees or along woodland edges, though it doesn't do well in full shade. Bottlebrush grass grows 2–5 feet tall, with delicately bristled seedheads (hence its name) rising a foot or so above the foliage. It is a host plant for the larva (caterpillar) of the northern pearly eye butterfly and some native moth species. Our native white-footed mice are known to dine on its seeds.

Native bottlebrush grass, which gets its name from the delicately bristled seed heads that rise above the foliage, does best in partial shade or dappled sunlight. (Christa Shoreman/PennState Extension)

These are just three native grasses becoming more widely available. There are plenty more to choose from! The U.S. Forest Service recommends three more as alternatives to maiden grass in particular: splitbeard bluestem (*Andropogon ternarius*), sugarcane plumegrass (*Saccharum giganteum*) and Indiangrass (*Sorghastrum nutans*).

A 2017 survey of Mid-Atlantic wholesale nurseries conducted by Mt. Cuba Center in Hockessin, DE, found that 25% of all the plants sold are native species. That's a good start, but not quite enough if we are serious about safeguarding biodiversity in our communities while making up for habitat loss and impacts of climate change.

Like any industry, the nursery trade will always respond to demands. Our landscaping choices have impacts far beyond our own yards. They can and do matter. ■

Emily Broich is the Pennsylvania green infrastructure projects coordinator for the Alliance for the Chesapeake Bay.

Meet the prothonotary warbler: fancy plumage, fancy name

By Alonso Abugattas

If you're looking for a warbler that isn't just passing through the Chesapeake Bay region on its way to summer breeding grounds way up north, keep a lookout the next few months for the prothonotary warbler. That's a mouthful of a name (I'll explain later), but it's a beautiful yellow bird that also goes by the name of golden swamp warbler or simply swamp warbler — names that say a lot about its preferred wetland or riparian habitat.

Like so many songbirds, in the fall it heads for the tropics and in spring, it returns north to breed. But for many prothonotary warblers *(Protonotaria citrea)*, our neck of the swamp is as far north as they need to go to find suitable breeding weather.

It's a particularly beautiful bird and a bit larger than the other yellow songbirds we see in summer, like goldfinches and yellow warblers. The male prothonotary's head, neck and breast are an eye-popping bright yellow, set off by jet-black eyes and a black bill. It has a brownish-orange upper back, or mantle, and slate-blue wings with white highlights. The female's yellow parts are a bit paler, often with a greenish/olive wash. Both sexes have short tails, with white undertail coverts. The male's bill is black, top and bottom, while the female's lower bill, or mandible, tends to be more flesh colored.

Prothonotaries are habitat specialists — specifically of shady wetlands, riparian areas, slow-moving rivers and, in winter, mangroves. They're rarely found away from these areas. By early May they'll be setting up shop in the Coastal Plain of the lower Mid-Atlantic states, from the Carolinas to the Chesapeake Bay region, including the Eastern Shore and into Delaware and southern New Jersey.

Some long-distance outliers go farther north. And there's a slightly larger cohort of prothonotaries that prefer the Midwest to the East Coast, migrating up the Mississippi River basin as far north as Illinois and Indiana.

The prothonotary warbler, a male shown here, is the only warbler in the eastern U.S. that nests in tree cavities, usually in abandoned woodpecker excavations. (Kim Harrell/Cornell Lab of Ornithology Macaulay Library)

They start their return trip south in late August. Their winter digs are mostly in Central and South America, from the Yucatan Peninsula to coastal Columbia and Venezuela, mostly in swamps and mangroves.

I always love seeing "our" birds when I visit the tropics, and the prothonotary warbler is a favorite. I've seen that distinctive flash of yellow in Caño Negro in northern Costa Rica, near Nicaragua. The Ticos (Costa Ricans) call them *reinita cabecadorada*, though elsewhere in Latin America it has other names, such as *manguito dorado* or *chipe dorado*.

Prothonotaries are also unique in being the only eastern warblers to nest in cavities — abandoned woodpecker holes, mostly, but also naturally occurring cavities in dead or dying trees. The only other North American warbler (i.e., Parulidae family) that nests in cavities is the tiny Lucy's warbler of the southwestern U.S. and Mexico.

They prefer cavities 4–6 feet off the ground, and an estimated 75% of all nests are near or over water. They will use artificial nesting boxes, so people often modify bluebird or tree swallow nesting boxes to have a smaller entrance hole of 1-1/8 to 1-1/4 inches. Nesting sites are hard to find, though, so prothonotaries are not always picky. I've seen them use unmodified tree swallow and bluebird boxes in Maryland.

They defend their nests vigorously and will often snap their bills at or attack bluebirds, downy woodpeckers, and house wrens in particular, which they see as threats and competitors for the same real estate. They also seem to have a beef with robins.

Mating pairs are formed just after they arrive at their breeding grounds, with the males arriving about a week before the females in early to mid-April to search for nest sites. To attract mates, the males often situate themselves at the chosen nest site and fluff up their plumage. The male starts prepping the cavity with moss, but once the female makes her choice, she finishes building the nest with twigs and more moss.

A female prothonotary warbler perches on a tree branch. (Ryan A. Candee/CC BY-SA 4.0)

Their pairing may last for more than one season and produces one or two broods of four to six eggs per year. Only the female incubates the eggs, which are white with brown spots, for 12–14 days. After they hatch, the father helps to feed the young.

The young fledge less than two weeks after hatching, but the parents care for them for up to 35 days, feeding them mostly insects, spiders and snails. That is also the preferred food for the adults, though they may eat fruits, seeds and berries when not breeding.

Prothonotary nests are a favorite target of the brown-headed cowbird, North America's infamous brood parasite. The warblers' main predators are raccoons and snakes, which is why they prefer to nest over water and why predator baffles are strongly recommended for nest boxes. The young are said to be able to swim, though I've never witnessed it. The oldest known prothonotary warbler, a banded bird found in Ohio, was just a month shy of 12 years.

Now, about that name. What does "prothonotary" mean? Well, to this day it's not an uncommon title in the U.S. for a civil court's chief recordkeeping official, or their office. But apparently — and only apparently, because a verifiable source of the word is lost in the mists of history — the term refers to the papal scribes of the Vatican, centuries ago, who wore bright yellow robes, or possibly hoods.

Of far more importance is that the population of prothonotary warblers, as with so many migratory songbirds, has declined significantly in the last half-century: an estimated decrease of 31% since 1966, likely driven by the loss and fragmentation of their wetland and riparian habitat.

All the more reason to order those birdbox plans and build a summer home for some lucky birds down by the creek. ■

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Cups, cavities, scrapes or spheres — to each bird its own nest

By Kathy Reshetiloff

I recently took advantage of the spring weather to walk around my yard to determine what needed to be spruced up.

Many of my trees or shrubs had not leafed out. As I passed my Virginia sweetspire bush, I noticed an empty nest left by a robin last spring. A rather ordinary nest, it was cup-shaped and made of woven grass.

As I moved around the yard, a small gray bird caught my attention, flying back and forth between the nearby woods and a spot under my deck. A closer look confirmed that the bird, an Eastern phoebe, was building a nest on a support beam. Unlike the robin's nest, this one was being created with carefully placed tiny pieces of moss and mud.

Birds are enormously diverse, of course — differing in size, color, song, food and habitat. So perhaps it's no surprise that their nests are just as varied. Some look simple and plain while others are engineering marvels. Some nests are lined with plant fibers, feathers and other materials to cushion the eggs as the adult bird moves around the nest. But they all serve the same purpose: to protect eggs and growing hatchlings.

The location of a nest is carefully chosen to provide shelter from wind, rain and sun. Eggs and chicks are far more vulnerable to predators than their parents are, so many nests are well hidden or thoroughly camouflaged with leaves, grass, moss, bark and other natural detritus.

Here is a sampling of some of the types of bird nests in the Chesapeake Bay region that you might find in your backyard or along your favorite hiking trail.

Cups

Although most common and therefore most familiar, cup-style nests differ greatly in size, dimensions and depth, depending on the bird species. Placement varies widely as well. Cup nests may be wedged into the forks of tree branches, tucked into the dense growth of a bush or even situated on the ground. You'll also find them on human infrastructure, like window ledges, eaves and deck supports, and in the rafters of open buildings like sheds and barns.

Above: A red-headed woodpecker brings food to its young in a cavity nest. (Joe Kosack/ Pennsylvania Game Commission)

Cup-shaped nests are used by robins, hummingbirds, yellow warblers and many other perching birds.

Pendants

The pendant nest you're most likely to see in the Chesapeake region is that of the Baltimore oriole, but these intricately woven nests are not uncommon around the world.

Baltimore orioles breed mostly in the northern and inland portions of the Bay watershed during June and July. Your best chance of spotting one of their elaborate pendant nests, according to the Cornell Lab of Ornithology, is not deep in the forest, but at the edges of woods, particularly near water, or in open areas with scattered deciduous trees — which they tend to prefer over conifers. The nests have small side entrances, making them challenging for predators and brood parasites like cowbirds.

Both golden-crowned and ruby-crowned kinglets build pendant nests, though we only see kinglets during their spring and fall migrations. To see their nests, you'd need to go north to their Canadian summer breeding grounds.

Spheres

Almost completely enclosed, these round or oblong nests have side entrances and are well-camouflaged because they are on the ground or in low areas susceptible to predators.

Sphere builders that breed in the Mid-Atlantic include ovenbirds. They are named for their nests, which are built on the ground and resemble primitive outdoor ovens, made from twigs, fibers and animal hair instead of mud. The ovenbird's breeding season is mid-June to late July.

Above: A male Baltimore oriole stands guard while his mate builds a pendant-style nest in a sycamore tree. (Andrew Weitzel/CC BY-SA 2.0)

Right: An osprey brings fish to its chicks in a platform nest at the edge of a river. (Randy Loftus/U.S. Fish & Wildlife Service)

Another sphere builder in the Bay region is the marsh wren, though its breeding grounds here are mostly confined to lower Eastern Shore marshlands from mid-June to mid-July. Their nests, which also have side entrances, are suspended between stalks of cattail or bullrush, a few feet above the sediment. The male marsh wrens are the primary nest builders — and over-achievers. They usually build several nests to increase their chances of attracting a mate.

Cavities

Woodpeckers are the primary DIY cavity nesters, hollowing out their own nests in trees or snags. There are also "secondary" cavity nesters: birds that take over abandoned woodpecker cavities or find natural holes in dead trees and poles. Among these are bluebirds, house sparrows, tree swallows and tufted titmice. Secondary nesters also readily use bird boxes.

Scrapes

You might not notice these shallow depressions at all. Some scrapes have a little nesting material, including plants, pebbles or down. Many shorebirds, including terns, plovers, killdeers and American oystercatchers, nest in scrapes.

Platforms

Sticks and twigs make up these bulky, relatively flat nests, although some have a shallow depression. Some birds may use the same platform nest year after year and continue to add material. Ospreys, bald eagles, great blue herons and other wading birds are platform builders.

If you come across an occupied nest, do not disturb the bird, eggs or hatchlings. Even minor disturbances can cause a bird to abandon its nest. The Migratory Bird Treaty Act is clear about this: "No person may take (kill), possess, import, export, transport, sell, purchase, barter, or offer for sale, or barter any migratory bird, or any parts, nests or eggs of that bird except under the terms of a valid [federal] permit."

But interested citizens can monitor birds and bird nests through a citizen science project called NestWatch (nestwatch.org) run by the Cornell Lab of Ornithology. The project provides information on how to monitor a nest safely and report your observations. You can also find nesting bird box plans that are designed for specific species in your region. ■

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