CHESAPEAKE
BAY JOURNAL

June 2023 Volume 33 Number 4

Independent environmental news for the Chesapeake region

Scientists outline path to a better Chesapeake Bay — but it's a slow one

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Concerns grow about data centers in Northern VA PAGE 16

COUNTING BLUE CRABS

Crab population doing better but well below average PAGE 7

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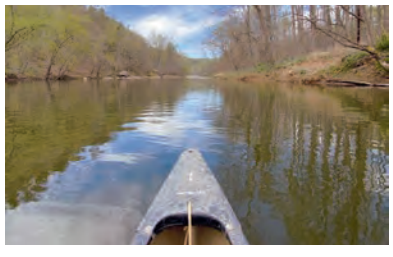

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The second article in the Bay Journal series, "Ag & the Bay: Sowing a Conversation," continues on page 20 with a look at the history of nutrient pollution goals in the Chesapeake region. (Dave Harp)

EDITOR'S NOTE

Upstream ponderings

Late last month, I joined the crowd attending the annual Choose Clean Water conference, which took place in Harrisburg, just a few blocks from the Susquehanna River. Cindy Dunn, secretary of the Pennsylvania Department of Conservation and Recreation, was among the opening speakers. "To choose clean water," she said, "you have to choose a clean watershed."

It's an assertion I'm hearing more often lately as people begin to ponder what's next for the Chesapeake Bay restoration. Panelists at the conference echoed that theme. An important new report from Bay scientists underscores it, too (see page 12). And the point emerges often in the many interviews that editor-at-large Karl Blankenship has been conducting for our new series, "Ag & the Bay: Sowing a Conversation" (see page 20).

But the concept, in a broad sense, is nothing new. Bay restoration partners realized a long time ago that cleaning up the Chesapeake means cleaning up the rivers and streams that feed it. Lots of science and restoration work has been focused on river basins and local watersheds — energized by the needs to "work upstream" and show that "the Bay starts here."

So I'm wondering what this re-emerging call to action will mean in real terms. What need are people expressing, exactly? What are they asking for? Is it something similar to the work already underway, but with more funding and momentum? Or are they looking for shifts that elevate and empower local level action in different ways?

I think clean water advocates in the Bay region are working through these questions themselves, and it will take time and creativity to answer them. The *Bay Journal* will be following the conversations as we move toward and beyond the 2025 Bay cleanup deadline.

Meanwhile, as I "pen" these thoughts on my computer, I am listening to water rushing through a rocky stream beyond my window. I love that it connects to the larger world, but I love that little stretch of water for its own sake, too.

— Lara Lutz

ON THE COVER

Paddlers work their way through a thick stand of spatterdock on Mattawoman Creek in Maryland. (Dave Harp)

Bottom photos: Left by Whitney Pipkin, center by Dave Harp, right by Jeremy Cox.

CORRECTION

In the May issue, the article "Dominion seeks permit for new ash landfill" should have stated that six households, not nine, were using bottled water supplied by Dominion Energy. The Bay Journal regrets the error.

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BY THE numbers

42%
Farms in the Chesapeake Bay watershed that are primarily livestock or poultry operations

1.9 million
Estimated number of septic systems in the Bay watershed

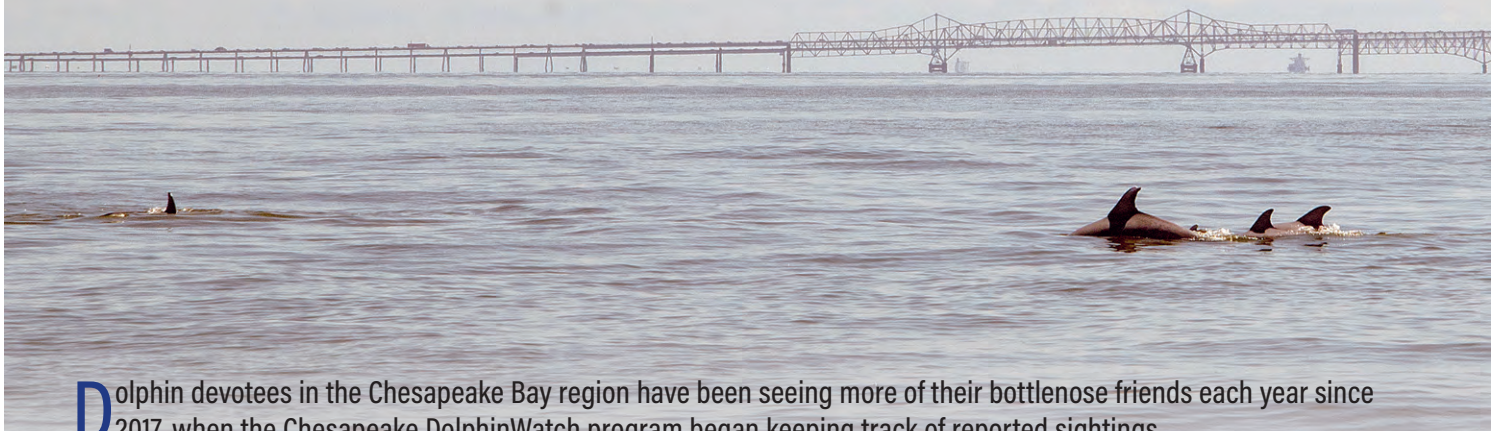
829.3 million
Pounds of nitrogen applied to farmland in the Bay watershed in 1985

768.7 million
Pounds of nitrogen applied to farmland in the Bay watershed in 2022

20.3 million
Pounds of nitrogen applied to developed land in the Bay watershed in 1985

72.6 million
Pounds of nitrogen applied to developed land in the Bay watershed in 2022

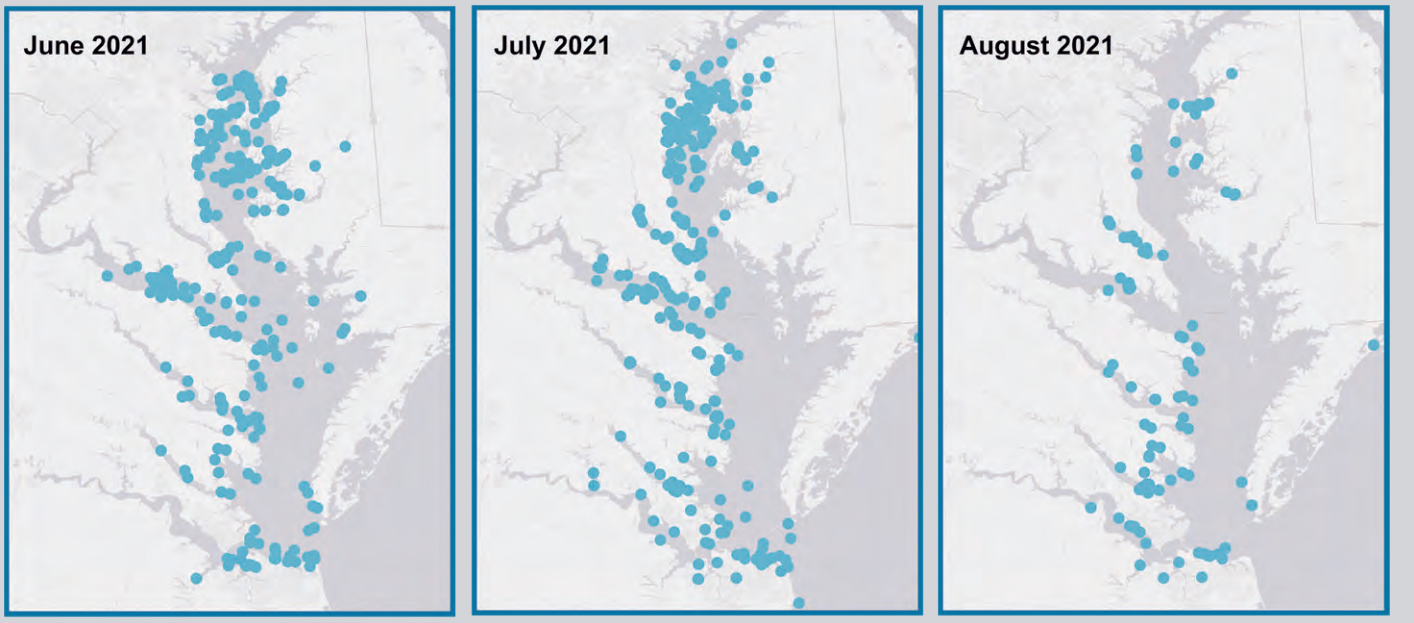
Chesapeake dolphin watching season is here



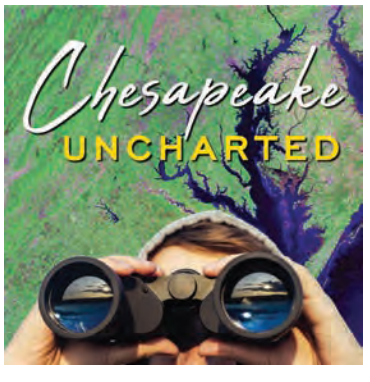
Dolphin devotees in the Chesapeake Bay region have been seeing more of their bottlenose friends each year since 2017, when the Chesapeake DolphinWatch program began keeping track of reported sightings.

This summer marks the seventh year the program has been providing dolphin watchers with a platform where they can log their sightings, sharing photos and location data with dolphin scientists. The app logged more than 10,000 registered users in May 2022. Reports of sightings in the Bay and its tributaries tend to peak around the 4th of July each year.

Visit umces.edu/dolphinwatch for more or find Chesapeake DolphinWatch in your phone's app store.



(Photo by Donna Wadsley via Chesapeake DolphinWatch / Graphics courtesy of Chesapeake DolphinWatch)



bayjournal.com/podcast

LOOKING BACK

30 years ago

'Ecologically valuable species' are key

The Chesapeake Bay Program emphasized the need to manage entire communities of aquatic organisms, including plankton and benthic animals, to protect the integrity of the Bay ecosystem. ■

— *Bay Journal,* June 1993

20 years ago

Options shared for a Chesapeake Bay national park

The National Park Service sought input on four concepts for a Chesapeake Bay national park. ■

— *Bay Journal,* June 2003

10 years ago

Air pollution regs help the Bay

Reductions in air pollution since 1985 were likely responsible for about a third of nutrient pollution reductions in the Bay to date, analysts found. ■

— *Bay Journal,* June 2013

ABOUT US

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

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BAY JOURNAL NOTEBOOK

The Bay Journal Media Board of Directors gathered with staff and others on May 19 to honor Karl Blankenship for 30 years of work as the Bay Journal 's founding editor. Pictured in front with Karl are board chair Mary Barber and copy editor Kathleen Gaskell. (Dave Harp)

An award-winning team

On May 19, the *Bay Journal*'s staff, board members and supporters gathered in Pennsylvania to honor editor-at-large **Karl Blankenship** for 30 years of service as founding editor of the *Bay Journal*. Karl is of course still on staff and tackling in-depth reporting projects but stepped back from his managerial role in 2021. We are grateful for his decades of leadership and contributions to environmental journalism in the Chesapeake region.

Karl's recent work, and that of other *Bay Journal* writers, recently received recognition from two regional journalism competitions.

From the Maryland-Delaware-District of Columbia Press Association, Karl won Best in Show and first place for environmental reporting in our division for *Can beavers help build a better Bay*? And **Jeremy Cox** earned first place in the features video category for A fish defies climate change. He and senior writer **Tim Wheeler** snagged first place in investigative reporting for their article about loss of urban tree canopy in the Bay region, and the duo earned second place in environmental reporting for *Decline in Chesapeake crab population sparks hunt for answers*. Staff photographer **Dave Harp** took second place in the feature photos category for his image *Beaver at work*.

From the Virginia Press Association, **Whitney Pipkin** won second place in the general writing category for *Landowners seek clarity over Virginia's living shorelines law*, as well as third place in the health, science and environment category for a body of work on various related topics. Karl earned second place in the in-depth/investigative category for his article on beavers, while Jeremy and Tim took third place in the same category for their article on urban tree canopy.

As the weather turns toward summer, *Bay Journal* staffers have been desperate to beat the mosquitoes back to the outdoors. So, when we weren't cranking out award-winning articles, we were outside. In Maryland, Jeremy paddled a stretch of Nassawango Creek with his daughter, Charlie, ands deemed it the region's "Disney's Jungle Cruise." Whitney took her son, also named Charlie, on his first expert-led bird-watching hike during an Eagle Festival at Mason Neck State Park in Virginia. Twenty-nine species and a pair of ospreys later, the 6-year-old is hooked on birding (or at least on using binoculars).

— *Whitney Pipkin*

NEWS briefs

LOCAL
REGIONAL
NATIONAL

MD court finds county erred in waiving forest law

An effort to prevent development of one of the last large, unprotected forests near the upper Chesapeake Bay has won a victory, but too late to spare some of its oldest trees from the bulldozer.

A Harford County Circuit Court judge ruled May 9 that county officials improperly granted developers permission three years ago to remove 49 large "specimen" trees while developing a business park in a 326-acre tract known as Abingdon Woods.

Harford Investors LLP and BTC III I-95 Logistics Center LLC received county approval in 2020 to clear 220 wooded acres. The county also waived part of an ordinance that would have required the developers to preserve all specimen trees, notable for their size and age.

The Chesapeake Bay Foundation and some residents living near Abingdon Woods filed suit in 2020, arguing that the county failed to follow the state Forest Conservation Act. Harford Circuit Judge Diane Adkins-Tobin at first dismissed the case, ruling that the county's sign-off on a developer's forest conservation plan could not be appealed until the entire project was approved.

But in 2022, the Maryland Supreme Court ruled that a developer's plan could be challenged in court and sent it back for reconsideration. The Harford judge then ordered a temporary halt to construction until she could decide the case.

In her May 9 opinion, Adkins-Tobin declared that the county had not made any findings of fact, as required by the law, to justify waiving the preservation of all specimen trees.

Before work was halted, though, the developer felled 22 of the specimen trees. *— T. Wheeler*

More online at bayjournal.com

Firm building vertical farm in PA goes out of business

A New York company that was building the world's largest vertical farm in northeastern Pennsylvania has announced that it's going out of business.

Brooklyn-based Upward Farms, which had started constructing a $160 million high-rise, indoor aquaponics farm near Wilkes-Barre said in a March 30 post on their website that it was closing its 10-year-old business, including two operating vertical farms in New York.

"We found that vertical farming is almost infinitely complex. As we tackled challenges, new ones emerged," the statement said.

The new vertical farm, which was to be inside a building with a footprint of about 6 acres, was being built on mine-scarred land in Luzerne County.

The soil-less operation would have grown organic microgreens, fertilized by fish waste from hybrid striped bass raised on site.

Company promotions touted many environmental advantages over traditional farming, such as using less water and land, eliminating the need for pesticides and not causing erosion or nutrient runoff.

The operation would have been powered by renewable energy, the company said, and employed 100 full-time people. *— A. Crable*

Consumer guide criticized for saying 'avoid' Bay oysters

Seafood Watch, a widely consulted guide to sustainable seafood, has published a draft recommendation that says people should avoid eating wild-caught oysters from the Bay.

A spokesperson for the Monterey Bay Aquarium, which produces Seafood Watch, declined an interview request from the *Bay Journal*.

"At this time, we are not able to comment on the draft assessment as the report may change based on feedback we receive in the public comment period," the spokesperson said by email.

The aquarium was taking feedback through May 22. Critics say it uses old data and erroneously portrays the Bay's oyster population as overfished and poorly managed.

"They have no idea what they're doing," said Robert T. Brown Sr., president of the Maryland Watermen's Association, "... and they're interfering with people's livelihoods."

Officials with the Maryland Department of Natural Resources say no one from the aquarium had contacted them.

"There's missing information, there's outdated information. They have misinterpreted information, and they have failed to live up to their own standards of using the best science and collaborating," said Kristen Fidler, assistant secretary for aquatic resources.

Roger Mann and Mark Luckenbach, biologists with the Virginia Institute of Marine Science, also say the ratings are "based on old data and are entirely inappropriate." *— T. Wheeler*

More online at bayjournal.com

Leadership change made in EPA's Chesapeake Bay office

Kandis Boyd moves on after less than a year at the helm

By Timothy B. Wheeler

The director of the federal office that coordinates the Chesapeake Bay restoration effort has left after spending less than a year in that position.

Kandis Boyd, who 11 months ago was named director of the U.S. Environmental Protection Agency's Chesapeake Bay Program office, has become senior adviser to the agency's regional administrator, Adam Ortiz. Replacing Boyd on an interim basis is Dave Campbell, the acting director of EPA Region 3's laboratory services and applied science division.

Ortiz described the leadership change in an April 25 email to staff as the beginning of "a new phase of Bay restoration." He did not explain the reasons for the change in the email or in his response to a query from the *Bay Journal*.

The turnover comes as the Bay Program partnership grapples with the prospect of missing a 2025 deadline for reducing nutrient pollution in the Chesapeake, along with other key restoration objectives.

Based in Annapolis, the EPA's Bay Program office helps coordinate the efforts of federal agencies, the six Bay states and the District of Columbia to restore the estuary's water quality and fulfill the goals of the 2014 *Chesapeake Bay Watershed Agreement*.

Boyd assumed leadership in June 2022 after a career as a federal meteorologist and agency senior manager. She had most recently served as strategic adviser to the National Science Foundation for equity and diversity. Prior to that, she had been acting director and deputy director of the National Oceanic and Atmospheric Administration's weather office.

The Bay Program office had been without a permanent director for more than a year when Boyd took over. Dana Aunkst, a former Pennsylvania environmental official who took the job in 2018, stepped down in March 2021.

When Boyd's selection was announced last year, Ortiz praised her "experience as a strategic leader in the sciences" and said her "success engaging diverse communities and youth will help take the Bay effort to a new level as we focus on climate change and vulnerable communities."

In her new role, Ortiz said that Boyd will "focus on implementing the [Biden] administration's priority initiatives for environmental protection and infrastructure" in Region 3, which includes the Bay watershed. Boyd did not respond to an email seeking comment.

Campbell has led the region's laboratory services and applied science division since its creation in 2019, according to Ortiz. Prior to that, he held regional positions overseeing air quality, land and chemicals, and environmental assessments. He has a bachelor of science degree in engineering from the University of Delaware and a master's in environmental engineering from Penn State.

Ortiz said Campbell "brings a strong background in data-driven and science-based field investigative work for decision-making. His leadership experience and expertise will serve the partnership well as we approach the next phase in restoration."

Kandis Boyd, then-director of the EPA's Chesapeake Bay Program office, speaks during the Chesapeake Executive Council Meeting on Oct. 11, 2022. (Will Parson/Chesapeake Bay Program)

Mariah Davis, acting director of the Choose Clean Water Coalition, thanked Boyd for her service and said the nonprofit environmental group looked forward to working with her successor. But she called this a "critical time" for the restoration effort.

"We need visionary leadership to not only meet our 2025 goals," Davis said, "but to look beyond and address the many water issues that touch the lives of people in the Bay watershed." ■

Chesapeake blue crab population still well below average

Winter survey shows numbers are better than last year, but juvenile count remains low

By Timothy B. Wheeler & Jeremy Cox

The Chesapeake Bay's blue crab population has recovered somewhat from last year's low ebb, new data show, but not enough to dispel worries about the region's most valuable commercial fishery and most popular recreational fishery.

The annual wintertime survey by the Maryland Department of Natural Resources and Virginia Institute of Marine Science found an estimated 323 million crabs baywide. That's up more than 40% from last year's record-low tally of 227 million crabs.

The survey likewise detected a big jump in the number of spawning-age female crabs, from 97 million in 2022 to 152 million crabs this year. They are now well above the threshold biologists say is the absolute minimum needed to sustain the population.

But the overall crab population is still significantly below the long-term average, the survey found. And while the estimated number of juvenile crabs increased slightly from 101 million in 2022 to 116 million this year, they remained well below average for the fourth straight year.

"Not exactly good news," Glenn Davis, a Maryland state biologist, said as he presented the findings May 18 to a regional panel of fishery managers and scientists. "This is still really bad."

The crab survey demonstrates that the population is "nowhere near collapse," said Rom Lipcius of VIMS, who oversees Virginia's half of the survey. But he said he continues to worry that the relatively healthy numbers of breeding-age females aren't resulting in more young crabs in the count.

The crab population varies, sometimes dramatically, from year to year. But last year's survey found them at their lowest abundance in more than 30 years. The number of females old enough to reproduce was also down, though still above the minimum level considered necessary to sustain the stock. And the count of thumbnail-sized juvenile crabs was the second lowest ever, only slightly better than the record low in 2021.

Scientists and fishery managers were concerned enough by last year's survey that they agreed to undertake a new comprehensive stock assessment of the Bay's crab population. The last one was in 2011.

Scheduled to get under way later this year, that study will reexamine assumptions about crabs and their life cycle that went into earlier assessments, and it will incorporate other data beyond the winter survey results.

Scientists also plan to look at whether environmental conditions in the Bay may have changed, affecting the reliability of the winter survey. It's already known that the tally of juvenile crabs is based on more limited data than that of adult crabs, because the dredge vessels can't get far into the shallows where many young crabs spend the winter.

Another big question concerns predation by other fish. Nonnative blue catfish, introduced in a few Virginia rivers in the 1970s, have since spread throughout the Bay and proliferated, consuming other fish and crabs in great numbers.

As fishery managers weigh whether to further clamp down on crab harvesting, the Chesapeake Bay Foundation urged a careful approach. The conservation group called on officials to maintain protections for adult males and consider additional actions, such as requiring tags to be affixed to cage-like crab traps, known as pots, to assist in regulatory enforcement.

For his part, Mark Sanford, a waterman based in Cheriton, VA, doesn't put much stock in the annual crab survey. Like many in the seafood industry, he points to the potential undercount of juveniles because the survey boats can't reach the shallows. And many smaller crabs, he suspects, aren't surviving to market size because blue catfish and other predators are eating them.

"But we have to go by that [dredge survey] because of the fact it's been going on since [1990], and it's the only science that they have," Sanford said. ■

More online at bayjournal.com.

Menhaden fishing fleets agree to limit activities in Bay

Deal aims to address outcry over dead fish spilled on beaches

By Timothy B. Wheeler

Large-scale commercial menhaden fishing will be limited in the Chesapeake Bay, mainly in warm months, under a voluntary agreement announced April 20. Recreational anglers and conservationists called it toothless and inadequate.

The 30-vessel fishing fleet working for Omega Protein as well as two other smaller operations signed a memorandum of understanding with the Virginia Marine Resources Commission aimed at limiting the impacts of dead fish spilled from nets and avoiding conflicts with boaters and anglers. Thousands of dead fish from several spills in July 2022 washed ashore at Silver Beach and Kiptopeke State Park on the lower Eastern Shore, prompting a public outcry.

Under the deal, vessels using purse seines to encircle and catch menhaden agreed to stop fishing in the Bay during holidays and weekends from Memorial Day through Labor Day. They also pledged to work at least half a mile away from the Chesapeake Bay Bridge-Tunnel year-round, and they vowed to harvest no closer than one mile from shore off Hampton Roads, Virginia Beach and the lower Shore.

The agreement also says the marine resources commission and three fishing operations will develop a protocol for responding rapidly to net spills.

"The new memorandum of understanding successfully addresses concerns that have been raised about how the menhaden fishery can best coexist with other user groups in the Bay," said Monty Deihl, CEO of Ocean Harvesters. It operates the fishing fleet for Omega Protein, which processes Atlantic menhaden into fish oil and pet food at a "reduction" plant in Reedville, VA. The other vessels catch much smaller amounts of menhaden, mainly to sell for bait.

After last year's net spills by the Ocean Harvesters fleet, more than 10,000 people signed petitions urging Republican Gov. Glenn Youngkin to shut down purse seine fishing for menhaden in the Bay.

The agreement comes four months after the marine resources commission, which manages saltwater fish species and their habitat, rejected a proposed regulation that would have barred fishing within one mile of Virginia's Bay shoreline and off Virginia Beach and within a half mile of the bridge-tunnel. It also would have prohibited fishing for a total of 17 days around the summer holidays.

By a 5–4 vote in December, commissioners opted instead for negotiating a voluntary arrangement.

Conservation and recreational fishing groups criticized the deal, saying it falls short of limiting the harm caused by commercial fishing in the Bay for menhaden, a small, oily fish that is forage for other fish and wildlife species.

Chris Moore, the Chesapeake Bay Foundation's senior regional ecosystem scientist, said the net spills not only waste a valuable natural resource but are becoming an annual occurrence. Four have been reported on average every year from 2018 through 2021, with the number of dead fish per incident ranging from 5,000 to 300,000, according to the agreement.

Steve Atkinson, president of the Virginia Saltwater Sportfishing Association, called the agreement a "positive step." But he pointed out that the one-mile no-fishing buffer should but does not extend north to the Rappahannock River, an area that he said is popular with anglers.

Annual commercial harvests of menhaden are capped in the Bay at 51,000 metric tons. Even with the cap, anglers and conservationists contend that large-scale harvests of menhaden in the Bay deprive birds and other fish of food.

On May 10, the Southern Maryland Recreational Fishing Organization filed a petition seeking judicial review of the marine resources commission's decision to ignore appeals from the public and scientists to reduce the menhaden harvest to benefit other fish and wildlife. ■

Upper Mattaponi Tribe acquires ancestral lands along VA river

More than 800 acres will be managed to help protect the health of the Mattaponi River

By Whitney Pipkin

The Upper Mattaponi Indian Tribe is reclaiming 866 acres of ancestral lands along the Mattaponi River in Virginia — with the help of $3 million in federal funds also aimed at improving climate resiliency in coastal areas.

The $3 million from the National Oceanic and Atmospheric Administration was made available through the Bipartisan Infrastructure Law's "climate ready coasts" initiative. The property, portions of which were formerly mined for sand and gravel, contains a diverse mix of habitats along 11,000 feet of waterfront on the winding Mattaponi River, a tributary to the York River in King William County.

An additional $630,000 for the land acquisition comes from a mix of state and local partners, including the previous landowner, the Virginia Land Conservation Foundation, the Trust for Public Land, and the Upper Mattaponi Tribe.

"The Upper Mattaponi people will use this property to help in protecting the integrity of the river, which has always been the homeland of the Upper Mattaponi Tribe," said the tribe's leader, Chief W. Frank Adams. "With these efforts we hope to improve water quality, accessibility, and preserve threatened cultural sites."

The property's 866 acres, about 40 miles northeast of Richmond, will be added to the 3,385 acres already conserved along the Mattaponi River basin corridor, said Laura McKay, manager of the Virginia Coastal Zone Management Program.

The tribe's plans for the property include revegetating mining areas with native plants and restoring streams on the property. The tribe is also exploring the idea of creating a fish and mussel hatchery to restore "culturally significant species" to the area and create new economic opportunities. Portions of the property near Beulahville are expected eventually to be open to the public as well.

Upper Mattaponi Tribe Chief W. Frank Adams walks a portion of the 866 acres his people are acquiring in Virginia with the help of federal and state programs, representing the tribe's return to the river that shares its name. (Upper Mattaponi Indian Tribe)

This acquisition is a first of its kind for the Mattaponi Tribe, representing a return to the river that shares its name and ancestral culture. In 2022, federal and state partners worked with the Rappahannock Tribe to return 465 acres of ancestral land along the Rappahannock River as well. ■

Fisheries managers move to curtail striped bass catch

Fishing pressure prompts emergency limit, with more restrictions likely in 2024

By Timothy B. Wheeler

Spurred by a warning about increased fishing pressure on already overfished Atlantic striped bass, East Coast fishery managers took emergency action in early May to curtail the recreational catch of the popular species while preparing for potentially more far-reaching restrictions next year.

The Atlantic States Marine Fisheries Commission, which regulates inshore catches of migratory fish, heard from a panel of scientists that the recreational catch of striped bass had doubled in 2022 over what it had been the year before, despite catch limits imposed to protect the diminished population.

Unless action was taken to reduce that catch, the expert panel said, the chances of rebuilding the striped bass stock by the end of the decade would fall from nearly 80% to less than 15%.

In response, the commission's striped bass management board voted unanimously to draw up a suite of new restrictions on recreational and possibly commercial fishing. The limits are expected to be adopted later this year and take effect in 2024.

But the board, feeling prompt action was urgently needed, also voted 15 to 1 to impose emergency limits for this summer. It ordered East Coast states to adopt a 31-inch limit for 180 days on the size of striped bass that anglers can keep. The limit is to be applied no later than July 2. After Oct. 28, the board can either end or extend the size limit for up to two more years.

"We really felt we should try to get ahead of this as soon as we could," said Martin Gary, chair of the commission's striped bass management board, who is also executive secretary of the Potomac River Fisheries Commission.

Striped bass, also known as rockfish, are one of the most sought-after sport and commercial fish in the Chesapeake Bay and along the Mid-Atlantic coast. But anglers have been under tighter rules for catching them the last few years after scientists warned that they were being overfished.

Catch-and-release fishing kills a significant number of rockfish, scientists said, especially in summer when warm water temperatures and lower oxygen levels further stress fish that are caught and handled. The Atlantic states commission responded in 2020 by ordering an 18% reduction in fishing-related mortality coastwide. It directed states to limit all anglers to one fish per day and set uniform size limits for keeping fish caught along the Atlantic coast and in the Bay. States were allowed to deviate from those coastwide limits if their rules reduced losses by the same amount.

Striped bass play an important role as a top predator in the Chesapeake Bay ecosystem. Scientists say the 2022 recreational catch was double that of 2021, despite tighter catch limits. (Dave Harp)

Those restrictions seemed to work at first. The estimated mortality in 2021 of striped bass coastwide dropped by 28%. But surveys conducted in 2022 tallied a doubling of the recreational catch from the previous year, raising fresh concerns.

Some have questioned the accuracy of those surveys. But Gary, the striped bass board chair, said the consistency and size of the increase reported was too great to discount. Plus, he added, it matched observations by anglers and fishery managers.

The commission has only taken emergency action to curb fishing four prior times, Gary said. The decision to do so in this case was motivated in large part by recognition that the last bumper crop of striped bass spawned in 2015 are now big enough to be legally caught along the coast.

"Another year of fishing on them like we did last year could have been really bad," said Mike Luisi, assistant fisheries director for Maryland's Department of Natural Resources. Reproduction has been poor for the last four years, meaning fewer fish are likely to reach maturity in coming years to help maintain the species.

The 31-inch limit will have various effects, depending on the season and jurisdiction. It will have the greatest impact along the Atlantic coast, because the striped bass there tend to be larger than most in the Bay. Anglers fishing ocean water were already required to release fish smaller than 28 inches or larger than 36 inches. Under the emergency rule, they can only keep those within a 3-inch size range.

But Gary said that restriction seemed fitting because the survey data indicated that the biggest increase in recreational catch last year occurred from Cape Cod, MA, to Cape May, NJ.

The commission held several public hearings in May to explain the reason for the limit and spell out for considering additional restrictions.

The commission's action drew praise from conservation and sports angling groups.

"It's definitely a step in the right direction," said Allison Colden, a fisheries scientist and Maryland director of the Chesapeake Bay Foundation. "Hopefully, it will prevent the need for more severe actions [later]."

David Sikorski, executive director of Coastal Conservation Association Maryland, said the board's move to adjust rules in 2024 was "pro-active," because it chose not to wait for a new assessment of the striped bass population, which isn't expected until fall 2024.

He likewise supported the emergency size limit. "Any of these larger fish we can protect, the better off we are," he said.

Maryland's Department of Natural Resources imposed the 31-inch size limit on May 16. Until then, there had been no maximum size in Maryland's Bay waters.

DNR's Luisi said he did not expect the new limit to affect Bay fishing much because the larger striped bass migrate to the ocean after spring and most remaining behind are smaller than 31 inches.

The new size limit won't apply in Virginia's portion of the Bay until the fall striped bass season, which runs Oct. 4 through Dec. 31. Rules in place for the spring season already specify a range of 19 to 28 inches.

Fishing in the Potomac River also could be affected. Currently, anglers may keep two fish a day of at least 20 inches, with no maximum. Gary, of the Potomac River Fisheries Commission, said its members could impose the 31-inch limit on or before July 2. ■

New era begins for 'dead zone' tracking in Chesapeake Bay

Federal agencies team up for improved monitoring of low-oxygen conditions in Bay, its rivers

By Jeremy Cox

A lonely gray boat bobbed like a cork in the Chesapeake Bay where its brackish waters converge with the Choptank River on Maryland's Eastern Shore. On deck, four men reluctantly set aside their last-minute preparations and posed together for a photograph.

The day had finally arrived. "I started proposing this 20 years ago, and I'm not the first," said Doug Wilson, a longtime oceanographer with the National Oceanic and Atmospheric Administration and now a consultant to the agency. "People were proposing this 20 years before that."

Moments later, Wilson and a fellow crew member unceremoniously heaved a yellow buoy into the Bay's gentle swells, launching a new era for monitoring the pulse of America's largest estuary.

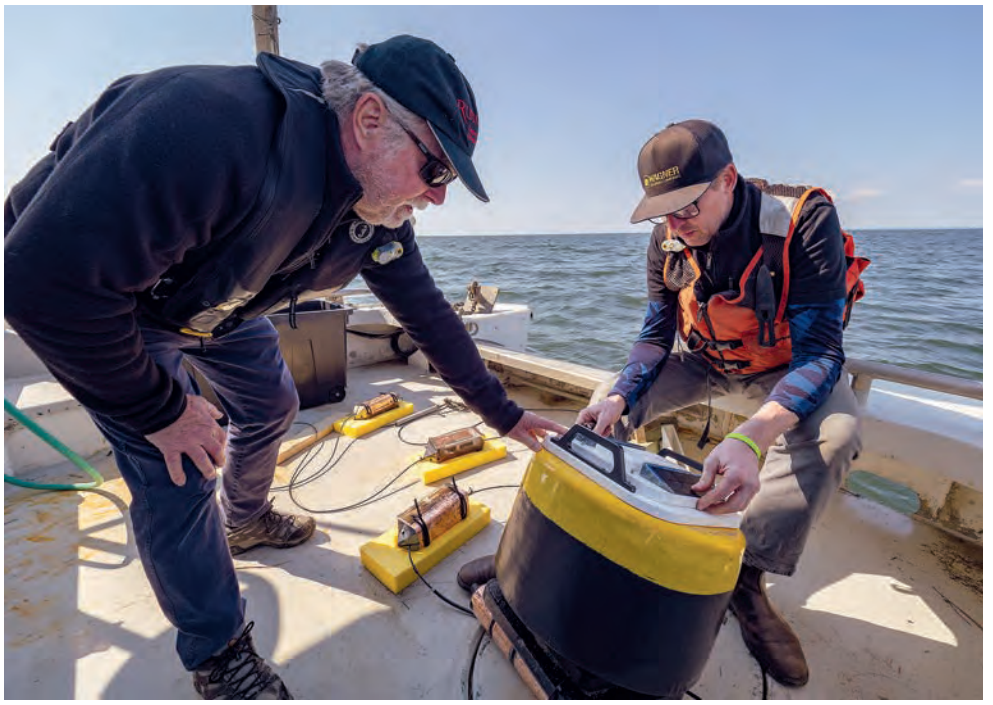
With its splashdown on that late April morning, the buoy became the first to operate under a new effort to vastly expand how scientists track "dead zones." A partnership involving three federal agencies — NOAA, the U.S. Environmental Protection Agency and U.S. Geological Survey — aims to distribute 10 monitoring stations around the Bay and in a select number of tidal rivers by the end of 2025.

The main objective for the network is to give Bay scientists a clearer understanding of where and when low-oxygen conditions occur. These are often called "dead zones" because they are practically devoid of life; any living thing that can't flee fast enough eventually suffocates.

While naturally occurring, the events are worsened by pollution. Farms and suburban landscapes across the Chesapeake's 64,000-square-mile watershed leak excess nutrients — nitrogen and phosphorus — into the Bay. There, they feed algae blooms. When those blooms die off, they consume dissolved oxygen, leaving blobs of "dead" water in their wake.

Bringing dead zones to heel has been the primary goal of the 40-year campaign to restore the Chesapeake Bay. Billions of state and federal dollars have been spent on the problem. But many questions about the performance of these measures remain unanswered, experts say, at least partly because real-world sampling of the Bay's dissolved oxygen levels has been sparse.

"For large parts of the Bay, we just don't have the ability to look at the oxygen," said Tom Parham, head of the Maryland Department of Natural Resources' Tidewater Ecosystem Assessment Program.



Doug Wilson of Caribbean Wind LLC and Jay Lazar of the National Oceanic and Atmospheric Administration make final adjustments to a buoy before deploying it in Maryland's Choptank River. (Dave Harp)

What is known about the Bay's dead zones mostly derives from a handful of sources.

The Chesapeake Bay Program, the federal and multi-state partnership that drives the restoration, has maintained a boat-based monitoring program since 1984. The cruises visit 49 locations per month — twice per month from June to August during peak dead zone season. Researchers test oxygen levels every few feet in depth throughout the water column.

The main drawback from that method is that the samples represent a fleeting moment in time, experts say. If water quality turns up bad in a single monthly sample, it paints the entire month as bad. But research shows that oxygen concentrations can shift at a particular location within little more than a moment's notice.

Another major monitoring effort consists of a network of seven floating stations that began operating in 2007. The Chesapeake Bay Interpretive Buoy System (CBIBS) is popular with scientists and fishing folks alike because it transmits fresh data to the web and mobile apps every six minutes. Its primary downside is that the sensors only detect water quality at the surface, leaving lower depths unmeasured.

Bobbing in the water at the mouth of Maryland's Choptank River is the first of 10 buoys that will provide nearly real-time water quality measurements in the Chesapeake Bay and several of its tributaries. (Dave Harp)

DNR's Parham, who isn't directly involved in the new project, said that the new program is poised to become the most advanced system yet. It will send sampling data almost in real time and include points from the surface to the bottom of the Bay.

"This monitoring will help us get a better handle on what our living resources are actually experiencing and being able to tie that back to our nutrient– and sediment-reduction goals," Parham said.

A better assessment of dissolved oxygen would be welcome on several fronts. Scientists say it could help improve forecasting the annual dead zone in the Chesapeake's deep channel. It also could give fishery managers a better idea of how much suitable underwater habitat is available to commercially important species, such as striped bass, blue crabs and menhaden.

Wilson, who founded the CBIBS program during his days at NOAA, said that technological advancements helped turn his dream into a reality. The first generation of buoys in the 2000s were expensive and bulky, towering about 14 feet above the water's surface. They could only be lifted with a boat-mounted crane.

Developed by Wilson's company, Caribbean Wind LLC, and Seattle-based Soundnine Inc., the current versions are far cheaper and smaller — about the size of an exercise medicine ball. Each is expected to cost about $5,000. Its sensors are attached every 6 feet to a wire strung between the buoy at the surface and an anchor at the bottom.

In addition to monitoring dissolved oxygen, the stations will gather data on several other parameters, including salinity, temperature and water pressure. The team's goal is to make the data available to the public in real time within a few months of its launch.

A panel of Bay Program experts is selecting the buoy locations. The main difficulty is placing them where the water is deep enough to experience low-oxygen conditions but not where shipping traffic is likely to occur, said Jay Lazar, a NOAA scientist working on the project. The Coast Guard must approve each location.

Lazar hopes to get three deployed by the end of this month. Besides the Choptank location, the initial buoys are targeted for an area west of Hoopers Island on Maryland's Eastern Shore and at the mouth of the Potomac River.

Back at the marina in the quiet village of Oxford, Wilson killed time on the boat, waiting for the sign that the newly installed buoy was up and running. The sensors collect measurements every 10 minutes, but the data is only transmitted once per hour. An email would automatically land in his inbox when that happened.

At the exact moment it was expected — 50 minutes past the hour — the message arrived, overflowing with numbers and decimals.

"It's working," Wilson said in a near whisper to Lazar.

Relief spread across Lazar's face. "We don't have to go back out today," he said. ■

Scientists say path to a better Chesapeake Bay is a slow one

Major new report suggests refocusing efforts on watershed's vast shallow waters

By Karl Blankenship

For decades, efforts to restore a healthy Chesapeake Bay have operated under a relatively simple assumption: Ongoing actions to reduce nutrient pollution on the landscape would improve water quality which, in turn, would bring back the bountiful populations of fish, crabs and oysters once seen in the Bay.

But a new report from some of the Bay's top scientists says those results are both more difficult and uncertain than originally thought. It suggests that major adjustments are needed in existing programs — and perhaps public expectations — to improve the Chesapeake's health.

The 115-page report casts doubt that the decades-old goal of eliminating low oxygen "dead zones" in the deepest part of the Bay is achievable, at least without new technologies.

And it says existing programs designed to curb urban and farm runoff are unlikely to attain their nutrient reduction goals, even with increased funding.

It's also unclear whether achieving those nutrient reductions, by themselves, would greatly improve aquatic life in the Bay.

But the report from the Chesapeake Bay Program's Scientific and Technical Advisory Committee also says opportunities exist to improve aquatic habitat, largely by refocusing efforts on shallow areas and combining them with other habitat improvements, such as restoring wetlands and protecting shorelines.

Those improvements would take time and, in some cases, require rethinking how Bay-related programs operate. For instance, the report says, some of the money directed toward nutrient reductions might be more effectively used to restore habitats.

Most fundamentally, the report suggests it is time to stop thinking about Bay "restoration." A theme throughout the report is that the future Bay should be healthier than it is today, but it will not be the Chesapeake of the past.

Climate change has brought warmer water temperatures, higher sea levels and new precipitation patterns. The Bay's 64,000-square-mile watershed is home to a growing number of people and farm animals, and it contains huge swaths of land permanently altered by development. Those changes "challenge the notion of restoration based on recreating historical conditions," the report said.

A kayaker wades through the shallows in Tangier Sound in the Chesapeake Bay. (Dave Harp)

"This whole idea that the Bay of the future is not going to look like the Bay of the past is a big pill to swallow," acknowledged Denice Wardrop, director of the Chesapeake Research Consortium, which helps coordinate Bay-related activities at research institutions. "There's just no way to return. It's just a different world."

That doesn't mean giving up on Bay improvements, added Wardrop, a coauthor of the report. "We're not going to stop, but there are signals that we could be doing things better, and how we can do that."

Shaping Bay discussions

The report comes at a significant moment for the state-federal Bay Program, which was launched 40 years ago to improve water quality and reverse the decline of its living resources.

The program recently acknowledged that it will miss its 2025 deadline for nutrient reductions and other restoration milestones, such as those for streamside forest buffers and wetlands. As a result, the Bay Program recently launched a "beyond 2025" planning effort to decide what should happen after that date.

The new report, *Achieving Water Quality Goals in the Chesapeake Bay: A Comprehensive Evaluation of System Response*, could shape those discussions. It took more than four years to develop and is the first major scientific consensus report about the Bay in decades. More than 60 current and former members of the independent scientific advisory committee approved it.

It's already getting a close look by others. Hilary Falk, president of the Chesapeake Bay Foundation, the region's largest environmental organization, said the report "highlights the enormity of the challenges we still face while providing incredible insight into where we might refocus our efforts. It should be required reading for everyone in the Bay movement."

Blue crabs are among the Chesapeake Bay's living resources that depend on healthy shallow water habitat. (Dave Harp)

Work on the report was launched to understand why progress toward meeting Bay water quality goals has been slower and more difficult than expected and how efforts to improve the nation's largest estuary and its living resources could be improved.

Bay nutrient reduction goals are loosely based on attaining water quality conditions that existed in the 1950s, before nutrient pollution began to increase dramatically. The goals are intended to reduce the amount of nutrients — nitrogen and phosphorus — flowing into the Bay, where they stimulate algae growth.

Algae are a critical fuel for the Bay's food web. But excess amounts result in harmful algal blooms that block sunlight to underwater grasses. They also rob the water of oxygen as they decompose, causing dead zones that are off limits to most aquatic life.

While some areas have seen modest benefits, nutrient reductions to date have not produced significant Baywide improvements in water quality, the report said, at least as measured by dissolved oxygen concentrations and water clarity. That's especially true for deep areas of the upper Bay, it noted.

Only 27% of the Bay fully met clean water goals in the mid-1980s, and that has only increased to the mid-30% range.

Part of the reason could be that nutrient reductions have not been great enough to trigger significant overall water quality improvements. But other factors, such as climate change, may be offsetting the impact of nutrient reduction efforts. Warmer water holds less oxygen, and rainfall has increased, washing more nutrients off the land and into the Bay.

Because of climate and land use changes, the report says, attaining water quality goals in some parts of the Bay, especially deep areas, may not be possible with existing technologies.

Most nutrient reductions so far have come from upgrades at wastewater treatment plants that cut nitrogen and phosphorus discharges, and from air pollution controls that reduced nitrogen emissions from burning fossil fuels.

Because most of the anticipated reductions from those sources have been realized, future reductions depend on reining in runoff from agricultural and urban areas. Those sources, though, are difficult to control because they involve dispersed sources of runoff from large areas of the landscape.

Runoff control challenges

The report says that efforts to control runoff from farms, which are by far the largest source of nutrients, are being at least

Efforts to control nutrient runoff from farms, which are by far the largest source of nutrient pollution in the Bay watershed, are being at least partially undercut by increases in livestock populations and the intensification of agriculture. (Dave Harp)

Algae chokes the mouth of a small creek near its confluence with the Choptank River in Maryland. (Dave Harp)

partially offset by increases in animal numbers and the intensification of agriculture [see *Chesapeake Bay cleanup faces difficult trade-offs with agriculture,* Bay Journal, May 2023].

It also cautions that runoff controls are likely less effective than indicated by the computer models used to estimate cleanup progress. That's especially true for phosphorus: The models show significant improvements, but monitoring in the Bay and its rivers shows little change in the last two decades.

The report says that existing agricultural programs, which rely largely on the voluntary use of best management practices like cover crops and streambank fencing, are unlikely to be implemented at the widespread levels needed to achieve nutrient reduction goals. That's especially true in areas of the Bay region that have intense animal production and generate far more manure than is needed by croplands.

The Bay is not alone in this situation, the report notes. There are few examples elsewhere of places and programs that have achieved significant watershed-scale nutrient reductions in such circumstances. But the report says new approaches could be tested in the Bay region.

Certain parts of the landscape, for instance, produce disproportionate amounts of nutrient-laden runoff simply because of their topography and soil types. Programs could target those areas more precisely to offer increased incentives for pollution reductions by certain communities and farms.

"You have to create a different incentive structure and crediting structure to have targeting be a viable option," said Zach Easton, a Virginia Tech agriculture professor who was a co-author of the report. "I can envision lots of different forms that could look like. But you can't treat all areas of a landscape or all actors, equally because they don't function or process nutrients equally."

The report also says new strategies are needed to deal with excess manure, which could include subsidizing the export of more manure to other areas or using technologies to treat animal waste.

"Animals produce 10 times more manure nutrients than humans in the watershed," Easton said. "We should be treating [those nutrients] as a waste. That's an expensive proposition, so we're likely not going to do it."

The report suggests the small-scale testing of different approaches to controlling runoff. If successful, the lessons learned could be more widely applied. But it would be a long process.

Kurt Stephenson, an agricultural economist with Virginia Tech and a co-author of the report, said it could take 10–15 years of water quality monitoring to determine whether a novel approach was having a measurable impact at a smaller scale, and even longer to apply those lessons to other sites.

"People need to adjust their expectations about how fast things can happen when you're dealing with 18 million people in a landscape that large," Stephenson said. "There's not going to be any silver bullets, and people should understand it's going to be a slog."

Helping aquatic resources

The report also says it is difficult to predict how fish, shellfish and other living resources would respond to improved water quality conditions in the future, largely because they are subject to so many other stresses. Shorelines are hardened, tidal wetlands are declining, oyster reefs are near historic lows and underwater grass beds are far below the regionwide goal.

But there is hope. Even if the region does not meet its nutrient reduction and water quality goals, the report says, other efforts to improve, protect and restore habitats could help increase the abundance of fish, crabs, oysters and other living resources.

"We could be getting appreciable living resource benefits without reaching full water quality attainment," Wardrop said.

In fact, the report indicates that overemphasizing nutrient reduction goals could "divert attention away from considering multiple means of improving living resources."

When the region adopted legally binding goals in 2010 as part of the Bay's total maximum daily load, or "pollution diet," it put the focus — and funding — on nutrient reduction as the primary means to bolster living resources.

Instead, the report says, a policy challenge facing the Bay Program is "how to allocate restoration funds and efforts to generate the largest living resource impacts for the most stakeholders."

The report suggests switching to a "tiered approach" for management. Right now, nutrient reductions are largely focused on restoring water quality in the deepest part of the upper Bay, where conditions are poorest and least likely to rapidly respond.

Alternatively, the report says greater emphasis could be focused on shallow areas of the Bay — places where improvements would likely be seen more quickly and which serve as more important habitats for fish and other aquatic life. Those nutrient reduction efforts should be paired with other projects to improve habitats in those areas, the report said.

According to the report, there is evidence that such an approach could provide tangible benefits from nutrient reductions in shorter periods of time.

The report cites Mattawoman Creek, a Maryland tributary to the Potomac, as an example. After a wastewater treatment plant there was upgraded, algae concentrations began dropping in the creek. In several years, underwater grass beds — a critical habitat for many species — began to rebound, increasing from 50 acres to more than 300 acres.

"If you look at the shallows, there are a combination of things going on," Wardrop said. "It's the first place where you see the impacts of climate change. It's at a scale where people feel they can manage it and do things differently. It's where the stakeholders are. It's where you will get water quality improvements sooner. And eventually those improvements will cascade down to the deep channel."

One thing is certain. The effort will take time.

"Achieving reductions in pollutants and realizing improvements in water quality and living resources in a system as large, diverse and complex as the Bay watershed and estuary calls for patience as changes are planned and implemented and the systems responds," the report cautions. ■

History helps shield large rural tracts from development

Frederick County creates first rural historic district in MD

By Jeremy Cox

Amanda Whitmore, a historic preservation planner for Frederick County, MD, stands with Jim Jamieson, the landowner who spearheaded the creation of a new rural historic district. (Jeremy Cox)

The Basil Harding farmstead in Frederick County, MD, has gained new preservation protections from the passage of a rural historic district. (Jeremy Cox)

Jim Jamieson doesn't know how his Colonial era farmstead in hilly Western Maryland came to be called Still Work.

Does it mean there was always "still work" to be done? Could it have to do with the sense of "stillness" evoked by the bucolic landscape? Or was it referring to the type of "still" that produces whiskey? All he can say for sure is that the name appeared on an early deed, and it stuck.

But of those explanations, Jamieson has a clear favorite: "I think it's the stillness of the place that captures me," he said on a recent spring morning, standing on a knoll with a pastoral vista of his property. "It's one of the few places that's quiet."

Nearly five years ago, the retired environmental attorney began exploring how he could keep it that way. Along the way, the preservation effort grew from protecting a single property to involving 10 separate parcels encompassing more than 1,000 acres of rural Frederick County.

After much research, Jamieson and his allies realized that to save their beloved farms from the ever-expanding Acela Corridor, they would have to get creative. The result, ratified by a unanimous Frederick County Council vote in April, was the creation of Maryland's first locally designated rural historic district.

The move places strict limits on any changes to the exteriors of the historic buildings in the district, with the county's Historic Preservation Commission responsible for signing off on alterations. To ensure the viability of the agricultural operations, stakeholders agreed to limit the commission to an advisory role on any improvements proposed outside the immediate surroundings of the historic structures.

Participation is voluntary. So, what's in it for the owners? Besides the tax credits, they are eligible for county grants of up to $50,000 available for historic preservation and restoration projects. A single project may receive the funding more than once.

The new district can be a model for other local governments and property owners trying to spare rural land from development, said Amanda Whitmore, the Frederick County historic preservation planner who helped shepherd the proposal.

"This is a unique district that does not exist in the state of Maryland, so we're kind of guinea pigs for how this works," she told the county council.

Dubbed the Peace and Plenty Rural Historic District, it lies about 5 miles west of the town of Mt. Airy. It is within a 40-mile drive of both Baltimore and Washington, DC, making its ample real estate attractive to subdivision developers. Since 2000, the Frederick County's population has grown 40%, to about 270,000 people.

Jamieson's farm is typical of agricultural operations in the district. The farmer who leases the land alternates between growing corn and soybeans.

From an environmental perspective, extending the life of a farm falls short of restoring the acreage to its natural state, Jamieson acknowledged. But he said he has taken steps across the farm to limit how much nutrient and sediment runoff makes its way into local waterways and eventually into the Chesapeake Bay. He views its current status as preferable to the likely replacement: more suburban sprawl.

"Don't compare this to the Garden of Eden," he said. "Compare this to the alternative."

His wife's parents purchased the Still Work property in the 1960s. The farmhouse, built beginning in 1750, continues to serve as a residence.

When Jamieson and Whitmore started their work in 2018, most of the land within what would become the rural historic district was already protected under agricultural preservation easements. That offers legal protection to the farmland but doesn't include farmhouses or other buildings.

A districtwide historical survey revealed about 50 "contributing resources" — buildings and sites dating to no later than 1940. The most notable are the farmhouses, each made of stone or brick and dating from 1760 to 1837.

The properties at first may seem disconnected, Jamieson said. Each is primarily accessed by a separate driveway from a county road. But there remains an internal network of crushed limestone lanes that allows for circulation among the farms.

The historical period at the center of the preservation effort reaches back to the 1730s, when European settlers began pushing their way inland to farm. The primary commodity at the time was tobacco, but they also raised, among other things, wheat, rye, corn, hay and potatoes.

The owners were "rural elites," according to historical documents. One of the main residences, the William Downey house, was the site of Western Maryland's first Masonic Lodge meeting. (The name "Peace and Plenty" originates with this property's historic deeds.)

Some of the district's earliest families built their growing fortunes with forced labor. At least four families within the district held enslaved people — the largest had about 100 people in bondage — according to the county's research.

There is no longer evidence above ground of the district's slave-holding past, but some may exist underground, Whitmore said.

Historic districts are typically reserved for clusters of buildings in older urban centers. If they do crop up in the country, they are usually centered around a historic village, Whitmore said. Other preservation avenues, she added, didn't quite fit Peace and Plenty's needs.

The Maryland Historical Trust identifies historic properties and districts, but their saying-so carries no regulatory bite. Meanwhile, the National Register of Historic Places has a designation for rural historic places, but being listed doesn't include design-review oversight.

Historic structures within the new Frederick County district can be torn down, with approval from the historic preservation commission, Whitmore said. But such decisions are typically made only if a building has deteriorated beyond repair and poses a safety risk.

Bringing the buildings under protection in the Peace and Plenty district was the missing piece of the preservation puzzle, said Nicholas Redding, executive director of Preservation Maryland, a nonprofit that works to save the state's built history.

"We can preserve land," he said, "but if we don't have the structures and the buildings that help tell those stories then we're missing a piece of that preservation." ■

‘Forever chemicals’ found in fertilizer raise concerns

Regulators study risks of fertilizing farms, gardens with biosolids

By Timothy B. Wheeler

Spring is planting time for farmers and home gardeners alike. They usually give their soil a dose of fertilizer to help their sprouts grow. For some, that might mean applying biosolids.

Biosolids are created from sewage sludge at wastewater treatment plants that has been treated to remove disease-causing pathogens and some pollutants. Hundreds of thousands of tons of it are produced annually at facilities across the Chesapeake Bay watershed and applied to cropland, pastures and gardens.

Those biosolids enrich the soil with nutrients and organic matter that feed plants. But testing indicates that at least some biosolids could be delivering a side order of so-called “forever chemicals” that could be making their way into groundwater, streams and the food chain.

An environmental group recently reported detecting what it called “ultra-high” levels of per– and polyfluoroalkyl substances, or PFAS, in biosolids produced by the Blue Plains Advanced Wastewater Treatment Plant in the District of Columbia. DC Water, the utility that operates Blue Plains, sells it under the brand name, Bloom. Farmers in Maryland, DC, Virginia and Pennsylvania can buy it by the ton, while homeowners can purchase 25-pound bags at some home and garden stores.

“When I saw … these astronomically high levels of PFAS in this product, I was stunned,” said Tim Whitehouse, executive director of Public Employees for Environmental Responsibility, the group that tested Bloom.

PEER said a private lab analyzed the biosolids and found 21 parts per billion of perfluorooctanoic acid (PFOA) and 26 parts per billion of perfluorooctane sulfonate (PFOS). PFOA and PFOS are the two most frequently detected PFAS compounds.

DC Water acknowledges that there are PFAS in its biosolids, but Chris Peot, director of resource recovery, said its tests detected “considerably lower” levels of those compounds — no higher than 3.7 parts per billion of PFOA and 15.5 parts per billion of PFOS, according to the authority’s website.

Bags of Bloom, a fertilizer made from treated biosolids at the Blue Plains wastewater treatment plant in the District of Columbia, are sold at garden stores in Maryland. (Timothy B. Wheeler)

“Their characterization of it being astronomically high, I think is unfair,” Peot said.

On its website, the utility says the overall PFAS levels detected in Bloom are many times lower than what has been measured in food packaging, ketchup, cosmetics and even daycare dust.

PFAS are a group of about 9,000 chemicals widely used in everything from fire-fighting foam to nonstick cookware, stain resistant and water repellant clothing, and some food packaging. They don’t break down readily and have been detected almost everywhere, including in drinking water, food and people.

Laboratory studies have linked chronic exposure to the chemicals to a variety of adverse health effects, including immune deficiencies, developmental problems and cancer.

The U.S. Environmental Protection Agency recently proposed enforceable nationwide limits in drinking water for PFOA, PFOS and four other PFAS compounds at 4 parts per trillion each. Ten states, including New York and Pennsylvania, already have their own state limits on PFOA and PFOS. Delaware is in the process of regulating them.

But the EPA has not set any limits on PFAS in biosolids. While there is evidence PFAS can leach through soil into groundwater and that plants can absorb PFAS through their roots, scientists and regulators are still trying to understand to what degree biosolids might be involved. The EPA is evaluating whether the health and environmental risks posed by PFOA and PFOS in sewage sludge warrant regulation, but that assessment is not expected to be finished until the end of 2024.

Some states are not waiting, according to a recent report by the Environmental Council of States. Maine banned land application of all but a few types of biosolids in 2022 after testing found high PFAS levels in milk, grass and manure at a farm where biosolids had been applied. Michigan bars land application of biosolids if PFAS levels exceed 125 parts per billion and limits their use at levels down to 50 parts per billion. A few other states require monitoring at this point.

DC Water’s Peot said the high levels in the Maine farm soil likely resulted from past spreading of paper mill sludge there. Blue Plains treats relatively little industrial waste by comparison, he pointed out, and the PFAS levels in its biosolids are low enough to be legally applied in Michigan.

In the Bay watershed, states are moving cautiously. The Maryland Department of the Environment has gotten about 30 municipal treatment plants so far to voluntarily test their wastewater and biosolids for PFAS. It expects to gather more data and is analyzing the results to determine what, if any, risks they pose.

In the meantime, MDE announced in February that it would stop issuing new permits for spreading biosolids on land until it completes its evaluation. That put a hold on eight new permits but did not apply to 242 current permits that allow biosolids be spread over 28,000 acres of land.

“We didn’t want new farms to start applying the material out of the utmost caution,” said Tyler Abbott, MDE’s director of land and materials. But a total ban on biosolids land application, he added, “would be a very large inconvenience,” not only for farmers forced to pay more for other fertilizer but also for treatment plants that rely on land application to dispose of much of their sewage sludge.

In Pennsylvania, the Department of Environmental Protection is working to add monitoring and reporting requirements to permits it issues for land application of biosolids, spokesman Jamar Thrasher said.

As with most other states, Virginia’s Department of Environmental Quality is waiting for the EPA’s risk assessment before imposing any limits, said Jeff Steers, director of regional operations. In the meantime, he said, the agency is telling wastewater plants in Virginia to check if there are any industrial or commercial sources of PFAS contamination among the facilities piping wastewater to them.

PEER’s Whitehouse said he was glad MDE had started to address biosolids in PFAS. He noted that the EPA has set extremely low limits on PFAS in drinking water and has said that there is no safe level of exposure to PFOA.

“It’s a huge problem,” Whitehouse said of biosolids contamination, “and people are going to have to figure out how to filter it out if it is going to be used on food crops.”

But DC Water’s Peot warned against “broad brush” decisions without further information.

“I’m all for studying this, I’m all for regulation,” Peot said in a webinar that DC Water held earlier this year. “I think it’s really important, but I implore regulators to ensure that their decisions are science-based.” ■

Data centers may be nearing tipping point in Northern VA

Residents grapple with high concentrations, environmental impacts

By Whitney Pipkin

Tractor trailer-size generators run the entire length of a data center building in Loudoun County, VA. (Hugh Kenny/Piedmont Environmental Council)

Northern Virginia has long been home to high concentrations of data centers: warehouse-like buildings filled with the computers that, from this one region, enable about 70% of the world's online activity.

But residents and county governments there are beginning to weigh the industry's economic benefits against the environmental costs. Those costs include increased stormwater runoff from buildings and parking lots, air pollution from backup generators and, perhaps above all, the pressure that energy-intensive cloud computing puts on local power grids.

And — when Virginia regulators considered waiving certain environmental requirements for some data centers this spring — those concerns began to reach a tipping point.

The Virginia Department of Environmental Quality in late January proposed a variance that would, in some counties, relax restrictions on data centers' use of backup generators during the summer, when projections indicate that the local power grid will be unable to keep up with energy demands. Although cleaner technologies are available, the vast majority of these generators burn diesel fuel, releasing pollutants that pose risks to human and environmental health.

The energy shortfall has been anticipated since last year, when Dominion Energy first said it had not upgraded electric transmission infrastructure fast enough to keep up with the rapid growth of data centers. But DEQ proposed the initial variance on a short timeline early this year.

After a contentious public meeting, the data center industry asked state regulators in March to limit the scope of the variance to Loudoun County. (It previously included Fairfax and Prince William counties as well.) Then, before a second public meeting in April, the same industry spokesman asked DEQ to withdraw the variance altogether, citing concerns that it was not necessary and that the measure might not be in line with federal law. DEQ did just that, withdrawing the proposed variance on April 12.

But the broader problems that set the stage for this variance have not been solved — and environmental groups and homeowners' associations now have their hackles up.

PJM Interconnection, the organization that coordinates electricity transmission in 13 states and Washington, DC, warned in a February report that "the proliferation of high-demand data centers in the region" is driving an unsustainable growth in energy demand. According to the report, that increase — coupled with the retirement of older power generation facilities, supply chain problems and waitlist issues for additional renewable energy facilities — will perpetuate the problem of regional energy needs "outpacing the construction of new resources."

Meanwhile, counties outside of Loudoun's fairly saturated market for data centers have been approving new data center developments at breakneck pace. Localized energy generation concerns — even if they currently impact just a few data centers in Loudoun County — have shed light on a broader suite of concerns about the pace and lack of oversight of data center development in Northern Virginia.

Regional growth

Counties west and south of Loudoun, Fairfax and Prince William — such as Fauquier and Orange — are beginning to see more data center proposals as global demand continues to rise. Some of the most recent projects were narrowly approved by local boards, despite their proximity to national parks and battlefields, schools and neighborhoods, as well as their expected contribution of stormwater into already impaired waterways — and, in one case, a struggling drinking water reservoir.

A bicyclist rides along the Washington & Old Dominion Trail in Loudoun County, which runs along a strip of large data centers. (Whitney Pipkin)

A recent poll of 300 Northern Virginia voters commissioned by the National Parks Conservation Association found that 86% would support legislation keeping data centers from being located next to national and state parks, where some are currently planned.

Bill Wright, a Gainesville resident, opposed changes to Prince William County's comprehensive plan that made way for expansive data center projects. He said that a disjointed and localized approach to approving projects has set the stage for "the crisis in electrical grid strain we are facing."

"The data center industry is way out over its skis and requires more responsible regulation," Wright said. "If we know this industry is the source of the problem, the onus should be on them to be part of the solution."

Instead, in addition to the proposed air variance, Virginia legislators at the end of February approved an expansion of sales tax exemptions and grant funds for data center companies looking to locate in the state.

This followed an announcement in January that Amazon Web Services plans to spend $35 billion to establish several new data center campuses in Virginia. Meanwhile, a bill proposing a statewide study of the water and energy use impacts of data center developments died in committee in February.

Chris Miller, president of the Piedmont Environmental Council in Virginia, called that level of investment by a single industry in just one state unprecedented. By his calculations, it could mean more than a million acres of land being devoted to data centers, solar panels and related uses.

"Virginia is being targeted for housing Amazon's entire global cloud services," Miller said. "So Virginia is going to be bearing not only that infrastructure — the data center footprint — but all those companies are trying to use ground-based solar to be 'green.'"

The variance considered for generator emissions this summer has made Northern Virginia's 275 data centers a fresh target for environmental concerns, especially for residents who live near them. The physical footprint of data handling and storage is no longer out-of-sight, out-of-mind for some Virginians. And they're wondering if there's

Parts of the Washington & Old Dominion Trail were closed on April 10 while Dominion Energy worked to improve the capacity of transmission lines in the area. Energy transmission in Northern Virginia has not been able to keep up with the rapid growth of data centers. (Whitney Pipkin)

Data centers line many thoroughfares in Loudoun County. Their cooling systems, located on their roofs, and their backup generators, used during emergencies, generate noise that can reach nearby residents. (Whitney Pipkin)

any way to limit the region's few-strings-attached invitations to the industry.

"The data center industry is taking over our area," said Spencer Snakard, president of Protect Fauquier, at a hearing in February. And it's "at our cost."

The Fauquier group formed in 2022 to oppose a data center project in Warrenton that its town council approved by a 4–3 vote this February. Ten residents and the group Citizens for Fauquier County filed a lawsuit in March against the Warrenton Town Council on behalf of residents directly impacted by the project.

Meanwhile, boards in Prince William County and Orange County have recently approved new projects, despite vocal opposition from residents. In Orange County, data centers were added at the last minute to the scope of an already contested development.

Heads in the clouds

Data center issues like those unfolding in Northern Virginia are taking place across the country and internationally. Steven Gonzalez Monserrate, a Ph.D. candidate at the Massachusetts Institute of Technology, is a "cloud anthropologist" who studies the human and environmental impacts of cloud computing and data storage. The larger the footprint of the industry grows, he said, the more it comes into conflict with other ideas for how land, water and energy should be allocated in a region.

"What I've found when we're talking about the environmental impacts of data centers is [that] it's very localized," Monserrate said.

Monserrate has studied clusters of data centers across the world and the rising conflicts they create. Environmentalists in Ireland have pushed back on the industry that one group said was on track to consume 17% of the small country's power generation in 2021, conflicting with Ireland's ambitious climate goals. There were also concerns about the chemicals used to treat cooling water before it is discharged to waterways.

Internet technology companies, he said, sometimes try to get ahead of a country's renewable energy requirements by making their own commitments.

"But that's in anticipation that the [EU] is going to start regulating them more," Monserrate said.

Other countries have begun to push back on data center approvals, too. The Republic of Singapore passed a three-year moratorium on new data center projects in 2019 after a period in which their growth rate appeared unsustainable.

In the United States, high volumes of water used by data center cooling systems in Arizona have pitted the industry against farmers and localities during drought.

Often, counties and cities initially welcome data centers for the influx of tax revenue they generate. And concerns about energy consumption are at least temporarily assuaged by green energy and carbon-neutral commitments from companies like Amazon and Google.

In Virginia, one of the literal costs of expanding data centers is that Dominion ratepayers are the ones who will fund expansions of the transmission line network, even though they are not driving additional demand.

Virginians' projected energy load over the next 15 years would hold steady or go down were it not for the influx of data centers coming onto the grid, according to Dominion projections used in a PJM report.

Meanwhile, the world's appetite for data consumption seems to grow exponentially with the introduction of new technologies. (Using artificial intelligence to write a report, for example, requires vastly more cloud computing than a person using a search engine.)

When asked if moderating personal data use could help, Monserrate said it would be hard for people to make a dent by cutting, say, their streaming service, because overall demand exists and data companies are constantly adding servers to keep up with it.

While there is no putting the data-use genie back in the proverbial bottle, there are innovations that could reduce the physical footprint of data storage. But Monserrate said the pace of such innovation is held in check by what he describes as a "resignation that this is the only cloud [technology] that there ever could be or ever was."

Still, some scientists are working on data storage that uses less space, such as synthetic DNA, while others are using lasers to etch data onto silica instead of cobalt and lithium.

In the near term, Monserrate said that because the impacts tend to be localized, the solutions will need to be, too.

"Try to bring attention to the issue," he said, reflecting on dynamics that have led to changes in how data centers are regulated internationally. "In the history of this issue, you can see the moment when the environmental impacts of these things became an issue of concern for the companies. That was only after environmental protests of various kinds." ■

VA conservation program passes million-acre milestone

Tax credit created through bipartisan bill in 1999

By Whitney Pipkin

The Virginia Land Preservation Tax Credit has helped protect more than one million acres in the state since it was first established more than 20 years ago.

Longtime Virginia Sen. Emmett W. Hanger (R-Augusta) — whose 1999 bill created the tax credit program — made the announcement in April at a conference sponsored by Virginia's United Land Trusts. The coalition consists of the many groups focused on preserving land using public and private resources.

The state program provides private landowners with tax credits in exchange for voluntarily limiting future development on their land, and by doing so conserving natural, cultural, scenic and historic resources. Residents can work with public agencies or nonprofit land trusts to protect their properties through the program while saving on taxes and allowing the land to still be passed down to future generations.

"The land preservation tax credit was a joint effort coming out of the Commission on the Future of Virginia's Environment," Hanger said at the Virginia Land and Greenways Conference on April 26. "None of us imagined that it would be as big as it would be."

The one million acres mark is significant for several reasons. In the 35 years before the bill was passed, only about 175,000 acres had been protected by conservation easements in Virginia. In the 24 years since the program was created, more than seven times that amount has been conserved: a total of 1,275,000 acres at last count.

"When the bill was introduced in 1999, we had no idea that we could in such a short time, within our lifetimes, preserve one million acres," said Sen. Creigh Deeds (D-Bath), co-patron of the 1999 legislation. "The impact of the Land Preservation Tax Credit on our environment is immeasurable."

To attempt to measure it: If the acres preserved were put together, they would create a landscape more than five times the size of Shenandoah National Park.

Limiting the development of additional homes, parking lots or industrial uses on these scattered properties has also met other objectives for the state, including preservation goals set out in the 2014 Chesapeake Bay Agreement to protect regional water quality. It also helps the state meet goals to preserve farmland for food production and to improve climate resilience while protecting clean air and drinking water.

Virginia is one of only five states that also makes its land preservation tax credits transferable, allowing property owners to sell tax credits they're unable to use. This is one of the ways the program helps the state permanently protect land each year "at a fraction of the cost it would take for the commonwealth to acquire the land needed to meet its conservation and water quality goals," according to a statement from Virginia's United Land Trusts.

"Our foundation has worked with thousands of landowners who've utilized this program, and most of them have re-invested the tax credits back into the land by expanding their farming and forestry operations and enhancing wildlife habitat," said Brett Glymph, executive director of the Virginia Outdoors Foundation. "These lands will benefit Virginians for generations to come." ■

Virginia Sen. Emmett Hanger (R-Augusta) is recognized at the Virginia Land and Greenways Conference on April 26, where he announced that the Virginia Land Preservation Tax Credit has helped protect more than one million acres in the state. (Hugh Kenny)

Program strengthens diversity in environmental workforce

Young Professionals of Color helps build confidence, opens doors

By Whitney Pipkin

(Left to right) India Dennis with Hood College, Maya Alexander with the Alliance for the Shenandoah Valley and Tyneshia Griffin with New Virginia Majority enjoy a group exercise during a Young Professionals of Color event on March 29 in Chevy Chase, MD. (Drew Robinson/Choose Clean Water Coalition)

(Left to right) Swathi Ayyagari with the National Aquarium, Carmen Tucker with GreenVest LLC and Natalia Sanchez with the University of Maryland's Environmental Finance Center take part in the March 29 Young Professionals of Color event. (Drew Robinson/Choose Clean Water Coalition)

Organizations that work on the health of the Chesapeake Bay and other environmental issues in the region have known for years that most of them have a diversity problem.

Reports over the past decade have demonstrated what many knew anecdotally: The amount of diversity in staffs of environmental nonprofits and government agencies often does not reflect the populations and places they aim to serve.

That's beginning to change. And advocates say it's partly due to initiatives like the Young Professionals of Color Mentorship Program. Under the umbrella of the Choose Clean Water Coalition, the program is in its seventh year of providing training and mentorship to environmentally minded people in BIPOC (Black, indigenous and people of color) communities.

In the process, the program also helps close the racial diversity gap that is common among environmental groups in the Bay region. It does so by creating connections, inroads and encouragement that may not have existed otherwise.

"One of the things that kept me from exploring this work initially was, I felt like, maybe there wasn't a place for me," said Joe Toolan, now a manager of Chesapeake programs for the National Fish and Wildlife Foundation.

Born in Guatemala and adopted in the 1990s, Toolan identifies as queer, Latinx and indigenous. After working with a mentor and then mentoring others through the program, he said he feels more comfortable having a seat at the table and bringing his experiences to bear on grantmaking work.

Being in the environmental field "is still hard," he said. But "this program was a natural point of connection for me."

Chanté Coleman, now the senior vice president of Equity and Justice at the National Wildlife Federation, started Young Professionals of Color in 2015 when she was with the Choose Clean Water Coalition. The year before, a national study by Green 2.0, an inequality watchdog organization focused on environmental professionals and leaders, pointed out that the percentage of ethnic minorities represented on the boards and staff of environmental organizations fell far short of representing the broader population.

In 2016, the federal-state Chesapeake Bay Program quantified its own diversity shortcomings for the first time: While people of color represented 35% of the region's population, they accounted for just 14% of the people working for the Bay Program. And just 9% of the program's leaders were people of color.

"There weren't as many people of color in the Bay restoration movement at the time," said Mariah Davis, recalling her experience as a mentee in 2016, which was the first year for Young Professionals of Color. She is now the Choose Clean Water Coalition's acting director and runs the mentoring program. "I do think, because of our collective efforts, we've been able to recruit and retain more people of color in the Bay community. It's filling a gap."

The 2022–23 program participants included 42 mentees and mentors filling a variety of roles in the environmental workforce. In the early days of the effort, it was hard to find mentors that were also people of color, but it's no longer *as* difficult, said Davis, who has developed her own reputation as a masterful matchmaker.

Mentors and mentees are encouraged to meet up regularly throughout the program, which also offers training sessions during the year. The sessions — unique to the needs of each cohort — focus on topics like overcoming imposter syndrome, having difficult conversations at work and persevering for the long-haul in an arduous field.

This spring, after a few years of Zoom-based sessions, the program hosted an in-person event at Nature Forward's Woodend Nature Sanctuary in Chevy Chase, MD, inviting both current and past participants. Some attendees said the event felt like a "tipping point" for the program: an opportunity to both celebrate the bonds that had been formed and make new connections in the local environmental movement.

"I was so nervous to be here," one of the participants told Davis at the event, "but now I feel like I have community."

Toolan noted that high-ranking officials from the Bay Program and other regional organizations attended a reception portion of the event that "was able to show people the reach that [the program] has."

Young Professionals of Color is supported by the Chesapeake Bay Trust and other grants. Davis said she hopes that, with additional funds, they can widen their scope to include more outdoor experiences throughout the Bay watershed.

Before participating in the program as a mentee, La' Portia J. Perkins thought her degrees in wildlife biology and forestry would keep her doing fieldwork her entire career. But the program "gave me an orientation to not only the [environmental nonprofits] but also this whole entire palette of conservation and natural resource work," said Perkins.

"My grandfather was a zookeeper and my great-great grandparents were sharecroppers, so my relationship to the land is basically in my DNA," she added. "But the drive to turn it into a career was fueled by being around the right people and situations."

Perkins' mentor helped her rework her resume, practice interviews and ultimately make a leap into a new branch of work, as a project manager for the Renewable Energy Wildlife Institute based in Washington, DC.

"It allowed me the opportunity to step back and say, 'What is it that I really want?' and to see myself there. It worked out," said Perkins, who works remotely for the DC institute from her home in Michigan. "I [used to be] very 1-2-3 about my career path. Now, it's more like an amoeba. I can become anything." ■

Should new Bay cleanup goals have a greater dose of reality?

Ag & the Bay
Sowing a Conversation

Editor's Note: This article is the second in an ongoing series that looks at water quality goals for the Chesapeake Bay and the fundamental challenges, which have persisted for decades, in reducing nutrient pollution from agriculture.

Policy and science leaders have said that the Chesapeake region will not meet its 2025 nutrient goals for the Bay, largely because of an inability to sufficiently reduce nutrient pollution from farms in Maryland, Pennsylvania and Virginia.

The reasons are complex. But it's important to explore those challenges as the region begins a vigorous conversation about the future of the Bay restoration effort beyond 2025.

Photo above: Worlds End Creek winds its way through farmland to the Honga River in Dorchester County, MD. (Dave Harp)

By Karl Blankenship

As far as the Chesapeake Bay cleanup is concerned, Kenn Pattison was given a job in 2010 that might be labeled Mission Impossible. He had to design a plan that met Pennsylvania's nutrient reduction goal.

Time and again, the state Department of Environmental Protection employee drafted strategies that called for an increasingly unrealistic amount of pollution controls on farmland. Time and again, his plans fell short.

Ultimately, Pattison got the job done — "on paper," he noted. It called for farmers to voluntarily implement high-priority runoff control practices on 92% of farmland and take large tracts out of production.

"It was no longer a matter of 'will we hit the mark?'" recalled Pattison, who retired in 2013. "It was a matter of just writing a plan."

That plan was part of the regional effort to produce a realistic, accountable strategy for reducing nutrient pollution in the Bay that could be completed by 2025. But, as with earlier goals set for 2000 and 2010, the region will miss its 2025 goal — and by a large margin.

In large part, that is because the goal-setting process failed to fully appreciate the difficulty of reducing nutrients — nitrogen and phosphorus — from the region's 83,000 farms, which are by far the largest source of water-fouling nutrients to the Bay.

Now, as the region stands on the brink of missing a third deadline in a quarter century, it faces questions about what comes next.

In dozens of *Bay Journal* interviews with current and former government officials, researchers, farmers, conservation district staff, environmentalists and others, most suggest that meeting goals on the region's farmlands will likely take decades.

The need for patience was bolstered by a recent report from the Bay's scientific community that said current efforts are unlikely to achieve nutrient reduction goals without significant changes. (See page 12.)

Nearly everyone believes that goals and deadlines are essential to making progress. But many also say that seemingly unachievable objectives can have the opposite effect: They can create unrealistic public expectations, diminish participation if goals are seen as unattainable, and result in inefficient use of funding. They can also stymie innovation and alternative cleanup approaches.

Perhaps most importantly, unrealistic deadlines don't allow enough time to build the personal engagement and connections critical to earning trust from the farmers who manage a quarter of the Bay's watershed and will bear the bulk of future Bay-related nutrient reductions.

Making things accountable

In 1987, a young activist, Chuck Fox, was dismayed by a draft document committing states and the federal government to reduce pollution in the Bay.

Four years earlier, those parties had signed an agreement establishing the Chesapeake Bay Program, a partnership between the Bay states and the federal government that continues to guide the restoration effort today. But the one-page 1983 document that launched the program contained no details about what should be done.

Now a new agreement was being crafted to flesh out those details, but Fox and a small group that analyzed the draft faulted it for not having measurable targets. They especially wanted goals for nutrients, which were considered the major threat to the health of the Bay because they trigger its oxygen-starved "dead zones."

They presented their case at a news conference in Washington, DC. "The headlines, literally in every newspaper around the Bay the next day, were 'Bay Agreement lacks specifics,'" recalled Fox, who went on to several positions in state and federal agencies and nonprofit organizations.

It worked. The final *1987 Chesapeake Bay Agreement* contained a commitment to cut the amount of nutrients reaching the Bay 40% by 2000. The goal was based on rough estimates of what it would take to eliminate dead zones in the deepest part of the upper Chesapeake, where water conditions were at their worst.

"It was this notion that the accountability regime for the Bay needed to start putting out numbers that we were going to hit," Fox said. "The only way we were

going to hold the Bay Program accountable for meeting the standard was to set these quantitative targets."

In 1992, that goal was given teeth: It was translated into state– and river-specific nutrient reduction objectives, and Bay states were tasked with writing "tributary strategies" showing how those would be achieved.

The region made progress but did not meet the goals. The next Baywide agreement, *Chesapeake 2000*, set a new target for 2010. That was also missed, leading to the latest targets keyed on 2025. Policy and science leaders have already acknowledged that the 2025 deadline won't be met, either.

Still, the goals were important drivers. They led to stricter limits on nutrient discharges from wastewater treatment plants — which have yielded substantial nutrient reductions — as well as new efforts to regulate stormwater from developed lands. They have also spurred increased oversight and funding for practices that control nutrient runoff from farms.

Overall, actions taken since 1985 should eventually reduce the amount of nitrogen reaching the Bay by about 27%, according to Bay Program computer model estimates.

The goals also have helped raise awareness and concern among the public, including farmers.

Watershed restoration specialists at the Stroud Water Research Center in Pennsylvania work with farmers in both the Chesapeake Bay and Delaware River basins to install conservation measures to improve the health of waterways.

"We feel the agricultural conservation discussion, writ large, is further along on the Chesapeake side than in the Delaware side," said Lamonte Garber, Stroud's watershed restoration coordinator.

"The farmers over on the Delaware side almost to a person say, 'Boy, am I glad I'm not in the Chesapeake.' In the same breath, they say, 'Boy, I wish we had the resources that farmers on the Chesapeake side have.' "

Despite those resources, reining in nutrient runoff from farms has proved to be to be far more difficult than anticipated.

Success depends on the widespread use of best management practices, or BMPs, such as planting nutrient-absorbing cover crops in the fall, installing forest buffers along streams, reducing soil tillage, and scores of other actions aimed at managing runoff.

And while financial assistance is available for many of them, BMPs typically require some investment from farmers, including increased time and management, and may require taking land out of production even as farmers are under market pressure to produce more.

Members of the Chesapeake Executive Council met on Dec. 15, 1987, to sign the 1987 Chesapeake Bay Agreement, which set the first numeric goals for reducing pollution in the Bay. (Courtesy of the Chesapeake Bay Program)

"It's one thing to put a plan on paper and another to see it through with private landowners operating a family-run business in a volatile commodity market," said Mark Dubin, a farmer with the University of Maryland Extension and senior agricultural adviser for the Bay Program.

"Once people look at the numbers, and you see the percentage change we have to make to get from where we are to where we have to be, some of this can be pretty staggering," he said.

Paper plans

The problems facing Pattison in 2010 illustrate that challenge. To meet the Bay's clean water objectives, the U.S. Environmental Protection Agency established the Chesapeake Bay Total Maximum Daily Load that year. The TMDL, also called the "pollution diet," set new nutrient reduction goals for Bay states.

Meeting those goals on agricultural lands, at least in computer model projections, came alarmingly close requiring implementation of "everything, everywhere by everyone" — the theoretical maximum of what was possible and a level far beyond what programs have historically been able to deliver.

Pattison's plan ultimately called for putting the most effective BMPs on 92% of farmland in Pennsylvania's portion of the Bay watershed and took huge amounts of land out of production.

It "retired" 138,889 acres of cropland, planted forest buffers on nearly 40,000 other acres, and called for large amounts of wetland restoration, grass buffers and other practices that removed additional acreage from production. Removing farmland from production typically produces the most nutrient reduction benefits, though it also reduces farm productivity and income.

"We made it on paper," Pattison said, "and I just shook my head."

Matt Ehrhart, who was director of the Chesapeake Bay Foundation's Pennsylvania Office at the time, said he was surprised the state "didn't at least make a play for a longer time period in the TMDL context, because there was no way to mobilize so much work on so many farms, let alone [deal with] the cost."

"It just was such a different animal in Pennsylvania, and we always glossed over that," said Ehrhart, who is now director of watershed restoration at the Stroud Water Research Center. "All the states have the same challenges. It's just that Pennsylvania's ag load, and ag production, dwarfs the other states."

Indeed, while Pennsylvania's situation is extreme, many consider the agricultural portions of Maryland and Virginia's cleanup plans unrealistic, too, largely because they also require such high levels of BMPs on farmland.

The number of BMPs written into plans are often several times higher than what conservation districts and others tasked with implementing the strategies thought was feasible. Further, agencies have nowhere near enough staff to help farmers with this work.

Jeff Corbin was a senior adviser on Bay issues to the regional EPA administrator when states were writing their original cleanup plans under the TMDL. Earlier in his career, he had worked as an assistant secretary of natural resources in Virginia, where he acknowledged earlier tributary strategies could not meet agricultural targets.

Corbin said he was hopeful the TMDL effort would produce a better result. But it ultimately became a "mathematical exercise" as state plans approached the "everything, everywhere by everyone" scenario. "On paper, the goals were attainable. I think we're starting to realize that some of them were not."

It is a widely held perception.

A Dartmouth College professor in 2021 interviewed 59 people involved in Bay policy development and found that many described writing cleanup plans as a "paper process," producing strategies that could not be effectively implemented.

What's realistic?

States in 2019 updated their Bay cleanup plans to show how they would reach 2025 goals. Pennsylvania, which had submitted perhaps the most unrealistic plan in 2010, revised its strategy based largely on county-by-county assessments of what people thought could actually be done. It fell about 25% short of its target.

That spurred a suit by environmental groups, Maryland, Virginia, Delaware and the District of Columbia, contending the EPA needed to force the state to take greater action.

Under a recent proposed settlement agreement, the EPA agreed to take several actions, including stepping up farm inspections in the state. Pennsylvania has long been criticized for poor oversight of its own programs.

But the settlement doesn't change the fact that Pennsylvania's plan doesn't add up, and no one has ever produced a realistic plan that meets the state's cleanup goals.

The situation in Pennsylvania's Lancaster County — which, with more than 5,000 farms, is by far the most intensive agricultural county in the Bay watershed — illustrates the challenge.

Lancaster's plan received considerable praise for its collaborative efforts that included farmers, conservation groups, local governments and others. But it only achieves about 75% of its nitrogen goal and sets the goal line not at 2025, but at 2040 — which is still considered a stretch.

BAY GOALS *continued on page 22*

Newly planted trees are the beginning of a robust buffer for a small stream in the headwaters of Catoctin Creek in Frederick County, MD. (Dave Harp)

BAY GOALS *continued from page 21*

"Is that even realistic? Probably not," said Chris Thompson, district manager of the Lancaster County Conservation District. "I always say it's dependent on the funding, regulatory flexibility and the people. If we don't have those three components, it doesn't matter how far out you project, we'll never get it done."

Acquiring funding and maintaining technical support staff needed to enact such an aggressive plan is an ongoing challenge. And it's faced by conservation districts everywhere.

Hiring and maintaining staff is difficult because funding is unpredictable, a problem cited by conservation districts in all of the Bay states. Thompson rattled off numbers to illustrate the point: Four years ago, his office's budget was $1.2 million; this year it is $13.5 million. Next year, they're anticipating between $3 million and $5 million, and beyond that he doesn't know.

Before hiring people, Thompson said he likes to anticipate several years of steady funding levels to maintain them.

Bringing on and training new staff is a slow process that confounds aggressive timelines. It can take two to three years before a person can do most tasks independently. "It's not like we're luring in fully trained people to fill those positions so that they can hit the ground running," Thompson said.

But making progress takes more than training new technicians. It can take years to build relationships with farmers, said Kevin Lutz, agricultural program manager with the conservation district.

"A lot of conservation work gets done with relationships and trust building," Lutz said. "So if a farmer is constantly working with a new individual, a new technician, they feel like they're calling up a stranger. There's a difference between just having a body in a position versus having an experienced body."

Further, budget increases don't always help with farmer outreach. The county has taken over some agricultural compliance work from understaffed state agencies. It is also absorbing increased requirements from the Bay Program to verify that older BMPs are still working.

"Staff are spending more time in the office completing paperwork and less time in the field working with landowners," Thompson said.

Lack of technical support

Lancaster County's situation is not unusual. Lack of adequate technical support for farms was one of the top concerns cited in public comments about updated plans completed by other states in 2019 as well.

Maryland earlier this year had a shortage of trained staff to write legally required nutrient management plans for farmers. State officials said they were having a hard time attracting candidates to fill the positions.

That's nothing new. As far back as 1990, a Bay Program report said more technical assistance would be needed to reach goals. It's been reiterated in numerous Bay reports over the years.

With the 2025 deadline approaching, more federal and state money has been steered toward agricultural cost share programs in the region — nearly $2 billion since 2014, including a record influx from recent federal legislation totaling hundreds of millions of dollars.

But that money often goes to state and federal cost-share programs that subsidize the installation of BMPs on farmland, which count toward meeting cleanup goals in computer models.

The money often does not support the staff who work with farmers to implement those practices. That means thinly stretched personnel are likely to focus on the "lowest hanging fruit," as opposed to more effective actions that might take greater time and effort.

"Appropriators like to buy things," said Ann Swanson, the retired executive director of the Chesapeake Bay Commission, which represents the legislatures of Bay states. "So they like to buy BMPs. They like to buy trees. They like to buy things you can see. And with technical assistance, you can't really see it. It's even hard to measure."

The commission highlighted the dire need for more technical assistance staff in a 2017 report, *Boots on the Ground*, that said the issue was a "red flag" for the cleanup efforts.

"This really is the Achilles heel of the Bay restoration," Swanson said.

That shortcoming is likely to hinder the effectiveness of even greater amounts of money now being steered toward the Bay by legislation at the state and federal levels.

Agriculture secretaries from states in the Bay watershed noted in a letter to EPA Regional Administrator Adam Ortiz last August that "large increases [in funding] have not consistently resulted in large growths in implementation." The letter said that "well-documented needs in existing programs and systemic issues like availability of technical assistance providers in agriculture are increasing in severity [despite] record spending."

A Bay Program analysis last year also expressed doubt about how effectively the new money can be used without more technical support staff, and it cited the difficulty of hiring new people under what are likely to be just short-term funding increases.

"This impacts jurisdictions' abilities to spend the new funding in an effective and efficient manner," the analysis said.

Reality checks

Despite the influx of available funding after the TMDL went into effect, the computer models the EPA uses to assess cleanup progress show that the average annual rate of nutrient reductions from farmland has actually decreased.

Only 6 million of the 30 million pounds of nitrogen reductions from 2010 through 2021 were due to runoff controls on farms, according to the models; most of the rest came from point sources, mainly wastewater plant upgrades, where discharges are measured at the end of a pipe.

With most of those upgrades completed, the lion's share of the 40 million pounds of remaining nitrogen reductions must come from agriculture.

One reason for the slow pace could be the intensification of agricultural production: The number of farm animals in the watershed has increased, and farmers tend to produce more crops per acre, often requiring more fertilizer.

But the actual amount of progress is unclear. Computer models in large part estimate progress based on the number of BMPs installed. That has put emphasis on funding the installation of BMPs, with less focus on examining how well those individual practices are actually performing. The result is widespread distrust in the modeled results.

A recent report from the Bay Program's Scientific and Technical Advisory Committee highlighted the issue. It said meeting the TMDL "tasks water quality managers with counting practices implemented and

thereby diverts attention from the question of whether those practices generate the predicted pollutant reductions."

The report — *Achieving Water Quality Goals in the Chesapeake Bay: A Comprehensive Evaluation of System Response* — says there is a high degree of uncertainty about the effectiveness of efforts to control polluted runoff. Monitoring and model estimates often do not align.

Part of the reason, the report said, is that the effectiveness of BMPs may vary widely from place to place and perform differently under different conditions. In addition, it can take years for some BMPs to become fully effective. Plus, it is difficult for BMPs alone to offset the impact of more livestock and fertilizer.

"We treat the nonpoint source BMPs like they have the same absolute certainty as upgrades at point sources," said Kurt Stephenson, an agricultural economist with Virginia Tech and an author of the recent report.

The report cites the need for more local water quality monitoring and analysis. Much of the monitoring in Bay rivers is done at scales too large to be certain about what factors drive observed nutrient trends.

It called on the Bay Program to be more flexible in promoting innovative approaches that might produce better, and more measurable, results than simply counting BMPs. But it would take time to test new approaches in a local area, monitor results, then apply them elsewhere if successful.

Tight cleanup deadlines in the past have hindered efforts to ramp up localized monitoring that could help document whether runoff control efforts were producing the predicted results.

Monitoring streams is expensive, and it usually takes a decade or more to sort out year-to-year variations caused by weather and to identify trends. Bay cleanup deadlines have typically been set roughly a decade into the future, and that doesn't allow enough time for monitoring to inform decision-making.

"Our goals always said we're going to do all this way faster than that," said Tom Simpson, a retired University of Maryland soil scientist who for years headed a Bay Program committee overseeing nutrient reduction strategies.

The lack of monitoring to ground-truth model estimates generates skepticism of the results. Many in the agricultural community say the model does not accurately reflect actions on the ground and leads to frustration with the Bay effort. Within the Bay Program, the Dartmouth College survey found that many in management believe the model underestimates nutrient reduction efforts. On the other hand, many in academia believe the model overstates progress.

Bay restoration efforts may require even greater emphasis on streams and rivers. (Dave Harp)

Thinking locally

Ultimately, meeting Bay goals may mean spending less time looking at the Bay and more time looking at the rivers that feed into it — and how people impact those waterways.

The recent science report suggests that focusing nutrient reduction and habitat improvement projects on shallow areas along the Bay and small "triblets" that feed into it could produce faster results, with more benefits to the aquatic life that is supposed to benefit from the cleanup.

That approach could support public engagement too. Making significant improvements in a waterbody as large as the Bay in a short time frame is difficult, the report notes, and goals toward that end can create unrealistic public expectations. Bay report cards highlight the situation when they issue basically the same grade each year.

"There's a certain amount of fatigue when every year the entire Bay gets a 'C' or 'D,'" said Denice Wardrop, director of the Chesapeake Research Consortium, which helps coordinate Bay-related activities at research institutions, and an author of the recent report. "If you report on the condition of things at the local scale, tons of people are engaged and involved."

Future Bay goals, many suggest, could be more effective if they put as much emphasis on restoring healthy streams as they do on estimating nitrogen and phosphorus reductions.

"The Bay is a hugely important impaired waterway, you just can't get around that," said Garber of the Stroud Water Research Center. "So we've got to deal with that impairment. But we can't put our local stream and river impairments — not just in Pennsylvania but in the other states as well — at a much lower level or priority and expect to make progress."

Stroud's Ehrhart said their work shows that engaging farmers with information about the health of local streams, and how their actions can improve it, is the most effective means of getting buy-in for conservation work.

"If farmers continue to be confronted with the Bay message, they dig in their heels, they defend their farms and agriculture generally, and they question the model, and it becomes a blame game," Ehrhart said. "If you instead shift to the stream and the practices around their own stream, there's an ability for us to get them working together to change their stream in a much faster timeline. It really creates a very, very different discussion."

Those could also build more public engagement, something many say has historically been limited — or rushed — in the Bay cleanup process. And it's particularly important for working with farmers, who manage so much land in the Bay watershed and are often asked to take actions that are counter to their own economic interest.

Kathryn Brasier, a professor of rural sociology with Penn State, and some of her students reviewed the development of Pennsylvania's county action plans.

While some, like Lancaster, had effective stakeholder engagement and led to consensus plans, others had less time and support. That led to a top-down, Bay-centric approach, as opposed to discussions about how actions might improve local waterways, Brasier said.

"The speed with which they had to act meant that they couldn't have the kinds of deep conversations and longer-term cultural change," said Brasier, who is also vice chair of the Bay Program's Agriculture Workgroup. "That is what I think is needed. In many cases, it wasn't allowed to really bloom in a way that focused on relationship building, rather than just filling out a report."

Lisa Wainger, an environmental economist with the University of Maryland Center for Environmental Science, who has conducted numerous interviews and listening sessions with farmers, said the Bay effort would have been further along had such farmer engagement taken place earlier, but "we wasted a bunch of time not listening to them and not engaging them."

"Now," she said, "we basically have to reset the clock for the agricultural community because we need to figure out what works. We need to figure out what's compatible with diverse operations. And we need to figure out what are the right incentives for getting those practices implemented on enough farms."

To some extent, that may be starting to happen. Adam Ortiz, the EPA regional administrator, has spent a large amount of time in Pennsylvania, especially Lancaster County, meeting with farmers, the Farm Bureau and others working on agricultural programs.

He's gotten generally high marks for his efforts; he and state Farm Bureau representatives — who had sued the EPA over the TMDL a decade ago — have appeared at many joint events promoting Bay efforts. "We're focused on developing buy-in and cultural change among small farmers," Ortiz said.

Whether that continues remains to be seen. What is certain is that the path forward will certainly be longer and require new thinking, new approaches and investments in the infrastructure that restoration work is built on: people, water quality monitoring and the streams that flow into the nation's largest estuary.

"If there's anything [the 2025 goal] should be doing right now," Corbin said, "it should be making us have those conversations that we put in the box and stuffed under the bed for such a long time. It's time to have them." ■

Satellites, drones join fight against air pollution in PA

Technology reveals otherwise invisible emissions from gas wells, chemical plants

By Ad Crable

In the summer of 2021, a twin-engine special research aircraft took off from State College, PA. Over three weeks, the plane flew 10,000–28,000 feet over oil and gas wells, landfills and coal mines in four regions of the state. The mission was to pinpoint sources of high levels of methane gas, or "super emitters," for the nonprofit group Carbon Mapper and its funding partner, U.S. Climate Alliance.

From a hole cut in the belly of the plane, they trained a camera-like device developed by NASA — an imaging spectrometer — that uses light wavelengths to pick up escaping plumes of methane. Methane emissions are the second-largest cause of global warming after carbon dioxide, and controlling them is increasingly considered a key to arresting climate change.

Methane is invisible to the naked eye. But spectrometers, and devices like them, detect and measure the infrared energy of objects. The cameras then convert that data into a three-dimensional electronic image.

For the 2021 aerial probe, Carbon Mapper targeted areas of generally high methane levels that the organization had previously located using readings from space satellites operated by the European Space Agency.

During the flights, the researchers found 63 super emitters. Most, they concluded, were the results of leaks and malfunctioning equipment.

The Pennsylvania Department of Environmental Protection, which collaborated in the project, was thrilled by the reactions they received when they took the results to the sources of the highest emissions. The operators of six landfills and six oil and gas wells responded by voluntarily fixing equipment or taking other steps to reduce emissions.

"That's a really positive thing. This is existential proof that making methane visible can lead to voluntary action," said Riley Duren, Carbon Mapper CEO and founder.

In Pennsylvania, the use of this and other technology has energized a new breed of environmental activism aimed at detecting air pollution from the sky and from the ground. Their tools include satellites, airplanes with specially equipped air monitors and ground-based remote-sensing cameras like those used by government regulators and gas operators to find leaks.

This infrared camera was used to capture images of methane escaping a natural gas well in Lycoming County, PA. (Earthworks)

Sometimes, communities and groups use these devices to document problems. They also use them to document air quality before gas wells or petrochemical plants are built.

"It's not our parents' or grandparents' environmentalism. It's definitely not just sitting in trees. It's a different type of environmentalism and it's much more sophisticated," said Justin Wasser of Earthworks, a national environmental group that helps communities fight oil, gas and mining pollution.

High tech eyes

Later this year and in early 2024, Carbon Mapper and its partners, which include NASA's Jet Propulsion Laboratory and Planet Labs, plan to launch two satellites to monitor methane emissions around the world. The first phase of the monitoring program has a $100 million budget, all funded by philanthropy.

Also early next year, a satellite dubbed MethaneSAT, funded by such high-profile financial backers as Elon Musk and Jeff Bezos, is scheduled to begin orbiting the Earth to monitor methane emissions.

"Methane satellites are going to dramatically change this work. This time next year, you and I are going to be talking about how astronomically large this problem is and why we haven't been working on this for years," Earthwork's Wasser said.

Since 2020, the Pennsylvania-based group, FracTracker Alliance, has used ground monitors in southwestern Pennsylvania to document the cumulative effect of air pollution from fracking wells and petrochemical plants.

Now, armed with a $495,000 federal grant from the U.S. Environmental Protection Agency, the group has purchased a drone that will carry infrared cameras over wells and gas-related petrochemical plants, looking for methane releases as well as smog-forming chemicals and volatile organic compounds. The grant is part of a new federal initiative to enhance air quality monitoring in communities across the U.S.

"This kind of camera never seemed possible before. It seemed like a wish list," said Ted Auch, FracTracker's primary drone operator. "We'll be deploying drones in a lot of hard-to-reach spots like up a hill, in a hollow, around a corner. We can pinpoint smokestacks."

The group hopes that the data it yields will bolster the group's stance that new gas well permits should be granted only after considering an area's cumulative air quality, executive director Shannon Smith said.

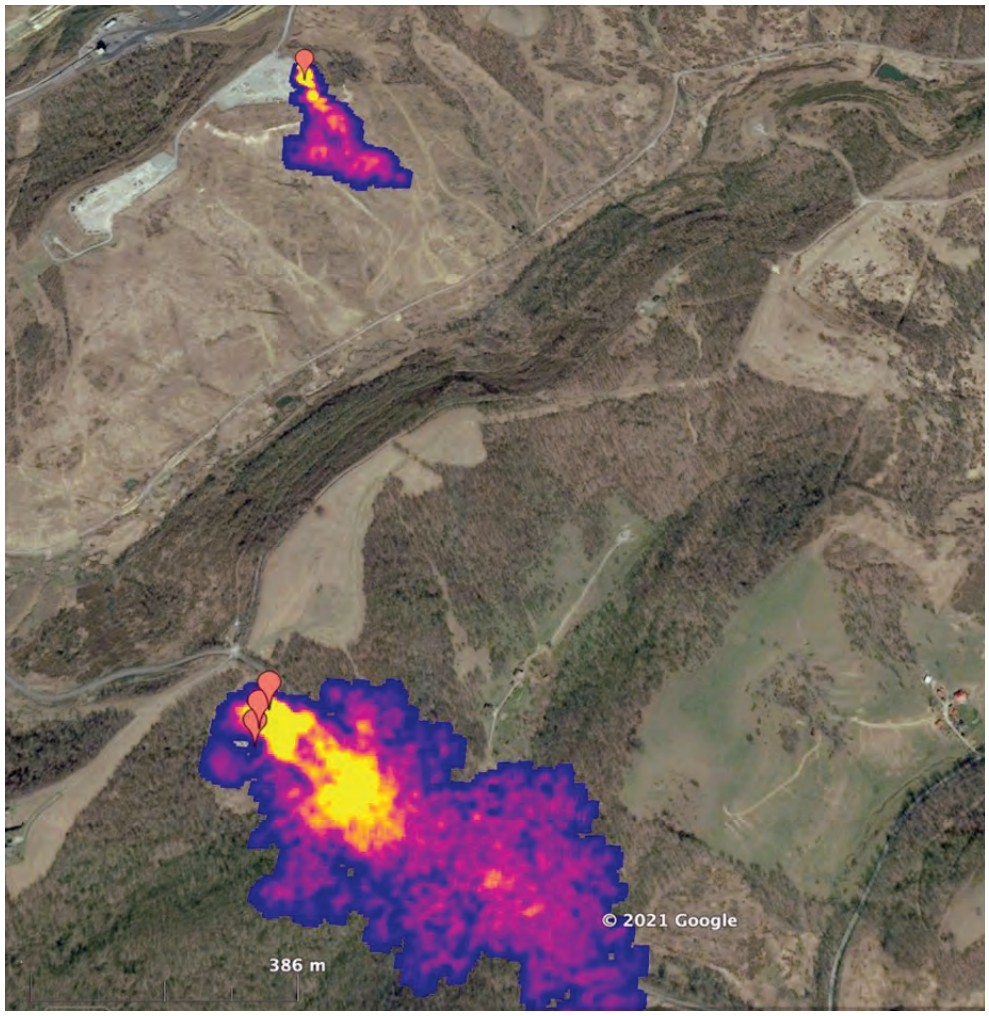
Christina Digiulio, a retired analytical chemist now working for the Pennsylvania chapter of Physicians for Social Responsibility, gets busy when she fields a health complaint from a resident living near a gas well, gas-based petrochemical plant or a landfill that's accepting fracked-gas waste.

A certified thermographer, she lugs a $100,000 gas-imaging forward-looking infrared (FLIR) camera to a gas well pad or the fence line of an industrial plant to look for plumes of methane and volatile organic compounds.

"We are using technology now that the industries have kept to themselves. We are an extension of our own regulatory agencies," she said.

A camera that sees infrared lightwaves captured this daytime image of methane emissions (the orange "smoke") from a gas-fired power plant in Pennsylvania. These emissions are not visible to the naked eye. (Physicians for Social Responsibility, PA Chapter)

Melissa Ostroff, a licensed thermographer for the environmental group Earthworks, used an infrared camera to detect methane leaks from a natural gas well in Pennsylvania. (Earthworks)



Colored blobs from an imaging spectrometer operated from an airplane indicate methane gas releases from a natural gas well pad (top) and from vents in a coal mine (bottom) in Pennsylvania. (Carbon Mapper)

Getting results

Environmental groups that share findings from their high-tech devices with regulators and gas operators report mixed results.

After the 2021 flights departing from State College, Carbon Mapper found that 60% of the methane releases documented were coming from vents in active and old underground coal mines — more than from oil and gas sources combined. Although venting is allowed to prevent the buildup of gases for safety reasons, regulators and researchers alike were surprised at the volume.

But the coal industry did not cooperate in measuring emissions from the mines and threatened criminal trespass charges for flying over them, DEP's Sean Nolan told the agency's Air Quality Technical Advisory Committee.

For the past two years, Melissa Ostroff, a thermographer for Earthworks, has roamed Pennsylvania with a handheld FLIR camera looking for fugitive methane and other invisible pollutants leaking from hundreds of active and abandoned oil and gas well sites as part of the group's Community Empowerment Project.

Of 52 instances of methane leaks she has reported to DEP, the agency sent someone to inspect the sites 31 times. Often, she said, equipment malfunctions causing the emissions were fixed.

In one of her most visible investigations, Ostroff found a gas well leaking methane gas in a popular park in Allegheny County. She reported the pollution to both the gas company and DEP. Within days, the leak was repaired with new equipment installed.

Digiulio once detected emissions coming from a compressor station on a liquid natural gas pipeline being built in the eastern part of the state. She notified her state senator, who determined that the company did not have a permit for releases. Work stopped until a permit was obtained.

But some environmental groups said that their reports to regulators of unauthorized pollution go unchecked or that operators are allowed to fix problems without being cited for violations.

On May 11, the Environmental Integrity Project and Clean Air Council filed a federal lawsuit to halt illegal releases of pollutants from a massive Shell plant using natural gas to produce plastics near Pittsburgh. The groups cite unpermitted releases of pollutants recorded, in part, by high-tech air monitors that Shell agreed to install as part of a previous settlement agreement.

Funding boosts

The increased use of citizen science is getting support from the federal government.

Under the EPA's proposed new nationwide rules to regulate methane gas, oil and gas drillers would be required to act on potential leaks at super emitter sites found by third parties, such as environmental nonprofits, universities and others.

In a separate initiative, the EPA has announced $53 million in grants in 37 states, including the Chesapeake Bay states of Pennsylvania, Virginia, Maryland, New York and West Virginia, to fund grassroots monitoring efforts in communities. The money will help pay for the purchase and deployment of various devices communities can use to detect air pollution, emissions and possible causes of health problems.

Pennsylvania will receive 11 grants under the program, with four supporting work by the Environmental Health Project to analyze air quality data as well as helping communities to understand it. A grant to the Maryland Department of the Environment will help reduce air pollution found by sensors in three environmental justice communities, and Virginia will receive two grants to enable the Upper Mattaponi Indian Tribe to set up an air quality program in their community.

The aid for monitoring "will finally give communities, some who for years have been overburdened by polluted air and other environmental insults, the data and information needed to better understand their local air quality and have a voice for real change," said Adam Ortiz, EPA administrator for Mid-Atlantic region.

Though thrilled to access equipment that can help amass hard evidence of pollution, some environmental groups are wary that they may have an increased role in protecting public health when it is the responsibility of government agencies to do just that.

"The data does not have the weight of EPA's Clean Air Act's requirements," said Nathan Deron, the environmental data scientist for the Environmental Health Project. "At the end of the day, it's up to DEP and other state regulators to listen to communities and act on the data that is being gathered."

"We have more advanced technology. The gas industry does, too. But that, in itself, is not enough to influence policy if the political will isn't there," FracTracker's Smith added. "We want to influence regulators to put in more protections." ■

Whitewater on West Virginia's Cacapon River is worth the wait

Top photo: Along the Cacapon River in West Virginia, low-lying rock ledges lead to a quickening of the pace. None of the rapids are classified higher than Class II, making for a relatively stress-free paddle. (Jeremy Cox)

Inset photo: A rock outcrop looms at the edge of the Cacapon River, which flows through valleys and gorges between the Blue Ridge and Allegheny mountains. (Jeremy Cox)

By Jeremy Cox

It has been some days, as of this writing, since my canoe trip down a 9-mile segment of West Virginia's Cacapon River, but one scene continues to play on a loop in my memory.

It goes like this: The tip of our two-person canoe approaches a ledge — basically a miniature waterfall. Seated in the front, I watch as the bow dips forward a couple feet, yanking us and the rest of the vessel downward. My stomach recoils. The water froths. Rocks scrape the hull from every direction.

My inner dialogue takes over: "Did I lean too far? Is the seat slipping out from under me?" I dig the outer sides of my legs into the canoe's metal rim. No time for breath. Only hanging on.

Then, stability returns. What seemed impossible a few seconds ago — making it past this ledge dry and upright — has turned into exuberant reality. A thrill blooms, rises to my lips and escapes into the air as a falsetto "Wooooooooo!"

We careened down so many ledges that April day, I lost track of the number. But each was just as exciting as the last.

Before I sound too self-congratulatory, it should be noted: Nothing along this stretch would qualify as anything more than Class I rapids, the gentlest category of moving water. And the rapids were interspersed by much longer, peaceful sections of walking-pace currents.

The result: a memorable ride through stunning sandstone gorges and leafy landscapes that even novice whitewater paddlers (like me) can enjoy.

As rivers go, the Cacapon (pronounced "kuh-KAY-pun") is a strange animal. To begin with, the river flows from south to north, emptying into the Potomac River about 80 miles west of Washington DC. So, when you head upstream, you're moving south.

And, in a way, it's two rivers in one. There is a 31-mile upstream segment known as the Lost River. This is because it disappears beneath a rocky ridge when water levels are low. But even when it's not visible at the surface, the river continues underground for more than a mile between the towns of Baker and Wardensville.

Once it reemerges, it becomes known as the Cacapon, derived from a Native American word for "medicinal waters."

The combined 112-mile course drains 680 square miles.

Despite relentless development pressure from the DC metropolitan area, about 85% of the Lost/Cacapon River watershed remains forested. This natural buffer helps to filter stormwater flowing off surrounding farms, and the Cacapon's waters are clearer for it.

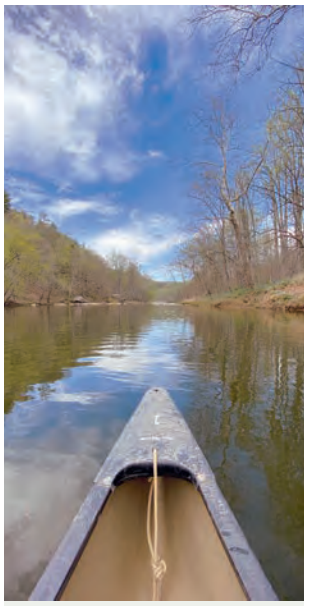
On a sun-bedazzled Friday morning, I joined a dozen paddlers for a planned group outing down a winding section of the Cacapon. We put in on the east side of the WV Route 127 bridge and wended our way downstream to a takeout at Cacapon Crossings. Both access sites are public and maintained by the state Division of Natural Resources.

The area generally corresponds to the rustic middle portion of the Cacapon. Here, no roads parallel the river. Except for a gated community straddling the final mile, there are only a smattering of home sites. Much of the land is either too rugged for development or under some form of protection.

Our flotilla consisted of several local environmental movers and shakers. Among them: Emily Warner, executive director of the Cacapon

Court Ogilvie, left, and Glenn Archer set off on a Cacapon River paddle, after launching at the Route 127 bridge boat ramp. (Jeremy Cox)

Canoers paddle downriver past a gentle patch of rapids. (Jeremy Cox)



& Lost Rivers Land Trust; Glenn Archer, vice president of the Friends of the Cacapon River; Ryan Cooper, the region's conservation planner for Trout Unlimited; and Will Evans, an ecological restoration coordinator with the West Virginia Nature Conservancy.

I had lugged my own kayak from home, a four-hour drive away on the Eastern Shore of the Chesapeake Bay. But when Archer offered up the front seat of his canoe, I readily accepted.

I had been uncertain about how my experience on flat water would translate to a more kinetic environment. I'm accustomed to tides and wind. But rocks and rapids are not often found on the Eastern Shore.

It turned out that Archer's knowledge of these types of waters and his proficiency with an oar more than compensated for my shortfalls. He whiled away his summers as a youth on his grandparents' farm along the Cacapon a little way upstream from where we were paddling. With their children now grown, he and his wife recently returned to live on the property most of the time.

Archer's expertise was on display almost immediately. Within a few hundred yards of launching, we arrived at an outcropping of submerged rocks. While others in our party scrambled out of their kayaks or canoes to drag them to deeper water, Archer stayed seated. Using his oar like a pole, he freed us with a few smart thrusts of his blade into the river's hard bottom.

Much depends on precipitation. If there isn't enough, the Cacapon will be too shallow to float even a kayak. The general rule is that the gage at the town of Capon Bridge must register at least 2 feet in depth to make paddling possible. That's usually the case in the spring and fall but rarely so in winter and summer.

If we had scheduled our trip a few days later, it's unlikely we would have been able to pull it off. It hadn't rained the previous two weeks. Water levels were low and dropping.

No matter how often he paddles the Cacapon, Archer said, he never encounters the same river twice. Rainfall, or the lack thereof, alters the depth, which in turn dictates the speed of the current, the height of the ledges and how much the rocks come into play.

Court Ogilvie, a solo paddler on this trip, put it this way: "I love it when it pours. It opens up so many opportunities. It's like snow to a skier."

The one constant with the Cacapon, everyone seemed to agree, is the clarity of the water. I had no trouble seeing the bottom. This is mostly a function of the watershed's relative lack of rooftops, roads and other types of drainage-blocking land cover.

"See that chute there?" Archer called out from the canoe's rear. I had no idea what that meant. Before I could ask, he was giving orders: "Hard paddle! Hard right!"

A "chute," he would explain to me once we had cleared the rapids, is a triangle-shaped wedge of free-flowing water that signals where gaps can be found between underwater rocks. You want to aim for those to avoid getting hung up on the rocks or catching an infelicitous current.

There were times when we would approach a ledge, and then, finding the chute too constricted or the downstream rocks too menacing, find ourselves paddling perpendicular to it until we could locate a more suitable entry point.

The scenery was a delight. For much of their length, the banks were coated with lavender-blue flowers. These native plants, Virginia bluebells, don't grow much more than a foot or two high, but they still put on quite a show. The hills were also bursting with dabs of pink from the blooming Eastern redbud trees.

At one point, Archer and I rested at the base of a bluff while the others caught up to us. Suddenly,

Virginia bluebells are a ubiquitous springtime sight along the edge of the Cacapon River. (Jeremy Cox)

he pointed to a skinny slick of brown fur stirring at the surface of the water barely 10 feet in front of us. It swam ashore, betraying its identity as a baby otter. It was carrying a small fish in its mouth.

The two of us just sat in awe. For the rest of the journey, we described the encounter over and over again to each fresh pair of ears.

You would have thought that we had timed our get-together for the spring bud break. When we first sank our oars into the water in the morning, the sycamores, oaks, tulip poplars and other deciduous trees still sported the bare branches of winter. Gently baked in the gathering warmth, the leaves began to emerge throughout the day. By late afternoon, all seemed green and lush.

That's probably not entirely true. But in the afterglow of a long, spirit-cleansing paddle, memories are all that matter. ■

IF YOU GO

The Cacapon River in West Virginia can be accessed at several public locations. The most popular section of the river runs between the town of Cacapon Bridge and WV Route 127, where the rapids can range from Class I to Class III.

A digital version of the Cacapon water trail map can be found at cacapon.org/resources/Cacapon-Water-Trail-Map-front-compressed.pdf.

Before you go, make sure the water is deep enough for paddling — it depends greatly on recent rainfall. Check the depth by going to americanwhitewater.org and searching for "Cacapon."

The recommended minimum depth at the Capon Bridge "virtual gage" is 2 feet.

Top photo: The prow of a canoe points downstream to gentle rapids in the distance, where the river's rocky banks close in.

A late spring thunderstorm moves over the Blackwater River on Maryland's Eastern Shore. (Dave Harp)

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Boaters gather along the shore of the Severn River to watch the Blue Angels' annual precision flight demonstration during commencement week at the U. S. Naval Academy in Annapolis. (Michele Danoff)

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Saving the Bay means creating a future with and for people

By Hilary Harp Falk

Children enjoy Fort Smallwood Park in Pasadena, MD, where the Patapsco River flows into the Chesapeake Bay. (Skyler Ballard/Chesapeake Bay Program)

What does it mean to save the Bay? That is the question we should be asking ourselves after reading the latest report from the Chesapeake Bay Program's Science and Technical Advisory Committee. The 132-page *Comprehensive Evaluation of System Response* is a painstakingly detailed examination of why progress to save the Bay has been slower than expected and is anticipated to take a lot longer. (See *Scientists say path to a better Chesapeake Bay is a slow one,* page 12.) After reading the report, with all the challenges it points to, I'm more energized than ever and hopeful this is our chance for a modern environmental awakening.

For the roughly half-century history of the environmental movement, we have been yearning to return to a pre-colonial time of clearer water, cleaner air and more abundant wildlife. We've sought to restore what was lost and preserve what is left.

This made sense in a world on fire from pollution and struggling to accommodate a skyrocketing population. But despite enormous effort and incredible progress in many areas, the resources we've sought to protect are still at grave risk. The water is not clean enough. The air is not safe enough. Wildlife continues to disappear. And climate change — not seriously considered 50 years ago — is an existential and immediate threat to all of us.

It's not that we've failed. We have cleaner water and cleaner air than when we started. It's that in trying to recreate the past, we've too often neglected to build for the future.

The world we live in today and the scale of the threats we face demand a new approach, one that builds on what has worked and looks forward, not back. Saving what is most precious to us isn't a matter of turning back the clock to an idealized time when nature flourished and human influence was minimal. It's creating a future in which humans and nature flourish together.

Nowhere is there greater opportunity to do this than the Chesapeake Bay watershed. The effort to save the Bay is one of this country's oldest, most-studied and most successful environmental restoration movements. And rightly so.

Even as a child growing up in Baltimore in the 1980s, when scientists declared the Bay was dying, I fell in love with its mysterious shorelines, the strange snails and fish I encountered while tagging along on assignment with my dad, a landscape photographer.

Later, as a young educator on Port Isobel, an island in the Bay that sits to the west of Virginia's Tangier Island, I fell in love with its people, among them the watermen who showed me what it was like to live off what the Bay provides.

It's impossible to separate the two — the people and the place. That's as true in Baltimore's bustling Inner Harbor as it is on remote Port Isobel, and it's a truth I saw repeated across this country's treasured landscapes while directing programs for the National Wildlife Federation. How can we create a future where both thrive?

To truly succeed in the next chapter of Bay-saving, we're going to have to widen conservation's historically narrow lens. We can no longer assume that all we need for a healthy Bay is enough oxygen in the deepest water — an improvement that is necessary, but not the only goalpost.

The Bay is more than its molecules and more than a piece of water in Maryland and Virginia. It's the streams our children play in, the shallow-water crab nurseries and the 18 million people who share its watershed.

The reason progress toward clean water is so difficult is that to achieve it, we need to ask a question we haven't always asked: What do *we* need, as humans and communities who love and depend on clean water in our backyards and the totality of riches this watershed provides us?

It turns out what we need and what the Bay needs are the same more often than you might think. We both need food systems that take care of the soil, produce nutritious foods that support local communities and economies, and are resilient to a changing climate. We need cities and homes that have green spaces, use energy efficiently and produce as little waste as possible. We need marine resource management that invests in the future by growing and tending the fish populations that support so much business, recreation and wildlife. We need air that is safe to breathe and water that is safe to drink, especially in the environmental justice communities we've left behind.

Our task isn't returning the mighty Chesapeake Bay to a past state, it's creating a Bay-region ecosystem that is vibrant and functions for all of us, now and in the future. That starts with a shift in focus. We need to look beyond just measuring dissolved oxygen and place more weight on improving habitat in our streams, rivers and marshes — the cradles of life for the Bay.

The Bay will never be saved by only looking backward. It will only be saved by concentrating on the road ahead, targeting our efforts and paying for outcomes that matter most to local communities. And when we succeed here, our success will be the model to follow for all conservation movements.

If we accept that we should seek not to save the Bay *from* people but *for* people, we will create a movement and watershed that work for everyone — for us and for nature. That is the opportunity we have together. ■

Hilary Harp Falk is president and CEO of the Chesapeake Bay Foundation.

A man and his yard: a crowded eighth-acre explained

By Tom Horton

Tom Horton sits on the steps of his home in 2015, surrounded by trees and other plants. (Dave Harp)

I've always thought peoples' yards say something about their owners. My eighth-acre plot in the city of Salisbury, MD, is shaggy and cluttered, a study in dishevelment, testament to fecund dishabille. Indulgent — but underlain by purpose, great and small.

I began the essay known as 225 South Blvd. some 15 years ago, and it is now as good as anything I've put between the covers of a book. Began it with crabgrass and a shovel, fueled by an aversion to mowing and to raking leaves (it still astonishes me how radical that last notion remains).

I was inspired by reporting trips to some of the world's finest forests and by my buddy Nick Carter's old farm in the Choptank River watershed that he and wife, Margaret, have been reverting to nature for more than half a century.

Over the years I've compared my budding enterprise to a journalist advocating free speech, the soils allowed to utter all their notes rather than drone the tone of lawn. I also touted it for sequestering carbon, slowing and purifying runoff to the Chesapeake Bay, boosting migrators and pollinators and reducing energy use by adding summer shade.

But truthfully, I just wanted to see leaves and berries and blossoms out every window of my urban bungalow. Shovel by shovel, plant by plant as budget allowed, a loose plan took shape.

I wanted winter interest, which led to hollies and American osmanthus and interesting bark river birch, paperbark maples, heptacodium. (Some know the latter as seven-son flower). Fall color dictated black gums and fothergilla.

A bevy of witch hazels blaze in February and March, as well as a little, underutilized bush known as leatherwood, which not only blossoms reliably in deepest winter, but does so in deepest shade.

Fragrance seems a good thing, so I deployed many native azaleas, which blossom in spring and come from seeds collected in the 1950s along the Choptank River near Nick's place. They are followed by fringe trees, whose May panicles of sweetish, frothy cream tell me it's time to paddle the nearby Pocomoke River, where they festoon the forested banks.

And oaks! Oaks are hot tickets in the last few years thanks to the efforts of botanist and author Doug Tallamy, whose research has confirmed that of all native trees, oaks offer the best eatin' for insectivorous nesting birds. I have 11 varieties: the usual white and red oak, as well as oglethorpe, georgia, arkansas, turkey, blackjack, dwarf chinquapin and runner oaks, plus a couple I forget.

I hear readers worrying: All those oaks on an eighth of an acre? Doesn't he know they get big? But take a walk in a forest and see how close many large species grow. I also reserve the right to cut if needed — indeed, I have long since traded my lawn mower for a cordless pole trimmer.

Not all oaks get big, and I've found species like tulip poplar, which can soar but also naturally occur in smaller mutations. My plants grow slowly, as I don't fertilize, except to add a compost made of raked up leaves from Montgomery County, MD. (And why are we transporting Montgomery County's leaves so far and wide from Montgomery County's trees? Don't get me started.)

No slave to native species am I, though I'd guess that of the yard's 100-plus species 75% are native. Native to where, you might ask — Salisbury, the Delmarva Peninsula, the Mid-Atlantic, the Eastern U.S.? Yes. Even a native of the Midwestern prairie, *silphium perfoliatum*, or cup plant, whose deep tap root loves my sandy loam and draws more pollinators than any of the others.

Urban verdure-holics like me do have an ace in the hole when it comes to variety: no freakin' deer, which the Nature Conservancy calls the biggest threat to forest biodiversity in these parts.

Rabbits and squirrels and voles do minimal damage. So it is that gnarly sparkleberries reside here with Alabama crotons, joined by anise plants and five kinds of dogwood and tropical-looking but winter-hardy Ashe magnolia, whose blossoms can span nearly a foot wide. Also maples: red and chalk bark, trident and Japanese. And various buckeyes: bottlebrush, red and painted. It's a funny thing that even a small yard never seems quite full up.

About the time I could not cram in another tree (except for that shagbark hickory I stuck in the back corner, I discovered Virginia bluebells and other shade-loving groundcovers. And as soon as that's "done," I'm thinking about native crossvine and maybe dutchman's pipe to train up my back fence where I've torn off invasive ivy.

Then there's probably the best habitat my efforts have wrought. You cannot do my kind of yard without dedicating space for a brush pile. Mine is full of songbirds and pretty surely a possum family that nocturnally gnaws on the oyster shells along the drip line of the porch after I shuck some.

My yard has also become something of a memorial in recent years. As loved ones and folks who've inspired me die, I name a tree or bush for the departed, hanging aluminum tags on a branch (one didn't depart after I had named a nice longleaf pine after him, but the pine can wait).

For all of the Bay– and planet-saving reasons to green this place (I've even planted the driveway now), I just purely enjoy all of the textures and scents and shapes and botanical knowledge I've gained — and the way light reflects off and filters through the plants, how they toss in the breeze as I sip my morning coffee and evening wine or write from my little office shed.

"I wake up each morning torn between saving the world or just enjoying it," said the writer E. B. White. With my yard I can do a tad of the former and a ton of the latter. ■

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.

Letters to the Editor

Acknowledge the 'cow' in the room

Regarding the April *Bay Journal* article, *Maryland lawmakers boost offshore wind, forest conservation among flurry of 'green' bills:* As an advocate for environmental health and justice, it continues to astonish me that our lawmakers largely refuse to address the elephant (or cow, rather) in the room when it comes to tackling the near-irreversible effects of an ever-warming planet. Then again, it's hardly that surprising since the animal agriculture lobby spends millions of dollars each year to push Americans to eat more meat, dairy and eggs, while downplaying the massive environmental health impacts those foods create (see insideclimatenews.org/news/02042021/meat-dairy-lobby-climate-action).

While it's good news that Maryland is pursuing environmental boosts such as offshore wind production, solar energy and land conservation, there was no mention of any legislation addressing the role animal agriculture plays in environmental destruction. The production of meat, dairy and eggs is responsible for greenhouse gas emissions that are more potent than carbon dioxide. Methane (from cows) and nitrous oxide (from fertilized soil and animal waste) are much more effective at trapping heat in the atmosphere than carbon dioxide. Animal agriculture generates more greenhouse gas emissions than the transportation sector.

Although it was encouraging to read about the environmental justice efforts addressed during Maryland's 2023 General Assembly, it's disappointing that the effects of animal agriculture were not included within this component. Numerous studies have shown that areas with factory farms, including here in Maryland, lead to increased illnesses due to high levels of bacteria, pathogens, chemicals, and heavy metals in the air and water. Studies also show that living near industrialized animal farms correlates with higher levels of poverty and crime, a lack of access to healthy foods, and lower property values (see mdpi.com/1660-4601/18/21/11039).

So, what is one reasonable solution to effectively combat the climate crisis while ensuring farmers maintain their livelihoods? We need lawmakers to begin funding transition programs that help animal farmers switch to climate-smart commodities. Furthermore, as the plant-based food and materials sectors continue to expand, it only makes sense to help farmers grow in-demand crops such as oats, chickpeas, and hemp (see ffacoalition.org/articles/livestock-transition). They are not only healthier for us but healthier for the planet. Lastly, we cannot forget about the 2023 Farm Bill currently being drafted on Capitol Hill. This projected $700 billion piece of legislation, which affects all of us, has every opportunity to truly do good for the planet. But only if we push for it by changing our diets and helping farmers where it matters most.

Alissa Kircher, Leonardtown, MD

Crabs like it hot (but not that hot)

Maryland may as well wave goodbye to its favorite signature tasty treat and a critical part of the Chesapeake Bay food web. A 2022 survey by the Maryland Department of Natural Resources estimated that the Bay's blue crab population is currently at 227 million, a 500 million drop since 2012 and the lowest population count ever recorded. Clearly, something is going on with the Chesapeake Bay.

One cause could be dead zones — areas with such low levels of oxygen almost nothing can survive. These can arise in natural ways, but in recent years human causes such as agricultural and urban runoff and treated wastewater bring excess nutrients into the Bay, amplifying dead zones and their ability to suffocate ecosystems. Warming temperatures, slow or stagnant winds, and increased rainfall all contribute to increases in algae blooms and dead zones.

Coincidentally, the average temperature for the Bay in July 2021 was 81.5 degrees — great for beaching but not so much for crabs, and water temperatures have increased by roughly 2 degrees since the 1960s with no indication of slowing down. The Bay is pushing these crustaceans to their limits, and it may prompt blue crabs to find better, healthier water.

Crabs are netted from a trotline in Maryland's Little Choptank River. (Dave Harp)

The Chesapeake is the largest estuary in the world, and the problems at hand are daunting but not irreversible. Insisting that the Bay states (especially Pennsylvania, Virginia, and Maryland) meet their 2025 pollution reduction deadline is the least we can do to preserve this unique ecosystem and all the organisms and people that depend upon it.

I, for one, would hate to imagine a day where someone would need to travel outside the Bay region to even get a glimpse (or taste) of Maryland blue crabs.

Alexandra Wettengel, Dameron, MD

Gill nets are killing fish in VA

Gill netters in the shallows around Fleeton Point in Reedville, VA, are destroying the striper population. In a few weeks recently, four large striper bass along with two sturgeon have washed up on my shore.

I reported this to the marine police, and they were certain these fish were killed in the small gill nets. The officer stated that the netters are not allowed to keep sturgeon or striper bass larger than 36 inches, so they just float them to wash up on the shore for scavengers. The stripers that washed up on my shoreline were 44 inches, 38 inches and two at 37 inches. The sturgeon were approximately 24 inches and 39 inches.

My shoreline is only 200 feet long. I can't imagine how many fish are killed and wasted along the entire shorelines around the Chesapeake Bay. This is why all other states that border the Bay other than Virginia have outlawed the use of these small gill nets.

I've also started filming the netters that haul from the net in front of my property, and every day they pull anywhere from 50 to 150 juvenile stripers or drum (12 inches to 20 inches) from one small net. In the last three weeks they have killed well over 1,000 juvenile striper bass. This is only one net, and there are eight to ten nets in this area. Therefore, it's possible that over the last three weeks they could have killed over 10,000 juvenile striper and puppy drum. I have photographs of the fish that have washed up and recordings of the daily fish haul for proof of this massive fish kill.

How do we stop this?

John Taggart, Reedville, VA

SHARE YOUR THOUGHTS

The *Bay Journal* welcomes comments on environmental issues in the Chesapeake Bay region. Letters to the editor should be 300 words or less. Submit your letter online at bayjournal.com by following a link in the Opinion section, or use the contact information below.

Opinion columns are typically a maximum of 900 words and must be arranged in advance. Deadlines and space availability vary. Text may be edited for clarity or length. Contact T. F. Sayles at tsayles@bayjournal.com, 410-746-0519 or at P.O. Box 300, Mayo, MD, 21106. Please include your phone number and/or email address.

CHESAPEAKE CHALLENGE

— Kathleen A. Gaskell

A

Flicker's hunting grounds are just that

Roughly 45% of a northern flicker's diet consists of ants, making this sizeable member of the woodpecker family the largest avian predator of these insects in North America. What percentage of this quiz will you get right? Answers are on page 36.

1. Northern flickers in the East are "yellow-shafted." Out West, they are "red-shafted." Where on the bird does this color variation occur?
   A. On the thighs
   B. On the nape
   C. Under the wings and tail

2. Flickers' beaks differ from other woodpeckers to make it easier to dig in the dirt. What is this adaptation?
   A. It is curved slightly downward.
   B. The tip is flattened.
   C. It is serrated.

3. True or False? Flickers only forage on the ground.

4. In the Bay watershed, flickers are the only woodpecker with what color feathers?
   A. Brown
   B. Green
   C. Orange

5. When a flicker isn't eating ants, it is rubbing the insect on or under its feathers, a behavior called "anting" that is practiced by more than 200 bird species. Which of these might be the reason(s), according to some ornithologists?
   A. The formic acid in the ant is thought to repel or kill parasites like lice or mites.
   B. The formic acid soothes the skin during molting.
   C. It masks the bird's scent so it can more easily sneak up on its prey.

6. Flickers are very protective of their eggs. One parent incubates the nest during the day while the other eats. At night, they switch roles. As a rule, which parent is on day-sitting duty and which one takes the night shift?
   A. Mom/day, dad/night
   B. Dad/day, mom/night

B

Title image: *Downy woodpecker (Michele Danoff)*

A *Northern flicker (Benjamin Miller/Public Domain)*

B *Pileated woodpecker (National Audubon Society)*

C *Red-bellied woodpecker (Michele Danoff)*

C

Wrap your head around these woodpecker points

Pecking order: Eight woodpecker species are found in the Chesapeake Bay watershed: the downy, hairy, pileated, red-bellied, red-cockaded and red-headed woodpeckers, as well as the yellow-bellied sapsucker and northern flicker.

Headbangers: A woodpecker has spongy plates inside the front and back of its skull that serve as cushions for its brain when the bird pecks a surface with a gravitational force of 1,200–1,400. (A g-force of 90–100 — the equivalent of a human skull hitting a wall at 20 mph — is enough to cause a concussion.) The woodpecker's brain is also tightly packed inside the skull so it doesn't judder as much.

Not a metal head, though: Woodpeckers can drum a metal roof or rain gutter harder than any rock band percussionist, but their beaks aren't sharp enough to penetrate the surface.

Tongue twister: To better get at the insects in a tree crevice, almost all woodpeckers have sticky tongues — many also have prickles. When not in use, the long tongue also wraps the back of the brain and neck, providing yet more padding as well as a harness to prevent the brain from bouncing around.

Give a suet, provide some grub: In addition to grubs and wood-boring insects, woodpeckers also eat spiders and ants, seeds, nuts, berries and sap. In the winter, when insects are scarce, many woodpeckers are nourished by energy-dense suet cakes hung at bird feeders. The cakes come in many varieties that can include insects, nuts, seeds or berries.

BULLETIN BOARD

VOLUNTEER OPPORTUNITIES

WATERSHEDWIDE

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

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

Citizen science: butterfly census
Friend of the Earth's *Global Butterflies Census* raises awareness about butterflies & moths, their biodiversity. Collect butterfly data to participate: When you see a butterfly or moth, take a close picture without disturbing it, then send it by WhatsApp message to Friend of the Earth along with your position's coordinates. The organization will reply with the species' name, file the information on the census' interactive map, database. Info: friendoftheearth.org. Click on "Projects."

PENNSYLVANIA

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

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

VIRGINIA

Prince William Bandalong
Help to empty trash out of *Bandalong*, Prince William County's trash trap on Neabsco Creek, every Friday. Participants also collect data. Info: Tim Hughes at thughes@pwcgov.org.

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

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

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

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

MARYLAND

Anita C. Leight Estuary Center
Meet 9-11 am June 11 at the Anita C. Leight Estuary Center in Abingdon for an Invasinators Workday. Ages 14+ (12 & younger w/adult). Remove invasive plants, install native species. Wear sturdy shoes, long sleeves, work gloves. Weather permitting. Preregistration recommended. Info: 410-612-1688, 410-879-2000 x1688, otterpointcreek.org.

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

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

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

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

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

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

Chesapeake Bay Environmental Center
Volunteer at the Chesapeake Bay Environmental Center in Grasonville a few times a month or more often. Volunteering more than 100 hours of service per year earns a free one-year family membership. Info: volunteercoordinator@bayrestoration.org.

Maryland State Parks
Search for volunteer opportunities in state parks at ec.samaritan.com/custom/1528. Click on "Opportunity Search" in volunteer menu on left side of page.

EVENTS/PROGRAMS

PENNSYLVANIA

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

- *Nature Walks:* 2–3 pm June 18 *(Father's Day)*; June 25 *(Summer Solstice)*.
- *Creature Corner Drop-ins*: 10 am–3 pm. June 15 *(Bears)*; June 22 *(Nesting Birds)*; June 29 *(Predators vs. Prey Skulls)*; July 6 *(Snakes)*. Display will include trivia, touchable objects, expert to talk to.
- *Nature Watercolor Class:* 9:30–11:30 am or 1–3 pm July 1. Teens & adults. Outdoor class, all materials provided. $10. Preregistration required.
- *Attic Clean-out Yard Sale:* 9 am–3 pm July 7–8. Wildlife paraphernalia. Cash only.
- *Reptile Story Time & Craft:* 9:30–11 am July 6. Ages 2–5. $5/child. Preregistration required.
- *Reptile Shows:* 10–11 am & 1–2 pm July 7. Live reptiles. $2/ages 3+; free 2 & younger. Limited space; preregistration required.

Submission Guidelines

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

DEADLINES
The ***Bulletin Board*** contains events that take place (or have registration deadlines) on or after the 11th of the month in which the item is published through the 11th of the next issue. Deadlines are posted at least two months in advance.
July-August issue: June 11
September issue: August 11

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

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

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

Answers to CHESAPEAKE CHALLENGE on page 35

1. C
2. A
3. False
4. A
5. A & B
6. A

BULLETIN BOARD

MARYLAND

Horn Point tours

The University of Maryland's Horn Point Laboratory in Cambridge is offering free walking tours through September:

- *Aquaculture Research & Ecology Laboratory:* 10–11 am Tuesdays through Labor Day. Ages 10 & older. Meet in lab's lobby for tour of the Atlantic Coast's largest hatchery that includes Bay facts and problems; Horn Point's research; citizens' roles as stewards; physical oceanography of the Bay; submerged aquatic vegetation; the Bay ecosystem; oyster restoration. Park under the solar structure. Special tours can be arranged. Info: 410-221-8383 or hpltours@umces.edu.
- *Oyster Culture Facility:* 30–60 minutes, weekdays through September. Ages preschool & older. See oysters spawn, baby oyster larvae, a working production facility. Info: Stephanie Alexander at tobash@hpl.umces.edu or 410-221-8310.

Win cash for snakeheads

The Maryland Department of Natural Resources and U.S. Fish and Wildlife Service are continuing a northern snakehead tagging program to spur the removal of this invasive fish. Up to 500 snakeheads will be tagged in the Gunpowder River, upper Chesapeake Bay tributaries, and Mattawoman and Nanjemoy creeks of the Potomac River. Harvest a yellow-tagged snakehead to receive $10, or $200 for a blue tag. Report the tag number to the phone number on the tag, then email a picture of the harvested, tagged snakehead to DNR. Only harvested snakeheads (those removed from the water & not returned) with a tag number that is reported in 2024 qualify for rewards. Info: web search "dnr snakehead incentive."

Butterfly walks

The Howard County Conservancy in Woodstock is offering free *Butterfly Walks* 10:30 am–12 pm June 20 & 1:30–3 pm June 25. Adults and ages 8+w/adult, will meet at Gudelsky Environmental Education Center to learn about butterfly identification while walking the trails, gardens. Bring a reusable water bottle. Leashed pets, while allowed on the grounds are NOT welcome on walks. Info: Susan Hobby at susan.hobby@howardnature.org, 410-465-8877. Registration required: Howardnature.org/events

Anita C. Leight Estuary Center

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

- *Morning Bird Kayak:* 9–11:30 am June 15. Ages 8+ Otter Point Creek water trails. $15. Register by June 14.
- *Kayak Cruising on the Creek:* 9:30 am–12 pm, June 16 or 23. Adults. Otter Point Creek, upper Bush River. $15. Register by day before.
- *Grown-Up & Me Kayak:* 9–11:30 am June 17. Ages 8+ Otter Point creek w/adult. $15. Register by June 16.
- *Butterflies 101:* 10:30–11:30 am June 17. Ages 8+ Learn what flowers attract these pollinators, make a craft to attract them to your garden. $10/family. Register by June 14.
- *Children's Gardening Series:* Three-session program meets 1–2 pm June 17, July 22 & Aug. 26. Ages 6–12. Learn how to keep moisture in & pests out. Harvest, eat edibles. $30. Register by June 14.
- *Sailing into Summer Canoe:* 9:30 am—12 pm June 20. Ages 8+ Otter Point Creek's channels. $15. Register by June 19.
- *Kids-n-Kayaks:* 2–4 pm June 24. Ages 5+ Learn about paddling safety, basic strokes, then explore Otter Point Creek. $15. Register by June 23.
- *Marsh Meander Canoe:* 11 am–1:30 pm June 25. Ages 8+ Look for signs of wildlife in the channels, lagoons of Otter Point Creek. $15.
- *Fingerprints of Fish:* 2-3 pm June 25. Ages 10+ Learn about using eDNA to study fish species. Free.
- *Water, Water Everywhere/Summer Nature Program:* 9 am–3 pm June 26–30 Ages 5–7. Games, experiments explore water cycle. Participants will get wet. $175.

MD Junior Ranger program

The *Maryland Junior Ranger Program* for children, ages 3-14, includes hiking, games, crafts. Participants can earn three achievement awards: basic, advanced & expert. After reaching the expert level, they can earn patches in self-guided levels: naturalist, explorer, conservationist, guide. To earn Junior Ranger status, children must attend all sessions. Check with park for availability. Info: Melissa Boyle Acuti at Melissa.boyle@maryland.gov. To download the Junior Rangers Adventure Guide, web search "MD jr rangers 2023 guide." Upcoming Sessions:

- *Tuckahoe State Park:* 6 pm Tuesdays June 20–25. Ages 4–6. Also 7 pm. Ages 7–11. Info: erin.gale@maryland.gov.
- *Cypress Branch State Park:* 7 pm Thursdays, June 22–July 27. Ages 4–6 & Ages 7–11. Info: erin.gale@maryland.gov.
- *Janes Island State Park:* 9 am–12 pm June 28–29. Ages 7–13. Info: Mark.Herring@maryland.gov.
- *Deep Creek Lake State Park:* 10–11:30 am Thursdays, June 29–Aug. 3. Ages: 7–13. Info: kathryn.barger@maryland.gov.
- *Seneca Creek State Park:* 9 am–12 pm July 3–7. Ages 7-10. Info: dylan.wagner@maryland.gov.
- *Elk Neck State Park:* 9:30–11:30 am July 5, 12, 19. Ages 7–10. Also July 6, 13, 20. Ages 11–14. Info: shawna.staup@maryland.gov.
- *Harriet Tubman Underground Railroad State Park:* 10 am–3 pm Tuesday–Sunday. Ages 5+ Info: michaelg.fray@maryland.gov.

MD Youth Fishing Rodeos

Youths, ages 3–15, can participate in the Maryland Department of Natural Resources 2023 Maryland Youth Fishing Rodeo. Registration required because of space limitations.

Frederick County

- *Burkittsville Town Pond:* 10 am June 17. Info: Sam Brown at 301-606-5479.

Washington County

- *Brownsville Pond:* 8:30 am June 17. Steve Kidwell at 240-344-0585.
- *Pangborn:* 9 am June 17. Bill Beard at 301-745-6444.

Worcester County

- *South Pond:* 9 am June 17. Lee Phillips at 410-208-1575.
- *South Pond:* 9 am July 15. Lee Phillips at 410-208-1575.

Free museum passes at libraries

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

Cruise St. Michaels Harbor

Chesapeake Bay Maritime Museum in St. Michael's is offering drop-in cruises aboard its floating fleet Friday–Sundays & select Mondays. These 45-minute *Harbor Highlights Tours* explore St. Michaels Harbor, its history. Fee: $25. Cruises dependent on marine conditions.

DNR photo contest

The Maryland Department of Natural Resources is accepting entries for its annual photo contest through 5 pm Aug. 1. It's open to resident or out-of-state novice & professional photographers. Entries may include wildlife, flora, recreation or landscapes from any year as long as photos were taken in Maryland. Contestants may submit three entries for $10. Additional entries (no limit) are $3 apiece. First, second, third place awarded for each season. A grand prize will be awarded to one of the first place winners. Winning entries will be featured in *Maryland Natural Resource* magazine & DNR's 2024 calendar. Best overall photo receives $500, a one-year Maryland State Park and Trail Passport, magazine subscription, five calendars. First, second, third place winners also receive prizes. Vote for a fan favorite on facebook.com/MarylandDNR, which will be printed in the calendar and magazine. Info: Web search "DNR photo contest."

Fishing report

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

Patuxent Research Refuge

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

- *Kids' Discovery Center - Snakes:* 9 am–12 pm (35-minute time slots, on hour) Tuesday-Saturday [S] Ages 3–10 w/adult. Crafts, puzzles, games, nature exploration, free booklet. Call 301-497-5760 to register for this event; large groups may request special arrangements.
- *Monarch Magic Center:* 9 am–4:30 pm Tuesday-Saturday [S] All ages. Daily sign-ups (in-person only) at info desk. Help release adult butterflies that are ready to fly at 12 pm; call to check. See all monarch life stages. No registration. Volunteers needed; call Barrie at 301-497-5772.
- *Managing Your Butterfly Garden:* 2 pm–3:30 pm June 10, July 15. [S] All ages. Visit gardens; learn how to best create/maintain gardens without toxic chemicals.
- *Easy Butterfly Habitat Gardens:* 2–3:30 pm June 17, July 8. [S] All ages. Plant & take home free native plants.
- *Family-Fun/Welcome Wildlife to Your Yard*: Drop in 10 am–1 pm June 23–24. [S] All ages. Activities, crafts, games. Learn how to provide a mini habitat. No registration.
- *North Tract Bicycle Trek:* 10 am–12:30 pm June 24. Ages 10+ See wildlife, plants, historical sites on 12-mile guided ride. Weather-dependent. Rough road may be unsuitable for narrow road tires. Bring bike, snack, water bottle, helmet.
- *Pollinators in a Pot:* 2-3:30 pm June 24. [S] All ages. Create a wildlife home in limited patio, deck space. Take home pots of plants for pollinators.

RESOURCES

NOAA interpretive buoys

The National Oceanic and Atmospheric Administration's Chesapeake Bay Interpretive Buoy System offers real-time weather and environmental conditions, info about Capt. John Smith's voyages in the 1600s. Buoys are located at Annapolis, Gooses Reef, Potomac, Stingray Point, York Spit, Jamestown and First Landing. Visit buoybay.noaa.gov/about/about-system to download app.

Community ambassadors are key to environmental work

By Amanda Bland

RiverSmart Homes ambassador Kim Sturdivant and her son, George, pick up trash at Oxon Run Park in Washington, DC, during a spring cleanup event. (Alliance for the Chesapeake Bay)

The streets we travel during our evening walks or work commutes are full of twists and turns, bumps and curves. These same streets carry the oil that drips from our cars, the fertilizers we spread on our yards, the salt laid on the street in preparation for the snow that often doesn't fall, and many more pollutants. When it rains, these same twists and turns carry those drops of water through our neighborhoods, yards and parks before draining into our creeks and rivers, and eventually into the Chesapeake Bay.

There are many things we can do to keep those pollutants out of the Bay, but only if enough of us take our commitment to environmental stewardship seriously.

Stewardship looks like many things. It looks like chatting with your neighbor about native plants on a Saturday morning, coffee cup in one hand, black-eyed Susans in the other. It looks like helping your elderly neighbor empty their rain barrel or handing out flyers about stormwater runoff at a community event in your neighborhood park. The list is virtually endless, but ultimately it's about individuals taking responsible steps to protect and conserve the environment so that we can enhance ecosystem resilience and human well-being.

For RiverSmart Homes Ambassadors in Washington, DC, it's a commitment that they've made to share information with their neighbors on stormwater problems and the practices that can help alleviate them.

The RiverSmart Homes program, which began in 2008, is a citywide program offering incentives to homeowners to reduce stormwater runoff from their properties. They can do this using rain barrels, shade trees, rain gardens, conservation landscaping and permeable pavers. Community members have been natural stewards of the program since its infancy, but in 2022 the Ambassador program was launched to provide a way for residents to take on a bigger role and increase their impact.

Thriving communities and thriving environmental conditions go hand in hand. When one is off, the other is unable to reach its full potential. Stewards play an important role in maintaining this balance — they are the bridge. They meet folks where they are. The places where we live, reside, play and work are some of the most crucial spaces. We all want to spend our day-to-day lives in areas that are flourishing so that we, along with our families and friends, can experience the highest quality of life.

By increasing access to stormwater management practices and providing education on how these installations treat stormwater, ambassadors can help meet community needs.

There is a saying that, "You don't know what you don't know." And the particulars of stormwater management fall in the what-you-don't-know category for many people — perhaps most people. But water is a powerful resource with a powerful influence on the environment. Excess stormwater can dramatically impact homes and other infrastructure through flooding and pooling, and it's a significant contributor to poor water quality in the Chesapeake watershed.

RiverSmart ambassadors share this vital message with their communities by connecting their neighbors to resources that alleviate some of these challenges, and ultimately lead to a healthier Bay and healthier communities. Stewardship initiatives, like the RiverSmart Homes Ambassador Program, help individuals not only recognize a gap but fill it.

People can engage in stewardship without participating in a formal program. The best place to start is to explore challenges and issues that you are already passionate about. Is it education, gardening, trees, stormwater controls, wildlife? We all have different interests and strengths. Some of us are natural communicators. Others may be most comfortable getting their hands dirty — planting trees, clearing stream culverts and working outside.

Stewardship comes from within: It's about uplifting communities through avenues they are already engaging in. It's about finding ways to take that engagement a step further.

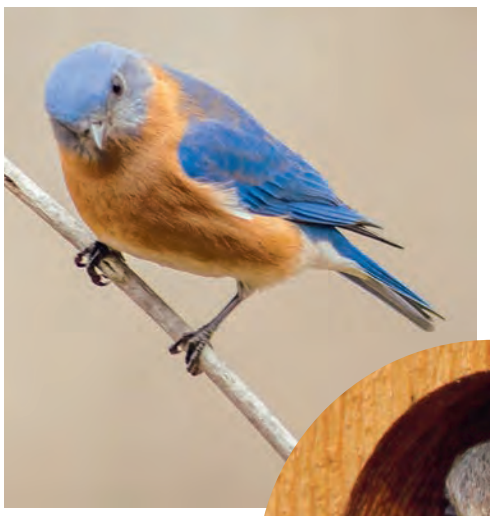
As I write this piece, I'm preparing to leave the Bay watershed and embrace a new one in San Diego, CA, in pursuit of a master's degree. As my time at the Alliance for the Chesapeake Bay comes to a close, I am more than ever pondering and inspired by the concept of stewardship and the steps we are willing to take to care for something we love and appreciate.

I've had the privilege of calling the Chesapeake region my home for my entire life and, as a member of this community, I feel a personal responsibility to care for it. As I prepare to leave this special place, I feel inspired by the many individuals I've witnessed giving their hearts, souls and precious time to a shared goal: creating a healthy, thriving, vibrant watershed for all who reside here. ■

Amanda Bland is the former infrastructure projects coordinator for the Alliance for the Chesapeake Bay.

If you build it (a birdhouse), the bluebirds will come

By Alonso Abugattas



A male eastern bluebird perches on a branch. Many bluebirds in the region are year-round residents, while others migrate south in the winter, preferring to stick to their diet of insects. (George Thomas/CC BY-NC-ND 2.0)

A female eastern bluebird looks out from her nest box. Human-made nest boxes have helped the species recover from its low point in the 1970s. (Dolan/CC BY 2.0)

A pair of bluebirds stake out a nesting box. A nesting pair can raise two or three broods per summer. (Virginia State Parks)

The eastern bluebird (*Sialia sialis*) is one of three species of bluebirds in North America but the only one you'll likely see in the Chesapeake Bay watershed.

Its two closest relatives, the western bluebird (*S. mexicana*) and mountain bluebird (*S. currucoides*), live where their common names suggest — the former in the U.S. West (and Mexico) and the latter generally in high elevations, also out west. The three populations are known to interbreed where their territories overlap, most commonly the eastern and western species. They are all members of the thrush *(Turdidae)* family of birds.

Measuring 6–8 inches from beak to tail (a bit larger than a typical sparrow), the eastern bluebird is the most widespread of the three species, ranging north to New England, west to Oklahoma and as far south as Central America.

Bluebirds were in severe decline in the mid-20th century, mostly from the loss of nesting cavities and competition from invasives such as house sparrows and European starlings. In 1978, the North American Bluebird Society was formed, and through its efforts bluebirds started to recover. They are now considered a "species of least concern."

One of the most effective actions was building proper bird boxes to make up for the loss of the tree cavities these birds need for nesting. There are many boxes available for sale, and you can build your own using the countless plans available online. Just web search "bluebird box," then be prepared for an afternoon's worth of comparison shopping. One of the most important features is an entrance hole no bigger than 1.5 inches to keep out larger birds like starlings and cowbirds. The bluebirds that come to your yard may well be year-round residents, so don't take down the box in winter, when it can provide invaluable shelter.

Next is proper placement, followed closely by the availability of native trees and plants. Bluebirds prefer edges and open habitats in or on the edge of a meadow and, if possible, away from buildings. Native flora is also extremely important; almost all of the food fed to young are insects that have evolved with native plants. A nearby small tree or sapling gives bluebirds a perch to guard their nests and provides a landing site for the young's first flights.

Place the bird box on a steel pole fitted with a predator baffle — a metal cone guard that keeps raccoons, snakes and other predators from climbing to the box. Also keep it well away from overhanging tree branches or high fences that predators might use to jump to the box. For extra protection, many people put a small metal cage (also available online) over the entrance hole to foil the most acrobatic predators.

Most people place bluebird boxes well away from each other — 200 feet or so — but there's also a school of thought that puts them closer together, even adjacent. This allows bluebirds and tree swallows to coexist and perhaps even team up to drive away predators.

Nest-commandeering house sparrows can be an issue, so if placing the bird box well away from buildings doesn't help, you can add a "scare baffle": short, parallel lengths of tightly strung monofilament fishing line, across and a few inches away from the entrance holes. The sparrow's eyesight is comparatively poor, and the line can be troublesome enough to send the interloper searching for an easier target.

There's also the so-called Gilbertson-design bluebird house made of 4-inch diameter PVC, often painted to look like the trunk of a small birch tree. The smaller and differently arranged interior is thought to be off-putting to sparrows.

Nonnative house sparrows are not a protected species. As a last resort you might be able to legally remove their eggs from a nest, although laws can vary by locality, so check first. Contact your nearest bluebird society (every watershed state has one) for tips and detailed information on these methods.

With a breeding season that extends from mid-May to late August, eastern bluebirds can have two to three broods a year, laying three to six pale blue eggs each time. These take up to three weeks to incubate, depending on climate, and another three weeks or so for the chicks to fledge.

Occasionally bluebirds lay their eggs in another bluebird's nest, particularly if there are not enough nest cavities present. Female bluebirds occasionally mate with more than one male, so the male that helps feeding the young is not always feeding its own.

Eastern bluebirds that migrate south travel short to intermediate distances. They feed their young insects and prefer these for themselves. When cold weather kills their prey, some switch to seeds, berries and buds. They also visit feeders stocked with mealworms, raisins, berries and peanut butter mixes.

Others move farther south in search of insects, forming winter flocks that can number 200 or more.

Bluebirds were significant in many native American cultures and were symbols of spring for many tribes. For the Haudenosaunee (Iroquois), the singing of bluebirds was said to drive off winter. The Cherokee associated them with the wind and thought they could influence the weather.

So keep an eye out for bluebirds or listen for their songs — one of which is described as *tru-ly, tru-ly or too, too-wee, too, too-wee.* As with most bird calls and songs, it's in the ear of the beholder. If you want to be one of those beholders, put a bluebird box in your yard. Then you can choose your own translation. ■

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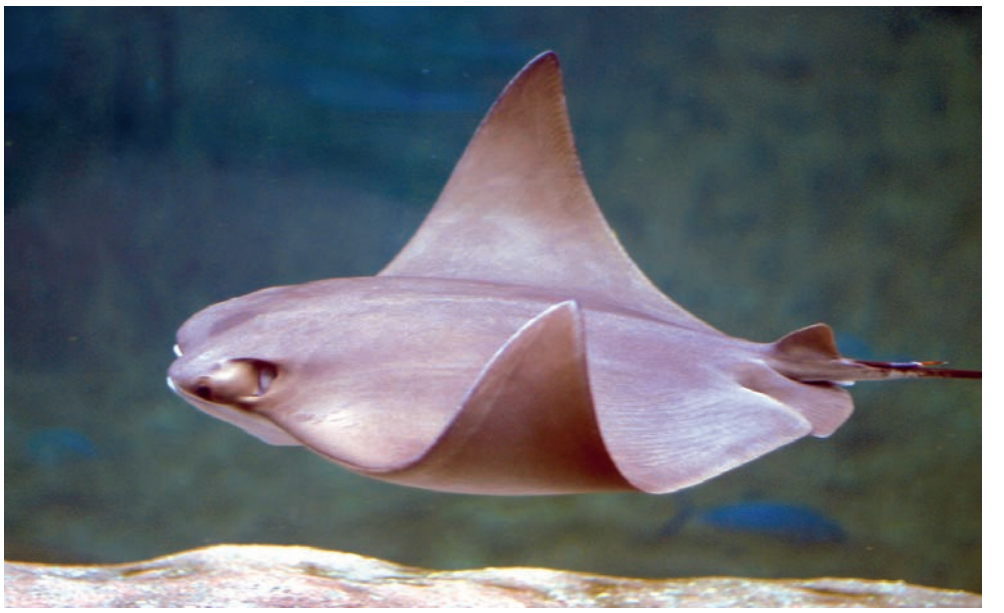
Rays and skates: Fish that soar . . . under the waves

By Kathy Reshetiloff



Eight exhausted teenagers dozed in the shade on Jefferson Island, just off Poplar Island in the Chesapeake Bay. Working for the Youth Conservation Corps, their mission that day was to stabilize an eroding shoreline with oyster shells. Now they slept on the grass, wanting nothing more than to rest.

Suddenly, the water around them churned. Curiosity overwhelmed the group, and they raced to the end of a pier, scanning the water. About 20 feet away, the water frothed. Brown fins broke the surface then quickly disappeared. I don't know about any of my coworkers that day, but this was my first encounter with a school of cownose rays.

Along with sharks and skates, rays belong to a group of primitive fish known as elasmobranchs, which do not have a bony skeleton. Instead, the bodies of these ancient creatures are made up of cartilage.

Skates and rays are sometimes described as "flat sharks" — but, viewed from above, their distinct triangular shape sets them apart. Their pectoral (side) fins are flattened and enlarged to look more like wings, and these fish do seem to fly rather than swim through the water. They are adapted to life at the bottom.

On both skates and rays, the mouth and gills are on the underside of the body. They forage the bottom for mollusks, crustaceans and the occasional small fish that they crush between their teeth. Since the mouth is often buried in the sand, skates and rays can "breathe" from the top of the head through what are known as spiracles. Rays have whiplike tails while skates' tails are notably thicker.

The cownose ray is the most common of all elasmobranchs in the Chesapeake. It has a brown back, whitish belly and a deep notch in the head, giving a double-headed appearance. From above, the head looks like the broad, squared-off muzzle of a cow. Adult cownose rays can grow up to 45 inches wide and weigh up to 50 pounds.

The cownose ray rarely rests on the bottom, so stepping on the venomous stinger at the base of the tail is unlikely.

That's not to say they won't sting if provoked. It was likely a cownose ray that stung English explorer Captain John Smith in 1608 when — according to the oft-told story — he speared the fish in the shallows near what is now Stingray Point on Virginia's Rappahannock River. He survived the sting but suffered enough that some crew members thought he was a goner, the story goes. Most accounts also say that he recovered quickly enough to have the ray for dinner that night.

Voracious feeders, cownose rays prefer soft clams. Moving in schools, they churn up the bottom to uncover food. These rays are migratory, moving north along the Atlantic Coast during warmer months and south during cooler months. Many cownose rays spend their summers in the Chesapeake, arriving in May and remaining until September or October.

Cownose rays give birth to live young. Ray pups are born in June or later. The female is refertilized within 10 days. She'll give birth again about 11 months later. Cownose pups are 11–18 inches wide at birth. They emerge tail-first so as not to harm their mother.

By contrast, skates lay eggs, usually a pair of them, every three to five days. The egg case is a hard rectangular capsule with a pair of pincerlike hooks at each end that allow it to attach to bottom vegetation. Known colloquially as a "mermaid's purse," the egg case usually contains a single embryo and the female may lay 50 or more eggs every year.

The most common skate in the Chesapeake is the clearnose skate, its name coming from the two transparent patches on either side of its pointed nose. Brown to gray in color, the clearnose has a row of spines down the middle of its back. The tail also has spines and two upright fins at the end.

Like rays, clearnose skates feed on crustaceans, mollusks and small fish. They hunt primarily at night, searching the seafloor for food. Clearnose skates have 46 to 54 teeth in their upper jaw and approximately the same number in their lower jaw. These teeth are blunt, small and close together, enabling the skate to crush the hard shells of its prey. Males have sharper teeth than females, although this is probably to aid in mating rather than feeding.

Most people probably think that the closest they will ever come to observing such ancient and exotic-looking animals is on the television or at an aquarium. They don't realize that the influx of both freshwater and saltwater into the Bay provides opportunities to see aquatic creatures we may not even know are there. Sometimes we just need to sit up and take notice. ■

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

Photos, clockwise from top left:

An aquarium specimen of a cownose ray. Along with skates and sharks, rays belong to a group of primitive fish called elasmobranchs, with bodies made of cartilage instead of bone. (Todd Poling/CC BY 2.0)

A newly hatched clearnose skate, photographed in an aquarium. Hatchlings have a "wingspan" of 3 to 4 inches. (Claire Aubel/NC Aquariums/ CC BY-NC-ND 2.0)

A skate egg case found washed up on a beach. The pincerlike appendages at either end of the case help it stay attached to underwater vegetation. (Martin Alonso/CC BY 2.0)

A close view of a cownose ray's mouth, built for crushing shellfish. When its mouth is buried in sand, a ray can "breathe" through openings on the top of its head, called spiracles. (Citron/CC BY-SA 3.0)