CHESAPEAKE
BAY JOURNAL
July/August 2025 Volume 35 Number 5
Independent environmental news for the Chesapeake region

Community science brings ‘invaluable service’ to Bay work

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Invasive water chestnut was eradicated from the Potomac River by the 1970s, but another species of the invasive plant is spreading in Virginia. Biologists are testing narrow spectrum herbicides in hopes of controlling it again. Read the story on page 13. (Dave Harp)

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EDITOR'S NOTE

The reader survey is coming: It's a critical time for your feedback

In a few weeks, you'll find the *Bay Journal* reader survey in your mailbox. It has never been more important to hear from you, so I hope you will take a few minutes to complete the survey and send it our way.

The survey is our best source of direct feedback from readers. It provides a collective sense of what you value and what we might do differently. Your responses have influenced our reporting topics, our website, our print layout, our webinar offerings and more — including the new series, Our Waterways, which highlights smaller sections of streams and rivers across the region.

There is added urgency behind this summer's survey.

The *Bay Journal* has been impacted by the federal grant freeze. We receive some support from a grant for public awareness about the Bay cleanup effort, but the funds have been frozen since February. The future of the grant remains uncertain.

As a result, we are trying to find new sources of support. How does the survey help with that?

Your responses tell the story of *Bay Journal* impact. In the survey, please let us know how you use the content you find in these pages. What have you learned? Has it impacted you personally? Does it play a role in your job or your conversations? Do you share the articles with others and, if so, who? Do you use the *Bay Journal* in your classroom? Do you reach out to policymakers? Have you been motivated to volunteer or attend programs? Do you know of cases when *Bay Journal* articles were circulating in your community to help solve a problem?

It's also helpful when readers explain why they value the *Bay Journal* and even suggest how it could play a greater role in regional environmental reporting.

Ultimately, your stories are our story. They can have a meaningful impact when funders decide where to place their limited resources.

I look forward to seeing your thoughts among the thousands of replies we expect to receive! And, yes, we do read them all.

— Lara Lutz

ON THE COVER

Gene Lopez volunteers with Shore Rivers on Maryland's Eastern Shore to monitor water clarity and underwater grasses in Rolles Creek near St. Michaels. (Dave Harp)

Bottom photos: Left courtesy of the U.S. Geological Survey; center by Tony Spezzatura; right courtesy of Virginia State Parks.

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BY THE numbers

12.7 million
Population of the Chesapeake Bay watershed in 1985

18.9 million
Population of the Bay watershed in 2024

333.3 million
Pounds of nitrogen (a major form of nutrient pollution) reaching the Bay from its watershed in 1985

235.7 million
Pounds of nitrogen reaching the Bay from its watershed in 2024

1,500-2,000
Estimated black bear population in Maryland

18,000-20,000
Estimated black bear population in Virginia

18,000
Estimated black bear population in Pennsylvania

The sandbar shark is born here and may return here

The Chesapeake Bay is just salty enough to be hospitable to many marine animals from the Atlantic Ocean, including sandbar sharks. In fact, they are the most common shark species in the Bay.

True to their name, sandbar sharks roam along sandy bottoms often 200 feet deep. They eat small prey such as crabs, menhaden and even octopus.

Like many migratory species, they travel north in the summer and south in the winter. Females in the Bay give birth every other year between June and August, typically to 8-10 pups. The juveniles stay in shallow water until late fall when they move south.

Sandbar sharks tend to avoid beaches and have been rarely associated with attacking humans. But keep your distance if you spot one. Given their size — up to eight feet long and 200 pounds — they are still potentially dangerous.

Sandbar sharks have few predators other than humans. According to the Virginia Institute of Marine Science, the population dropped by 65% from the late 1970s to early 1990s due to overfishing. Federal programs established in 1993 have led to a slow rise in population. — Lauren Hines-Acosta

Top photo: A sandbar shark swims at the Virginia Living Museum in Newport News. (Will Parson/Chesapeake Bay Program)
Bottom photo: A sandbar shark swims among its smaller neighbors at the Virginia Aquarium & Marine Science Center. (Courtesy of VA&MSC)

Beautiful swimmers indeed

The *Bay Journal*'s first film, *Beautiful Swimmers Revisited*, debuted in 2016 and remains one of its most popular. Summer is a great time to admire the Bay's iconic blue crabs, so check out the film today at *bayjournal.com/films* or on the *Bay Journal*'s YouTube channel.

Podcast milestone

This spring, we topped 16,000 all-time downloads for the *Chesapeake Uncharted* podcast. Are you among our listeners? If not, tune in through your podcast provider or at *bayjournal.com/podcasts*.

ABOUT US

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

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BAY JOURNAL NOTEBOOK

Bay Journal reporter Whitney Pipkin (far right) joins a work crew in Virginia to report on their efforts to combat invasive water chestnuts. (Dave Harp)

Dog days of summer

Flashy rains, floods and heat advisories have defined summer so far in many parts of the Chesapeake Bay watershed. And, as staff writer **Jeremy Cox** reports in this issue, not every community is prepared.

But warmer weather also opens the floodgates for water recreation.

Staff writer **Lauren Hines-Acosta** went to Kiptopeke State Park in Virginia early in the season to report on a location that will make everyone want to reach for the out-of-office button. Lauren recently relocated from the Midwest to join the *Bay Journal* team by working from a base in Richmond. So this marked her first visit to the Eastern Shore and her first chance to touch the mainstem of the Chesapeake Bay.

Staff writer **Whitney Pipkin** also had a first while working on an article for this issue: riding on an airboat to report on the effort to curb the spread of invasive water chestnuts. Whitney said she felt a bit like the mice in Disney's 1977 *The Rescuers* as the boat skimmed the surface of the water so crew members could spot and spray the invasive aquatic plants lurking beneath native American lotus.

Lauren and Whitney both ventured to Virginia's Shenandoah Valley recently attend portions of the Choose Clean Water Coalition's annual conference. Lauren gleaned several story ideas from the conference, as well as an anecdote from the Otsego County Conservation Association in New York that appears in her article about community science.

Editor-at-large **Karl Blankenship** and *Bay Journal* columnist **Tom Horton** were part of a team that co-authored an article set to appear in the journal *Frontiers in Marine Science*. Their work highlights lessons learned from 40 years of Bay restoration efforts that could be applied elsewhere. Authored with a dozen other experts, the article focuses on the importance of science, public engagement, leadership and other critical aspects of such complex efforts. Effective communication, they found, is key — and the article highlights the benefits of having a publication like the *Bay Journal* help provide independent, transparent coverage of the ongoing restoration effort.

NEWS briefs

LOCAL
REGIONAL
NATIONAL

EPA cancels flood protection grant for Hampton community

The U.S. Environmental Protection Agency has terminated a $20 million grant for flood resilience and other improvements to the city of Hampton, VA, and the nonprofit Wetlands Watch, the groups announced in June.

The grant was going to help finance the Aberdeen Gardens Neighborhood Resilience Action Plan. The Aberdeen Gardens neighborhood in Hampton started out as one of President Franklin D. Roosevelt's New Deal projects. In 1933, during the Great Depression, Roosevelt wanted subsistence homesteads built for low-income rural workers. Aberdeen Gardens was the first of those communities built by and for African Americans.

People from some of those same families still live in Aberdeen Gardens, but they now regularly experience flooding. Mold is growing in some of the original brick homes. The plan was going to add drainage infrastructure, widen nearby creeks, build a trail along a creek and create a community garden.

The grant was part of the EPA's $1.6 billion Environmental and Climate Justice Community Change program aimed at funding projects that benefit disadvantaged communities. The city and nonprofit received the grant in December 2024.

The Aberdeen Gardens Historic Museum celebrates the Aberdeen Gardens neighborhood in Hampton, VA, which was built for and by African Americans in 1935. (Courtesy photo)

The status of the funds had been uncertain since April 1, when the city found it couldn't withdraw resources from its account. In a press release, Wetlands Watch said the Trump administration claimed that the grant was "no longer consistent with EPA funding priorities" and referenced a policy of "merit, fairness and excellence."

In his January 27 announcement of the federal funding freeze, Trump said he is targeting diversity, equity and inclusion programs and climate resilience projects. Wetlands Watch and the city of Hampton are exploring options to appeal the termination. *— L. Hines Acosta*

New CEO selected for Chesapeake Conservancy

The Chesapeake Conservancy, a land preservation group serving the Chesapeake watershed, has named a former vice president of the organization as its new chief executive officer. Susan Shingledecker is set to take the reins Sept. 8.

Shingledecker most recently served as executive director of Earth Science Information Partners, which promotes the use of data to tackle environmental issues. In that role, she collaborated with federal and state agencies, universities and private-sector technology firms to advance data-driven solutions.

"My five years at ESIP have given me an incredible understanding of the opportunities for data to inform our conservation work, increase our efficiency and grow our impact," Shingledecker said in a statement. "I am excited to combine this experience with my past work in conservation and outdoor recreation."

New Chesapeake Conservancy CEO Susan Shingledecker. (Courtesy photo)

From 2017-2020, she served as the conservancy's vice president and director of programs. Among

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briefs

From page 5

other initiatives, she helped defeat a Dominion Energy plan to build a compressor station directly across the Potomac River from Mount Vernon, the home of founding father George Washington.

"Susan's return is a homecoming we are thrilled to celebrate," said conservancy board chair Stephanie Meeks. "She is uniquely positioned to build on our strong foundation and guide the Chesapeake Conservancy into its next chapter."

Shingledecker also previously served as vice president of BoatUS, where she advocated for public access and outdoor recreation. She also led renewable energy programs for the Maryland Energy Administration and was a policy analyst with the National Governors Association.

She holds a master's degree in environmental management from Duke University and a bachelor's degree in international studies from American University. She lives in Severna Park, MD.

Former CEO Joel Dunn, who had led the Annapolis-based organization since 2010, left in January to work for Campaign for Nature, a group that seeks to protect 30% of the world's lands and oceans. The conservancy's EJ Amyot will continue to serve as interim president and CEO, as well as chief operating officer, until Shingledecker comes on board. *— J. Cox*

VA commission denies petition to protect terrapin turtles

The Virginia Marine Resources Commission unanimously rejected a petition in late June that would help prevent diamondback terrapins from dying in crab traps.

Known for the diamond-shaped rings on their shells, diamondback terrapins are found in the tidal portions of the Chesapeake Bay. The Virginia Department of Wildlife Resources sees the turtles as a species of "very high conservation need." According to the department, terrapins' biggest threats are loss of nesting habitat and death in crab traps. The turtles enter the traps to eat the bait and drown if they can't escape.

Filed by the Center for Biological Diversity, the Virginia Herpetological Society, Wild Virginia and Ohio University professor Willem Roosenburg, the petition asked the commission to require licensed commercial and recreational anglers to add "bycatch reduction devices" to their traps, widely known as crab pots, in waters within 150 yards of shore.

The devices are wire or plastic slots that prevent turtles from entering a crab pot while allowing crabs to pass through. Maryland requires the devices on recreational crab pots. Virginia offers a discount on the license for recreational anglers who use traps that have the devices.

A juvenile diamondback terrapin explores a shoreline in Kent Narrows, MD. (Alicia Pimental/ Chesapeake Bay Program)

The petitioners presented the results of six studies to the commission. All demonstrated that the devices were nearly 100% effective in keeping terrapins out of the traps, though four showed that traps with the exclusion devices also caught fewer crabs than those without.

At the commission meeting, many commercial anglers said the slots would require more maintenance. The devices cost about $4 per pot, but crabbers said that cost would add up and, just as important, they might reduce their catch.

Commissioner Jamie Green was concerned about enforcing the requirement. VMRC police would have to pull pots, measure the device for compliance and check licenses.

The commission denied the petition but recommended that commission staff evaluate applying the requirement to only recreational anglers. *— L. Hines Acosta*

New director leads Smithsonian environmental research

William "Monty" Graham, a veteran marine scientist and former head of the Florida Institute of Oceanography, took over in early June as the director of the Smithsonian Environmental Research Center in Edgewater, MD.

Graham, a native of Danville, KY, spent the last four years leading the Florida institute, a 32-member consortium of universities and colleges, state agencies, industry and nonprofits, including the Smithsonian's National Museum of Natural History. He also has worked at the Dauphin Island Sea Lab and the University of Southern Mississippi.

Lonnie G. Bunch III, secretary of the Smithsonian, called Graham "an ideal fit" to lead SERC, which was established in 1965 and occupies 2,650 acres of land and 15 miles of shoreline along the Rhode and West rivers south of Annapolis.

"I am honored to join SERC and look forward to working with the talented team to deepen our understanding of environmental systems especially as they relate to the human enterprise," Graham said.

briefs

William "Monty" Graham, the new director of the Smithsonian Environmental Research Center. (Courtesy photo)

Graham succeeds Anson "Tuck" Hines, a marine biologist and blue crab specialist who stepped down at the end of May after 20 years as SERC's director. During that time, Hines expanded the center's core campus and added seven green buildings — including the Charles McC. Mathias Lab, the first Smithsonian building to earn LEED-Platinum for its construction.

Hines also launched SERC's participatory science program, which engages hundreds of volunteers every year in hands-on science. He started work at the center as a researcher in 1979 and plans to continue his crab research as an emeritus scientist.

— Staff report

Amazon building two new data centers in PA

Amazon announced in June that it is planning to invest at least $20 billion to build two new data centers in Pennsylvania, one of which will be in the Chesapeake Bay watershed.

Democratic Gov. Josh Shapiro touted the investment, which will support cloud based computing and artificial intelligence activities and will create at least 1,250 high-tech jobs in the state.

"With this historic announcement, we're creating opportunity for our workers, generating new revenue for our local communities and ensuring the future of AI runs right through Pennsylvania," Shapiro said in a June 9 statement.

But the rapid expansion of data centers in the region has raised concerns about their environmental impacts — mainly their huge electric power demands but also water consumption, stormwater runoff and air pollution from the facilities' backup diesel generators.

Amazon plans to build two data centers in Pennsylvania, one of them near the nuclear Susquehanna Steam Electric Station in Luzerne County, shown here in 2015. (jakec/CC BY-SA 4.0)

The two data center campuses planned by Amazon will be built in Luzerne County, in the Bay watershed, and Bucks County, which is in the Delaware River watershed. More campuses are under consideration.

The Luzerne campus will draw most of its power from the nearby Susquehanna Steam Electric Station, a nuclear power plant where Amazon has made investments in recent years, though some are concerned the new centers will still add more demand overall to the region's power grid.

At an April 24 meeting of the state Public Utility Commission, Amazon's energy services chief Michael Fradette said the company is "committed to being responsible partners in grid development and energy consumption" and is also investing in solar, wind and advanced nuclear technologies.

— K. Blankenship

VA's Pay-for-Outcomes program invites innovation

Funds for reducing water pollution paid out only after grantees demonstrate results

By Lauren Hines-Acosta

Grants for reducing water pollution in the Chesapeake Bay and its rivers typically fund projects that reduce nutrient-laden runoff from farms, wastewater treatment plants and developed areas. The money usually helps cover the costs of conducting a project — like restoring a stream, planting trees, managing manure or reducing discharges and sewer leaks.

But as the region continues to struggle with reducing nutrient pollution in waterways, some government grant programs are switching up the format. They require grantees to front the money for project costs and award funds only after they show a measurable amount of pollution reductions. The model shifts the performance risk from the taxpayer to the applicant.

The Virginia Department of Environmental Quality launched this type of effort recently, announcing this spring $19 million in grants that will go to nine projects as part of the agency's Pay-for-Outcomes pilot program — if they demonstrate results.

Maryland and Pennsylvania have programs similar to Virginia's that pay based on progress made, not just practices implemented. But they are limited to practices pre-approved by the Chesapeake Bay Program, the state-federal partnership that leads the Bay cleanup.

Virginia's Pay-for-Outcomes program goes beyond the pre-approved practices to invite new ideas, including from the private sector.

"It's one of the programs I'm most excited about in Bay work, because I think that it's going to lead to change, and I think it's going to lead to a lot of exciting opportunities," said Joe Wood, Virginia senior scientist at the Chesapeake Bay Foundation.

Out of 31 applications, the program awarded grants to nine proposed projects, which accounted for a combined reduction of 580,000 pounds of nitrogen over the next 10 years. Nitrogen is one of the main forms of nutrients plaguing the Bay.

Some projects take familiar approaches like restoring forest land, building oyster reefs and converting farmland into a forest while others specialize in innovation.

A company called MOVA Technologies plans to use air filtration technology in poultry houses in the Shenandoah Valley that will collect ammonia gas. Ammonia is 82% nitrogen, which the company would extract and sell for other uses.

Luke Allison, MOVA Technologies chief advancement officer, said the filter will prevent 164 pounds of nitrogen per house annually from entering the Bay. If the company can deliver on that promise, it will receive a $1.3 million grant.

LIXIL Americas, which owns American Standard, proposed a toilet system that's used in Europe but emerging in the United States. It's designed to collect urine and pipe it to a machine outside the home that treats it before it goes to the septic tank.

The company will retrofit septic systems in sensitive areas in two Virginia counties. There are already on-site sewage systems for septic tanks on the market, but they can cost tens of thousands of dollars, the company says, and its system can remove almost as much nitrogen for a fraction of the cost.

"I think what's so interesting about our project is that it represents sort of an entirely new approach to nutrient management, particularly in on-site systems," said Andrea Stowell, project lead for LIXIL Americas.

The company plans to add the technology to 12 homes and six businesses over the duration of the project. If all goes well, LIXIL Americas will earn its $499,800 grant.

Virginia dairy farmers will also benefit from the Pay-for-Outcomes program. Eric Paulson, executive director of the Virginia State Dairymen's Association, said the program will pair well with the state's cost-share program that helps farmers pay for environmentally friendly methods.

Virginia Tech will assess the outcomes of all of grants, measuring and verifying how much nitrogen is reduced.

If the program is effective, Wood of the Bay Foundation hopes to get more support for the volunteer experts who review the applications. ■

Report 'desperately' urges more pesticide study in Bay region

Dozens of studies show continued contamination from PFAS, fluorine and atrazine

By Jeremy Cox

Widespread pesticide use is polluting waters throughout the Chesapeake Bay watershed as well as imperiling the health of a host of organisms, ranging from oysters to humans.

And scientists are "desperately" calling for further investigation into what happens to living things when they're exposed to haphazard mixtures of these myriad chemicals at once.

Those are among the top findings of a new review of more than 40 recent scientific studies examining the effects of pesticide use in the Chesapeake region and beyond. The 20-page report, released May 27 by the Maryland Pesticide Education Network, singles out "forever chemicals" — officially called per-and polyfluoroalkyl substances or PFAS — and atrazine, a common weed killer, as two of the most pressing threats. The report has not been peer reviewed.

Bonnie Raindrop, the network's program director, said she hopes that putting the best and latest pesticide information in the hands of farmers, homeowners, lawmakers and fellow researchers will lead to better safeguards against pollution.

"Clearly, pesticides are having an effect and a damaging impact on Bay system health," she said.

The report was primarily authored by the group's Pesticides & the Chesapeake Bay Watershed Project, a coalition of more than 300 scientists, state regulatory officials, advocacy organization representatives, farmers and others.

The report does have some positive news. Citing a 2021 study conducted in the Potomac and Susquehanna rivers, the authors noted that efforts to control farm runoff has reduced pesticide concentrations. They also pointed to the success of the ban on DDT.

But on the downside, a recent sharp uptick in the production of pesticides that contain fluorine and PFAS is raising alarm in the scientific community. While fluorine can lengthen a pesticide's active life, it might also cause harmful substances to accumulate within fish tissues, research shows.

PFAS, known as forever chemicals because of how slowly they break down in the environment, can be active ingredients in pesticides or they can leach into chemicals through their containers or the manufacturing process.

A 2021 study found PFAS in every smallmouth bass sampled in rivers amid four very different land uses within the Bay watershed. But much more research is needed, the authors say, to determine whether chemical exposure is behind smallmouth population's decline or the maladies among living fish, which include external lesions, communicable diseases and imbalances of reproductive hormones.

"Knowing that pesticides of concern described within this report are not only co-occurring amongst themselves but are also present amongst PFAS compounds leads researchers to desperately ask what the synergistic effects may be within our populations," the report states.

Meanwhile, even low doses of the popular herbicide atrazine have been shown to result in the loss of microbes that support oyster health. Research suggests that atrazine "may reduce the fitness and survival of oyster species," the authors wrote.

Vicki Blazer, a U.S. Geological Survey scientist, helped compile the review and authored several of the studies within it. She said she hopes that the report gets lawmakers' attention and persuades landowners to limit pesticide use.

"I guess I'm one of those optimistic people," she said. "I think most people don't want to pollute, but they don't understand what they're spraying around and what it does to the environment."

The paper urges various entities to collaborate on more research. Specifically, it recommends adding pesticide analysis to testing protocols at USGS monitoring stations operated around the Bay watershed. It also calls on Maryland to strengthen its existing data-collection program on pesticide use. The state gathers voluntary reporting from just 650 of its 12,000 farms. ■

USGS faces big cuts, endangering Chesapeake science

Budget proposal from the Trump administration takes an axe to ecosystem research

By Timothy B. Wheeler

Vital research into threats to the Chesapeake Bay from invasive blue catfish, PFAS contamination, climate change and land use change is on the chopping block as the Trump administration aims to decimate if not eliminate ecological studies done by the U.S. Geological Survey.

In its proposed fiscal 2026 budget released May 30, the White House has called for a 90% cut in funding for ecological research, laboratories and personnel at the USGS, the science arm of the U.S. Department of the Interior.

"It's the most important mission area in USGS that they're cutting," said Scott Phillips, who retired from the agency in 2023 after more than 25 years as its Chesapeake Bay science coordinator. Beyond water quality, he noted, fish and wildlife are "what people care about."

The USGS is perhaps better known to the public for monitoring surface and groundwater flows, analyzing inland floods and assessing energy and mineral resources in the ground. But ecological research also plays a major role, Phillips said, and helps make the USGS the leading source of scientific information in the Bay watershed.

All told, the USGS spends about $17.5 million a year on research in the Bay watershed, he noted, with nearly two thirds of that devoted to ecological studies.

Possible cuts and closures

The White House has proposed cutting a total of $564 million from the USGS, a 39% reduction in the agency's overall budget of $1.5 billion. The ecosystem mission area accounts for about $300 million.

It's not clear what else would be cut, though the General Services Administration in March proposed terminating leases for 25 USGS water science centers nationwide, including as many as eight in Bay watershed states. Those centers maintain a network of stream gages that the USGS uses to monitor drought and flooding.

In a preliminary budget request released May 2, the Office of Management and Budget (OMB) said that it wanted to eliminate USGS "programs that provide grants to universities, duplicate other federal research programs and focus on social agendas (e.g., climate change)." The budget office said that, instead, the USGS would narrow its focus to what has been described as "achieving dominance in energy and critical minerals."

A team of researchers from the U.S. Geological Survey seek signs of habitat quality in a West Virginia stream. (Jeremy Cox)

In April, though, the journal Science reported that an internal email from the then USGS associate director of ecosystems directed agency managers to develop a plan to wind down and then stop all activities in its ecosystems division in the next fiscal year, which begins in October.

The publication Government Executive, meanwhile, reported in May that the USGS was expected to lay off about 1,000 employees, focused on the ecosystems division — which is roughly its entire remaining workforce after accounting for voluntary resignations. The Trump administration's "reduction in force" planned across most federal agencies was blocked by a California federal judge and upheld on appeal, with the case likely to go to the Supreme Court.

USGS scientists and managers in the Bay watershed declined to comment for this article. A USGS spokesperson referred questions about the proposed cuts to the OMB, where a spokesperson did not respond to the *Bay Journal*'s requests for an interview or information.

But the OMB's proposed cut in USGS ecological research tracks with a recommendation from Project 2025, the presidential transition plan prepared by the conservative Heritage Foundation before Trump was elected. Project 2025 called for abolishing what it called the "Biological Resources Division" of the USGS, which was renamed the Ecosystem Mission Area in a 2010 agency reorganization.

Instead of having ecological research done by the USGS, the OMB suggested having "necessary research about species of concern" performed by universities through competitive grant awards.

Science for the Bay

Former USGS scientists said cuts of the magnitude proposed by the Trump administration, if accepted by Congress, could be devastating to the long-running effort to improve and protect the Chesapeake — not just its water quality, but its fish and wildlife populations and habitats.

"We improve understanding of water quality, of what the fisheries need," Phillips said. USGS monitoring of nutrients and sediment in the Bay's tributaries provides important ground-truthing of whether pollution reduction practices adopted by watershed states are achieving the desired results.

If the USGS network of stream gages and monitoring stations suffers cutbacks or interruptions, Phillips added, "you lose the pulse [of the cleanup effort]. You lose whether you're making progress or not."

The USGS also maps land use and land cover in the 64,000-square-mile Bay watershed, providing decision-makers with information on trends in forestland and development that can guide efforts to conserve ecologically important sites.

"I can tell you if you don't have the science, you won't [make] good decisions," said Nathaniel "Than" Hitt, a fisheries biologist who left the USGS last year to work for the West Virginia Rivers Coalition. The USGS, he said, is "providing the foundational science for fish and wildlife conservation," and without it "we'd be flying blind."

At risk if the Trump administration's budget is approved by Congress would be the Eastern Ecological Science Center, the largest of 15 USGS ecological research centers nationwide. It employs about 150 scientists and support staff with two laboratories in the Bay watershed that work on a diverse array of studies.

One of the labs, in Kearneysville, WV, focuses on fish health and factors impacting

Kyle Fronte (foreground) and Karli Rogers of the U.S. Geological Survey take measurements at a stream gauging station in Virginia's Shenandoah National Park. (Courtesy of USGS)

Damon Jenkins of the U.S. Geological Survey conducts amphibian research and monitoring at Great Falls Park in Virginia. (Courtesy of USGS)

A team from the U.S. Geological Survey visits common and least tern nesting colonies on Poplar Island in Talbot County, MD. (Marielle Scott/Chesapeake Bay Program)

aquatic species, including chemical contaminants, habitat loss and invasive species.

Vicki Blazer, a research biologist at that lab, has spent years studying how intersex characteristics in smallmouth bass, a popular gamefish, are linked to chemical contaminants in the Bay watershed. In recent years, her focus has shifted to per- and polyfluoroalkyl substances, or PFAS. Commonly known as "forever chemicals," PFAS have been detected in smallmouth bass that Blazer and colleagues have sampled in Pennsylvania, West Virginia and Maryland. While PFAS contamination is often traced to military or industrial use, a paper she co-authored last year found the toxic chemicals in fish collected from streams that flow through farmland.

During Hitt's time there, he worked with others to track how climate and land use change are diminishing brook trout, a freshwater fish so highly prized that it is the official state fish in four of the six Bay watershed states. The lab also identified spots where cold groundwater seeping into warming streams enabled temperature-sensitive brook trout to hang on, at least for now.

"The question is, where will be the last cold streams?" he said. "We helped answer that question."

Science for wildlife

The other USGS lab in the Bay watershed shares space with the U.S. Fish and Wildlife Service on the 12,841-acre Patuxent Research Refuge in Laurel, MD. Scientists there have tracked bird, bee and other wildlife populations.

Retired USGS scientist Mike Erwin focused on waterbirds during his time at Patuxent from 1978 to 2012. He recalled helping launch the restoration of Poplar Island just off the Eastern Shore in Talbot County, MD. Using sand and sediment dredged from shipping channels in the Bay, state and federal agencies rebuilt the island, which had nearly eroded away. The island's wetlands and other habitats now are home to a variety of migratory birds.

Another Patuxent scientist, ecotoxicologist Barnett Rattner, has spent nearly five decades studying ospreys in several Maryland and Virginia rivers of the Chesapeake, as well as in Delaware Bay. Much of his work focused on whether pesticides and other toxic chemicals accumulating in fish might be affecting the birds' reproduction or survival.

Patuxent scientists have worked on other pressing Chesapeake issues, such as the impact of invasive blue catfish on native fish species and the spread of avian influenza from wild birds to economically important poultry operations in the watershed.

Looking beyond the Bay region, USGS scientists at Patuxent coordinate the annual North American breeding bird survey as well as a continent-wide bird banding program to collect and analyze data about bird populations and migrations. Scientists, birders and conservation advocates nationwide have spoken out against the threatened elimination of those efforts.

Erwin, the former USGS waterbird specialist, said he is "appalled" to think that all or nearly all of that ecological research could be shut down.

"My heart goes out to all those scientists," Erwin said. "It's not just a job. It's a passion."

"When I first started back in 1978," he said, "Patuxent was considered the premier wildlife research facility in the world," with field stations across the United States. Initially hired by the U.S. Fish and Wildlife Service, he and other scientists there were shifted at one point to an independent federal biological research agency, then made part of the USGS.

"I've seen a pretty dramatic reduction through the years," Erwin said, referring to the size of both staff and budget. "But now," he concluded, "science is no longer a priority at all." ■

More polluted wastewater discharged into Patapsco River

Equipment problems lead to incomplete treatment, bypasses at Baltimore plant

By Timothy B. Wheeler

By all accounts, Baltimore's two wastewater plants have been running more smoothly and polluting much less than they were three years ago when chronic treatment failures actually worsened water quality in the Chesapeake Bay.

But the Patapsco River treatment plant, the state's second largest, seemingly took a step backwards in May, when it experienced a spate of equipment overloads and failures that released a total of 155 million gallons of incompletely treated wastewater into the Bay tributary.

City officials said pump breakdowns and other equipment problems, aggravated in some cases by heavy rains that greatly increased inflows to the plant, caused some wastewater to bypass the plant's enhanced nutrient removal system. The diverted wastewater still got primary and secondary treatment, city and state officials note, and it was disinfected with chlorine before being discharged into the river.

Nevertheless, sampling at the plant's outfall showed elevated levels of nitrogen and phosphorus going into the Patapsco, which is already impaired by excess nutrient pollution.

Baltimore Harbor Waterkeeper Alice Volpitta said her nonprofit Blue Water Baltimore's routine water quality monitoring of the Patapsco did not detect elevated bacteria counts near the wastewater plant's outfall during the incidents.

Even so, Volpitta called the bypasses of the nutrient removal system, detailed June 3 in a Maryland Department of the Environment inspection report, "disheartening."

"It's like an echo from four years ago," she said. One photo in the MDE inspection report showed unwanted vegetation growing in a treatment tank, and another showed conveyor belts clogged with solid waste removed from the incoming wastewater. The inspector cited five different violations, including broken equipment and poor maintenance and housekeeping.

Volpitta called these the "root causes" of the plants' earlier woes that if left untreated, she warned, could result in a relapse at the plant.

In the MDE inspection report, city officials suggested that in at least a few of the bypasses, the plant was overwhelmed by high inflows of stormwater during heavy rains.

Baltimore Harbor Waterkeeper Alice Volpitta retrieves a water sample from Baltimore's Inner Harbor. (Dave Harp)

Volpitta countered that it was "not an unusual amount of heavy rain" and that spring downpours are normal occurrences. "Our wastewater system should be able to handle routine rain events," she said. Plant operators were also cited for failure to report the wastewater bypasses and a smaller sewage overflow to MDE within 24 hours of discovering them, as required.

"It's really discouraging to see some of these old problems cropping up again."

Recently, Maryland's environment secretary, Serena McIlwain, had hailed what she called a "dramatic turnaround" in the operation of Baltimore's Back River and Patapsco wastewater treatment plants, which had been so poorly run and maintained that in 2022 her department temporarily seized control of Back River and stepped up oversight of Patapsco.

The city subsequently signed a consent decree in 2023 pledging to fix the problems. Since then, McIlwain reported, there has been a 60% reduction in nitrogen pollution from the Back River plant, the state's largest wastewater facility, and 78% from the Patapsco plant.

MDE, meanwhile, is preparing to renew the Patapsco plant's discharge permit, allowing it to expand its treatment capacity from 73 million gallons per day to 81 million but also imposing new requirements on facility operators.

At a June 12 public hearing on the permit, Michael Hallman, deputy water and wastewater bureau head at the city's Department of Public Works, attributed the bypasses to a lack of operating pumps to move storm-swollen surges of wastewater through the enhanced nutrient removal system.

He said the city has completed 16 of 19 improvement "milestones" it was required to reach at Patapsco under the consent decree. Two of the remaining ones require rehabilitation of the facilities that separate solid material from the liquid wastewater so it can be treated. Contracts have been awarded, he said, but those projects will take time, with some repairs not expected until the end of 2027.

Overall, Hallman said, the Patapsco plant's performance "has improved tremendously in 2023 and 2024, and I expect that to continue."

MDE spokesman Jay Apperson said that until just before the bypasses occurred, Patapsco this year was removing more nitrogen and about as much phosphorus as it did in 2024.

"We expect the nitrogen numbers for May will be worse due to the bypasses," he acknowledged, but MDE nevertheless expects the overall nutrient removal for this year to be better than in 2024.

Even so, Apperson added, "MDE will be meeting with Baltimore City [Department of Public Works] in the near future to discuss these issues and what steps they will be taking to minimize these occurrences in the future."

Meanwhile, several residents who attended the public hearing in Curtis Bay insisted that regulators should strengthen requirements that the plant notify MDE and the community promptly whenever there's a problem with the system — especially one that results in a wastewater release that might make swimming or wading along the river shore unsafe.

The city recently installed a required buoy in the river to mark the end of its wastewater outfall pipe. The buoy has a light that is supposed to flash if bacteria in the discharge exceed prescribed limits. But a couple of residents pointed out the light is not visible from shore. Waterkeeper Volpitta said the MDE and public notification requirements in the plant's permit are insufficient to protect people's health.

She noted that the two Baltimore plants are so large that they can have an outsize impact on water quality when they have problems. In 2021, when their maintenance and staffing failures surfaced, the two plants discharged so much nutrient pollution into Back and Patapsco rivers that it more than offset reductions made at all other treatment plants combined in the Bay watershed.

The plants' performance matters, Volpitta said, because while Blue Water Baltimore's water quality monitoring shows an "improving trend" in bacteria levels in the harbor and its watershed, there's a declining trend in other measures of ecological health.

"In some ways, that's reassuring," she said. "In other ways, it really is a wake-up call. ... If they don't continue to improve," she warned, "there's no way we'll ever see waterway restoration in the region." ■

In VA, fight continues against invasive water chestnut

Research might help stop its spread to the Potomac River

By Whitney Pipkin

A research crew tests the use of herbicides to combat invasive water chestnut on Lake Brittle in Fauquier County, VA. (Dave Harp)

Spraying a jet stream of herbicide from an idling airboat is no easy task, especially when the invasive plant you're trying to target is barely visible beneath native American lotus leaves.

"These plants, they get lost among the emerging vegetation, and this one rosette can make 20 fruits in a year," said Lynde Dodd, a research biologist with the U.S. Army Corps of Engineers.

She was holding a fistful of *Trapa bispinosa* — two-horned trapa, as scientists call it — an invasive species of water chestnut that has been gaining ground in Northern Virginia ponds, lakes and reservoirs since it was discovered in the region in 2014.

The "horns" in the plant's name refer to the spikes protruding from its seed pods. Those enable it to hitch a ride to new water bodies via clothing, boats and, most often, the feathers of resident Canada geese.

Native to East Asia, the freshwater plant quickly multiplies to form dense mats that can block sunlight from reaching underwater vegetation and decrease water oxygen levels. Once established, the mats can also make all sorts of recreation unsafe or even impossible.

The plant has popped up on the surface of more than 100 sites across Northern Virginia. More recently, it has also appeared in tributaries of Virginia's Roanoke River and in Maryland.

Experts say adding herbicides to the arsenal of tools being used to curb the plant's expansion could help prevent it from reaching an important milestone: the Potomac River.

Dodd was working that morning at Lake Brittle with a pair of specialists from LakeSource LLC, treating the aquatic plant where it's cropped up on the edges of the the lake in Fauquier County, VA. The Corps of Engineers is also working on the project, along with the Virginia Department of Wildlife Resources.

The work is part of a research effort to test the effectiveness of three herbicides already approved for use by the U.S. Environmental Protection Agency. Researchers want to see which, if any, can be used more broadly to help remove the fast-spreading plant.

"We had hoped to eradicate two-horned trapa before it left the Chesapeake watershed, and we've failed," said Sara Tangren, program coordinator for the National Capital Partnership for Regional Invasive Species Management (PRISM).

But the involvement of PRISM — and others at the state, regional and federal level — is a sign of hope for those who've been sounding the alarm for years.

"It's a relief that we have so much help now," said John Odenkirk, the biologist with the Virginia Department of Wildlife Resources who discovered the plant in Pohick Bay in 2014. "Now it seems like a lot of people are listening."

The two-horned water chestnut closely resembles its four-horned relative, *Trapa natans*, which blanketed much of the Potomac River in the 1950s. A concerted regional effort led to its eradication by the 1970s.

"I think it can be eradicated again because [*T. natans*] had spread all that distance before, and it was eradicated," said Nancy Rybicki, a retired U.S. Geological Survey aquatic plant expert.

The Virginia Department of Conservation and Recreation issued a management plan for the two-horned variety in 2022. And community science has played a role in understanding the plant's reach as curious plant enthusiasts snap a picture of the water chestnut's serrated-edged, arrow-shaped leaves branching out from a central rosette. The plants are green on top and red on the bottom in the summer months.

"A lot of discoveries are just someone pointing a smartphone at a plant they don't recognize," said Tangren, who notified the Quantico Marine base about the presence of the plant after it was identified in a reservoir there. "If they find out sooner rather than later, this could save them many thousands of dollars in management."

Removing the plants by hand has been the main treatment option at some sites. But hand removal can take hundreds of hours and pose risks to volunteers. Where possible, smaller ponds have been drained to make removal easier and safer. Once the plants are established, large-scale removal with machinery can cost millions of dollars.

And to complicate matters at Lake Brittle, two-horned trapa is growing under and around other native plants, making physical removal all but impossible. That's part of what made the lake an ideal place to test chemical methods. Two of the herbicides kill the root of the plant. Another causes the leaves to die.

A federal environmental assessment determined that the chemicals would have no significant environmental impact. They were also selected because they target the invasive plant but not surrounding natives.

"You don't want to use the same herbicide year after year," said Dodd, who planned to return in a couple weeks to measure how the sprayed plants have fared. "We want to make sure there are plenty of tools in the toolbox." ■

Susquehanna basin falling short on climate prep, study says

FEMA, meanwhile, removes climate change language from guidance on mandated preparedness plans

By Jeremy Cox

Pennsylvania communities in the Susquehanna River watershed aren't adequately accounting for climate change in their disaster planning, leaving them vulnerable to floods from increasingly frequent heavy rains, according to a new report.

None of the 40 counties in the Penn State University study achieved what the authors described as the "best practice standard" for addressing climate impacts. To meet that standard, a county needs a plan that incorporates place-specific climate change information and includes documentation of chronic flooding hot spots, as well as data on past and future impacts from climate-driven flooding, they said.

That information is crucial for communities to prepare for disasters, said Virginia Silvis, a postdoctoral scholar specializing in climate adaptation.

"A lot of communities and counties are mentioning climate change, but that mention isn't crossing over into usable information," she said.

The Federal Emergency Management Agency requires state, local and tribal governments to have approved "hazard mitigation plans" to be eligible for many types of non-emergency disaster funding, such as flood-control projects. And the plans must be updated every five years.

As a result, nearly 85% of the U.S. population lives in a jurisdiction covered by an active hazard mitigation plan, FEMA reports.

The plans can be dozens or even hundreds of pages long, identifying high-risk areas and outlining strategies for coping with them.

Amid mounting evidence that climate change has been causing wildfires, hurricanes and other catastrophes to worsen, the Biden administration began mandating plans to address climate in 2023. But the requirement was short-lived. The second Trump administration deleted climate-change contingencies from FEMA's list of plan requirements shortly after taking office.

Silvis said she was disappointed by the reversal, arguing that communities ignore climate change at their own peril. "Climate change is occurring," she said. "We are stabbing ourselves in the foot a bit by trying not to mitigate for it. Maybe if [a disaster] happens once, a community can be OK, but … this is happening over and over again."

Levees line the banks of Codorus Creek in southern Pennsylvania's York County. (Karl Blankenship)

A FEMA official, asking not to be identified, said that changes in the 2025 update "include removal of requirements related to climate change and equity. These actions ensure that FEMA guidance aligns with the president's executive orders and Secretary Noem's direction on how to best support states and local communities in disaster planning, response and recovery."

The Penn State study was published in January in the International Journal of Disaster Risk Reduction. The analysis looked at plans published between 2017 and 2022 — before the Biden-era climate directive took effect.

Silvis and Penn State colleague Robert Nicholas discovered that 30% of the plans made no reference at all to climate change or, if they did, not in relation to flooding — the region's top hazard.

A handful of plans mentioned climate-driven flooding but only devoted a sentence or two to the issue. Lycoming County's 2020 plan, for example, offered a single sentence on the subject: "As climate change brings more frequent heavy rains to the region, the probability of future levee failures is expected to increase."

"It was more like a statement that, 'Yes climate change is happening,'" Silvis said, adding that such plan shortcomings demonstrate that FEMA should provide more guidance to communities on what climate information they should include.

Kelsey Green, hazard mitigation planner for Lycoming County, in north-central Pennsylvania, doesn't dispute the study's criticism.

"I absolutely agree that we didn't really mention climate change, and I feel like that was due absolutely to political pressure," she said. "We're in a rather rural county, and things like that can be rather difficult to explain to our elected officials as well as to our public."

For its part, the study didn't find a link between mentioning climate and whether a county is urban or rural. Political affiliation didn't appear to have any bearing either.

Green started her job with the county just as it was wrapping up its 2020 plan. She said one of the biggest considerations in hiring a consultant to update the plan this year was a goal to look into climate impacts.

That was when FEMA still required climate language. But Green said she still hopes to include it — just less directly.

"The majority of my population here is rural," she explained. "The media has made certain words like 'climate change' and 'vulnerable populations' cause a reaction in people. Rewording it in a different way goes a long way."

Consultant-authored plans were more likely to discuss climate than their county-authored counterparts, according to the Penn State researchers.

FEMA's new guidance for hazard mitigation plans, released in April, includes no mentions of the "climate" and entirely deleted a section from the previous version titled "Planning for Climate Change and Equitable Outcomes."

It appears, though, to leave the door open for jurisdictions to continue incorporating climate-linked risks in their planning. An analysis of the FEMA document conducted for the Association of State Floodplain Managers found that it remains laden with terms such as "future risks" and "resilience."

"This allows for jurisdictions to choose to continue to consider climate-related risks," wrote Patrick Marchman, a senior advisor for the planning firm Jacob Green & Associates.

Some of the county plans at least came close to meeting all the best standards for climate planning, the Penn State study found. The plans of four counties — Chester, Dauphin, Lancaster and Luzerne — were only missing figures for future flooding projections, Silvis and Nicholas wrote.

Several counties have updated their mitigation plans since the study's analysis took place and include much more detailed climate information. York County, for example, mentioned "climate" 16 times in the 2018 plan analyzed by the Penn State study; the 2024 version upped that total to 88.

That wasn't an accident, said Roy Livergood, a senior planner for the county. "For the 2024 plan, FEMA placed a greater emphasis on further calling out climate change in each section of the plan, where applicable, as part of their guidance and requirements for plan approval," he wrote in an email.

When asked whether the county would back off from considering climate in future updates because of the Trump administration's rollback, Livergood said no. Climate has always factored into the county's planning, even before the Biden requirement went into effect, he noted.

But hazard mitigation efforts could be hindered by the administration's recent decision to abruptly cancel billions of dollars in nationwide spending on local planning and resilience projects, he added. ■

Bay's latest health slump tied to climate change, scientists say

But aquatic health of the nation's largest estuary has gradually improved since the 1980s

By Jeremy Cox

The Chesapeake Bay's ecological health declined in 2024 as extreme heat, rainfall and drought wreaked havoc across the estuary's watershed, according to the latest annual report card from the University of Maryland Center for Environmental Science. Experts worry it may be a sign of things to come.

The grade for the Bay's aquatic health slipped from a C+ in 2023 to a C last year, dropping 5 percentage points to an overall score of 50%, UMCES reported.

"A changing climate is definitely affecting the Bay," said UMCES vice president Bill Dennison. "These are the kinds of weather patterns that are starting to become more common … drought punctuated by severe weather events."

The announcement of the decline comes at a precarious moment for Bay advocates.

State and federal officials are trying to complete by the end of the year a top-to-bottom revision of the regional agreement that guides the restoration. And the second Trump administration, while vowing not to cut the Chesapeake Bay Program at the U.S. Environmental Protection Agency, is proposing widespread cutbacks to other programs that support the 42-year-old cleanup effort.

"The extreme weather of 2024 is not an anomaly — it's a warning," said Chesapeake Bay Foundation President and CEO Hilary Harp Falk in a statement. "Climate change is accelerating, and with it comes more flooding, pollution and ecological stress. The Trump administration's proposed budget cuts threaten the world-class science and partnership at the heart of the effort."

The water quality in the Bay and throughout its drainage basin can vary widely from year to year because of differences in weather, Dennison said June 10 at an event unveiling the report card at the Annapolis Maritime Museum.

The lower score wasn't unexpected. Last summer's weather conditions — which went from too wet in the beginning to too dry at the end, and hotter overall — were a recipe for sparking a downturn in the system's health, scientists say.

"What was happening was the crops didn't have enough water, so they were not soaking up the nutrients," Dennison explained. "So, when it did rain, there were excess nutrients running into the Bay."

Heath Kelsey and Bill Dennison, both of the University of Maryland Center for Environmental Science, talk about the findings in the center's 2025 Chesapeake Bay report card. (Dave Harp)

An overabundance of nutrients presents a feast to algae blooms. The microscopic organisms multiply by the billions and consume oxygen in the water when they die off, leading to "dead zones" in the Bay's deepest reaches. There, the nearly oxygen-free environment smothers any life that can't flee fast enough.

Last year's record heat further inflamed the situation, Dennison said. That's because warmer water holds less oxygen than cooler water, and the hotter temperatures boost the temperature stratification of the Bay's water column. That, in turn, prevents the layers from mixing, trapping the oxygen-starved waters at the bottom.

"Now, sadly, this is our future," he said, referring to the damage from climate change.

Trying to reduce nutrient and sediment runoff while the climate trends hotter and stormier is "like trying to walk up a down escalator," said U.S. Senator Chris Van Hollen in taped remarks. "The only thing to keep things from getting worse is to walk faster."

Josh Kurtz, Secretary of the Maryland Department of Natural Resources, speaks during the unveiling of the 2025 Chesapeake Bay report card produced by the University of Maryland. (Dave Harp)

Despite last year's drop-off, the Bay's health since the 1980s has gradually improved, rising from an average score of 44.4 over the five report cards released from 1986-1991 to 50.2 over the last five. Scores for dissolved oxygen and submerged aquatic grasses show improving trends, as do those for the nutrients nitrogen and phosphorus. Scores for chlorophyl and water clarity have declined over that time.

The report card attributes those improvements largely to restoration efforts, such as upgrades to wastewater treatment plants, oyster replenishment and aquatic grass plantings.

The report carves up the Bay and its tributaries into 15 segments. Six of those had better health scores in 2024: the Elizabeth, James and Patapsco/Back rivers as well as the upper Western Shore, the upper Bay mainstem and the lower Bay mainstem.

The best score belonged to the lower Bay, which received a B. Dennison traced that to the tidal exchange with the nearby Atlantic Ocean and to improvements in Virginia's James River. He applauded the James River Association, one of the lower Bay's largest environmental groups, for the efforts that won it the Thiess International Riverprize in 2019.

Meanwhile, the letter grade for the Chesapeake's "watershed health," as opposed to its aquatic health, notched upward to a C+ in 2024, raising its score from 52% to 57%. That score refers to the health of the 64,000-square-mile watershed as a whole and considers ecological, societal and economic indicators. For specific regions, scores ranged from 42% in the Choptank River watershed on Maryland's Eastern Shore to 61% along the upper James.

The UMCES report card has long coexisted with another Baywide health assessment independently authored by the Chesapeake Bay Foundation, the largest nonprofit dedicated to protecting and restoring the Bay watershed. UMCES officials announced at the Annapolis event that the two entities plan to work together on future report cards.

"It will reduce the confusion of having two separate report cards and slightly different messaging," said Heath Kelsey, director of UMCES Integration and Application Network, "but we're still working out the details." ■

A refresh for Chesapeake cleanup goals: What's in, what's out?

Bay Program releases draft of revised restoration goals, aiming for 2035 and 2040

By Jeremy Cox

Leaders of the Chesapeake Bay cleanup are touting a back-to-basics approach in the restoration blueprint set to be finalized by the end of this year.

The Chesapeake Bay Program, the state-federal partnership that leads the regionwide effort, released the proposed revisions to the 2014 Bay cleanup agreement for public comment on July 1.

The restoration partnership should put efforts to reduce nutrient and sediment pollution at the forefront, emphasizing "practical results," said Amy Van Blarcom-Lackey, whom President Trump recently appointed to head the U.S. Environmental Protection Agency's Mid-Atlantic region.

Nutrient pollution has been the Bay's most vexing water quality problem, and the region will miss its 2025 goals by a wide margin."

"We will prioritize actionable solutions," said Van Blarcom-Lackey at a May meeting of the Principals' Staff Committee, a Bay Program body that consists of senior officials from the federal government, Bay states and the District of Columbia, as well as other key partners. She added, however, that she found the work on streamlining the effort — one of the top directives issued by the program's Executive Council — to be "a little bit lacking" in the current draft.

A draft of the document, the first top-to-bottom update of the agreement in more than a decade, is available for public comments through Sept. 1.

The 2014 agreement set a voluntary 2025 deadline for achieving most of its goals, including reducing nutrient pollution. The region has fallen short of that goal and several others. As proposed, the update urges many of its targets to be reached by 2035 or 2040, but there is no overarching deadline.

The Executive Council is expected to vote on a final draft of the agreement before the end of the year. The council includes the administrator of the EPA; the governors of Maryland, Virginia, Pennsylvania, Delaware, New York and West Virginia; the mayor of the District of Columbia; and the head of the Chesapeake Bay Commission, which consists of legislators from Bay states.

The revised agreement groups priority goals into four broad categories: habitat and wildlife, water quality, healthy landscapes and engaged communities. Twenty-one more specific outcomes are nested within them.

A Bay Program analysis suggests that the amount of resources needed to achieve 14 of the outcomes will likely remain the same. More resources could be required for four, related to fish habitat, forests and trees, changing environmental conditions, and a robust workforce. The amount of resources needed for three others — wetland restoration, land protection and water quality — is unknown.

The 18-page proposed revision to the 2014 Bay Agreement puts forward modest changes. Mostly, it calls for continued progress toward meeting water-quality goals and making the region a more habitable place for humans and wildlife alike.

But it's also notable for what it doesn't include. In the wake of executive orders from the Trump administration, direct references to climate change and diversity efforts have been deleted.

Although the Bay Program has many partners that are not part of the federal government, neither modification has drawn much opposition. For example, Marty Qually, a county commissioner of Adams County, PA, and chairman of the Bay Program's Local Government Advisory Committee, said he initially balked at replacing "climate change" with "changing environmental conditions." But he came to embrace it, he said.

"I really like the flexibility of it and how it brings in the social science side," he said.

It is unclear whether the Trump administration will make available the funding and staffing needed to carry out the Bay Program's initiatives. Federal money supports Bay-related work in several ways: through the EPA Bay Program office; through other federal agencies such as the National Oceanic and Atmospheric Administration, National Park Service, U.S. Department of Agriculture and U.S. Geological Survey; and through significant grants to states, academic institutions and nonprofit organizations. While promising to maintain the EPA Bay Program's current funding of $92 million annually, the White House has scaled back other programs that support the effort, and it indicated deeper cuts in the future.

Here's a look at the most notable changes for each proposed outcome.

Comment period open through Sept. 1

On the Bay Program website, you can review the draft, learn about the commenting process or register for webinars about each section of the draft. Visit chesapeakebay.net, click on "What We Do," and then "Planning for 2025 and Beyond."

The webinars will be recorded and available on the Bay Program YouTube channel.

- Overview: July 2, noon
- Habitats and Wildlife: July 8, 11:30 a.m.
- Clean Water: July 15, noon
- Healthy Landscapes: July 24, noon
- Engaged Communities: July 30, noon

Thriving habitat and wildlife

Blue crabs: A blue crab stock assessment expected in 2026 will be the biggest determinant of this species' future management. Until then, there isn't much to say, as illustrated by this goal's generic verbiage.

Oysters: Not much more than a decade ago, oyster management in the Bay was at a low ebb. There was no consensus about what to do, and there was significant support for replacing them with a nonnative species. But scientists and policymakers rallied around a restoration strategy involving quantifiable targets, assessment and maintenance — then tweaked those policies as new data arrived. The result has been a dramatic steadying of the population. The update largely maintains this strategy, calling for restoring or conserving 1,800 more acres of oyster reef habitat and maintaining the oyster habitat restored in 11 Bay tributaries under the 2014 agreement.

Fish habitat: The update adds more substance to the 2014 language, which did little more than call for studies. It pushes for improving water quality in shallow waters, guided by Baywide habitat assessments due in 2026. Important forage species, such as menhaden and bay anchovy, would be assessed annually as "good," "uncertain" or "poor." The update also urges the development of a target for addressing the impacts of acid mine drainage on fish habitat. Freshwater mussels would receive conservation plans in five Bay tributaries.

Wetlands: The cleanup has been woefully behind on this effort, garnering just 4,800 acres of the 85,000-acre wetland creation goal. And just over 60,000 acres have been enhanced, well short of the 150,000-acre target. The update dramatically dials back those expectations, reducing the amount of tidal wetlands to be restored or created to 1,000 acres while enhancing 15,000 more. Nontidal wetlands would get 2,000 acres restored or created and 15,000 enhanced. Both would face a 2035 deadline. And priorities would be developed to focus on waterbird habitat within 18 months of the agreement's signing.

Stream health: The 2014 agreement sought to improve the health and function of 10% of watershed stream miles above a 2008 baseline. It had risen by 6% as of 2017, making it on track for completion in 2025. The updated agreement would shift that goal to improving 3% of stream miles every six years. That isn't expected to require more resources to accomplish.

Brook trout: The current agreement pressed for an 8% increase in occupied brook trout habitat by 2025. The fish require clean, cold water for survival. There hasn't been enough monitoring to confirm whether that goal has been attained, but experts believe the region has fallen short because of continued development and warming water. The update aims to increase brook trout occupancy by 1% by 2035 while increasing abundance at 10 monitoring sites.

Fish passage: The 2014 agreement set a goal of opening 1,000 stream miles to fish migration, and the region achieved this goal just two years later. In 2020, the Bay Program set a regionwide goal of adding 132 miles every two years. Dam removals have slowed in recent years because the easiest and least costly projects have already been completed. Still, the new agreement ups the two-year target slightly to 150 miles.

Underwater grasses: The goal would be increased from 185,000 to 196,000 acres Baywide, setting an "interim" target of 95,000 acres by 2035. Approximately 83,000 acres of grasses existed in 2023, the most recent year for which data was available.

Clean water

Water quality standards and monitoring: The 2014 agreement mainly called for increasing monitoring capacity and reporting results to the public. The update sets forth more specifics. Notably, it sets a modest target of at least 0.2% improvement per year in attaining a key water quality indicator. That matches the 1985-2022 trend, which is often criticized as having been too slow.

Reducing nutrient and sediment pollution: The Bay Program is expected to refine its nutrient reduction goals in 2030 using new computer models. Until then, the new language allows the states and DC to continue working under their existing pollution reduction plans or use "other innovative strategies." The agreement will eventually be updated with new goals and deadlines. The proposed changes for the first time allow demonstrating progress through "multiple lines of evidence," including monitoring.

Reducing toxic contaminants: No significant changes. The proposed language promotes research and information-sharing into reducing toxic contamination, with an emphasis on PCBs, plastics, mercury and PFAS (or "forever chemicals").

Healthy landscapes

Protected lands: Under the revised agreement, the partnership would strive for protecting up to 2 million acres of land by 2040 — equal to the goal set by the 2014 agreement for 2025. As of 2022, the effort had recorded 1.6 million newly protected acres, putting it on target for reaching the 2025 goal.

Land-use decisions: The update would roll two 2014 outcomes into one. Both are aimed at providing communities and organizations with "actionable" information to help with land use decisions. The Bay Program considers both on track for meeting the existing goals. But the pace of development in the region suggests that little has been done to slow the loss of undeveloped land. Tweaks in the proposed update give little indication of change.

Healthy forests and trees: The revised language calls for reducing the loss of existing canopy and for planting 35,000 acres of community trees by 2035. That's a lofty goal — over nearly a decade, the region has planted little more than 11,000 acres of urban trees. The long-term goal for streamside buffer coverage would increase from the existing 70% to 75% of such acreage under the new language. The Bay watershed lost about 21,000 acres or 0.4% of forest cover located within 100 feet of waterways from 2013-2018, research shows.

Adapting to changing environmental conditions: The 2014 agreement included a goal to increase the resilience of the ecosystem and human communities to climate change. Other than removing all references to "climate" and instead referring to "changing environmental conditions," the main difference in the new language is an emphasis on "nature-based solutions" to rising seas, erosion, heavier rainfall and other impacts of a changing climate. That means less concrete and more living shorelines, restored wetlands and other "green" infrastructure.

Engaged communities

Stewardship: The 2014 agreement seeks to increase the number and diversity of trained restoration volunteers. The new language omits the word "diversity" and sets a 2040 deadline for making sure practitioners have the best data and technical assistance.

Local leadership: This outcome looks to boost local officials' knowledge of and ability to implement conservation actions. The update calls for increasing the percentage of local leaders reporting resource management actions every two years.

Workforce: This new goal establishes 2035 deadlines for advancing restoration efforts that create jobs. This replaces the diversity outcome, which was added in 2020 to identify and recruit people "not currently represented" in the effort.

Public access to waterways: The 2014 agreement aimed to develop 300 new water access points by 2025. As of 2023, there were 285 added. The new agreement is less ambitious, proposing 100 more sites by 2040. It also urges expanding access to urban conserved lands by a percentage to be determined by a 2026 study.

Student experiences: The 2014 agreement set a goal of making sure each student has at least one meaningful watershed educational experience in elementary, middle and high school, "depending on available resources." The update sets a goal of 75% of a state's students being enrolled in a district that offers such experiences.

School district planning: Little change. The outcome seeks to "continually" increase the number of school districts that have policies and practices in place that support environmental education and sustainability. The update sets a 2040 target. ■

Editor-at-large Karl Blankenship contributed to this report. Photos by Dave Harp.

March of the monarchs: an annual migration marvel at risk

A hard-traveling butterfly, threatened by pesticides and loss of habitat, struggles to survive

By Lauren Hines-Acosta

Editor's note: Parts of this article are featured in our Chesapeake Uncharted podcast, available from your podcast service or at bayjournal.com/podcasts. This podcast season is a companion to our new film, Chesapeake Rhythms, which explores wildlife migrations in the Bay region.

In a forest in the Sierra Madre Mountains of Mexico in 2016, James Diffendorfer saw the bark of fir trees moving. Monarch butterflies rustled along the tree trunks, clustered on branches and filled the sky.

"You're talking while you're hiking, and then you get up there and everyone's just quiet, and you're just in this place of a million monarchs," said Diffendorfer, a research ecologist with the U.S. Geological Survey. "And it's unbelievable."

The overall eastern population of monarch butterflies, which visits the Chesapeake Bay region, has been steadily declining since the 1990s, but there are still plenty of opportunities to interact with — and help — the species. Their complex, multigenerational migration, often covering thousands of miles, makes it difficult for researchers to understand all the factors contributing to the decline, and some are better known than others.

Wendy Caldwell, executive director of a national partnership called Monarch Joint Venture, said taking care of monarchs and the habitats they depend on helps address multiple environmental issues. While not as effective as bees, monarchs also act as pollinators as they feed on flowers during their journey.

Monarch habitat includes parts of the Chesapeake Bay watershed. They've come as far as Pennsylvania by late summer, before they begin heading back south in the fall. People can also see them en masse along Virginia's Eastern Shore and the Chesapeake Bay Bridge in early September and October.

After overwintering in Mexico, they fly north in the early spring, and produce offspring, primarily in southern Texas. That first generation of the spring emerges from their chrysalises and continues north, as does the second generation, and the third, by which time monarchs can be found more or less everywhere in the eastern U.S.

An adult monarch butterfly feeds on the flower of a Jerusalem artichoke in September, as it readies for the long journey back to its winter home in Mexico. (Dave Harp)

A monarch butterfly caterpillar feeds on common milkweed on Maryland's Eastern Shore. (Will Parson/Chesapeake Bay Program)

The fourth and final generation, the great-great grandchildren of the winter cohort, have a unique and strenuous role. Their reproductive system, taking its cue from the shorter and cooler days, goes dormant; rather than procreating, they devote all their energy to the long trip home — the oyamel firs of Mexico's Sierra Madres. It's not until they arrive there that they produce the fifth generation. Then, the following spring, that generation somehow knows to start the cycle all over again.

It's normal for insect populations to go up and down or to have boom-and-bust cycles. But the population that overwinters in Mexico has gone down overall. According to the U.S. Fish & Wildlife Service, the eastern migratory population of monarchs has declined by about 80% since 1980.

Milkweed is the only plant on which monarchs lay their eggs. Diffendorfer said the decline in monarchs, at least in part, is likely due to the loss of milkweed from herbicide use on Midwest farms — which, Caldwell said, can also harm the butterflies themselves if they land on treated milkweed.

She cites climate change as another factor changing where and when milkweed is available.

"We're talking about this changing climate and [its] potential to impact populations like the monarch that are utilizing a lot of different landscapes, but they're really reliant on the right resources at the right time," she said.

Evidence suggests that climate can affect monarch populations, but exactly how remains unclear, according to Diffendorfer. Studies suggest climate conditions in one part of the life cycle can affect the overwintering population size in Mexico. For instance, a drought along the migratory path could make less milkweed available for one of the butterfly generations.

Beyond nationwide tagging and monitoring programs for monarchs, there has been an effort to create habitat "waystations" to give monarchs resources along the way. Waystations are areas of land filled with milkweed, for eggs and caterpillars, and flowering plants that adults feed on. There are more than 5,800 waystations ranging from 200 to 5,000 square feet in Maryland, Pennsylvania and Virginia, according to the community science program Monarch Watch.

The Virginia Department of Transportation also began reducing mowing medians in 2023 to encourage milkweed growth.

In December, the U.S. Fish & Wildlife Service proposed listing monarchs as "threatened" under the Endangered Species Act. Though not yet finalized, the listing would give the species certain protections, such as prohibiting the unpermitted sale or intentional killing of monarchs and the development of protection plans by the Fish & Wildlife Service.

The Fish & Wildlife Service continues to review input from a public comment period on the proposal that ended in May.

In Pennsylvania, 77 million acres of privately owned farmland in the state are enrolled in voluntary monarch conservation programs, according to the Pennsylvania Farm Bureau. But the organization does have concerns about the impact of additional pesticide restrictions on farmers, noting that pesticides are already heavily monitored.

"While we respect the agency's goal of identifying ways to assist the monarch butterfly," the bureau said in a statement, "we are concerned at the potential impact of what could be a wide-ranging review of an unknown number of crop protection tools that are important to farmers."

If the threatened listing is finalized, Caldwell hopes it will bring greater awareness of the monarch's decline. She is also hopeful that many groups will be consulted to avoid regulatory concerns that disincentivize conservation work. To help conserve monarchs, Caldwell recommends people plant milkweed and other wildflowers native to their region, reduce pesticide use, and help spread the word. ■

Nature-like passage will help fish navigate the Susquehanna

Unusual design provides easy route around dam to reach upstream spawning areas

By Karl Blankenship

A 900-foot-long fish passage at Shikellamy State Park in Pennsylvania bypasses the inflatable dam that has blocked the Susquehanna River every summer since 1969. (Commonwealth Media Services)

Shad and river herring that make it past an obstacle course of hydroelectric dams on the lower Susquehanna River — a tall challenge — now have a clear path to get all the way to New York.

State and federal officials dedicated a new naturalistic fish passage in June that allows fish to bypass an inflatable dam that stretches across the river at Shikellamy State Park in Pennsylvania, just below the confluence of its west and north branches.

"This is the largest East Coast river," said Cindy Dunn, secretary of the state Department of Conservation and Natural Resources (DCNR). "The Susquehanna is 440 miles long. It deserves nothing but the best."

The best, in this case, is a passage that doesn't look like a typical fish passage at all. There are no concrete ladders or chambers to help fish climb above the obstruction and no elevators to lift them over.

Rather, it is a 900-foot-long, 50-foot-wide channel that entirely bypasses the dam on the river's west side. Filled with boulders, it looks like a fast-flowing stream.

"Traditional fish passages are like an escape room," said Tim Schaeffer, executive director of the Pennsylvania Fish and Boat Commission. "Fish get in and have to figure out how to get from this chamber up to that chamber. This is not an escape room. This acts just like the stream or river would."

The dam has long been controversial. Pennsylvania usually leads the nation in dam removals each year and has advocated for improved fish passages at utility-owned dams on the lower Susquehanna. Yet the state itself has owned and operated the inflatable dam since 1969.

The 8-foot-high inflatable "fabridam" stretches between the towns of Shamokin Dam and Sunbury and is inflated each spring to create the 3,000-acre Lake Augusta at Shikellamy State Park, which offers boating, fishing and other water-based activities.

Biologists have explored fish passage options for decades but have learned that existing designs aren't especially helpful for shad and river herring, which tend to avoid ladder-like devices.

But a passage designed to mimic a natural waterway was built in 2015 at the Howland Dam on Maine's Penobscot River, and it caught their attention. After a visit to Maine, DCNR biologists concluded that such a design would work at Shikellamy State Park.

The resulting $5.3 million passage is filled with boulders and riprap that mimic a natural stream bed with a series of riffles and resting pools. It also provides a variety of different flow conditions that attract different kinds of fish.

Shad and herring, for instance, are attracted to the faster flows on the outside curve of the bypass while eels and many resident fish prefer the slower flows found along the inside bend.

"The beauty of the nature-like fishway is it's not targeted for a specific species," said Jack Hill, state park resource manager with DCNR. "There are lots of fishways that are targeted just for shad or just for eel or salmon. For the money that was spent, it's really all inclusive."

Construction on the passage began in October 2022. It was mostly completed the following year but was tweaked to withstand higher flows after it was damaged by flooding.

One person who long advocated for a passageway was Sid Jamieson, an indigenous Cayuga Nation Iroquois, who noted that Native people had long gathered at this site — 11 trading pathways converged in the area — to meet one another and gather fish.

"I am here today to talk on behalf of all the aquatic life that are now free to move up and down this national historic water trail, the Susquehanna River," Jamieson said, adding that he was filled with "joy" with the completion of the passage.

The $5.3 million fish passage at Shikellamy State Park mimics a natural channel by creating pools and riffles that are suitable for a variety of fish species. (Karl Blankenship)

"Wouldn't it be wonderful if someday we can catch shad in the upper reaches all the way up to Cooperstown, New York?" he asked.

That is probably a long way off, though.

Hundreds of millions of spawning shad and river herring once swam up the river each spring as far as the river's headwaters in New York — in numbers so large that they sometimes created a visible wave in the water.

But migration to the Susquehanna's headwaters — the largest spawning area along the East Coast — was choked off by a series of four hydroelectric dams constructed in the lower 60 miles of the river, starting with the 18-foot-high York Haven Dam in 1904. It culminated with the nearly 100-foot Conowingo Dam in 1928, built just 10 miles upstream from the river's mouth.

In recent decades, utilities that own those dams have spent hundreds of millions of dollars on huge fish elevators and other passages, but they have not effectively moved large numbers of fish upstream.

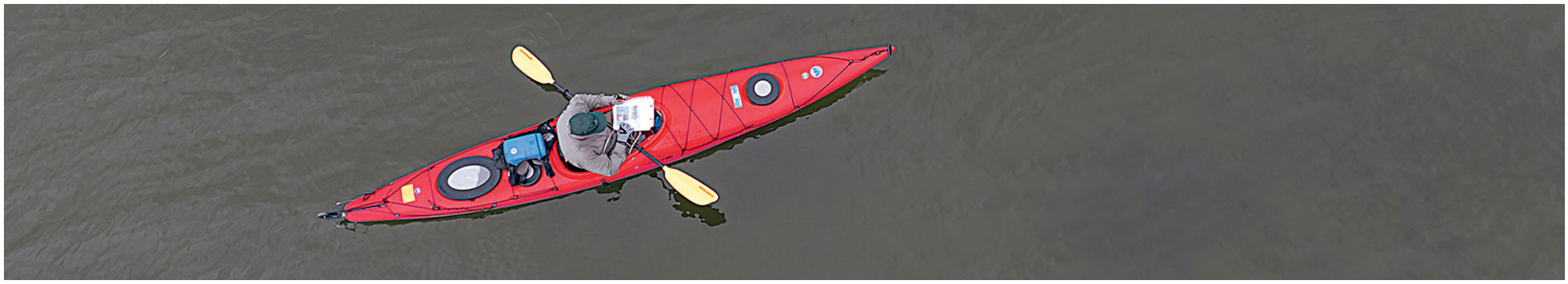
This year, only 2,050 shad were captured at the Conowingo fish lift, then trucked past the other dams and released. The story was much worse for river herring: Only 23 were captured and moved upstream.

Biologists hope that improved passages will be built in coming decades as part of new relicensing agreements with the utilities.

But the nature-mimicking technique used at the inflatable dam won't solve the problems at those larger dams, biologists say. The fabridam is only 8 feet high, making the development of an artificial channel feasible, and there was also enough room available for its construction.

Still, even if large numbers of shad and river herring do not return, the new passage at the fabridam will benefit local species such as smallmouth bass, darters and muskies. The Fish and Boat Commission is monitoring fish above and below the structure to learn more about how it is used.

There are signs that it is working. In recent years, efforts have been made to return American eels to the Susquehanna. When the fish passage was completed and a coffer dam holding back river water was removed, an eel was waiting to go past, commission director Schaeffer said. "It literally zipped upstream the day that it opened up." ■



Community science brings 'invaluable service' to Bay work

Volunteers fill data gaps for federal agencies and communities

By Lauren Hines-Acosta

San Domingo Creek in St. Michaels, MD, had called to Gene Lopez since he retired and moved there eight years ago. So, it was not surprising that, while paddling his kayak there one day, he noticed an area that had suddenly come alive with thick beds of underwater grasses.

He told the Choptank riverkeeper, and they spent a day motoring up and down the creek, trying to understand the reason for the growth spurt.

After learning the ecological importance of these grasses — known formally as submerged aquatic vegetation or SAV — Lopez has spent countless hours paddling the creek, mapping SAV for science.

"It encourages me to see that there are changes happening that are probably beneficial for all of us," Lopez said.

Lopez is one of many volunteers in the Chesapeake Bay region who use their free time to collect ecosystem data — on everything from water quality to dolphin behavior. Over the last 30 years, community science has ballooned across the country and grown to be an important pillar informing Bay restoration work.

In general, community science takes place when the public voluntarily collects information to help answer a scientific question. Some of the earliest programs are from the late 1800s and early 1900s, when organizations asked citizens to count birds to better understand migration patterns.

But community science programs as we know them today started growing in the 1990s and gained momentum around 2008, when the smartphone emerged. Apps like iNaturalist, through which people can share biodiversity observations, made public participation in science easier and more accessible. Some organizations now have dedicated smartphone apps that volunteers can use to submit data and observations — to report dolphin sightings, for example, on Chesapeake Dolphin Watch.

Corey Callaghan, assistant professor of Global Ecology at the University of Florida, found that community science has contributed to more than 80% of data in the Global Biodiversity Information Facility since 2010.

The Chesapeake Bay Program, a state-federal partnership that leads the Bay cleanup effort, has used community-collected data since its start in 1984. In 2015, the Chesapeake Monitoring Cooperative was formed through an agreement between the Bay Program and the Alliance for the Chesapeake Bay. As part of that effort, organizations across six states and the District of Columbia collect water quality information for the cooperative's database.

Sally Hornor and Chris Kerchner, volunteers with the Magothy River Association in Maryland, examine a clump of algae and horned pond weed that Kerchner collected from the Little Magothy River. (Dave Harp)

Science by the people, for the people

Because community-sourced data is often collected by non-scientists, some question its credibility.

The Bay Program addresses that by sorting the data into tiers based on how the information is collected. Data collected using rigorous sampling methods, such as those established by the U.S. Environmental Protection Agency, are considered credible enough to help guide policy decisions.

The Submerged Aquatic Vegetation (SAV) Watchers program takes a similar approach. Every year, the Virginia Institute of Marine Science creates a map of the SAV species in the Bay from aerial surveys. But scientists need to know which species are where because each type of grass requires specific conditions to thrive.

The SAV Watchers program started in 2019 as a way of ground-truthing aerial surveys. The Bay Program's SAV workgroup started the program, and the Maryland Department of Natural Resources coordinates the effort. That data is also sorted into groups based on the amount of training volunteers receive. Brooke Landry, SAV program chief, reviews the data, especially the "tier one" data collected by people with little training.

"I think [community science has] been incredibly influential," Landry said. "One of the things we realized decades ago is that we can't go it alone, that we need to get people involved."

The Alliance for Aquatic Resource Monitoring (ALLARM) was founded in 1986 at Dickinson College in Carlisle, PA, to study the impact of acid mine drainage on Pennsylvania streams, at one point deploying as many as 500 volunteers. The organization supports data collection for the Chesapeake Monitoring Cooperative from communities in Pennsylvania and New York. ALLARM also verifies the quality of the cooperative's samples by testing extra samples collected by volunteers.

Karen Kovaka, assistant professor of philosophy at the University of California San Diego, wrote a paper exploring the credibility of community-collected data. She said it comes down to the question and purpose. Not all questions require professional-level accuracy, such as how many birds you see in a day or whether your neighborhood floods when it rains.

Kovaka said formal scientific studies can leave out community concerns or paint broad strokes that don't reflect what's happening

Top photo: Gene Lopez, a volunteer with Shore Rivers on Maryland's Eastern Shore, takes notes about underwater grasses and water clarity in Rolles Creek near St. Michaels. (Dave Harp)

Ines Kenhoung, then a sophomore at Bowie State University, participates in a 2021 water quality monitoring training session off Maryland's Patuxent River, coordinated by the Chesapeake Monitoring Cooperative. (Will Parson/Chesapeake Bay Program)

on the ground. For example, Richmond has data on where the city floods. But Sheri Shannon, co-founder of Southside ReLeaf, said it doesn't fully reach the neighborhood level. The nonprofit focuses on cooling the city with tree canopy, but a lack of trees to capture rain can also increase flooding.

"It's not a coincidence that the neighborhoods that have more impervious surfaces and less canopy cover and green spaces are also the ones where we're seeing hotter temperatures, and also that flooding," Shannon said.

So, Southside ReLeaf launched a program called Go with the Flow, which allows residents to sign up to submit photos of flooding in their area when it rains. The nonprofit is partnering with the University of Richmond to map the data and plans to present its findings to the city.

Scientific two-way street

Stephanie Letourneau, who worked for three years as community science manager for ALLARM and recently earned a master's degree from VIMS, remembers teaching volunteers how to identify benthic creatures — small organisms that live at the bottom of a waterbody. At first, the volunteers seemed uncomfortable. But Letourneau loved seeing the shift that always came next.

"Once they kind of finally figure it out, it's a moment of success for them because they've achieved something," Letourneau said. "Seeing them go from 'I don't want to do this' to 'Oh my gosh, I figured it out ... ' That's the cool moment."

Letourneau has helped community science volunteers at multiple organizations like ALLARM, the Chesapeake Monitoring Cooperative and now Wetlands Watch. Some volunteers she worked with pointed out the sometimes-extractive nature of community science. Researchers will often approach groups with a study, ask them to collect data and then ... just leave, she said.

"Being around a lot of people who are primarily in academia, they're like, 'Oh, this is such a great resource to get free data,'" Letourneau said. "It might look free, but there's so much investment that goes on that, unfortunately, [and] some programs don't realize that."

Letourneau said there should be a "scientific two-way street" where researchers get their data, but volunteers receive training, improved environmental literacy and the skills to be advocates for their community.

Amy Wyant is putting that into practice. As executive director of the Otsego County Conservation Association in New York, she aims to ramp up the environmental literacy and empowerment aspects of the group's community science programs. It has multiple programs, such as monitoring water quality and assessing culverts.

The association has a dedicated team that inspects culverts that carry steams under roads. If they are blocked by debris or in disrepair, the association can receive state and federal grants to fix them. The volunteers are trained to use protocols developed by the North Atlantic Aquatic Connectivity Collaborative.

After joining the culvert team and completing training, volunteers can receive a $100 stipend for gas, waders or other things they need to be in the field. It's one way some groups are giving back to their volunteers.

Funding, or lack of it, can be a sore point with some community science efforts. Blue Water Baltimore's Water Watch team provides tier-three data (the most rigorous) to the Chesapeake Monitoring Cooperative at the Bay Program. Alice Volpitta, the Baltimore Harbor Waterkeeper, said groups like hers provide "an invaluable service to our regulatory agencies" by collecting this data, but they don't receive state or federal funding typically reserved for monitoring.

"None of that funding is ultimately trickling down into programs like mine, even though our data has become really important to properly characterize the health of our rivers," Volpitta said.

Many communities still take it upon themselves to fill in those data gaps and expand environmental education.

The St. Mary's River Watershed Association in Southern Maryland focuses mainly on restoring oyster reefs — a process that requires checking dissolved oxygen levels at potential restoration sites. Ordinarily that's a job for volunteers and no small amount of field work. But, according to Emma Green Ewing, the group's director, they were fortunate enough to have a couple of tech-savvy volunteers, Norm and Shelly O'Foran, who developed a remotely operated water monitoring device, called a Bay Observation Box, or BOB.

Though not as precise as the commercially produced remote monitors used by the Chesapeake Biological Lab in nearby Solomons, the device measures the same water conditions and is considerably less expensive.

The association now has 18 BOBs operating in the river and in nearby St. Clements and Breton bays.

The association partners with the local Forrest Career and Technology Center so high school students can use the monitors to learn scientific skills.

One of the students, Megan Shepherd, said she's always been passionate about water quality because of visiting her grandfather's dock on the Potomac River. She looks forward to the days she works with the BOBs, whether she's collecting data in class or cleaning one on a pier.

"It makes me kind of have more hope for our future, knowing that my generation is going to be able to work on this kind of stuff," Shepherd said. ■

Shelly O'Foran, a volunteer with the St. Mary's River Watershed Association, teaches water monitoring basics to high school students in Leonardtown, MD. (Mary Anne Williams)

How can you get involved?

Start local! Reach out to your local watershed groups to ask about community science programs in your area. Search the internet for options too. Examples are listed below. You can find direct links to their websites at the end of the online version of this article at *bayjournal.com*.

Bay-wide

- Chesapeake Monitoring Cooperative
- Chesapeake Bay SAV Watchers
- Chesapeake Dolphin Watch
- Monarch Watch
- eBird

Virginia

- Catch the King with Wetlands Watch
- Go with the Flow with Southside ReLeaf
- James River Watch with the James River Association
- Help state Department of Wildlife Resources map wildlife with iNaturalist.

Maryland

- Creek Critters with Nature Forward
- Water Quality Monitoring Program with the Potomac Riverkeeper Network
- Maryland Department of Natural Resources community science programs
- The Maryland Water Monitoring Council will host a free workshop on water monitoring on Oct. 8, 8:30 a.m. to 3 p.m., at the USGS Water Science Center in Catonsville, MD. Information at *tinyurl.com/MD-WMC.*

Pennsylvania

- Alliance for Aquatic Resource Monitoring
- Pennsylvania Amphibian and Reptile Survey
- PennState Shaver's Creek Environmental Center community science program

VA's pastoral Chickahominy River faces a new kind of foe

Presence of 'forever chemicals' in fish mars river's reputation as unspoiled waterway

By Whitney Pipkin

OUR WATERWAYS

Editor's note: This article is part of a series examining the health of smaller streams and sections of rivers in the Chesapeake Bay watershed. If you would like to suggest a waterway to feature, contact Jeremy Cox at jcox@bayjournal.com.

Bald cypress trees decorate the water that meanders through largely undeveloped land along Virginia's Chickahominy River. (Dave Harp)

The Chickahominy River in Virginia is known for its physical beauty, with bald cypress trees and lily pads decorating the water that meanders through largely undeveloped acres of forests and wetlands. But the river's appearance tells only part of the story.

In May, the Virginia Department of Health issued its first fish consumption advisory for the presence of a new suite of harmful chemicals in the Chickahominy River, which is a James River tributary, and the White Oak Swamp where its waters originate. The advisory notifies the public of the risk of exposure to PFOS, a so-called "forever chemical," by eating too many (or, in some cases, any) of some fish species from the waterway.

PFOS, or perfluorooctane sulfonic acid, is a synthetic chemical used to make products resistant to stains, grease, water or fire. And it has now been linked to serious health problems in humans.

The stretch of river upstream of Walkers Dam, also known as Chickahominy Lake, was already considered contaminated by mercury, also leading to fish consumption warnings. That hasn't prevented the waterway from being long considered "one of the best all round fisheries in Virginia," according to the state's Department of Wildlife Resources.

But the discovery of PFOS — one of thousands of chemicals broadly known as PFAS, or per– and polyfluoroalkyl substances — is relatively recent, and it's not yet clear how it will affect the fishing reputation or future of "the Chick."

The Virginia Department of Environmental Quality has identified Richmond International Airport property, where military firefighting training has taken place, as a potential source of the PFOS — via White Oak Swamp, a Chickahominy headwater that joins the river about 11 miles east of Richmond. Firefighting foam has become recognized as a common source of PFAS contamination throughout the Chesapeake Bay watershed as researchers have learned more about how ubiquitous and harmful the substances can be.

But that doesn't necessarily make their presence obvious. In 2018, researchers from Virginia's Department of Conservation and Recreation described the Chickahominy's natural beauty at length as they documented reasons to consider extending a Virginia Scenic River designation to another stretch of the waterway. The upper half of the Chickahominy was already considered scenic. It is separated from the lower half by Walkers Dam, which was built in 1943 to create a drinking water reservoir serving the city of Newport News, VA.

The waters below that dam "flowed heavily through forests and wetlands with no signs of stream modifications," the DCR report stated. "There were no signs of visible water pollution and no signs of industrial or commercial development, only river houses."

That dissonance between how the river looks and what may be rendering its fish unsafe to eat is alarming for those who've had longtime relationships with the Chick.

"Relatively speaking, it's always been a pretty pristine river. That's why the latest developments with the elevated PFOS levels in White Oak Swamp are pretty disheartening," said Dana Adkins, a citizen and environmental director of the Chickahominy Indian Tribe.

The tribe's relationship with the river that shares its name goes back likely hundreds of years before English settlement. In many areas, the Chickahominy is thought to look much as it did when Capt. John Smith and his crew first explored the river in late 1607, before his two longer journeys in 1608.

Smith's link to the tidal portion of the river, from its confluence with the James River up to Walkers Dam, is interpreted today as part of the Chickahominy Water Trail, a segment of the National Park Service's Captain John Smith Chesapeake National Historic Trail. But, by 1640, the tribal citizens who had been living in as many as 20 villages scattered along the river no longer had a presence at the water's edge.

"We had been pushed off of or out of our villages by encroachment from the colonists," Adkins said.

The tribe didn't reestablish a presence along the river until a few years after receiving federal recognition in 2018. In early 2022, the Chickahominy Tribe reacquired Mamanahunt, a historic site of cultural significance along the river, as part of an 800-acre property in Charles City County. Adkins said the property features about five miles of shoreline on the Chickahominy, acreage he considers central to the tribe's future relationship with the river.

"We're having to reintroduce our citizens to some of the cultural lifeways that our tribe had," Adkins said. "It's been a period of learning that's still ongoing for us, not only from the cultural aspects of harvesting fish from the river but what farming may have looked like."

Adkins said early explorations of Mamanahunt revealed a large stand of wild rice amid the wetlands. He has since traveled to Minnesota to learn from other tribes who harvest wild rice how his people might have historically processed such a resource. The arrow arum plant, which the Chickahominy knew as tuckahoe, is also abundant in the river's wetlands. Adkins said his ancestors would have dried, crushed and ground the plant's roots into flour.

Access to the river and its resources, he said "will really aid in preserving that history so it can be passed on."

It's not yet clear how others who use the river's resources, such as recreational fishers, will respond to the latest revelations about chemical contamination. The state health department's advisories warn anglers not to eat any of the sunfish, creek chubsuckers and chain pickerel caught in White Oak Swamp, citing high levels of PFOS found in fish tissue. For the same reason, they recommend eating no more than two meals per month of sunfish, chain pickerel or largemouth bass species caught in the river itself.

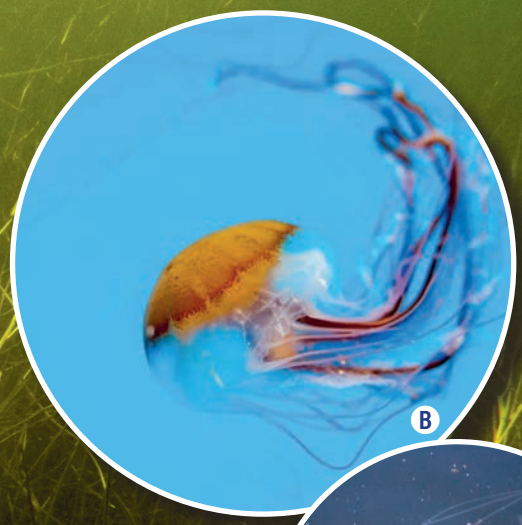
The advisory was recently posted to the "Chickahominy River Fishing Report" Facebook group, which has about 7,700 members. None of the commenters on the post seemed keen to change their fishing habits right away.

"I guess we're all gonna die 'cause I've been eating everything out of the James and Chickahominy for years," wrote one. ■

CHESAPEAKE CHALLENGE

— Kathleen A. Gaskell

That nettlesome jelly, the sea nettle



The only way to totally avoid getting stung by the Chesapeake's most common jellyfish, the Chesapeake sea nettle or bay nettle (*Chrysaora chesapeakei*), is to stay out of the Bay when its temperature is 78-86 degrees — or, broadly speaking, the summer months.

Avoid a smackdown! A group of sea nettles is called a smack. A single nettle, though a cause for caution, doesn't mean you can't swim, as long as you can give it a wide berth, keeping in mind that its 24 stinging tentacles can grow 5-6 feet long. Each additional jellyfish, though, greatly increases your chances of tangling with venomous tentacles.

Dress for no access: Pantyhose or a wetsuit may provide a sufficient barrier between your skin and stinging tentacles.

What are the odds? Scientists at the Virginia Institute of Marine Science have developed an experimental computer model (*vims.edu/research/products/cbefs/sea_nettles*) that uses the nettle's narrow requirements for temperature and salinity to show in real time where the Bay water is tolerable for *C. chesapeakei*. Note that it predicts the likelihood and not the presence of the creature.

Well, that's just beachy! Sea nettle tentacles can still sting after the animal has washed up dead on the shore. Don't touch them!

Now you've done it. Unless you are allergic, sea nettle stings are rarely fatal, and the moderate-to-severe pain usually lessens in a few hours. If it continues to hurt or itch, see a doctor. For some people, the rash may persist for a couple of weeks.

Beware the internet! Sites that say treating a sting by urinating on it or rinsing the area with vinegar are widely thought to be wrong. These substances can stimulate the tentacle's nematocysts to discharge more venom. Medical experts instead recommend rinsing the area with baking soda and seawater for 15 minutes, then gently scraping off any tentacles still present. Soak the area in warm water for at least 30 minutes, then take ibuprofen. Although it is not scientifically tested, many swear by meat tenderizers. They contain papain or bromelain, protein-dissolving enzymes that are thought to neutralize the jellyfish venom and alleviate pain, itching and swelling.

Title image: *A bay nettle at the National Aquarium in Baltimore. (Courtesy of the National Aquarium)*

A *A bay nettle, or Chesapeake sea nettle, floats in the Severn River in Maryland. It has a gelatinous body and an umbrella-shaped bell, called a medusa, about 4 inches in diameter. Hanging from the rim of the medusa are 24 tentacles that contain nematocysts, stinging cells, that open on contact and shoot a venomous barb into the victim. (Will Parson/Chesapeake Bay Program)*

B *A bay nettle at the National Aquarium in Baltimore. (Courtesy of the National Aquarium)*

C *A bay nettle drifts in Spa Creek in Annapolis, MD. (Matt Rath/Chesapeake Bay Program)*

D *A bay nettle in captivity. (Mary Hollinger/NOAA)*

Nettles are neato

Sea nettles are more than just stinging menaces. Let's see how much you know about these bodacious blobs. Answers are on page 32.

1. Approximately what percentage of a sea nettle is water?
   78% 88% 98%

2. Which three of these does a sea nettle lack?
   Brain Heart Lungs Nervous system

3. Sea nettles are mostly found in the middle or lower Bay. What conditions might increase their numbers in the upper Bay?
   Frigid winters Hot, dry summers Hurricanes

4. True or false? Sea nettles are the Bay's largest macrozooplankton.

5. True or false? A sea nettle can regrow an amputated tentacle.

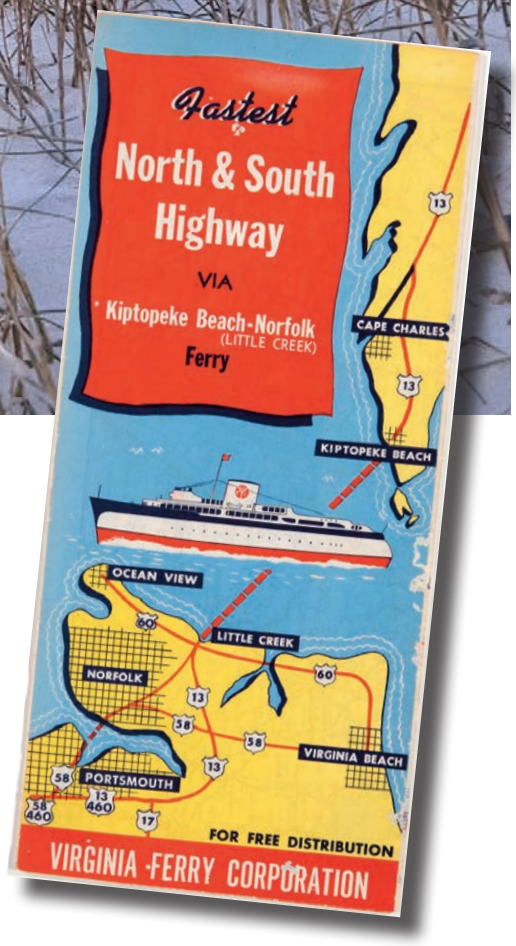
6. Sea nettles help oyster larvae two ways. How?
   A. If nettles consume the larvae, they spit them out unharmed.
   B. Nettles eat comb jellies, which prey on oyster larvae.
   C. Oyster larvae are immune to the nettles' venom and seek shelter from predators among their tentacles.

7. One species of sea turtle that visits the Bay can't get enough of a sea nettle snack. Which one?
   Kemp's Ridley Leatherback Loggerhead

8. What significant event affected the Bay's sea nettles in 2017?
   A. They were recognized as a separate species from the Atlantic sea nettle.
   B. They all but disappeared.
   C. They appeared in such large numbers that many beaches had to close.

9. True or false? Sea nettles can swim.

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



Top photo: The sun sets offshore of Kiptopeke State Park in Virginia, with the breakwater of concrete ships visible in the distance. (Kevin Divins/ Virginia State Parks)

Inset: The Virginia Ferry Corporation transported people and cars between Hampton Roads and Virginia's Eastern Shore from the 1930s to 1964. (Library of Virginia)

Uncover an Eastern Shore gem: VA's Kiptopeke State Park

By Lauren Hines-Acosta

White sand and sparkling water welcome visitors to Kiptopeke State Park, one of only a few public places on Virginia's Eastern Shore offering direct access to the Chesapeake Bay. Protecting swimmers from the Bay's sometimes strong waves are two short rows of scuttled concrete ships that double as tourist attractions for curious kayakers.

Situated on a major wildlife migration route and neighbor to a national wildlife refuge, the park offers stunning natural scenes for both local visitors and others who are willing to trek to Virginia's Eastern Shore. Historical interpretation programs at the site also provide insight as to how transportation and culture has changed in the Bay watershed.

"I think that having access to the Chesapeake Bay is what makes it really stand out in a lot of people's minds … but then the campers that come [here also] appreciate the quiet beauty of the Eastern Shore," former park ranger Forrest Gladden said.

Gladden, who managed the park for a decade, said Virginia's Eastern Shore is underserved when it comes to parks. Kiptopeke is in fact the state's only Delmarva park.

At 562 acres and located three miles from the Chesapeake Bay Bridge-Tunnel in Virginia, it offers a choice of cabins or tent camping and features a fishing pier, picnic area, swimming beach, playground and about five miles of hiking trails. Maggie Humphreys, the park's education support specialist, recommends the Brown Pelican Trail along the water.

Because the Eastern Shore is a peninsula, it acts as a funnel for migrating birds heading north in the spring and south in the fall. The park has a hawk watch station for spotting osprey, American kestrels and peregrine falcons. Humphreys said the best time to see them is in the fall beginning in September when they all migrate south.

About half a mile west of the birding station lies the Bay. Park visitor Freda Cavallaro said she and her sun-kissed pup, Lily, love the "serenity of the beach." It was their second trip to the park in May, and this day's goal was to look for treasures in the sand, such as shark teeth.

According to the Chesapeake Bay Program, the state-federal partnership that leads the Bay restoration effort, there were more than 1,400 public access sites to the Bay and its tributaries as of 2023, with about 260 of those added since 2010. Maryland has the most sites, but some say it's not enough because much of the Bay's tidal shoreline is privately owned.

Also visiting the park on that day in May were Mindy and Don Potts, who had driven from their home in Delaware for a long weekend. They were looking forward to sunsets on the Bay and taking kayaks out for a close look at the concrete ships.

Due to the shortage of steel during World War II, a shipyard in Tampa, FL, made the ships out of concrete. They were seaworthy enough to transport bulk goods in the South Pacific Ocean, but they were slow, reaching a top speed of six knots. In 1948, nine of them were scuttled in the 12- to 18-foot-deep water off Kiptopeke as a breakwater for the ferry that used to land there.

The forlorn, weatherbeaten ships still tame the waves, but now for kayakers and swimmers — not for the ferry landing, which closed in 1964. In the summer, birds perch on the ships to fish, shellfish build habitat on their underwater surfaces, and curious humans surround them. Some of the latter are tempted to venture inside the ships through their deteriorated walls, but park staffers don't recommend it.

The land here served many purposes before it was a park. Kiptopeke is thought to mean "big water" in the Algonquian language and was the name of an Accomac chief's younger brother, according to the Virginia Department of Conservation and Recreation. In 1607, the Accomac tribe lived in the southern part of the Eastern Shore, or today's Northampton County, which includes the state park.

According to Salisbury University, a 1640 treaty moved the Accomac people to the Gingaskin reservation on the Atlantic side of the Delmarva Peninsula, near what is now Eastville. But by the 1750s, most Indigenous people had left the peninsula and the land that would become Kiptopeke State Park.

As the population grew on the Eastern Shore, transportation methods changed and gradually increased. Andy Dunton with the Cape Charles Museum said the railroad reached Cape Charles, VA, by 1886. But the southernmost Eastern Shore of Virginia remained isolated from the rest of state for several more decades. While Norfolk is just 20 miles from the southern tip of the peninsula, the overland distance between the two is closer to 500 miles. Enter the Virginia Ferry Corporation, which opened a ferry service in the early 1930s — first running from Cape Charles to Virginia Beach, then from Kiptopeke to Virginia Beach.

Karen Pruitt, who recently visited the park, remembers being on the ferry when she was 10 years old. As the boat rocked, her vision pendulated between the sky and water.

The corporation operated seven ferries from Kiptopeke at its height, and developers built a motel to accommodate the traffic. But the ferry business and motel closed after the Chesapeake Bay Bridge-Tunnel opened in 1964. The hotel was eventually demolished. All that remains is a rusting sign promising the glamour of free TV.

Kayakers take advantage of a calm day on the water to visit the concrete cargo ships that were scuttled as a breakwater for the long-gone Kiptopeke Beach ferry landing. (Virginia State Parks)

After the ferry terminal closed, Virginia Beach entrepreneur John Maddox bought the former ferry landing at the Kiptopeke beach. He tried to establish a resort but ran into financial issues. Defeated, Maddox cut his losses and sold the land to the state in 1992. The state park opened a month after the purchase in time for Memorial Day. Now the park has about 150,000 visitors annually.

Gladden was a Virginia park ranger for 50 years and says he understands why natural spaces like Kiptopeke are so important.

"To break down the word of recreation, to 're-create' yourself, is really what's important," Gladden said. "We have people … since the park opened that come every year because they identify with this. This is what re-creates their soul." ■

Maggie Humphreys, an education support specialist at Kiptopeke State Park, points out the Tourinns Motor Court sign that used to be part of a now torn-down hotel at the park. (Lauren Hines-Acosta)

IF YOU GO

Kiptopeke State Park is on Virginia's Eastern Shore along the Chesapeake Bay. It's open every day of the year. It offers a variety of camping options, a boat ramp, fishing pier, picnic areas, hiking and biking trails, and a swimming beach.

Day use and overnight guest visitation is from 6 a.m. to 10 p.m. The unguarded swimming beach is open during daylight hours. Staff is available from 8 a.m. to 6 p.m. daily. The park's Big Water Visitor Center is open daily from 9 a.m. to 5 p.m. The camp store is open daily from 10 a.m. to 6 p.m.

The parking and entry fee is $7 per car. It costs $5 for adults to fish from the pier and $3 for children. Launching a boat costs $3 to $10. Campsites and cabins can be reserved at *reserveVAparks.com* or by calling 800-933-PARK. Cabin and lodge rental rates range from $132 to $459 per night. You'll also have to pay the bridge-tunnel toll if you're coming from Virginia Beach.

Kiptopeke park rangers recommended their favorite trails:

- The Brown Pelican Trail has two overlooks on the Bay as it hugs the water. It's about a half mile long.
- The Raptor Trail is the most accessible hike, and it's about 1.5 miles long.
- The Taylor Pond Trail leads to a freshwater pond and offers a different variation of ecology than the rest of the park. The trail is a quarter mile long.

Kiptopeke State Park is near other attractions you can visit on your trip:

- Cape Charles Museum and Welcome Center explores the history of Cape Charles and the Eastern Shore. It's open daily from May through November. Admission is free.
- Samuel D. Outlaw Blacksmith Shop Memorial Museum in Onancock is an intact blacksmith shop founded in 1927 by African American Samuel D. Outlaw. It's a window into the economic and community life of African Americans on the Eastern Shore. Call 757-656-3460 to schedule a tour.
- Eastern Shore of Virginia National Wildlife Refuge has a visitor center that is open Friday to Sunday from 10 a.m. to 4 p.m. The area has trails and also water access through the Wise Point Boat Ramp.

The dry days of the 1960s, surprisingly kinder to the Bay

By Tom Horton

An undated photo of extremely low water on the Potomac River at Great Falls, VA. (National Park Service)

What was Chesapeake Bay like when I was a kid more than six decades ago?

In a word, *dry*.

When I tell my college students about "the good old days" of my Chesapeake youth, it's no simple, paradise-lost tale I spin.

Overall there were more fish and fowl, more oxygen in the deeps, and endless acres of SAV, or underwater grasses, visible in the clear shallows. It helped that human population in the watershed was less than half today's.

But there were raw sewage discharges aplenty, and industrial wastes that routinely stained and clouded the waters. Ospreys were scarcer, and I never saw a bald eagle or a brown pelican — these all devastated by DDT. Forests were scarcer as it took so many more acres of farmland to yield sufficient grain.

Recently, however, I realized that in all my "when I was your age" lecturing, I hadn't given drought its due.

From 1951, when I turned six, through college and military service after that, streamflow entering the Chesapeake from its 40-odd rivers was seldom above normal. The 13-year period of 1958-1971 was historically dry — the "largest recorded departure" from normal freshwater flows in records going back to 1869, according to the U.S. Geological Survey.

The driest-ever year for the Chesapeake was 1930. But for a long, dry period, nothing compares to the 1950s and 1960s.

And for the Chesapeake, dry (and wet) conditions have bigger environmental consequences than they do for most coastal waters.

Our Bay doesn't have as much water in it as you might think. It's 187 miles long and 20 miles wide in some places, its average depth is only about 21 feet.

So there's not a lot of volume to absorb the pollution carried by rivers and streams from a watershed whose lands stretch from Cooperstown, NY, nearly to North Carolina.

For example, quantities of nitrogen, a principal Bay pollutant from farm and pavement runoff, sewage and dirty air, can more than double in a wet year, versus a dry year, increasing by hundreds of millions of pounds.

The biggest headlines regarding my dry Bay youth were probably the threat of the District of Columbia running out of drinking water. The city was withdrawing 80% of the Potomac River's flow. Lady Bird Johnson, the president's wife, implored citizens to conserve by using dishwater to revive their yard plantings.

The Army Corps of Engineers proposed 16 new dam projects, flooding vast areas of open space in Maryland, Virginia and West Virginia with reservoirs. Only one was ever built.

But for the Chesapeake itself, the long dry spell meant less pollution from the land and clearer water than we deserved, given the increasing use of agricultural chemicals and manure fertilizer, and the willy-nilly development of forested open space that was picking up speed back then.

In the midst of that drought, University of Maryland marine scientist Don Heinle made a remarkable observation of a Bay clear beyond current belief.

He flew one winter day the length of the Chesapeake on a National Guard mission, standing in the half-lowered loading ramp in the back of a cargo plane, looking down.

Back at the lab, examining depth charts, he realized he was seeing the Bay bottom down to 40 feet, everywhere but the deepest channels. It made a strong impression, he said, because growing up on Puget Sound, hundreds of feet deep, he had never seen the bottom.

The enormous wet-dry difference for the Chesapeake was elegantly documented by another Bay scientist, Walter Boynton, when he and his team developed a "nutrient budget" for the Patuxent River — showing where all the river's nitrogen and phosphorus came from, and where it went.

They examined pollution for 13 years, from 1985 to 1997. During the first eight of those years, sewage treatment plants were massively upgraded to state-of-the-art nitrogen removal along the whole Patuxent.

But the two largest influxes of nitrogen to the river came after those upgrades. The least nitrogen flowed in *before* all the sewage improvements.

It didn't mean the money was wasted — just that the weather was drier before the sewage upgrades, and wetter after. It reinforced beyond a doubt that we will never recover a healthy Chesapeake if we rely only on technical fixes and do not reduce the flows of pollution from its landscapes.

My dry youth ended with a bang in June 1972.

A wet winter and spring had saturated the ground throughout the Bay watershed, so the soil couldn't absorb much more. Atop that came Tropical Storm Agnes in all her sodden fury — days of rain that caused "the most massive flooding in the history of the eastern United States," said the Federal Office of Emergency Preparedness.

Agnes killed 122 people in its path — 16 in the District of Columbia metro area alone — and destroyed so many homes, bridges and businesses that it remained the most costly storm in U.S. history until Hurricane Andrew smashed Florida in 1992.

Ecologically, the impact was equally disastrous. The deluge came at the beginning of summer, when the Chesapeake's fish and aquatic plants were reproducing and most vulnerable. In a few days Agnes smothered the Bay with as much polluting sediment, washed down its rivers, as the estuary normally receives in a quarter century, perhaps longer.

I was just two months into a career covering the Bay as a journalist. Still at it 53 years later, I think it remains the biggest story I was ever assigned.

And that's the wet and dry of it. ■

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.

As osprey chicks starve, VA history risks repeating itself

By K.R. Callaway

It's summertime in coastal Virginia, and osprey whistles and chirps once again fill the air. These birds are found on nearly every continent, but their largest breeding population — estimated at more than 20,000 — chooses the Chesapeake Bay every year to raise their young. Ospreys feast almost entirely on fish and are sensitive to environmental changes and pollution, making them a nearly perfect indicator for the environmental health and ecological abundance of the Bay. In recent years, they have been indicating trouble.

When they make their startling dives into the Chesapeake's gentle waters, ospreys are often looking for Atlantic menhaden, a small but nutrient-dense fish native to our coastal waters and estuaries. And they aren't the only ones searching for these fatty fish. Other predators include striped bass (or rockfish, as we call them locally), dolphins, whales, eagles … and Omega Protein. A Virginia-based and Canadian-owned maker of fish-oil supplements and animal feed, Omega Protein owns the only fish-oil processing plant in the U.S. Its presence in Virginia means the state accounts for more than two thirds of menhaden fishing in the Atlantic, according to the Atlantic States Marine Fisheries Commission (ASMFC).

Competition with commercial fishing has wreaked havoc on the region's ospreys, whose chicks are starving in their nests and whose population has declined nearly 90% in under 40 years, according to recent studies by the Center for Conservation Biology at William & Mary University. This research corroborates years of concern from some local scientists and environmentalists, who claim menhaden are declining and threatening the Chesapeake's delicate ecological balance. However, these are still just claims. Menhaden's rate of decline within the Bay, or whether they are really declining at all, is a bit of a mystery. There is surprisingly little data on the number and location of menhaden in the Chesapeake.

In the "Responsibility" section of its website, Omega Protein acknowledges menhaden's importance in their habitat but shares a rather defensive statement from the ASMFC: "The stock is not overfished, and overfishing is not occurring." For the Atlantic Ocean as a whole, this is likely true. When it comes to the Chesapeake, though, even the ASMFC is not so sure. Just last August, the commission voted to establish a working group to consider new protections against overfishing menhaden in the Bay. And this year, for the second year in a row, the Virginia's General Assembly bowed to pressure from Omega Protein and failed to pass a bill commissioning a report that would have clarified the state of local menhaden.

An osprey heads for its nest with a freshly caught menhaden, the bird's primary prey in some parts of the Chesapeake Bay area. (Russ/CC BY 2.0)

In 2024, when the bill was first tabled, Chris Moore, the Chesapeake Bay Foundation's Virginia executive director, said the legislative stalemate was not "the Virginia Way." But what is the Virginia Way if not craving economic growth at the expense of natural resources and against science-backed guidance?

We see this, for example, in the plight of the Atlantic sturgeon. For millennia, it was a dietary staple in the Chesapeake region. From pre-Colonial times and for more than 150 years after English settlers colonized nearby Jamestown, this odd and archaic fish provided more food "than could be devoured by dog or man," as Capt. John Smith wrote in 1609. This enduring population met its match in the late 1800s when demand for caviar quickly decimated the species locally. Although the sturgeon population plunged to just 2.2% of its 1888 peak by 1908, it took another 20 years for Virginia to curb fishing. This was too little too late for the sturgeon, which were deemed locally extinct by the 1990s despite a 1974 moratorium on catching the fish in Virginia waters.

The oyster, another regional staple, suffered a similar but more violent fate. After the Civil War, oysters went from a working-class food to a delicacy, creating "a boom reminiscent of a gold rush," as John R. Wennersten, environmental historian and author of *The Oyster Wars of Chesapeake Bay*, told the magazine *Humanities*. Virginia capitalized on this boom, creating cutthroat competition between permitted oystermen and "pirates," between Virginians and Marylanders, and even between those using different oyster-harvesting methods — dredges versus tongs.

Those conflicts lasted decades, only slowing after oyster demand passed its peak at the end of the 1800s and profits diminished. Protections for the creatures that brought so much revenue to the Bay region were finally enacted in 1962 when the Potomac River Fisheries Commission was formed to "end the long Maryland-Virginia ruckus over fishing rights," the *Washington Post* reported at the time. Today, the oyster population is commonly estimated to be just 1% of what it was before widespread commercial harvesting began.

These species — and others harmed by Virginia's longtime laissez-faire approach to commercial fishing regulation — are now on the mend, with Virginia making fewer overtly destructive decisions for the Bay in recent decades. But progress, as the sturgeon, oysters and osprey could tell you, is not self-sustaining. Especially in Virginia and especially now, it requires vigilance.

The "Virginia Way" has been with us throughout the state's history. Its instinct to prioritize economy over environment has been only partially constrained by environmental protections, such as the Clean Water Act, the Chesapeake Bay Restoration Act, commercial fishing restrictions and local laws. Before letting these protections lapse — whether due to the deregulatory agenda of the Trump administration or the type of powerful industry lobbying we are only starting to get a taste of from Omega Protein — Virginia should heed the ospreys' warning. There are fewer whistling this summer, but their message is clearer than ever. ■

K.R. Callaway, from Norfolk, is a science writer pursuing a master's degree in journalism at New York University.

SHARE YOUR THOUGHTS

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

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

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

Contact T. F. Sayles at 410-746-0519 or *tsayles@bayjournal.com*.

A kayaker pauses to watch a posse of stand-up paddlleboarders pass by on the Chesapeake Bay. (Dave Harp)

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There's no greater sign of the *Bay Journal*'s success than compliments and donations from readers like you. Your gifts make our work possible, from coverage of the Bay and its rivers to wildlife, forest health, growth and more. We are grateful for your donations. *Please continue to support our success!*

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A lush stand of Joe Pye weed grows near the waters edge on Maryland's Eastern Shore. (Dave Harp)

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EVENTS / PROGRAMS

PENNSYLVANIA

Elk Expo
9 am–6 pm, July 26 and 9 am–5 pm, July 27; Elk Country Visitor Center, Benezette. Just before the popular elk rut gets into full swing, the Keystone Elk Country Alliance and Elk Country Visitor Center host the largest elk celebration in the northeast. The Expo will feature exhibits, seminars, antler scoring experts, a presentation by Pennsylvania Game Commission, calling contests and more than 100 vendors. More info: elkexpo.com.

Bat Night
6–9 pm, July 19; Greenwood Furnace State Park, Huntingdon. Join park staff and Lincoln Caverns for a fun evening learning about all things bat-related. Program will begin with a presentation at the blacksmith shop. Activities will include bat box building, games and a bat count. Free. All ages. More info: events.dcnr.pa.gov/event/bat-night-4991.

Nature Book Club
7 pm, July 28; Shikellamy Park and also on Zoom. Join the Nature Book Club, sponsored by the Middle Susquehanna Riverkeeper Association, for a discussion of *Eager: The Surprising, Secret Life of Beavers and Why They Matter* by Ben Goldfarb. More info: fisherann531@gmail.com.

Susquehanna River Ranger Programs
10:30–11:30 am, July 17, 24, 31 and Aug. 7; Columbia Crossing River Trails Center, Columbia. Join the Susquehanna National Heritage Area and the state Department of Conservation and Natural Resources at Columbia Crossing on Thursdays for the River Ranger Hour program. Upcoming topics include the water cycle, the fur trade, "tracks and traces" and Susquehanna fishing. Best for ages 5-12. Free. Registration: susqnha.org/events.

VIRGINIA

Hike with a Naturalist
7–8:45 pm, Aug. 6; Leopold's Preserve, Broad Run. Join a professional naturalist and discover the flora and fauna at Leopold's Preserve. August theme is bats. Observe bats flying to catch their dinner while learning more about them and their food. Free. More info: leopoldspreserve.com/calendar.

Tree Rescue Volunteer Workday
8:30 am and 1 pm shifts, July 19 and Aug. 16; Leopold's Preserve, Broad Run. Help remove invasive vines that present a huge threat to trees. Suitable for volunteers aged 13+. Minors must be accompanied by a parent or guardian. Registration: leopoldspreserve.com/calendar.

Kayak Trips with the Friends of Dragon Run
8:30 am–12 pm, July 13 through 27; Big Island in Shacklefords. Each kayak trip is led by a Nature Guide who describes Dragon Run and its ecological and cultural significance. See bald cypress, birds, fish, butterflies, dragonflies, flowers and the work of beavers during a three-hour paddle. No prior paddling experience required. All equipment provided. $60. Ages 18+. Registration: dragonrun.org (click on "Paddles").

Summer Blooms Workshop
10 am–2 pm, Aug. 2; Sky Meadows State Park, Delaplane. Join a Virginia Master Naturalist to discover the beauty and diversity of summer blooms. Begin with a presentation on summer-blooming flowers, their associated pollinators, tips and tricks to their ID and more. Then enjoy a 3-mile guided hike through the flower-filled meadows. Free w/standard parking or admission fee; children welcome. Registration encouraged: dcr.virginia.gov/state-parks/events (select date).

Secrets of the Bats
6:30–8 pm, Sept. 6; Powhatan State Park, Powhatan. Join this special series in collaboration with Bat Conservation & Rescue of Virginia and Virginia's Department of Wildlife Resources. Includes interactive activities and conversations with bat experts and a field trip to listen and look for bats as they take to the sky. Use of specialized bat-detecting equipment will pick up their vocalizations that we can't normally hear. Free w/standard parking or admission fee; children welcome. Registration encouraged: dcr.virginia.gov/state-parks/events (select date).

MARYLAND

Ride for Clean Rivers
8 am–3 pm, Sept. 21; Chesapeake College, Wye Mills. Save the date for the 21st Ride for Clean Rivers and your chance to ride the beautiful back roads of Talbot and Queen Anne's counties in support of ShoreRivers' work for clean waterways. Registration: shorerivers.org/event/rideforcleanrivers2025.

Kayak with the Chester Riverkeeper
10 am–12 pm, Sept. 30; Chestertown. Join Chester Riverkeeper Annie Richards to explore Chester River at Foreman's Branch. Participants will be able to notice the transition in plants and ecosystems as they travel from bigger water at Buckingham Wharf to the smaller and fresher water of the upper Chester tributaries. Ages 10+. Bring your own kayak or use gear provided by ShoreRivers. Free. Registration: shorerivers.org/expedition-register.

Aquatic Life: Crabs, Fish, Aquatic Grasses
10 am–2:30 pm, Aug. 20; Chesapeake Bay Environmental Center, Grasonville. Come explore CBEC's brackish waters with biologists to learn about its animals and plants. After a talk, trek down to the beach and use dip nets and seine nets to discover all kinds of aquatic life. $30. Registration: bayrestoration.org/life/#shell.

Guided Walk with Nature Worx
10–11:30 am, Aug. 2, Sept. 6, Oct. 4; Masonville Cove, Baltimore. Explore the beautiful grounds at Masonville Cove, slowly walking and pausing frequently, using all of your senses to drop out of doing mode and into being mode. Learn simple, but profound ways to make space for yourself to breathe and savor the natural world. Registration: masonvillecove.org (click on "Events").

Patuxent Research Refuge, National Wildlife Visitor Center
Patuxent Research Refuge offers free public events and activities on its South Tract in Laurel. No preregistration needs when registering. Registration and info: fws.gov/refuge/patuxent-research/events or 301-497-5772.

- *Monarch Magic:* 10 am–4 pm, Wed.-Sat. Full-color video: *Monarch butterflies, life cycle*. All ages.
- *Kids' Discovery Center:* 10 am-12 pm (35-minute time slots, on-hour), Wed.–Sat. Ages 3 to 10, w/adult. Crafts, puzzles, games, nature exploration. July: *Bees & Wasps*. August: *Fish.* September: *Butterflies & Moths*. Registration urged.
- *Kids Click! A* youth nature photo contest through 4 pm, August 2. Ages 5-14 years. Free to enter. Cash prizes. Nature & wildlife themed. More info: fws.gov/refuge/patuxent-research/events.
- *What Makes a Good Nature Photo?* Discovery walks and talks: 10–11:15 am, July 12. Leveled for ages 5-14 with parent/guardian. Meet at visitor center front desk.
- *"Wingspan" Game Days*: 10 am–1 pm: July 11 & 26; Aug. 8 & 23; Sept. 12 & 27. Ages 12+. No experience needed. Play the award-winning board game and learn more about birds. Preregistration required: online or at front desk.
- *"Dark Skies" Walk*: 8-10 pm, July 16. A night-time walk to explore what the refuge is like once the sun goes down. Meet at visitor center. All ages. (Time subject to change; check: fws.gov/refuge/patuxent-research/events).
- Free Film, *Nocturnes*, and free native plants: 5-7 pm, July 17. All ages. Spread your wings into the world of moths, an often-underrated night-time pollinator. After the film, enjoy light refreshments and take home some free native plants and/or seeds for creating your at-home pollinator habitat.
- *Mothing around at Patuxent:* 8–11 pm, July 18. All ages. Observe and catch some of the moths that call this refuge home. Learn about common moths and how humans benefit from moths every day.

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.
September issue: August 11
October issue: September 11

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

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

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

Answers to CHESAPEAKE CHALLENGE on page 23

1. 98%
2. Brain, heart, lungs
3. Hot, dry summers
4. True
5. True
6. A and B
7. Loggerhead
8. A
9. This is a trick question. While they can move by expanding and contracting their bell, they mostly move by wind, currents and tides.

BULLETIN BOARD

■ *Family Fun*: staffed: 10 am–1 pm, July 19/20, Aug. 15/16, Sept. 18/19. Independent: 10 am–4 pm, Wed.-Sat. All ages. Drop-in program, come and go as you wish. July and August: *Bugs!*

Creek Cruise Eco Paddle
9–11 am, July 12, 19, 26; Annapolis Maritime Museum, Annapolis. Ease into the weekend with a beginner-friendly, two-hour paddle through scenic Back Creek. Spot wildlife, learn about local ecology. No experience necessary; suitable for adults and families with children (under 14 w/ adult). Registration: amaritime.org/kayak-tours.

Guided Foraging Nature Walk
1 pm, Sept. 14; Mount Harmon, Earleville. Join staff naturalist on a guided foraging walk. Wear comfortable walking shoes; bring water and snack. $10 day pass. Registration: info@mountharmon.org.

Plant Pest & Disease ID for Small Farmers
4–7 pm, July 30; Calvert's Gift Farm, Sparks Glencoe. A first-hand look at the most common plant pests and diseases that occur on small farms during the peak growing season. Discuss identification methods and ways to combat these challenges. Free; dinner provided. More info: futureharvest.org ("Events/Upcoming field school events").

VOLUNTEER OPPORTUNITIES

WATERSHEDWIDE

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

Potomac River watershed cleanups
Learn about shoreline cleanups in the Potomac River watershed. Info: fergusonfoundation.org. (click on "Cleanups").

PENNSYLVANIA

Middle Susquehanna volunteers
The Middle Susquehanna Riverkeeper needs volunteers in these areas: Monitor local waterways and provide monthly online updates: web search "Susquehanna sentinels." Water sampling: search "Susquehanna Riverkeeper survey." New people are needed for stream restoration, litter cleanups, individuals, families. Scouts, church groups welcome: MiddleSusquehannaRiverkeeper.org/watershed-opportunities.

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

VIRGINIA

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

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.

Friends of Dragon Run
Dragon Run is an all-volunteer land trust dedicated to the preservation, protection and wise use of the Dragon Run watershed. Volunteer opportunities include: assisting with kayak trips and hikes, property monitoring, citizen science surveys, maintenance, educational and community engagement projects. More info: vicepresidentdragonrun@gmail.com.

MARYLAND

Chesapeake Bay Environmental Center
Help with educational programs; guide kayak trips and hikes; staff the front desk; maintain trails, landscapes, pollinator garden; feed or handle captive birds of prey; maintain birds' living quarters; monitor wood duck boxes; join wildlife initiatives. Participate in fundraising, website development, writing for newsletters, events, developing photo archives, supporting office staff. Info: bayrestoration.org/volunteer.

Patapsco Valley State Park
Opportunities include daily operations, leading hikes and nature crafts, mounted patrols, trail maintenance, photographers, nature center docents, graphic designers, marketing specialists, artists, carpenters, plumbers, stone masons, seamstresses. Info: 410-461-5005 or dnr.maryland.gov/publiclands/Pages/central/patapsco.aspx (click on "Volunteer").

Smithsonian Environmental Research Center
SERC in Edgewater is currently recruiting volunteers for Chesapeake Water Watch, Environmental Archaeology, the SERC Lab and the Chesapeake Bay Otter Alliance. Info: serc.si.edu/participatory-science/projects.

National Wildlife Refuge at Patuxent
Opportunities include Kids' Discovery Center help, volunteering at the Bookstore & Nature Shop, help with events, hospitality, public conservation-education programs. Call 301-497-5772 during staffed hours (10 am–4 pm, Wed.-Sat.).

C&O Canal National Park stewardship
Become a C&O Canal steward. "Adopt" a section of the park and throughout the year help ensure it remains clean and beautiful. Participate individually, with your family or as part of a larger group: canaltrust.org/programs/volunteer-programs.

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

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

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

RESOURCES

WATERSHEDWIDE

Creating a Backyard Buffet for Birds, Bees, and Butterflies
Your yard can be an oasis — a rest area for birds, bees and butterflies to fuel up and raise their young. This Chesapeake Bay Foundation webinar takes you through the practical steps of assessing your yard, prioritizing changes and planting with a purpose. Webinar: cbf.org/events/webinars/creating-a-backyard-buffet-for-birds-bees-and-butterflies-0222.html.

MARYLAND

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

University of Maryland Extension Home & Garden Info
Submit your questions to a team of Maryland certified professional horticulturists, Extension faculty and master gardeners, view gardening resources, connect with the master gardener program for local classes and other in-person learning opportunities. Info: extension.umd.edu (click on "Programs/Home & garden information center").

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

Calling Maryland Organic Farmers
Emma Jagoz of Moon Valley Farm will be representing organic farmers in the Maryland Agriculture Commission. In order to best represent organic farming throughout the state and across many industries — poultry, grain, dairy, row crop and more — she is seeking feedback from organic farmers to include in her report to the commission. Email emma@moonvalleyfarm.net if you're an organic farmer interested in being part of this feedback loop.

VIRGINIA

Living Shoreline Cost Share
The James River Living Shoreline Cost Share Program is administered by the James River Association and is available to homeowners whose property is within the James River watershed. Info and links to programs elsewhere: jamesrivershorelines.org/apply.html.

Explore the Wild
With over 1,000 sites listed, Explore the Wild is your online tool to find the best public lands in Virginia to hunt, fish, boat, paddle, view wildlife, hike and go primitive camping. Info: dwr.virginia.gov (click on "Explore the Wild").

Hummingbirds are back, and your garden can be their haven

By Marie J. Fritz

A ruby-throated hummingbird drinks nectar from scarlet beebalm, a native herbaceous perennial. (Brian Plunkett/CC BY 2.0)

A ruby-throated hummingbird gets sustenance from coral honeysuckle in a Baltimore garden. (Pauline Horn/CC BY-NC-ND 2.0)

Summer is here, and that means the peak of hummingbird season in the Chesapeake Bay region. Hummingbirds comprise the world's third largest avian family (Trochilidae), and all 360-plus species are found only in the Americas. Hummingbirds play an important role as pollinators and are necessary for a healthy ecosystem.

The ruby-throated hummingbird *(Archilochus colubris)*, the only hummingbird that breeds in the mid-Atlantic region, can cover as much as 500 miles per day during its spring and fall migrations. While there are increasing numbers of year-rounders in the southern U.S., most ruby-throats spend their winters in southern Mexico and Central America, where they feed on nectar from plants, pollen and small insects.

Weighing less than a nickel, ruby-throated hummingbirds bulk up in their winter habitat to prepare for the long journey to the mid-Atlantic. They have adapted well to human development, but climate change, habitat loss and breeding ground fragmentation remain ongoing challenges, as they do for so many bird species. Many introduced and invasive plant species offer little to no nectar and can crowd out nectar-producing native plants. There are steps we can take in our own spaces and communities, though, to help these flying jewels thrive.

Use native plants for landscaping

Hummingbird feeders with sugar water (one part granulated sugar to four parts water) are widely considered safe and nutritional — as long as you clean them at least every other day, or even daily in the heat of summer, to control bacterial growth. But you can also use your space to naturally attract and support hummingbirds. Consider adding native plants to your yard or garden, ideally a variety that gives you flowers at different times in the spring, summer and early fall, to offer a constant source of nectar.

Hummingbirds have co-evolved with specific native flowering herbaceous perennials, shrubs and vines. They need them for fuel — not just for nectar, but also for the insects those plants attract. These tiny birds have an extremely high metabolism, burning up to 12,000 calories per day. That's the equivalent of a human burning 150,000 calories! So, consistent energy sources are paramount. Research shows that native plants have a greater concentration of insects. which all birds need for food, than nonnative plants.

- Shrubs: summersweet or sweet pepper bush (*Clethra alnifolia*), New Jersey tea (*Ceanothus americanus*), common witch-hazel (*Hamamelis virginiana*)
- Vines: coral honeysuckle (*Lonicera sempervirens*), trumpet creeper (*Campsis radicans*), yellow passionflower (*Passiflora lutea*), virgin's bower (*Clematis virginiana*)
- Herbaceous perennials: Eastern red columbine (*Aquilegia canadensis*), cardinal flower (*Lobelia cardinalis*), scarlet beebalm (*Monarda didyma*), wild bergamot (*Monarda fistulosa*), lyreleaf sage (*Salvia lyrata*), beardtongue (*Penstemon laevigatus*)

Keep your yard insecticide free

When managing your own hummingbird haven, avoid chemicals that might harm birds and other wildlife, including the insects that hummingbirds eat. Small insects and spiders are an important source of protein for hummingbirds, and nestlings are primarily fed small spiders.

Pesticide use also pollutes local ground water and waterways. Recent research shows that certain insecticides impact hummingbird metabolism, contributing to their decline. If you must treat a plant due to disease or infestation, choose organic options or neem oil and apply it in the evening. Avoid any service that sprays for so-called pests all over your yard, including for mosquito control.

Don't let your house cats outside

Domestic and feral cats are the most common predators of backyard birds, including non-nested hummingbirds. A 2013 study, which collected information on predation studies, found that bird mortality caused by outdoor domestic cats ranged from 2 to 4 billion annually. Cats stalk birds from porches and bushes, and the aerial acrobatics of hummingbirds are particularly attractive to their keen hunting instincts. Encourage your neighbors and friends to keep their cats indoors too. Who knows? After having a conversation, they might be inspired to install some native plants too. Finally, if you keep water sources and nectar feeders in your space for hummingbirds, ensure that feral cats cannot access them.

Birds play a crucial role in a balanced ecosystem. By suppressing their populations through irresponsible domestic cat ownership, humans are negatively altering our ecosystem and harming the environment.

Add a water source

In 2024, the District of Columbia metro area experienced 38 days without measurable rain. The lack of rain makes alternative water sources essential for all wildlife. Making fresh and clean water available in your yard is useful for wildlife, including hummingbirds that need water to drink and wash. They are attracted to light mist and moving water. If you have a birdbath, add a bubbler or misting device and make sure the water is shallow enough for small birds.

As with all birds, diseases can be transmitted through feeders and birdbaths. A clean and sanitary water source will keep it safe for all birds that visit your space. Change the water frequently and scrub the birdbath weekly with soap and water, avoiding toxic cleaners. To prevent mosquito larvae from hatching in a birdbath, you can empty and refill the water regularly or use a product called Mosquito Dunks, which is safe for birds and other wildlife. Emptying the water every few days will remove any mosquito eggs or larvae that may be present. Mosquito Dunks contains a larvicide that kills mosquito larvae but is nontoxic to birds, fish and other animals.

Taking small steps in our own spaces can help create healthy environments for hummingbirds to thrive and return year after year. To find the right plants for your own hummingbird haven, visit the Alliance for the Chesapeake Bay's Native Plant Center at allianceforthebay.org/native-plant-center. ■

Marie J. Fritz is the green infrastructure outreach specialist for the Alliance for the Chesapeake Bay.

That mewing at the edge of the woods? Not a cat — a catbird

By Alonso Abugattas

Spotting a gray catbird in the open, like this one perched on a roof, is not exactly rare, but these birds do prefer to be heard instead of seen, often lurking in dense brush or forest understory. (Wilfred Hdez/CC BY 2.0)

Catbirds are not the most precise mimics, compared to related northern mockingbirds and brown thrashers, but they have a deep catalog of songs and vocal stamina, often sounding off for 10 minutes at a time for an entire day. (Laura M/CC BY-SA 4.0)

The gray catbird is aptly named, being all gray, except for its jaunty black cap, and sometimes sounding a bit like a cat. But the eponymous "mew" is just one call from a remarkable repertoire, which can be a mad symphony of chirps, whistles, clacks, trills and squeaks. It can sound like a heated debate involving half a dozen different types of birds.

As the bird's family name Mimidae suggests, it is a mimic — along related brown thrashers and northern mockingbirds — known to incorporate other bird calls into its own. But there are subtle differences among the species.

While catbirds are considered less precise mimics than mockingbirds and thrashers, they do have an impressive repertoire of sounds. And they have stamina, sometimes singing for 10 minutes straight and repeating the performance all day long. Most of their sounds mimic those of other birds, but they have been known to mimic tree frogs and mechanical equipment as well. And their unique syrinx (vocal organ) can make two calls simultaneously, which few other birds can do.

A medium-size songbird, a bit smaller on average than a northern cardinal, the gray catbird prefers dense brushy habitat, which gives the species their genus name Dumetella, from the Latin for "small thicket dweller." They are the sole members of the genus with the epithet *carolinensis* coming from where they were recognized. They avoid open areas, though many are killed by cars as they dash across roads seeking cover in the roadside woods or brush.

They are generally medium- to long-distance migrators, leaving in the fall to the southern U.S., Central America and the Caribbean, with some going as far as northern coastal South America. That said, some catbirds keep the migration minimal, simply flying east to the coasts in the winter and, if there's enough food, staying there.

These birds have been expanding their territory north and staying along coastlines later each year. In the Chesapeake Bay region, you can expect to hear their catlike call from May through October. They will return to the same area where they have successfully had young, though they will not reuse the same nests or exact site.

The adults' diet is about half insects and other invertebrates and half fruits and berries, varying according to availability and seasons. The diet of nestlings, though, is strictly invertebrates — caterpillars, grasshoppers, beetles and other arthropods. Catbirds forage for these by rummaging through leaves and ground detritus. Unlike sparrows and other ground foragers that use their feet to kick up prey, catbirds rummage with their beaks.

They're keen on fruit, so you may consider them pests if you grow cherries, raspberries, strawberries, grapes and such. Annoyingly to some, they often just peck at fruits without eating all of them. Among wild natives, they favor holly berries, elderberries, cherries, poison ivy berries, bay berries, blackberries and greenbrier fruit — all of which become more important in winter as insects become scarce.

While the males and females appear almost identical, the males tend to sing more, and more loudly, than the females. The mewing call is sometimes part of the males' courtship display in which they puff out their feathers, flatten and flick their tails and raise or lower their heads. Females will often choose the same mate as the year before, especially if the pair had a successful brood or broods.

For nests, the female usually looks for a horizontal branch from 3 to 60 feet off the ground (though most are 4 or so feet high). It takes her 5-6 days to build the nest, with the male supplying some materials but not helping with construction. The bulky nest is about 5 inches across and two inches high, made of mostly grasses, twigs and even trash. For the inner lining, horsehair is favored when it's available.

After laying 2-6 eggs, the female does all the incubating while the male brings her food. The eggs hatch in about two weeks, and both parents feed them until they fledge 10-13 days later. The pair will commonly have two broods in a season and occasionally three in their southern breeding range. They are known to be quite intolerant of other nesting birds nearby, sometimes not just chasing them away but also destroying their eggs and nests — with particular animosity for peewees, song sparrows and chipping sparrows.

Brown-headed cowbirds, those infamous parasitic nesters, have little success with the nests of catbirds, which — like blue jays, robins and brown thrashers — can readily spot an impostor egg and will promptly destroy or eject it.

Known in some places as cat thrushes or slate-colored mockingbirds, gray catbirds are common summer residents of the eastern two-thirds of the U.S. and southern Canada and have been spreading north. They do well in developed areas if they can find the dense understory they need. In fact, some ornithologists say that habitat fragmentation by humans can work to their advantage by creating edge habit where none had been. The catbird population, according to the North American Breeding Bird Survey, remained stable from 1966-2019 at about 29 million, and they are considered a species of least concern.

Catbirds still face challenges in loss of dense habitat, collisions with cars and death from predators. This especially includes outdoor cats, which according to the Smithsonian Migratory Bird Center accounts for nearly half the losses of fledglings. Barring disease and predation, catbirds can live a long time. The record was a catbird that was banded in Maryland but caught and then released in New Jersey when it was was just shy of 18 years old.

So while you may not always see them, these birds can be reliable neighbors as long as you provide the habitat. ■

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

From backyard to Bay, luminescent critters light up the night

By Kathy Reshetiloff

Left: The sea walnut, also known as a warty comb jelly, is common in the Chesapeake Bay, often seen flashing brightly in boat wakes at night. (Steven G. Johnson/CC BY-SA 3.0) Above: Bioluminescent algae illuminates a beach on the lower York River in Virginia. (Susan Maples, VIMS/CC BY-NC-ND 2.0)

Every August, as the Earth enters a region of space containing high concentrations of solar debris, nighttime sky watchers are rewarded with a wonderful light display known as the Perseid meteor shower.

But you don't have to be an amateur astronomer to see magnificent light shows. Some animals produce light from within their bodies. This phenomenon is called bioluminescence.

Years ago, it was thought that phosphorus was the source of light in living creatures. Researchers now know that bioluminescence is accomplished through oxidation (the addition of oxygen) in an animal protein called luciferin. When a luciferin molecule comes in contact with oxygen, either in a gaseous or liquid form, and an enzyme known as luciferase, the resulting new molecule is excited and gives off light. Unlike fuel combustion, there is no heat associated with luminescence.

Curiously, bioluminescent animals can create this light only at night. Even when these creatures are in darkness during the day, they either will not glow or will only barely glow. Because of this, it's believed that bioluminescence may depend upon an animal's daily cycle or the amount of time that animal is subjected to dark conditions.

The light producer most familiar to us is the firefly or lightning bug. During June and July, after spending most of the year underground, fireflies emerge to attract a mate. Light, produced in the firefly's abdomen, flashes on and off in a specific pattern. There are more than 2,000 species of fireflies, and each has its own flashing code.

In most firefly species, the males fly about while flashing their code. Females, usually on the ground, will flash the same code back. The male then joins the female on the ground, where they mate.

This type of communication is not without danger. Some female fireflies are excellent mimics and can flash back the signal of another species. The enamored male believes he has found his mate and flies down, only to be devoured by the impostor.

As its name suggests, the common eastern firefly is the most familiar firefly of the eastern U.S. (Art Farmer/CC BY 2.0)

The aquatic world supports the greatest number of bioluminescent animals. The Chesapeake Bay, especially in Virginia waters, supports its share of "living lights."

Many microscopic bacteria and plankton possess the ability to produce light. The species Noctiluca *scintillans*, about 1/16 of an inch in size, belongs to a group of plankton known as dinoflagellates. Noctiluca literally means "night light."

Like many bioluminescent life forms, these organisms, called "sea sparkles" by some, they light up in response to physical disturbances in the water. While the light from a single *N. scintillans* is tiny and brief, many individuals gathered together create an eerie greenish glow in the water.

Another genus of dinoflagellate, *Ceratium*, has a three-pointed, anchor-shaped body that produces a twinkling light.

Larger light-producing creatures include the moon jellyfish and species of comb jellies. The moon jelly sports four pink, horseshoe-shaped gonads atop its 10- to 12-inch "head." Its tentacles are marginal and very short. The light from a moon jelly appears bluish.

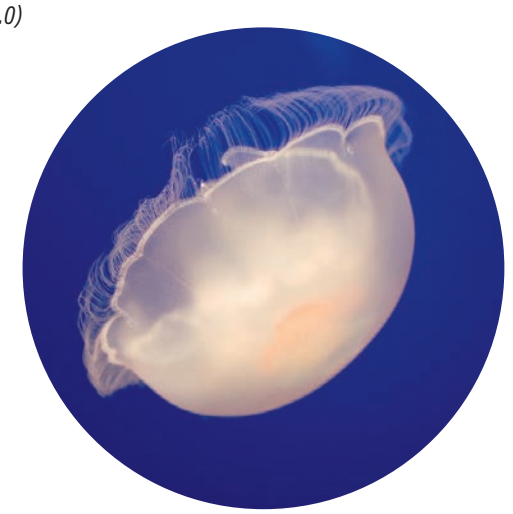
Comb jellies are similar to other jellyfish in their translucent, gelatinous appearance, minus the stinging tentacles. Instead, eight rows of fringed plates, called combs, propel them through the water.

One comb jelly common in the Bay is the sea walnut, named for its oval shape. When disturbed, the sea walnut flashes a green light along its combs. Although only 4 inches in size, the effect created by hundreds of sea walnuts congregating together is quite startling.

In bays and the shallow edges of oceans, only a relative handful of organisms are bioluminescent. In deep ocean zones, however, up to 80% of all jellyfish, squid, shrimp and fish light up one way or another. In the pitch blackness of these ocean depths, it seems logical that so many animals can produce their own light.

In shallower water areas like the Chesapeake Bay, bioluminescence is a response to an outside stimulus. Touch, wind, rain or extremely choppy water may cause a creature to light.

Researchers also believe that bioluminescence serves a variety of other purposes. The light may protect the animal by startling or confusing a potential predator or by disguising the prey's true size and form.



A moon jellyfish drifts in an aquarium tank. (Steve Jurvetson/CC BY 2.0)

Flashes and patterns of light may be a form of communication for attracting a mate, as with the firefly, or as a warning to others of its kind.

Bioluminescence in nature is everywhere, from our backyards to the Chesapeake Bay itself. So if you miss the Perseid shower and still crave a light show, take a walk near a dark field and watch the firefly display. Lie on a dock after a rain and peer into the murky water. If you are lucky, these usually dark waters will provide a glimpse of fantastic creatures dancing in their own light. ■

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