CHESAPEAKE
BAY JOURNAL
July/August 2024 Volume 34 Number 5
Independent environmental news for the Chesapeake region

Gravestones return to a reborn island

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Virginia moves to loosen harvest restrictions PAGE 14

STREAMSIDE BUFFERS

Plantings pick up but data suggests net loss PAGE 15

FLOATING CLASSROOMS

Enjoy ecology lessons on the Susquehanna River PAGE 20

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Researchers are using technology to listen in on dolphins that visit the Chesapeake Bay. Read the article on page 24. (National Aeronautics and Space Administration)

EDITOR'S NOTE

Forever 'saving the Bay'

It's been many decades since "Save the Bay" became a rallying cry in the Chesapeake Bay region. In the early days of the restoration movement, it helped shine a spotlight on the beleaguered estuary. It rejected the decline as inevitable and called for action. It was dramatic and needed to be. The harder questions — save the Bay from what? from who? for who? and how? — came later. Now, many people are also asking, what exactly does a "saved" Bay mean?

This month, the Chesapeake Bay Program has released its draft proposal for guiding the cleanup beyond the the current goals, most with a 2025 deadline. It is the first concrete act in a long process that, even after a year of meetings, has barely begun. These first recommendations are very broad, but they set the stage for much more.

They also propose a two-year time frame for laying out goals moving forward. As the *Bay Journal* has already reported, opinions differ as to whether the cleanup effort needs major changes or small ones. People are also debating areas of emphasis and how to direct resources.

What you can do? Weigh in. Public comments on the recommendations are invited through Aug. 30. You don't have to be an expert to share your perspectives with regional leaders. To view the draft report and send comments by email, search for the "Chesapeake Beyond 2025" web page. Scroll down and look for the draft under Projects and Resources.

And there's something else: Recognize that "saving the Bay" is a forever job. "Save the Bay" suggests an end point. But the current cleanup agreement, and those that predated it, never presented their goals as a finish line. And even if we have a "saved" Bay, however you define it, there will be a lasting fight to preserve it. The restoration of the Chesapeake — and its rivers — is facing an enormous cultural challenge, a multigenerational effort to give humans a more sustainable footprint on our shared natural resources.

I find that a reason for hope, not discouragement. It's a reminder that our steps may sometimes feel small, but they are part of a longer, larger journey. And it couldn't be more important.

— Lara Lutz

ON THE COVER

Maryland Environmental Service employees Jason Doty (right) and A. J. Ruark put a plumb level on one of the gravestones that were returned to Poplar Island in May. (Dave Harp)

Bottom photos: Left and center by Dave Harp, right by Ad Crable

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BY THE numbers

2,324
American shad moved past Conowingo Dam on the Susquehanna River this spring

1,843
Invasive snakehead fish captured and removed at Conowingo Dam on the Susquehanna River this spring

2 million
American shad — the restoration goal for the area above dams on the lower Susquehanna River

$552 million
Economic value of boating and fishing in Maryland in 2022

$554 million
Economic value of boating and fishing in Virginia in 2022

3
Times their weight — the amount of blood a female mosquito can drink

What is an airshed and why does it matter?

An airshed is the geographic area through which airborne particles travel to reach a body of water. The Chesapeake Bay airshed is nine times bigger than its watershed.

Airborne particles of nitrogen oxides, or NOx, are one form of nutrient pollution that plagues the Bay and its rivers. According to the U.S. Environmental Protection Agency, one-third of the nitrogen that enters the Bay comes from its airshed.

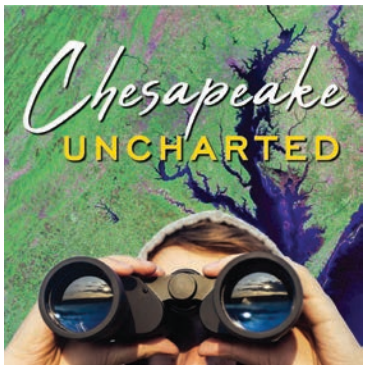
NOx particles come from systems that burn fossil fuels, like cars and power plants. The particles then fall directly onto land and water, hitch a ride on a raindrop or are absorbed by plants.

The U.S. government passed the Clean Air Act in 1970 to combat air pollution. Between 1990 and 2022, NOx emissions decreased nationally by 71%, according to the EPA.

– L. Hines-Acosta

The Chesapeake Bay airshed

(Source: Chesapeake Bay Program)



bayjournal.com/podcasts

LOOKING BACK

30 years ago

Tributary strategies nearly finalized

Hundreds of people attended public meetings to comment on river-specific strategies for reducing nutrient pollution that flows into the Bay. ■

— *Bay Journal,* July–August 1994

20 years ago

Impervious surfaces will be used to document sprawl

Bay Program partners agreed to chart the rate of sprawl by the amount of rooftops, pavement and other hard surfaces measured via satellite images. ■

— *Bay Journal,* July–August 2004

10 years ago

2014 Bay cleanup agreement signed

After nearly 18 months of negotiations, federal and state partners signed their fourth agreement on Bay cleanup goals, many with a 2025 deadline. ■

— *Bay Journal,* July–August 2014

ABOUT US

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

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CONTACT US

by mail:
The Bay Journal | P.O. Box 300 | Mayo, MD 21106

subscriptions, donations & advertising:
jcaine@bayjournal.com or 540-903-9298

opinion columns and news:
tsayles@bayjournal.com or 410-746-0519

editor:
llutz@bayjournal.com or 410-798-9925

Ladew Topiary Gardens invited the Bay Journal's Kathleen Gaskell to make a pumpkin for a virtual autumn event during the COVID lockdown. (Karl Blankenship)

A lot more than copy editing

After nearly 30 years with the *Bay Journal*, **Kathleen A. Gaskell** is retiring in July — from almost all of her duties, which included copy editing, compiling the Bulletin Board, writing Chesapeake Challenge and, until a few years ago, laying out the print edition. She will still be writing Chesapeake Challenge and keeping an eye on editor-at-large Karl Blankenship (the two have been married for 39 years). We asked Kathleen to share some highlights from her time with the *Bay Journal*.

You've edited about 300 issues of the Bay Journal. Any particularly memorable ones?

The first one. Our son, Grant, was only a week old and had just gotten his first bath. He was screaming his head off, and I couldn't persuade him that mommy wasn't trying to drown him while Karl was in the kitchen pasting up the paper. Nobody had fun that night.

What was your most memorable Chesapeake Challenge?

This May, I had already written the next one when a mama fox and her four kits showed up outside the window where I work. Out went the column I was working on and in went one on foxes. I took a video on my phone, and we used a still frame as a photo in the column.

What lifestyle changes you will be taking with you?

I've learned new facts with every issue, and it's only grown my love for environmental topics. When I was in school, I was a finalist in an essay competition that asked what I believed would be an important educational issue in the future. I wrote about how and why ecology education ("environmentalism" hadn't caught on as term back in 1977) should be a required course for all students. After my years at the *Bay Journal*, I'll continue to volunteer at the Nixon Park Nature Center [in York County, PA] and with the Cornell Ornithological Institute's FeederWatch citizen scientist project. Now that I am retiring, I will be able to devote even more time to these activities.

What are your post-retirement plans?

I'll have more time for camping, traveling and for my hobby making "junk" journals out of materials that would otherwise be thrown away. And I plan to teach myself to play piano.

NEWS briefs

LOCAL
REGIONAL
NATIONAL

Governor removes VA from electric vehicle mandate

Virginia Gov. Glenn Youngkin announced June 5 that the state will change its regulations on car emissions when its current electric vehicle mandate expires at the end of the year.

The Virginia General Assembly set the state's current rules in 2021 when it adopted regulations developed by California as an approved alternative to federal regulation under the Clean Air Act.

The California Air Resources Board adopted the Advanced Clean Cars I mandate in 2012, which includes regulations on greenhouse gas emissions from both low– and zero-emission vehicles.

Then, in 2022, California updated the regulations with Advanced Clean Cars II. The new, more expansive version includes a requirement that 100% of new vehicle sales must be zero-emission models by 2035. With this change, Youngkin decided to remove Virginia from the mandate to avoid putting pressure on auto dealers.

Environmental groups like the Southern Environmental Law Center said Youngkin's efforts to repeal the legislation is illegal because it was passed by the General Assembly.

In an email obtained by the *Virginia Mercury* in 2022, Assistant Attorney General Michael Jagels said that Virginia would require "an amendment or repeal of the mandating legislation" to leave the California mandate.

Transportation was Virginia's largest contributor to greenhouse gas emissions from 2016 to 2020 at 36.8%, according to the state Department of Environmental Quality.

Critics of Youngkin's decision point out that Virginia still needs to abide by the 2020 Virginia Clean Economy Act. It currently doesn't have any regulations on emissions from vehicles.

According to Attorney General Jason Miyares' 2024 published opinion, Virginia does not have to adopt California's updated mandate. But states can't cherry-pick California's rules. So, Virginia will return to federal standards. *– L. Hines-Acosta*

150 swimmers jump in for Baltimore Harbor Splash

More than 150 people hopped into Baltimore's Inner Harbor for a swim on a balmy Sunday morning in June. Aside from being refreshing, organizers say the event represented a watershed moment in the longstanding effort to make the harbor swimmable and fishable.

"I think everyone who came had a wonderful time," said Adam Lindquist, vice president of the Waterfront Partnership of Baltimore, a coalition of business, nonprofit and government leaders who launched what they called the "Healthy Harbor" initiative in 2010.

About 1,000 spectators lined up on the morning of June 23 for the event, dubbed "Harbor Splash," around the appointed jumping-off spot: Bond Street Wharf at the edge of the Fells Point neighborhood.

It was an orderly affair. Participants donned life vests and took the plunge. Instead of all going in at once, they entered in manageable groups of 30. After 5 minutes, it was the next troop's turn.

With temperatures in the mid-90s, the harbor's cool water was a welcome relief, said Lindquist, who took the plunge himself multiple times. "It was hard to get out once you got in," he added.

The harbor once teemed with sewage and trash. Past industrial activity and the near-total development of its watershed left its waters nearly lifeless and certainly not beckoning to swimmers.

Such a statement would have been virtually unimaginable a decade or two ago. Since the Healthy Harbor effort began, the city has invested more than $1 billion into fixing its leaky, overflow-prone sewer system under a consent decree with state and federal regulators. After one key repair in 2021, there has been a 75% decline in the volume of untreated sewage overflowing into the harbor, according to the Waterfront Partnership's research.

To tamp down the debris, local officials have deployed four, solar-powered floating "trash wheels" at the mouths of rivers and storm drains emptying into the harbor. That alone has resulted in the removal of about 1 million pounds of debris from the harbor per year.

Today, water sampling tends to show that bacteria levels are low enough for swimming to be safe as long as it hasn't rained during the previous 48 hours, Lindquist said.

No one is declaring the mission finished, though.

Five days before the long-planned swim, the conservation group Blue Water Baltimore released its annual water quality report card for 2023. The harbor received a grade of 51%, or an "F." That was up 5 percentage points from 2022 but still represented a decline in water quality since the

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briefs

From page 5

group started collecting data 11 years ago.

Lindquist said he wasn't concerned about the "F" grade because bacteria levels — the most important metric for swimming — weren't part of Blue Water's scoring process.

To be clear: Authorities still advise against swimming in the harbor outside of events like the one on June 23. The water quality varies too much, and boat traffic poses safety concerns, Lindquist said. But he hopes that the partnership's success inspires other groups to choose the harbor for their recreational events.

Organizers with the Healthy Harbor campaign first tested the waters last fall with a brief organized swim at the same location.

While no fanfare accompanied that outing, the June event included several VIPs, such as Baltimore Mayor Brandon Scott, Maryland Comptroller Brooke Lierman and "Mr. Splash," the character that sprays celebrating fans with a hose at Baltimore Orioles games.

In May, online registration opened and closed within 10 minutes as participants quickly filled all the open slots. "It shows there's a tremendous demand for recreational opportunities in Baltimore Harbor," Lindquist said. *– J. Cox*

Wastewater treatment plant offers green bonds

Alexandria Renew Enterprises, or AlexRenew, announced on June 6 the sale of $45.7 million in green bonds. It's the first wastewater treatment plant in Virginia to offer them.

Green bonds are a way for companies and other entities to raise money for projects that help protect the environment.

More than 35 investment firms and individuals purchased bonds from the plant, which will use the money to upgrade its biosolid treatment, filtration process, wastewater screening and pumping facilities. In return, investors will get their original investment back plus 4.17% interest by 2054.

Runoff from wastewater can carry nutrients like phosphorous and nitrogen into nearby bodies of water. The nutrients themselves aren't harmful. But at excessive levels, they can cause an overgrowth of algae that depletes water of oxygen and harms aquatic life. So, upgrading wastewater treatment plants or sewer systems can reduce pollution.

Matt Robertson, director of communications at AlexRenew, said the company usually leverages loans through the Virginia Clean Water Revolving Loan Fund. But the state government reduced the amount of money in the loan fund in 2022. After seeing the demand for green bonds increase over the last few years, the company turned to the relatively new tool. The credit rating company, S&P Global Ratings, saw the bonds as high quality and stable, giving them a AAA rating.

Construction on the biosolid upgrades will begin later this year, and work on the remaining upgrades will begin in 2025. *– L. Hines-Acosta*

Advocates say MD needs better pollution controls on highways

Environmental advocates are calling on the Maryland Department of Transportation to make more effort cleaning up the polluted stormwater that washes off highways.

Stormwater runoff represents the fastest growing source of pollution in the Chesapeake Bay watershed, according to Chesapeake Bay Program computer models.

Some of that can be traced back to the oil, gas, dust and other contaminants that rainwater carries into waterways from roads, experts say. MDOT's State Highway Administration oversees about 15,000 lane miles of highways and 2,600 bridges.

Maryland environmental regulators set pollution control mandates under a statewide permit for the highway system. The five-year permit is up for renewal later this summer.

The Chesapeake Bay Foundation and other advocates say the state needs to do more to account for climate change and increasing development in the new permit. Previous iterations have employed outdated rainfall estimates to determine how robust the pollution controls should be, they say.

The groups also accuse highway officials of depending too heavily on restoring streams to offset road pollution. Last year, MODT reported that the impacts of nearly 5,000 acres of road surfaces were counterbalanced by stream restoration projects, the top mitigation practice by far.

Stream restoration efforts have drawn strong pushback in several communities from opponents who say the ground-clearing needed for the work leads to needless deforestation.

Other actions the groups are seeking in the new permit include broadening the range of options for lessening pollution, as well as adding streamside plantings and "green infrastructure" to the menu. They also are pushing the state to expand monitoring to look at wildlife impacts and to track a wider spectrum of pollutants, such as polychlorinated biphenyls (PCBs) and PFAS, also known as "forever chemicals."

MDE's public comment period for the proposed permit is open until July 18. *– J. Cox*

Scientists say ‘dead zone’ will be slightly larger than normal

Pollution reduction efforts across the Bay region may have offset some effects of high river flows

By Jeremy Cox

Researchers are forecasting the Chesapeake Bay’s annual oxygen-starved “dead zones” to be only slightly larger than usual this year, despite higher than average rainfall last winter and spring.

Dead zones are areas in deeper parts of the estuary where nutrient-fueled algae blooms sink and die, sucking up oxygen as they do so. That makes areas largely unlivable to fish and crabs and can be lethal to some organisms that can’t move away.

Scientists with the Chesapeake Bay Program, University of Maryland Center for Environmental Science, University of Michigan and U.S. Geological Survey announced their prediction June 21. The forecasts have been released every year since 2005.

This year’s dead zone should be only 4% larger than the average size during that span, they said. The average dead zone covers an area equivalent to 0.97 cubic miles of water.

Those experts said it could have been worse because stream and river flows were 23% higher than normal earlier in the year.

Normally, more rain and higher river flows means poorer water quality as they wash greater amounts of nutrients off the land and into the Bay. But scientists said the amount of nitrogen washed into the Chesapeake this winter and spring was near the long-term average measured since 1985.

They attributed that, and the better-than-expected forecast, to widespread pollution-reduction efforts throughout the Bay’s 64,000-square-mile watershed.

> *“In the face of a warmer and wetter climate, there is an urgent need for strong leadership to develop new solutions for pollution from agriculture and developed areas.”*
>
> — Alison Prost
> Chesapeake Bay Foundation

“Forecasts for average summer hypoxia, despite above average precipitation and temperatures, continues to demonstrate the success of nutrient management efforts,” said Marjy Friedrichs, a Virginia Institute of Marine Science researcher who contributed to the report.

“This forecast of an average year for summer hypoxia is further good news, following on the last few years of near or below average amounts of hypoxia in the Chesapeake,” said Aaron Bever of Anchor QEA, a consulting firm that assisted with the forecast’s computer modeling. “Let’s hope weather during the summer helps the Chesapeake realize this forecast.”

But the Bay isn’t out of the woods yet, a leading environmental group cautioned in its response to the report’s findings.

“The latest dead zone forecast reflects that the longstanding partnership between the federal government and the Chesapeake Bay watershed states has made some strides, particularly from wastewater treatment plant upgrades,” said Alison Prost, the Chesapeake Bay Foundation’s vice president for environmental protection and restoration. “In the face of a warmer and wetter climate, there is an urgent need for strong leadership to develop new solutions for pollution from agriculture and developed areas.”

The forecast model is based on the monitoring of nitrogen pollution and river flows at stations along the Bay’s nine largest tributaries, which account for 78% of the watershed. In areas not monitored by these stations, additional pollution from wastewater treatment plants is also included.

The dead zone likely began forming earlier this year because of the spring’s warmer than normal temperatures coupled with weaker winds, the researchers said. ■

Last major Patapsco River dam targeted for removal

Daniels Dam's demise will open miles of habitat for shad, herring and eels

By Jeremy Cox

Three dams have been dismantled on the main portion of the Patapsco River in Maryland since 2010. The fourth and final major barrier may soon go away, too.

The National Oceanic and Atmospheric Administration in May awarded $1.8 million to the nonprofit group American Rivers to begin the planning and initial design phase for the removal of Daniels Dam.

The project will have broad environmental benefits, said Jessie Thomas-Blate, director of restoration for American Rivers. With the dam gone, river herring and shad will gain 65 miles of spawning habitat, and American eels would gain nearly three times that.

"We're very excited," Thomas-Blate said. "This is the final piece to the restoration puzzle we've been working on in the Patapsco."

The Patapsco begins at the confluence of its North and South branches near Marriottsville and wends its way 40 miles to Baltimore Harbor. Nearly half of its drainage basin has been developed.

Daniels Dam was built in 1833 to power mills that have long since closed. It is no longer needed, Thomas-Blate said.

The dam's owner, the Maryland Department of Natural Resources, supports the group's move, said Gregg Bortz, an agency spokesman. The state will partner with American Rivers in the removal process.

The Daniels Dam project was one of 46 projects nationwide receiving a total of $240 million in NOAA grants to support improvements to fish habitat. The effort to reopen the Patapsco began in 2010 with the removal of Union Dam. That was followed by the removal of the Simkins Dam in 2011 and Bloede Dam in 2019.

So far, the campaign appears to be working as advertised. When Bloede Dam was still in place, the eel ladder attached to the Daniels Dam recorded only a couple dozen uses each year. Since then, observers have counted nearly 80,000 eels, Bortz said.

Dam removal advocates will have to contend with several issues before demolition can begin.

The Daniels area is one of eight developed access points managed as part of the popular Patapsco Valley State Park. The dam, 27 feet high and 450 feet long, creates 2 miles of slow-moving water prized by anglers and swimmers.

"Right now, it looks like a lake," Thomas-Blate said. "It will look more like a river channel. It will be moving pretty fast through there." She added that the planning process will include outreach to affected users and recommendations on where they can find similar recreational opportunities nearby.

All dams pose some risk to human safety, Bortz said. But Daniels has experienced fewer incidents than Bloede Dam. In the past 15 years, there have been three emergency incidents on record, the most recent a near-drowning in 2020. None resulted in death.

The project will also have to proceed cautiously, given the large amount of silt that has gathered behind the dam over nearly two centuries. Allowing that sediment to wash away freely after the dam's removal could cause buildup downstream at Ellicott City, exacerbating drainage problems for the flood-beleaguered community.

Thomas-Blate said the partners may consider dredging the sediment out of the channel and floodplain before addressing the dam's removal.

Another dilemma: Removing an obstacle to desired fish could also do the same for undesired fish, such as snakeheads, toothy invasives from Asia. But Thomas-Blate said that dams typically aren't very effective barriers against such species. One of the main ways that snakeheads have spread across the Bay's tributaries has been by anglers transporting them to places where they want to catch them.

If the Daniels barrier is taken down, the only blockage remaining on the Patapsco system would be Liberty Dam on the river's North Branch. That dam is the linchpin in a 9,000-acre reservoir that the city of Baltimore taps as part of its drinking water supply. ■

MD and Baltimore explore partnership for vast city park

Gywnns Falls/Leakin Park attracts birders, hikers, but needs help, advocates say

By Timothy B. Wheeler

With a dense forest, scenic trails and historic structures spread across more than 1,200 acres, Gwynns Falls/Leakin Park is a green oasis in the urban landscape of western Baltimore. Established more than 100 years ago to protect Gwynns Falls, a tributary of the Patapsco River, the park has managed to survive largely intact as the city grew around it.

Now, under legislation passed earlier this year, the state Department of Natural Resources will join the city's Department of Recreation and Parks to explore a joint arrangement to run and maintain what could become the first state park in Baltimore.

While many nearby residents fondly recall hiking, bicycling and picnicking there, others say its appeal has declined in recent decades because of its condition and safety concerns. A collapsed tennis court fence, sagging signs, burned-out lights and litter are among the marks of neglect.

Less apparent but more insidious is the park's reputation as a dumping ground for murder victims — echoed far and wide by the nationally popular true crime podcast *Serial.* It's an exaggerated rep, according to Mike Cross-Barnet, executive director of the Friends of Gwynns Falls/Leakin Park.

Nonetheless, a 71-year-old woman was sexually assaulted there last fall, which sparked a public outcry and lent urgency to the group's efforts to enlist the state's help in turning things around.

In response to the assault, the city's Department of Recreation and Parks has hired four park rangers and is looking for a fifth. But it's not enough, Cross-Barnet said. Although the rangers' office is in Leakin Park, they are responsible for patrolling all 262 of the city's parks.

The friends group, with about 150 members, does what it can, cleaning up litter and doing some maintenance. But Cross-Barnet said, "we can't keep up with the needs of this place."

Even so, the park has a lot going for it, Cross-Barnet and others advocates are quick to point out.

Nearly 2,000 people turned out for the 35th annual Herb Festival there in late May. Every second Sunday, a group of historic railroad enthusiasts offers free miniature steam train rides, while every Saturday features a 5k run. The Carrie Murray Nature Center offers field trips and environmental education programs, and Outward Bound, the experiential school for at-risk youth, has a 17-acre campus at the park.

Still, the park's potential is far from being realized, advocates say.

Among the possibilities, Cross-Barnet suggests, are camping facilities, a visitor's center, better trail signage and, above all, more rangers.

Baltimore city is one of only two jurisdictions in Maryland without a state park, he pointed out. If more people were drawn to use it, it might help relieve crowding at other state and county parks.

"This could be a boon for West Baltimore," Cross-Barnet said, "a real point of pride for the city and, honestly, a regional destination."

The legislation to explore its conversion to a state park enjoyed universal support of neighboring residents, state and city officials, conservation advocates and environmental scientists. All described it as an ecological and community asset worth preserving and enhancing.

Reginald Moore, the city's recreation and parks director, said he welcomes the opportunity to discuss ways to collaborate with DNR on maintaining and improving the park. But he said he wasn't sure the city wanted to give up control over such a large forested tract, and he noted that even though state lawmakers approved new staffing and resources for state parks in 2022, DNR's resources could be just as limited as the city's, given its current budget straits.

The legislation calls for DNR to submit a report by the end of 2025, detailing the physical parameters of the new state park and funding needed for maintenance, capital improvements and staffing. ■

Energy demands for data centers almost too big to compute

Rapid change in the industry is remaking VA's energy landscape

By Whitney Pipkin

The tractor-trailer-size boxes alongside the this data center in Loudoun County, VA, are backup power generators. (Hugh Kenny/Piedmont Environmental Center)

The growing presence of data centers in Northern and Central Virginia is causing an unprecedented spike in projected energy use for the area. A sharp increase in the use of energy-hungry artificial intelligence inside the centers is driving it up even faster.

As a result, environmental advocates are increasingly concerned about Virginia's ability to meet renewable energy goals.

New data center construction projects continue to be approved by local county governments even as the state works to study their impact. Meanwhile, many state and federal representatives see data center approvals as purely local issues, despite their cumulative impact on the region's electrical grid and environment.

In lieu of passing several bills that aimed to rein in data center growth earlier this year, the Virginia General Assembly instead authorized a study by the Joint Legislative Audit and Review Commission. The study aims to examine concerns about data centers, including their energy demands and environmental impacts.

Dominion Energy produced or purchased about 22 gigawatts (22,000 megawatts) of power to serve both commercial and residential customers in Virginia in 2023, according to its latest *Integrated Resource Plan*. That same plan indicates that the power supply needs to nearly double in the next 15 years to keep up with demand.

The increase is driven almost exclusively by data center growth, according to reports from PJM Interconnection, which coordinates electricity transmission.

Dominion spokesman Aaron Ruby confirmed that power demand in Virginia is expected to grow by about 85% over the next 15 years.

"We've just never seen anything like this," said Buddy Rizer, executive director of Economic Development for Loudoun County.

Loudoun County is home to the world's largest concentration of data centers, and Rizer said its buildout had been steady for most of the 17 years he's been at the economic helm. There was an uptick in 2017 when tech companies began offering cloud-based services and another in 2020 when many workplaces turned to video conferencing during the pandemic.

But the intensification of energy use being ushered in by artificial intelligence is "unfathomable," he said.

Future power needs for data centers can be hard to nail down. That's partly because AI is driving increasingly complex computations that require far more energy for both the machines and the cooling systems that keep them running. (Ironically, AI also has been used to cool hardware more efficiently, helping one Google data center reduce its cooling costs by 40%.)

Researchers say people struggle to comprehend big numbers, especially when they have no tangible comparison, so it can be hard to imagine how much power one data center uses — let alone how that compares to, say, running a dishwasher.

"Our human brains are pretty bad at comprehending large numbers," Elizabeth Toomarian, an educational neuroscientist at Stanford University, told NPR. "Our brains are evolutionarily very old, and we are pushing them to do things that we've only just recently conceptualized."

But some comparisons help. Dominion's Aaron Ruby explains megawatts by how many homes they power. If one megawatt is enough to power about 250 homes, he said, then one of the existing data centers (which might consume about 100 megawatts of power) would consume as much power as about 25,000 homes.

As the amount of power each new data center consumes grows exponentially, that math gets antiquated quickly. In March, a board in Hanover County, VA, approved an expansive data center project expected to consume 2.4 gigawatts (or 2,400 megawatts of power, enough to power 600,000 homes).

That's 24 times as much energy consumption as the data center in the previous example. For further comparison, Dominion's 176-turbine offshore wind project is expected to generate 2.6 GW of electricity, enough to power 660,000 homes — or just one mega-data center.

While overall power demand is anticipated to grow 85%, the power demand of just data centers in the region is expected to quadruple, Ruby said. By 2038, he said, data centers in Dominion's service area in Virginia could be consuming as much power as about 3.5 million homes.

Funding growth

Localities often 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.

But some say the sharp increase in power demand is threatening Virginia's ability to meet its clean energy goals. It's also causing new and larger transmission lines to be constructed through areas previously sheltered from such infrastructure.

"Everyone in Virginia is going to be impacted," said Julie Bolthouse, land use director for the Piedmont Environmental Council. "It's transmission lines … it's impervious surfaces that effect drinking water. It's air quality. It's huge impacts across the region."

Dominion's *Integrated Resource Plan* lays out options for meeting the increased demand that include building both renewable energy facilities and fossil fuel burning

power generators. The company plans to apply to build a new natural gas-powered plant at a former coal site in Chesterfield, VA, that would increase carbon emissions while generating an additional 1,000 megawatts of power, according to Dominion's resource plan. Still, Dominion's Ruby said that 90–95% of the company's proposed new power projects are renewable, including solar, wind, storage and other options.

When asked how Dominion would still meet the General Assembly's charge in the 2020 Virginia Clean Economy Act for the company to deliver electricity from 100% renewable sources by 2045, Ruby said that Dominion is ahead of schedule. The act also allows for carbon-contributing projects to remain part of the state's portfolio beyond 2045 if needed to meet power demands.

"We are on track to meet the goals of the VCEA, and our commitment to it is unwavering," Ruby said.

Data center companies have made even stronger commitments: Google says it's aiming for net-zero emissions companywide by 2030, and Amazon intends to match its electricity with 100% renewables by 2025.

But the rapid expansion of data centers makes it nearly impossible for local grids to keep up with demand simply by expanding renewable sources, said Tim Cywinski, communications manager for Sierra Club's Virginia Chapter.

"It's the height of hypocrisy when the tech industry says, 'We are climate conscious,' and they are one of the sole reasons in Virginia for exacerbating the climate crisis," he said.

Because of the way the grid works, it's not possible to say whether a data center or an electric car charged at home, for that matter, are fueled by renewable sources at any given moment.

As Dominion's Ruby said, "You can't itemize the grid."

That's true for residential ratepayers as well. Technically, all ratepayers fund some portion of the infrastructure expansions made necessary by data center growth, including costly new transmission projects. But figuring out whether that share is "fair" is complex.

The State Corporation Commission approves the rates Dominion charges customers. That commission's estimate is that rates would need to nearly double over the next 15 years to cover infrastructure replacement and renewable energy costs, if other variables stayed the same. But Ruby said the commission's methodology assumes two things: that power demand would stay steady and that all classes of customers would pay the same share of infrastructure costs.

Residents who opposed data center projects in Northern Virginia hold signs during a December 2023 press conference for the Data Center Reform Coalition. (Hugh Kenny/Piedmont Environmental Council)

Commission staff estimates that customers' monthly bills would be about $184 by 2030, a 58% increase over the average cost in 2020.

Dominion uses a different method. It projects that rates will increase incrementally over the next 15 years, with an average monthly bill of $133 rising to approximately $174 by 2038.

Dominion's equation assumes demand will grow exponentially and that the share of infrastructure funding will be reallocated based on which class of customers is demanding it.

"Every year … we are rebalancing how much of the cost of service belongs to this group of customers versus this group of customers," Ruby said. "So, in the last several years, as more and more data centers have come online and required more power and infrastructure to be developed, the share of transmission costs that residential customers are responsible for has decreased, [and] the share of transmission costs for large commercial industrial has increased."

Since 2020, for example, Ruby said the residential share of such infrastructure costs has declined by 6%, and the share paid by the user group that includes data centers has increased by 8%.

State tax rebates for the data center industry have also increased. Companies received an estimated $750.4 million in tax abatements in fiscal year 2023. In 2022, they had received approximately $135.9 million.

Yet for ratepayers whose energy use has remained the same or decreased due to efficiencies, the additional infrastructure costs are "not proportional to what you're using," said Chris Miller, president and CEO of the Piedmont Environmental Council. While necessary maintenance and transmission for renewable energy projects that benefit all customers are baked into infrastructure costs, projects servicing new data center regions are as well.

Unlike residential customers, large commercial customers are able to negotiate bulk discounts on their power usage and, sometimes, to lock those into place against market fluctuations with the help of power purchase agreements.

Who's in charge?

Data center and utility representatives tend to talk about how they will continue supplying more power to the industry, not whether they will.

"Data centers are critical infrastructure for the United States and the world," Loudoun County's Rizer said during a panel discussion at the Environment Virginia Symposium in April. "So we have to figure this out in a way that maintains the industry while figuring out sustainability goals for our community."

Later, over the phone, Ruby said Dominion has "a legal obligation to provide electrical service to every customer, large and small, who needs it."

"It's not our job to pick and choose who we give power to," he said. "You don't want your local utility having veto power over that."

But, for local authorities and elected officials that do have the power to approve or deny data center projects, it can be hard to say "no." Many localities see the economic boon that data centers have been for Loudoun County and are setting the stage for something similar in their own.

Tax revenue from data centers now accounts for nearly a third of Loudoun County's $3 billion budget, with 33 million square feet of existing data centers and another 8 million square feet under construction or planned, Rizer said. The industry has been "transformative" for a county Rizer said was once failing economically. As of 2020, Loudoun's median household income was the highest of any county in the nation.

Yet even Loudoun has its limits. The county Board of Supervisors in March voted 5–4 to reject a proposed data center, citing concerns about the electrical grid's ability to provide power. This happened despite the county attorney cautioning supervisors that they were not allowed to weigh power supply concerns in their decision, "because the power company had a legal obligation to provide the service," according to a *Loudon Now* article. The project was reduced to about a quarter of its original size before the board approved it in April.

A growing number of opponents to such energy-intensive projects are urging local boards to wait on results from the legislative review commission before further approvals. The commission is expected to deliver its report to the legislature by the end of the year. ■

Push to save trout in PA hampered by unassessed streams

Limited funding behind state backlog of designation process

By Ad Crable

A Pennsylvania Fish and Boat Commission crew samples a small stream in search of wild trout. (PA Fish and Boat Commission)

A stream survey turned up this native brook trout. (PA Fish and Boat Commission)

It's an all-out effort to save habitat for Pennsylvania's state fish, the eastern brook trout, the only native trout in the cold waters of the state. But brook trout defenders are saying louder than ever that you can't protect what is essentially invisible.

The wild brook trout, a small, brilliantly colored fish with ancestry dating to the last Ice Age, continues to decline for a variety of reasons: warmer water from climate change, polluted runoff from farms and developed land, oil and gas development, stocking of competitive nonnative brown trout and rainbow trout, and even the die-off of hemlocks that shade and cool streams.

Brook trout have disappeared from an estimated 34% of the watersheds they once occupied in Pennsylvania.

Conservation groups have been working for more than a decade to identify remaining brook trout habitat so that the state can step in and protect what's left, but progress has been painfully slow, the groups say.

Of 86,000 miles of streams in the state, more than half have not been surveyed by the state Department of Environmental Protection to see if wild trout are present or if they are high-quality streams that qualify for greater protection.

It's a sobering gap of information increasingly frustrating conservation groups battling to save the fish. They say it is harming the restoration effort.

Equally angering to the groups: Even when the Pennsylvania Fish and Boat Commission flags wild trout streams or possible high-quality waters and nominates them for official protection, it can take DEP up to a decade to act, sometimes longer, because the agency is required by law to first do its own meticulous surveys.

That is pushing some nationwide and state brook trout conservation groups to act. Both Trout Unlimited and the Theodore Roosevelt Conservation Partnership have mounted campaigns to put pressure on DEP to protect trout streams more swiftly before it's too late.

While the surveying efforts focus on all potential wild trout habit, the overriding interest is finding and protecting suitable habitat for brook trout, which are more sensitive to water quality issues than nonnative brown or rainbow trout.

Not only are trout streams an important driver in Pennsylvania's growing recreation economy, but they also need official protection to guard against pollution, said Emily Baldauff, Trout Unlimited's Mid-Atlantic policy program manager.

"At least [protected status means] you cannot degrade this stream, and if you do, you are responsible for fixing it," she said.

The advocacy groups have been trying to hurry things along since at least 2010, when Trout Unlimited and other nonprofit partners joined with the Fish and Boat Commission to launch the Unassessed Waters Initiative, which would look high and low for undesignated streams, often small headwater brooks in the mountains.

Drawing on help from its members, along with other conservation groups and universities, Trout Unlimited completed 1,652 stream surveys from 2011 to 2023. More than 40% qualified to be listed as wild trout habitat. And 35 streams met the criteria for "Class A" wild trout water, which carries even more protection.

But so far, only 129 of 540 qualified streams have made it through the DEP designation process.

The backlog is blamed on both underfunding at DEP and the more exacting stream surveys the agency is required by law to perform itself. The Fish and Boat Commission, by contrast, is allowed to accept the findings of outside groups, as long as their surveys meet the commission's standards.

A team with Trout Unlimited uses a mild electrical current to search for trout in a Pennsylvania stream. (Trout Unlimited)

And while the commission looks only for the presence of wild trout, DEP's surveys are more involved — looking at water quality, presence of aquatic insects, density of wild trout, water chemistry, flow rates and sometimes even a recreational value.

Their surveys also must be conducted at specific water levels, which can be a literal moving target. Public comment periods are required, along with evaluations by state legislative committees and a commission before designations can be made.

"They have a small team of 25 in their water quality department for the whole state. They do have low staffing, and they need more money to go out and do these surveys," Baldauff said.

Nathan Walters, head of the Fish and Boat Commission's coldwater unit, said his agency and DEP are working jointly to quicken the designation process.

"DEP and the Fish and Boat Commission are working together with the same goal in mind, and that is to protect our natural resources," he said. "It can be slow, but we are working together to make it more efficient and faster. It just takes time sometimes to have that data vetted properly."

The Unassessed Waters Initiative, he said, has been a huge success, resulting in 4,600 stream miles being designated as wild trout streams. About a dozen partners are helping the agency explore about 750 streams per year, he said.

The agency began searching streams for wild trout in 1983 with a "resource first" policy embodied in a program called Operation Future.

A lot of the lowest hanging fruit have been found since then, but Walters said the agency's new trout management plan continues to make searching for wild trout a priority.

Jim Suleski, a Hershey resident and member of the Doc Fritchey Chapter of Trout Unlimited, has found brook trout in about a dozen streams through the Unassessed Waters Initiative.

He finds fault with both DEP and the Fish and Boat Commission for not assessing streams more quickly.

Fish and Boat policies, he contends, too often are driven by the wishes of anglers, whose license fees mostly underwrite the agency, and not enough by a "resource-first" pledge. That sometimes makes the agency hesitant to identify wild trout streams that may result in closures to stocking, he said.

DEP is "working diligently to process the [Fish and Boat Commission] recommendations," said department spokesman John Repetz. He noted that DEP completed approximately 116 stream designations in the past two years and expects to make 94 more Class A Wild Trout Stream designations in 2024 and 2025. ■

What's next for the Chesapeake? Draft goes out for public input

Bay Program committee recommends updating 2014 cleanup agreement

By Jeremy Cox

After 30 years of stubbornly slow progress toward restoring the health of the Chesapeake Bay and its rivers, federal agencies and watershed states in 2014 adopted a far-reaching strategy.

Their agreement formally expanded the Chesapeake Bay Program partnership to include three more states — Delaware, New York and West Virginia — so that the entirety of the 64,000-square-mile drainage basin would finally be covered by the pact. It incorporated enforceable pollution caps set by the U.S. Environmental Protection Agency for nutrients and sediment. And it set goals for restoring oyster habitat, planting streamside buffers, improving fish passage, and a host of other actions. The partners imposed a voluntary 2025 deadline for getting the work done.

But the effort will fall far short of accomplishing many of the agreement's most critical targets.

Now, as 2025 approaches, scientists, policymakers and conservationists are grappling with what to do next. On July 1, the Bay Program released a draft report that proposes keeping, but updating, the 2014 agreement. Detailed changes would be made as early as the close of 2026.

The 18-page report is available at *chesapeakebay.net*, and public feedback is invited through Aug. 30 via *comments@chesapeakebay.net*.

The Bay Program expects to revise the draft before presenting it to the Chesapeake Executive Council, a panel of Bay state governors and other partnership leaders, for a vote in December.

A 29-member Beyond 2025 Steering Committee, primarily populated with state and federal environmental officials and scientists, has been working on the recommendations since last summer. Martha Shimkin, director of the EPA's Chesapeake Bay Program Office and a Beyond 2025 co-chair, hailed the group's efforts after it finalized the version for public review during a three-hour meeting on June 27.

"This has been a lot of work, a lot of expertise and time commitment for more than a year," she said in thanking the committee members.

Visitors at the Chesapeake Bay Environmental Center in Grasonville, MD, inspect a horseshoe crab on the shoreline. (Dave Harp)

The draft incorporates input from committee members and hundreds of comments given in writing and at public meetings that focused on five themes: clean water, climate, healthy watersheds, people and shallow water habitats. The Eastern Research Group, a consulting firm, conducted an organizational review of the Bay Program.

Chuck Herrick, a retired environmental policy consultant who chairs the program's Stakeholders' Advisory Committee, said he was impressed by the partnership's willingness to look inward.

"I think 2025 could have [come and gone], and the partnership could have continued to move ahead without any momentous activity, without looking intentionally at the past and toward the future," he said. "It's good governance."

The 2014 Bay cleanup agreement is the fourth in the history of the 41-year Bay Program partnership. This time, the committee has recommended updating the 2014 pact rather than creating a new one. To undertake a new agreement from scratch would bog down the program in bureaucracy and distract from the direct work of cleaning up the Bay and its watershed, participants agreed.

The resulting report singles out two "overarching recommendations" for the Executive Council to consider in December: 1) affirming the leadership's commitment to meeting the 2014 agreement's goals, while directing staffers to pursue amendments aimed at its improvement; and 2) moving to "simplify and streamline" the Bay Program's structure to better meet the revised agreement's goals.

At its October 2022 meeting, the Executive Council tasked the Bay Program with reporting back at the council's 2024 gathering on how the effort can be improved based on scientific advancements, lessons learned from restoration projects and evolving partnership priorities. The Beyond 2025 report lays out those suggestions as well. They include:

- Bolstering the restoration of shallow edges of the Bay and its tributaries, where ecological improvements are more likely to be appreciated by the public and provide more direct benefit to fish, crabs and other wildlife, in contrast with the traditional focus on the Bay's deep trough
- Adapting the 31 "outcomes" in the 2014 agreement to be "more compatible" with changes wrought by a growing human population, increased development and climate change
- Doubling down on the partnership's existing diversity, equity, inclusion and justice plan by folding it into all "relevant" areas of its efforts.

But even before the Beyond 2025 group had finished its draft, some environmentalists were pushing back. In late May, the Choose Clean Water Coalition issued its own recommendations, declaring that the Beyond 2025 group's suggested actions "do not go far and move quickly enough."

The Beyond 2025 report, for example, suggests a review and potential overhaul of the partnership's outcomes, with "every effort" being made to finalize the updated agreement by the end of 2026.

Kristin Reilly, the coalition's director, said she is concerned that the draft report lacks clear deadlines. Her group's letter calls for the Executive Council to launch a revision of the existing outcomes in an "open" process, driven by public input. Those suggested changes should be brought back to the council at its 2025 meeting, she said.

So far, some of the goals have been more attainable than others. Of the 31 outcomes, 17 have been achieved or are on track, according to a Bay Program review. Among them: restoring oyster reefs in 10 rivers, conserving an additional 2 million acres of land and improving fish passage.

But another dozen objectives are far from completion, it found. Those include some of the effort's most critical ecological goals, such as reducing nutrient pollution, creating wetlands, increasing streamside buffers and restoring underwater grasses.

Reilly and other conservation group leaders have pressed for the Executive Council "recommit" to the original 2014 outcomes. Funding remains at or near record levels for the cleanup effort. But most of the Executive Council members — the governors of the six watershed states, mayor of the District of Columbia, chair of the Chesapeake Bay Commission and administrator of the EPA — have been absent at the annual Executive Council meetings in recent years, sending representatives instead. That's led some observers to question their commitment to the cause.

"I think the feeling overall is of uncertainty," Reilly said. "We're all hoping to see leadership from the states and federal agencies say that we're committed and continuing to move forward."

The slow pace of the cleanup has caused some fatigue among those in its orbit, said Joe Wood, a Virginia-based scientist with the nonprofit Chesapeake Bay Foundation. If council members affirm that they stand by the outcomes, it would help re-energize the effort, he suggested.

"I think there's a lot more that needs to happen," Wood added, "but that [recommitment] has to be first." ■

To read the draft recommendations and submit comments via email, search for the "Chesapeake Beyond 2025 committee" web page. Scroll down to find the link under Projects and Resources.

Chesapeake blue crabs hold steady, but concerns remain

Meanwhile, Virginia looks to loosen crab restrictions

By Timothy B. Wheeler

The Chesapeake Bay's blue crab population is holding steady but remains below average, new data show, easing but not completely dispelling worries about the long-term viability of the region's vital commercial and recreational fishery.

The recent winter dredge survey, conducted each year by the Maryland Department of Natural Resources and Virginia Institute of Marine Science, found about 317 million crabs in the Bay and its tributaries. That's down slightly from last year's estimate of 323 million crabs, though it is well above the all-time low of 227 million crabs, which occurred in 2022.

Not long after receiving that report, fishery managers in Virginia voted to pursue a significant shift in the state's longstanding crab policy. The Virginia Marine Resources Commission (VMRC) moved 5–4 on June 25 to lift the prohibition on the winter dredge fishery in state waters.

The ban, which has been in place since 2008, mostly aims to protect female crabs that migrate to the Bay's southern reaches in winter to spawn.

Virginia's action, which is pending a final vote in September, came despite the survey's finding that spawning-age females decreased by 12.5%, from 152 million crabs in 2023 to 133 million crabs in 2024. That figure, though, remains well above the minimum that biologists say is needed to sustain the population.

Juvenile crabs continued to recover from an all-time low in 2021 but remained well below average for the fifth year in a row. The survey found 138 million young crustaceans this year, a nearly 20% increase over the 2023 survey.

The survey, which has been jointly conducted since 1990, is widely regarded as a barometer of the Bay's crab population, and its results are treated as a forecast of the commercial and recreational harvest for the year. Maryland and Virginia crews sample 1,500 sites from December through March, dragging a dredge across the bottom of the Bay to collect and record the sex and size of crabs found slumbering there.

Blue crab reproduction varies from year to year under the influence of several factors, including weather, ocean conditions, available nursery habitat and predation by fish and even other crabs.

The annual winter dredge survey assesses the population of blue crabs in the Chesapeake Bay by examining 1,500 sites in Maryland and Virginia. (Timothy B. Wheeler)

But scientists say the number of young crabs seen by the survey for the past decade has lagged well behind what they expected, given the measures taken in 2009 to maintain a robust stock of female crabs to produce new generations.

For that reason, the Chesapeake Bay Stock Assessment Committee, a group of state and federal fishery managers and independent scientists, have decided to conduct a new assessment. The multi-year analysis, which begins this summer, will evaluate a wide range of data and review the mathematical models used to gauge the stock and the level of harvest it can sustain. The last such assessment occurred in 2011. This one is to be completed in 2026.

"One of the big reasons we're doing the stock assessment is that recruitment hasn't been as good as we expected based on the last assessment," said Mike Wilberg, a professor at the University of Maryland Center for Environmental Science, who is leading the effort. "We want to take a look at this and figure out why things aren't going the way we expect."

Some think the winter dredge survey may simply be missing juvenile crabs, while others have suggested that the decline is real and many young crabs are being consumed by predators like invasive blue catfish.

Scientists also plan to take another look at the status of the adult male crab population and whether the males need more protection from harvest. Like the females, their number declined in the latest survey, from 55 million in 2023 to 46 million in 2024.

In the wake of last year's survey that found the crab population somewhat recovered, both states eased harvest limits a bit. In Maryland, the Department of Natural Resources also carved out a Labor Day weekend exemption to the August-September male harvest limits imposed for the first time in 2022.

Virginia watermen in May asked for a limited reopening of the state's closed winter dredge fishery. Although the VMRC's own staff recommended against doing so, the board narrowly granted the request — though it still needs to set forth the final rules in September.

Conservation groups strongly oppose the reopening, saying it would make it harder to maintain the species at a healthy population.

"It is incredibly disappointing," said Chris Moore, the Chesapeake Bay Foundation's Virginia leader. "The VMRC's vote imperils not only the vulnerable blue crab, but the sustainability of harvests throughout the year and other species in the Bay that depend on the blue crab for food."

Maryland fishery managers quickly denounced the action in Virginia. The winter fishery remains closed in Maryland.

"The success of the species' recovery after a steep decline in the 2000s can be directly traced to Maryland and Virginia cooperatively managing blue crabs, especially females, based on science," said Natural Resources Secretary Josh Kurtz. "Today's action by Virginia breaks with this successful approach."

In an interview before the VMRC vote, Rom Lipcius, the researcher who oversees Virginia's half of the survey, called the survey results "a mixed bag" and likewise urged managers not to relax harvest limits.

What's more, he suggested there may be reason to tighten limits on the seemingly healthy stock of female crabs. Research by one of his doctoral students indicates that many newly mature females may be caught before they can spawn, Lipcius said. That could explain the low count of juveniles the survey has been finding lately, he added.

"We have to figure out a way to allow them to spawn before they're harvested," he said. ■

Staff writer Jeremy Cox contributed to this story.

Read more about Virginia's winter crab dredging policy at bayjournal.com

New streamside forests may be outpaced by development

Planting rate picked up in 2023, 900-miles-a-year goal for Bay region could be within reach

By Karl Blankenship

The Chesapeake Bay region has dramatically ramped up its pace of planting streamside trees, but recent data indicates that it may be losing them at an even greater pace.

Streamside forest buffers are among the most effective ways to control polluted runoff and improve streams, but the region for years has lagged far below its goal of planting 900 miles of buffers annually.

Figures released in June by the state-federal Bay Program partnership, though, showed a significant uptick in 2023, with states planting 640.5 miles of buffers.

That was up from 457 miles in 2022 and an 11-fold increase from the 56 miles planted in 2017, the low point in the tree planting effort.

"Seeing the planting numbers rise for the last few years is really exciting," said Katherine Brownson, the U.S. Forest Service liaison to the Bay Program.

The 900-mile-a-year goal, which seemed out of reach only a few years ago, is now "within the realm of possibility, which is really exciting to see," she said.

Figures show that in 2023, Virginia planted 298 miles of buffers; Pennsylvania planted 268 miles; Maryland 40; New York 21; West Virginia 13; and Delaware less than 1. Buffers must be at least 35 feet wide to be counted.

But the increase is tempered by satellite data that showed a loss of 21,743 acres of streamside, or riparian, forest cover between 2013–14 and 2017–18.

The Bay Program seeks to have forest cover along 70% of stream miles in the Chesapeake watershed, but during the analysis period the amount dropped from 69.3% to 68.85%.

West Virginia and Virginia exceeded the 70% mark, but both are losing stream forest coverage. Virginia's loss of 15,829 acres accounted for more than half of the total Bay watershed loss of 21,743 acres. New York was the only state that gained stream forest cover during the period.

Updated figures through 2022 are expected later this year and could shed more light on the extent of riparian forest losses. But, Brownson said, holding the line in the face of development is challenging.

"The drivers of loss aren't going away," she said. "We have good reason to think that the pressures on forested lands are increasing watershedwide with the growing population and stresses of climate change."

Jenny McGarvey of the Alliance for the Chesapeake Bay visits young trees along Jenkins Run in Baltimore County, MD, that were planted to create a riparian forest buffer. (Will Parson/Chesapeake Bay Program)

Brownson said that illustrates the need to not only continue ramping up buffer planting, but to also emphasize measures that ensure those areas are protected, such as easement programs.

Riparian forest plantings have been a critical part of efforts to restore the Bay and the streams that feed it since the early 1990s. Emerging science showed that buffers were highly effective at reducing the amount of nitrogen and phosphorus — two key Bay pollutants — from running off the land and into streams.

But streamside trees do much more. They diversify stream habitat by creating pools and riffles, while their leaves and wood fuel the aquatic food web. Their roots stabilize streambanks and, left alone for decades, they can help once-degraded streams regain their natural stream channels.

Forest buffers help reduce flooding and soak up carbon dioxide from the atmosphere, mitigating impacts of climate change. Their leaves also shade and cool stream water, which is important for coldwater fish — forest cover is typically an essential component of healthy trout streams. They also provide habitat for a range of terrestrial species.

And, unlike most runoff control practices, forest buffers become more effective as they age.

A forest buffer borders Fanels Branch in Kent County, MD. (Will Parson/Chesapeake Bay Program/aerial support by LightHawk)

Because of their many benefits, the Bay Program in 1996 set a goal of planting 2,010 miles of forest buffers by 2010. Although that goal was seen as unlikely, the effort proved popular, garnering support from government agencies as well as watershed groups interested in restoring local waterways.

The goal was met eight years early and led to the adoption of a new 900-mile-a-year target in 2007. But instead of accelerating, the rate of planting began slowing.

Rising commodity prices made farmers, whose property was the prime target for tree plantings, reluctant to take land out of production, especially when they often had to share the cost of planting and assume the burden of maintaining the trees.

Maintenance, in particular, is a significant chore as many seedlings can be overwhelmed by invasive plants or fail to thrive and need to be replaced.

Lack of adequate compensation, cumbersome programs and insufficient technical support contributed to the decline of forest buffer plantings.

In recent years, state and federal agencies have sought to streamline programs, cover all planting costs and, often working with watershed groups, provide buffer maintenance. As a result, the plantings have increased in each of the last three years.

Still, the 900-mile goal has never been reached. The highest amount was 721 miles in 2009. In most years, the total has been less than 300 miles.

And while 900 miles per year is the official goal for the entire Bay watershed, states cumulatively call for even higher rates of plantings in their own plans to reach the Bay's 2025 nutrient reduction goals.

States would have to plant a total of 10,943 miles of forest buffers in 2024 and 2025 to meet their cleanup goals. That's slightly more than the total planted between 1996 and 2023.

"Even though we've long known that protecting and restoring trees along waterways is one of the most efficient ways to prevent pollution to the Chesapeake Bay, these efforts are still falling short," said Alison Prost, vice president for environmental protection and restoration with the Chesapeake Bay Foundation.

"Our region is losing more forested buffers to development and other causes than it is gaining through planting," Prost said. "It's time to take a hard look at protecting and planting forested buffers."

She said the "key for success" in meeting forest buffer goals was improving state and federal support for programs. The federal Farm Bill has historically been a major source of funding for buffer planting efforts. And, Prost said, the new version being debated in Congress is a "a golden opportunity to boost investment in forested buffers in the Chesapeake Bay watershed." ■

Researchers send in a drone to study Shenandoah bacteria

Aerial spectrometer images may help pinpoint sources of algae blooms plaguing river

By Jeremy Cox

Researchers in Virginia hope a new technology can help in the battle against one of the oldest forms of life on the planet.

Scientists with Virginia Commonwealth University are deploying a drone this summer over the Shenandoah River to hunt for the presence of cyanobacteria, the slimy, sometimes toxic mats of goop that have plagued the waterway in recent years.

Residents have been complaining about massive algae blooms in the river since 2010. These outbreaks of filamentous green algae have been considered a nuisance, making the river look scummy and forcing more than a few swimmers out of the water.

But in 2021, testing for the first time confirmed the presence of something potentially worse: cyanobacteria.

Such bacteria are among the planet's most ancient organisms. Large outbreaks like those on the Shenandoah in recent years indicate that the river's ecosystem has gotten out of balance, experts say. And some varieties, most notably species of the genus *Microcystis*, can produce toxins that can cause fish kills and lead to liver and kidney damage in exposed humans and animals.

In response that summer, the state issued swimming advisories for 53 miles of the Shenandoah's North Fork. In 2022, warnings were posted again along about 11 miles through the town of Strasburg because of the mats.

The state legislature set aside $2.5 million in 2022 to investigate the blooms in the Shenandoah. The legislation assigned the Department of Environmental Quality as the study's lead. Partnering on the research are the Interstate Commission on the Potomac River Basin (ICPRB), the U.S. Geological Survey, Old Dominion University, George Mason University and VCU.

Field work began in 2023. A final report is due in 2025.

The research has several prongs. The USGS, for example, has installed four sensors, two each on the North and South forks, that take readings for signs of blooms every 15 minutes. Agency staff members also are collecting water samples in-person monthly along both forks, looking for nutrients, sediment and other indicators.

VCU's drone will offer a new dimension to the study, said Douglas Chambers, a USGS biologist and water-quality specialist involved in the Shenandoah investigation.

Virginia Commonwealth University researchers Paul Zimba (left) and Ron Lopez pose with their coffee-table-size drone and two cyanobacteria cultures at the university's Rice Rivers Center in Charles City, VA. (Nina Brundle)

"They can cover kilometers of river reach in a relatively short period of time. They can capture a snapshot of the river in much less time, and we can relate that back to some of the parameters being collected by USGS and ICPRB," he said.

Researchers suspect the blooms are linked to an excess of nutrients washing into the river from its nearly 3,000-square-mile watershed. They tend to flare up when the water heats up, usually in August and September. But the culprit or culprits remain unknown.

"The ecological world is a messy place. It's not an easy place to predict and there are a lot of interactions going on among the variables," Chambers said.

One hypothesis is that a well-documented symptom of climate change — boom-and-bust rainfall patterns with prolonged droughts occasionally interrupted by fierce bursts of rainfall — is creating the perfect setting for blooms. Some experts blame sewage overflows from wastewater treatment plants. Others point to the local agricultural sector's decades-long transition from apple orchards to industrial-scale chicken operations, which they say has introduced a critical mass of the nutrients nitrogen and phosphorus into the basin.

"Poultry [manure] is heavily laden with nitrogen and phosphorus to kickstart these algae blooms," said Mark Frondorf, the Shenandoah Riverkeeper.

A 2022 photo of cattle alongside an algae-plagued Shenandoah River. (Shenandoah Riverkeeper)

"We know the area is agriculturally influenced," said Gordon "Mike" Selckmann, associate director of aquatic habitats for the ICPRB. "There is published literature that points to why these blooms occur, but we don't have a silver bullet for the Shenandoah yet."

Ron Lopez and Paul Zimba of VCU's Rice Rivers Center are leading the drone research. Lopez said he hopes the study reveals the locations of algae hot spots, which can then help researchers pinpoint their upstream sources. "We're setting up the foundation for that sort of work right now," he said.

The drone is equipped with a spectrometer, an imaging device that breaks up incoming light into discrete wave bands. It's similar to how a prism works, Lopez said.

The final product is a wavy line on a graph. Be it a glop of sediment or a cloud of microscopic plants, every substance in the water translates into a distinctive spectral shape, its own visual fingerprint.

"It has as many dimensions as there are wave bands from the imager," Lopez said. "It's like a stack of maps. And each of those layers corresponds to the way an individual wavelength is interacting with what's in or on the water."

With the drones hovering about 200 feet above the river, the camera can detect blooms down to the size of a fist. Lopez said that using satellites to gather the imaging would be far less labor-intensive. But the best pixel size the team could hope for from satellite imagery would cover roughly the same area as two adjacent basketball courts, too wide to spot anything unless it spans the entire width of the river.

Cyanobacteria blooms appear bluish green to the naked eye. The researchers can identify cyanobacteria through two tell-tale pigments: phycocyanin (PC) and phycoerythrin (PE).

Here's where things get tricky: Cyanobacteria blooms in the Shenandoah are often adjacent to or mixed with green algae. While that type of algae is tinged by a different pigment — perhaps you've heard of this one: chlorophyll — there is an overlapping of the pigment spectrums that makes it hard to tell how much cyanobacteria is present.

The resulting effect is like police investigators coming across two people with the same fingerprints. A huge part of the study, therefore, is given over to developing and implementing computer algorithms to throw out the muddying algae data, Lopez said.

He and Zimba plan to collect imaging through November this year, focusing on six segments, each 600 feet long, along the North Fork between Strasburg and Woodstock.

But they aren't relying on remote methods alone. The VCU researchers also are collecting water samples to record precise cyanobacteria concentrations and assess the accuracy of the remote imaging. The first round of data collection last summer and early fall was promising, Lopez said. ■

Baltimore waste incinerator draws fire for air pollution

Groups accuse city of harming nearby neighborhoods by continuing to burn refuse

By Timothy B. Wheeler

Environmental justice and clean air and water advocates who have been fighting for years to clean up or shut down a polluting trash-burning incinerator in heavily industrialized South Baltimore are trying a new line of attack.

On May 28, the South Baltimore Community Land Trust filed a civil rights complaint with the U.S. Environmental Protection Agency, arguing that nearby residents in predominantly Black and Hispanic neighborhoods are disproportionately harmed by emissions from the incinerator, which sits alongs the elevated I-95/395 interchange over the Middle Branch of the Patapsco River. It is operated by WIN Waste Innovations.

"Way too many of my family members and [high school] classmates … suffer from asthma and other respiratory problems made worse by air pollution," said the land trust's Carlos Sanchez during a press release announcing the action.

The land trust, which grew out of a successful effort more than a decade ago to block the construction of another refuse-burning incinerator in South Baltimore, alleges that the city is violating the federal Civil Rights Act by continuing to rely on incineration to dispose of municipal garbage. Represented by the Chesapeake Bay Foundation and Environmental Integrity Project, the group is asking the EPA to investigate the health effects of the WIN Waste incinerator and require the city to divert municipal waste from it while increasing composting and recycling.

EPA spokesperson Dominique Joseph said the agency could not comment on a pending complaint. Under federal regulations, the EPA has 20 calendar days to decide if it will investigate but, as the *Bay Journal* went to press, the complaint was still under jurisdictional review.

The complaint focuses on the city's 10-year solid waste management plan, which was adopted by Baltimore Mayor Brandon Scott in November and approved by the Maryland Department of the Environment. The group contends that in developing the plan, the city's Department of Public Works failed to map out a way to reduce reliance on the incinerator.

With its towering smokestack, the incinerator is a highly visible fixture on the southern edge of downtown Baltimore. Though just one of many industrial and waste disposal facilities in that area, including a controversial coal loading pier, the incinerator is the largest stationary source of industrial air pollution in Baltimore.

Announcing their civil rights complaint at a press conference near a waste incinerator in Baltimore are (left to right) Angela Smothers of the Mt. Winans Community Association; Carlos Sanchez of the South Baltimore Community Land Trust; and Michael Middleton of the SB7 Coalition. (Tom Pelton/ Environmental Integrity Project)

Advocates contend that its emissions of mercury, carbon monoxide, nitrogen oxides and fine particulate matter contribute to respiratory issues, heart conditions and other serious health problems for residents of nearby neighborhoods, including Cherry Hill, Brooklyn, Curtis Bay and Westport.

"As someone raised in Cherry Hill who now suffers from an incurable lung disease as a result of air pollution, I am hopeful that our call for a just transition away from burning trash in our communities is finally heard and acted upon," said Cherry Hill resident Cleo Walker. "I don't want another generation to have to grow up worried about the air they breathe."

A 2017 study commissioned by the Bay Foundation likened living near the incinerator to living with a cigarette smoker, particularly for some children, aged adults and others with respiratory conditions. It estimated that the incinerator's emissions caused as much as $55 million annually in health problems in Maryland and downwind states. And citing 2011 data, the foundation said the incinerator's air emissions also deposited about 6,570 pounds of water-fouling nitrogen annually in the Cheapeake Bay and its tributaries.

The city has long contracted to send a large portion of its municipal refuse to the incinerator. Advocates complain that the city and state have effectively subsidized the waste-to-energy facility by making it eligible for lucrative renewable energy credits.

In 2019, under pressure from community and environmental advocates, the city imposed substantially tighter air pollution limits on the incinerator, only to have them struck down by a federal court. The incinerator's owner then agreed to upgrade pollution controls, but the complaint notes that its emission limits are far looser than what the EPA has recently proposed for municipal waste incinerators nationwide.

In 2020, the city also renewed a long-term contract, pledging to send waste to the incinerator through 2031.

Over the past several years, community activists have pressed for the city to adopt a zero-waste plan, which would move it away from incineration and landfills while expanding composting and recycling. Despite hundreds of people submitting comments urging such a course, the final version of the city's solid-waste plan, activists say, only paid lip service to that goal. Instead, they note, the plan concludes that until residents and businesses change their waste generation habits "it is likely that [the incinerator] will continue to operate at or near its current throughput."

"Trash incinerators and landfills produce unacceptable levels of toxic and climate-harming pollution, and they are often sited in marginalized communities," said Leah Kelly, senior attorney with the Environmental Integrity Project. "We cannot continue relying on these facilities as our primary waste disposal options, as Baltimore City has in this plan. We must plan a transition to better alternatives. That is part of what South Baltimore residents are seeking in this complaint."

Mary Urban, a spokesperson for WIN Waste Baltimore, said that the company has spent $45 million to upgrade its pollution controls, making it "among the lowest-emitting waste-to-energy facilities in the world." She cited a company-commissioned study finding that the incinerator has negligible impact on air quality and argued that it is reducing climate-warming emissions by burning rather than landfilling waste. She also noted that the city has estimated it could cost taxpayers nearly $100 million to stop incinerating trash and instead truck it to the landfill on Quarantine Road, also in South Baltimore.

Jennifer Combs, spokesperson for the city's Department of Public Works, said the 10-year plan does call for expanding waste diversion. She added that city officials "stand ready to work with the EPA" should the agency decide the land trust's complaints warrant investigation. ■

After 60 years, family returns gravestones to reborn island

Markers rescued from Poplar Island decades ago as rising water steadily swallowed the land

By Jeremy Cox

Sometimes, a final resting place is far from final.

When the Howarth family interred their loved ones in Poplar Island's soil in the late 1800s, they probably had no idea that the ground, along with everything on it and in it, would disappear in a matter of decades.

A mixture of forces — sinking land, rising seas and erosion — chewed away at the Chesapeake Bay island just off Maryland's Eastern Shore. By the 1920s, the last of the original 100 residents had been forced to flee. By the early 1990s, nothing of Poplar remained above water but a few small scrapes of marshland.

Water has claimed countless cemeteries and individual graves around the Chesapeake. As climate change accelerates the pace of sea level rise, much more hallowed ground is at risk of vanishing.

But the descendants of those buried at Poplar fought for a different outcome. More than 60 years ago, an aging family member led a mission that rescued the remaining five headstones from a watery grave. Then, fate intervened. A history-making project to rebuild Poplar Island gave them the opportunity to bring those stones back to where they had once stood.

At the center of this story are an aging father, Louis Howeth, and his son, Lee. (The family surname morphed its spelling after they left Poplar.) Lee, an IT specialist at the Shore's Salisbury University, has raced against time over the past few years to fulfill his father's dream while he was still alive to see it.

The *Bay Journal* reported this story over 15 months. What follows is the account of an unlikely reunion told by those who made it happen.

Broken ties

Louis Howeth: People would say well, "If you could be anywhere in the world, where would you be?" This person would say, "Well, in New York." My father said, "Poplar Island."

Lee Howeth: There's definitely some story to be told about the island fading away and the restoration that they're doing. This is kind of the human side of that story.

Louis: [My family] had a farming operation. I understand that the Howarth family owned over 1,000 acres [on Poplar]. They were timber people. They were farmers.

Kristina Motley (senior environmental specialist, Maryland Environmental Service): People used to live out here. The first date we like to focus on is the year 1847. And the reason is that's when they first measured the area of the land. At that time, they found it to be 1,140 acres in size, a fairly large island. It housed a town called Valiant, where there were about 100 individuals.

Louis: My mother told stories on how there were 16 old, brick-solid — not brick veneer — but solid homes over there.

Motley: There was a schoolhouse [that also served as a church] with a cemetery attached to that, a general store, a post office and a sawmill.

Louis: My mother told a story about how she and dad were lying in bed one night. All of a sudden, they heard this terrible squeal. The men get up the next morning to go out to the farm, went down to the water, and there was a cow down there without its tail. Mother said that it was Chessie, the monster that lived on the Bay [that had attacked the cow].

Motley: By the 1920s, all the full-time residents had to move off the island due to erosion. The water was pretty much coming up to their doorstep.

Louis: My father said, "We watched a field go, and we didn't really think too much about it because when it gets to that woods, the trees will stop it." Well, they weren't thinking about the fact that the tide and waves would undermine the roots. Suddenly, you just have a tree on roots, and nothing in the ground. That was my first understanding of erosion firsthand.

Lee: People that lived out there spent their whole lives, raised families and died on the island.

Louis: [My father] had a lot of — I wouldn't call them regrets — but he had a lot of thoughts about how he could have maintained the island itself. They had to sell [their portion of] the island, must have been early 1900s. It was a money thing.

Motley: The island went through a variety of different owners after that.

Saving the stones

Louis: There was a cemetery plot [remaining on Poplar]. My uncle, Harvey Howarth, used to go over there with his lawn mower to keep it looking nice. He said to me one day [in the 1960s], "We got to get over to that island. That graveyard is eroding, and I think we've lost some of the stones already."

Top photo: Poplar Island, in Maryland's portion of the Chesapeake Bay, has been restored using dredged material. (Dave Harp)

Bottom photo: Lee Howeth checks out the gravestone of his great grandfather at its new location on Poplar Island. (Dave Harp)

Lee: [Harvey] was in his probably late 70s. He didn't have the means or capability to do it by himself. So, he asked a friend of his, Willie Rowe, to help. He, Willie and another friend went out [to Poplar] and looked for the stones.

Willie Rowe: (speaking to the *Baltimore Sun* in 2006): He'd been asking me two months before that to take him. That one day was a Saturday. I said, "I'll take you right now."

Louis: They had a row skiff and went to the island.

Lee: They didn't take any tools. They didn't realize they were going to be taking them [when they set off]. They had to get down on their hands and knees and literally dig with their hands to get the gravestones out.

Louis: They couldn't find any evidence of the bodies themselves. All they had was stones.

Lee: From oldest to youngest, there's Levi Howarth. He was my great-great grandfather. Then, there's his son, George. He was my great-grandfather. And George's first wife, Mary, is there. There's a stone for their son, Grover. And there's a stone for George's son, Melvin, whom he had with his second wife, Lizzie.

Louis: The water was intruding into the cemetery. It was turning into a marsh. It was muddy.

Lee: They ended up taking [all five remaining stones] and bringing them back to Tilghman Island and placing them on Willie Rowe's property. They were there for 50-plus years. My great-uncle would go there and mow the grass and keep them up and plant flowers.

Poplar Island is reborn

Motley: When the U.S. Army Corps came out in 1993, they did another land survey on the island. They found that the island had shrunk from that 1,140 acres to less than 5 acres. And those 5 acres weren't even one continuous island. They were split between four tiny "remnant islands."

We are restoring the island by using fresh material from the Baltimore [shipping] channels that we bring here to Poplar Island to restore habitat for our native species. We started construction in 1998 and received our first bit of inflow of dredged material in 2000. We've been slowly filling it up ever since.

It's been estimated that in our known history about 400 islands have been lost in the Bay. Every year, we lose about 260 acres of this wetland habitat. It's very important habitat that is very much on the decline.

[Poplar] is sort of a sanctuary. We get a lot of migratory birds. We've been able to identify over 400 different species of animals that have come back to the island. Over 250 of them are bird species.

Maryland Environmental Service employees Jason Doty (left) and A. J. Ruark prepare to install the Howarth family gravestones at their new location on Poplar Island. (Dave Harp)

Hatching a plan

Lee (speaking in March 2023): We want to get [the headstones] in a permanent place. Over the years, I've kind of felt that sense of burden. My father's 85. I'd kind of like to see him see it through and see them put back where they belong.

About three or four months back, Willie Rowe passed away. And my father, realizing that the house was going to be sold, felt the need to move [the headstones] quickly. So, right now they're at my cousin's house [also on Tilghman].

Louis (speaking in November 2023 at Lee's home, where he had recently moved because he could no longer live on his own): I said to my son, Lee, "Before something happens to me, those tombstones down on Willie Rowe's farm, in my opinion, should go back to the island."

Lee (responding to his father): You talked to me about it probably for the last 20 years.

Louis: There was talk about putting them other places, but I thought, "That's where they came from."

Lee emailed the Maryland Environmental Service, which is involved with the restoration work. Ryland Taylor, then an environmental specialist at the agency, quickly responded.

Ryland Taylor: It was too good of an opportunity to pass up to bring them back here.

Lee (in November 2023): Everything's hung up, waiting on a legal document to be drafted that dad will sign with one of my cousins. It essentially says we don't have any claim to the tombstones anymore. I don't feel like we ever really did have a claim to them. I feel like in every way they belong to the island more than they ever belonged to us.

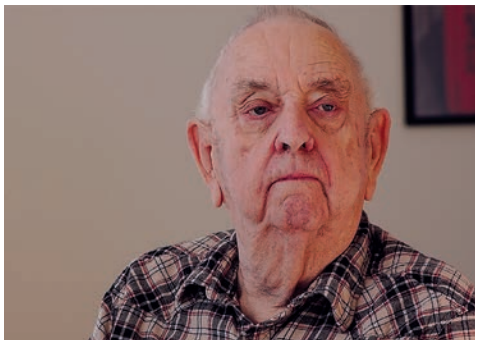
Another hangup: The stones needed refurbishment. Some were missing the entire underground portion. The family took the stones to Tony LeCompte (pronounced "lay count") of LeCompte Monument in Laurel, DE, to have them fixed.

Tony LeCompte (speaking in May 2023): We are fabricating new parts to replace the missing parts. They're from other old stones that were destroyed. They were hit by a car. So, it's kind of from the same vintage time with the replacement parts.

The final step will be epoxy and then cleaning the stones to make them look as if they've been cleaned, but not new. I don't want them to look like they came right out of the factory or the quarry. ... My family does go back a long, long way here. I'm sure I have relatives whose stones have been broken and washed out into the Bay. I want to be part of the process of fixing them and putting them back where they belong.

The headstones return

By May 2024, the headstones' restoration was complete and the legal hurdles cleared. The job of ferrying the headstones to Poplar fell to Robert Wilson, a 72-year-old waterman based on Tilghman Island who has a contract with the Maryland Environmental Service to haul freight to the island. For the final resting place, officials selected a shady spot adjacent to a courtyard of stone pavers.



Louis Howeth long hoped to see his family's gravestones returned to Poplar Island. (Dave Harp)

Katie Perkins (Poplar project manager for the Army Corps): As soon as visitors arrive here and step off the boat, they will see it.

Motley: This is where we gather every tour. We'll talk about the history of the island. We'll definitely have [the headstones] here, front and center, for people to come and visit. And we'll definitely talk about their story to give a full picture of what Poplar Island really is.

A family celebration

On June 4, a little more than a dozen Howeth family members climbed aboard a boat on Tilghman for the 20-minute ride to Poplar. The stones, gleaming white, were standing upright once again in two neat rows. Workers had spread a layer of pea gravel around them, shaped like a heart.

Lee: I'm amazed. I'm impressed that we've got everybody here to see it together. These [names on the headstones] are all Howarths here. But they represent a bigger community that is here and many other surnames and other people that were here.

Bobbie Sue Knight (Louis' great-niece): I don't think I ever came out here. Not to say I didn't hear all the stories.

Lorie Fluharty (also a great-niece): They look like they were made to be here. It makes a connection with the past even though I didn't know these people. It makes it more real.

Lee: Today's just the end of a 60-year journey for these stones. It's an emotional day, and I'm happy to see it completed. They're back where they belong. (Turning to his father standing beside him, gripping a silver cane) What do you think?

Louis: Absolutely. ■

Video and photo gallery online at BayJournal.com

PA riverkeeper offers double-decker educational cruises

Floating Classroom series combines river learning with paddle-wheel charm

By Ad Crable

The Hiawatha paddleboat provides both a one-hour cruise and environmental lectures on the West Branch of the Susquehanna River. (Ad Crable)

As the paddle wheel churned water in the West Branch of the Susquehanna River, Matt Wilson of Susquehanna University stood on the open-air upper deck of the *Hiawatha* and offered fascinating insights on snails and freshwater mussels to about two dozen people, mostly children.

At the same time, in the enclosed deck below, Penn State Biology Professor Edward Levri and two of his students held a similar audience in thrall, describing threats from the nonnative New Zealand mud snail now establishing itself in the river. Meanwhile, the brightly colored sternwheeler languidly glided through the framing mountains of northcentral Pennsylvania.

Along the way it passed anglers in bass boats, summer river camps and what appeared to be stone islands but were actually log booms left over from the era when massive rafts of timber were floated down the river to sawmills.

Welcome to the Middle Susquehanna Riverkeeper Association's Floating Classroom, a popular annual series of learn-while-you-cruise programs revolving around the local environment. Riverkeeper Association serves an 11,000-square-mile watershed of the Susquehanna in 20 Pennsylvania counties that drain into the main and west branches of the river.

Offered twice per month all summer into October, the program touches on a range of subjects, from the status of the eastern hellbender (Pennsylvania's state amphibian) and Louisiana waterthrush to pollinator awareness and turtle species. Each cruise features two lectures, one per deck.

"I feel it is important to connect everyday people with the experts behind the research," said Middle Susquehanna Riverkeeper John Zaktansky. "Many people consider the biologists and others at some of the state agencies or other groups that do this work as unapproachable. … We strive to connect people with those who know these topics best, while also making sure the subjects are fun and engaging for a wide variety of ages and attention spans."

It has worked. This is the fifth year for the program, though COVID-19 shut it down in 2020. The 60 seats on the one-hour trips are almost always sold out.

While Wilson, director of Susquehanna University's Freshwater Research Institute, was describing the 135 species of mussels and snails that live in waters in this part of the country, attendees were invited to examine vials of preserved specimens. Down below, at the simultaneous lecture, participants peered into microscopes for an up-close look at invasive mud snails.

Other topics through the years have included a history of the river, legacy pollution from mines, raptors, microplastics, aquatic insects, fish anatomy, bats, flooding by Tropical Storm Agnes, rocks and geology, "forever chemicals," Native American artifacts, and eels. There have also been photography and videography classes.

And it's not an either-or situation with the double lectures. Halfway through the cruise, the *Hiawatha* turns around and attendees switch decks.

The *Hiawatha*, a commercial tour boat with daily cruises, has proven to be a perfect venue for the program. Built in 1982, the 65-ton vessel is named after a steam paddle-wheeler of the late 1800s and early 1900s that used to carry local residents to a swimming beach on the river.

"The *Hiawatha* has been in our collective backyard for decades, but there are still so many people who have never taken a ride on the paddleboat ... What better environment to learn about the river and the creatures that depend on it than on the river itself?" Zaktansky said.

During the snails and mussels trip, mayflies hatching from the river hitched a ride on the decks of the boat as Wilson roped in his mixed audience of all ages with interesting tidbits — for example, the "pearl" buttons once used in clothing came from freshwater mussels, and the river's mussels can live for more than 100 years.

Equally startling, Wilson noted, the larvae of invasive Asian clams, found all over the Susquehanna, can pack atop each other to the tune of 2,000 per cubic foot. For nonnative zebra mussels, make that 10,000 larvae.

Down below, Levri topped that by noting that the offspring of New Zealand mud snails can crowd 75,000 into the same space. "If they get into the Susquehanna River, they're going to stay in the Susquehanna River," was his somber conclusion.

The kids were fascinated to hear that clams and mussels have something akin to a foot to walk around underwater, though it would take them 33 hours to go a mile.

"I think what's interesting is [mussels] don't have feet, but what moves them is called a foot," said 9-year-old Emma Cassidy of Williamsport when asked for her favorite fact from the cruise.

"I thought it was extremely informative and engaging," said Courtney Davis, who drove an hour to bring her four homeschooled children on the cruise. "We had signed up for two more classes and are even more excited now."

Amy and Jason Pflecker from Sunbury attended with their 14-year-old daughter, Hazel, and found the experience both peaceful and fulfilling.

"To me, we are learning about our environment. We live close to the river and it helps us feel connected," Amy said.

The Class Catalog

Here are the topics for the remaining 2024 Floating Classroom cruises. All run 10–11 a.m. on Tuesdays.

July 9: Proposed re-introduction of the American marten in Pennsylvania. Tom Keller, Pennsylvania Game Commission.

July 16: Birdwatching tips and the importance of the Louisiana waterthrush as an indicator species. Andrew Bechdel, Middle Susquehanna Riverkeeper Association.

Aug. 6: New research on the eastern hellbender, the state's official amphibian. Matt Kaunert and students, Lycoming College Clean Water Institute.

Aug. 13: Invasive plants and bees, and forage possibilities. Emily Shosh, Middle Susquehanna Riverkeeper Association.

Sept. 10: Casting, fish identification and efforts to save the Chesapeake logperch in the lower Susquehanna. Amidea Daniel, Pennsylvania Fish and Boat Commission.

Sept. 24: Turtles of the watershed, including wood turtles and their status. Kathy Gipe, Pennsylvania Fish and Boat Commission.

Oct. 8: Monarch butterflies, with a butterfly tagging session and a native plant "seed bomb" to take home. Emily Shosh, Middle Susquehanna Riverkeeper Association.

The cost is $5 for adults; $10 for youth 17 and younger; and $8 for additional youth 17 and younger. Ages 2 and younger are free. The *Hiawatha* paddleboat leaves from a dock on Hiawatha Drive in Susquehanna State Park in Williamsport, PA. For information about trips or to sign up, visit *middlesusquehannariverkeeper.org.* ■

Kaine lays out the 'Virginia Nature Triathlon' challenge

U.S. senator and former governor hiked, biked and paddled his way across the state

By Whitney Pipkin

Tim Kaine has had many titles over more than a quarter-century in public office: U.S. senator, mayor, governor and vice-presidential running mate, to name a few.

But in his new book, *Walk Ride Paddle: A Life Outside,* released in April, Kaine reveals a title he earned while hiking the Appalachian Trail where it winds along the spine of Virginia: "Dogbowl."

It's a reference to a collapsible bowl, typically for dogs, that Kaine carried with him during 42 nonconsecutive days on the trail. Hopping off and on, he hiked for a string of days at a time between sessions in Washington until he had traveled the entire Virginia portion. The bowl, which he used to scoop up water for hand washing, was one of his innovations.

But in the process, Kaine may have invented something a little bigger too: a Virginia Nature Triathlon.

The concept, more like a quest than a weekend excursion, entails hiking the 559-mile Virginia portion of the Appalachian Trail, cycling 321 miles along the state's scenic Blue Ridge crest and paddling the James River for 348 miles, from its headwaters in the Allegheny Mountains to its raucous rendezvous with the Chesapeake Bay.

That's what Kaine did over the course of three years, starting in 2019. After crossing the 25-year mark in public office and turning 60 the year before, Kaine wrote in the book that he was looking to "moor [his] future public service to something more meaningful." So, like many people during the pandemic years that would follow, he turned to the outdoors.

As a U.S. senator, Kaine spends 36 weeks a year in legislative sessions in DC. Elected officials often use their recess weeks and weekends to see their families and tour the regions they represent by car or plane.

"Considering Virginia has so much stunning terrain — from the mountains to the ocean — I wanted to take the time to really explore," Kaine wrote in an article for *Blue Ridge Outdoors* magazine in 2022, which he used in part to see if anyone else had ever done the three-part excursion he completed the previous year.

"As far as I know, no one has done all three of these," Kaine said during an interview with the *Bay Journal.* "I do have people coming up to me now saying, 'I'm gonna do it.' And that's exciting."

U.S. Sen. Tim Kaine celebrates reaching the end of the Virginia portion of the Appalachian Trail after 42 days of section-hiking and backpacking. (Courtesy of Tim Kaine)

Kaine traveled this Appalachian Trail footbridge where it crosses the James River near Snowden, VA, during the "walk, ride, paddle" journey that he dubbed the Virginia Nature Triathlon. (Courtesy of Tim Kaine)

Kaine worked with outdoors nonprofits and the app FarOut to create an interactive map and guide of the nature triathlon, available online for $30. He found a previous version of the app indispensable to his hike on the Appalachian Trail, but he worked with experienced friends and guides from organizations like the James River Association to help plan the other legs of the journey. The app now makes it much easier for others who want to tackle the challenge.

Kaine said he hoped the outdoor expeditions would help him "go deeper" into portions of the state he had grown to love since moving to his wife's hometown of Richmond in the early 1980s.

He met far fewer people on the Appalachian Trail in the heat of August than he might have at public events. But Kaine said he found a lot of value in the interactions he had along the way, unshaven and nearly unrecognizable after days in the outdoors.

"This is getting to know my state, too, but in a different way, without the entourage," he said. "We live in polarized times politically, but there's a lot of harmony in nature."

The triathlon was no walk in the park either. When asked if there was a moment he wanted to quit the more than 1,200-mile journey, Kaine said, yes, "every day" of the first two-thirds of the Appalachian Trail. He recounted run-ins with bears, wolf spiders on his pack and a mix of heavy evening rains and almost not enough water to drink at various times along the way.

By the time he was more than halfway finished, though, he knew he would go on.

Kaine spent some of his 42 total days hiking solo on the Appalachian Trail in 2019, while friends or family members joined him for others. The solo days proved to be some of his most physically trying and intellectually rewarding, providing mental rest from the constant technological demands of a busy senatorial life and time to reflect on his various roles in the state.

The cycling trip along the Blue Ridge Parkway and Skyline Drive began a few months into the pandemic year of 2020. For this eight-day jaunt, Kaine was joined by longtime friends, some of whom had biked across Iowa with him in 1996 as part of a large, longstanding bicycling event.

Kaine said he developed the Virginia Nature Triathlon in part to create a similar outdoor quest for Virginians, akin to hiking all 46 peaks in New York's Adirondacks over the course of several years or a lifetime.

"It's one thing to have the idea and another to do it," he said. "But I knew I wanted to write about it either way."

The book takes a day-by-day approach, with Kaine reflecting on both the trials of the terrain and the political backdrop of the time. He said the daily-journal approach was inspired by Henry David Thoreau's book, *A Week on the Concord and Merrimack Rivers*, which Kaine read while exploring that same setting during his years at Harvard Law School.

The paddle on the James, of course, mirrors this inspiration most closely. And, with dams still crossing the river in several places, canoeing the length of the river proved to be the most difficult "leg" of the triathalon. The James River Association's executive director Bill Street joined him for some of the route, as did friends and family for others.

During the trip, Kaine accidentally poured water from a Jetboil stove onto his foot, resulting in second-degree burns that took him off the water for a few weeks to heal.

Kaine also saw firsthand which portions of the river are easy for the public to access and which are not.

But he eventually finished his trek by paddling a borrowed kayak through whitecaps during a small craft advisory to the beach at Fort Monroe National Monument.

"So much has happened in between these trips," he wrote in the book. "But the river flows on, seemingly unchanged." ■

VA offshore wind project underway as studies continue

Potential environmental impacts range from wetland disturbances to marine and bird migration

By Lauren Hines-Acosta

As Nature Conservancy marine scientist Brendan Runde motored into the Atlantic Ocean to study fish about 27 miles offshore from Virginia Beach, two 600-foot-tall wind turbines appeared in the distance. They steadily grew on the horizon, until one of them was towering over the comparatively tiny C-Hawk fishing boat Runde steered.

To catch the fish he was there to tag for his study, Runde had to keep the boat right beside the massive pilon — as the equally massive turbine blades swept by overhead.

"There's 100 or 130 feet between the tip of the blade and the boat, but it doesn't feel like that much when that thing's coming down," Runde said. "So, that's pretty cool to experience."

Runde is one of many scientists eager to fill in the remaining knowledge gaps around how the country's growing offshore wind industry affects the environment. The turbine he was visiting was one of two "demonstration" units built in advance of Dominion Energy's enormous Coastal Virginia Offshore Wind (CVOW) installation. Its construction got underway in earnest in May after the project received its final federal permit.

Once finished, with an estimated completion date of late 2026, it will be the largest wind energy installation in the U.S., in terms of both size and energy output. Its 176 turbines and three offshore substations will cover 112,800 acres, and it is expected to generate 2.6 gigawatts of electricity, enough to power at least 650,000 homes.

The project is in response to Virginia's Clean Energy Act. The 2020 law demands that Dominion Energy deliver 100% of its electricity from carbon-free sources by 2045.

"Cutting emissions is important from a climate change perspective," said Chris Moore, the Chesapeake Bay Foundation's Virginia executive director. "So, these types of projects can help reduce our impact on Chesapeake Bay resources, improve water quality and help us meet our Bay goals."

"I'm not sure that we can't have it all," he added. "I think it's a matter of making sure that we site these things correctly, making sure that we try to reduce our impact on other resources."

After studying Dominion's proposal for two years, the Bureau of Ocean Energy Management (BOEM) in September released its environmental impact statement, which proposed a variety of alternatives that would reduce environmental disburbances. Dominion adopted BOEM's Alternative B, which removed acreage from the "lease area" in two places — one along the northern boundary, to protect a fish haven created by scuttled World War II ships, and one at the northwest corner, where it risked interfering with vessel traffic.

Marine scientist Brendan Runde of the Nature Conservancy holds a black sea bass with a tracking tag near the base of a wind turbine off the Virginia Beach coast. (Courtesy of the Nature Conservancy)

Dominion Energy's first offshore wind turbines, shown here on April 27, stand about 27 miles off the coast of Virginia Beach. (Courtesy of Dominion Energy)

The transmission line will come ashore near Rudee Inlet south of Virginia Beach and then run underground to a switching station that will be built at Oceana Naval Air. From there it will run about 14 miles above ground to Dominion's Fentress substation in the southern outskirts of Chesapeake, VA.

The line will have to cross wetlands along the canal that connects the Elizabeth River to the upper North Landing River. According to the BOEM report, the overland transmission line route adopted by Dominion will permanently impact 40 acres of wetlands and temporarily affect 17 more acres.

Dominion says it will limit access roads to existing paths and use a tunneling technique called horizontal directional drilling to minimize impacts. The company also plans on using timber mats to cross wetland streams. Mitchell Jabs, manager of environmental services with Dominion Energy, said the utility purchased credits from a wetlands bank to offset the 40 acres of permanent changes.

Noise matters

Underwater construction noise will have the most direct effect on wildlife. It will be temporary, though, and the BOEM report concluded the noise wouldn't likely cause population-wide changes on any marine species.

Driving piles on the sea floor for the turbine foundations will no doubt affect marine mammals, sea turtles, seals and even finfish, possibly disorienting them and likely causing them to avoid the area while the work is underway. (See the related article about dolphins, page 24.)

One of Dominion's strategies to minimize the noise issue is to limit pile driving to an hour and a half at a time, Jabs said. And it will start up the pile drivers gradually, with the hope of driving animals away before the noise peaks. The company will also deploy sound-monitoring buoys. Some will listen for marine mammals before starting to drive the piles, and others will measure the construction sounds.

As has been done with other offshore wind projects, the company will also use "double bubble curtains" to reduce the sound impact — perforated air hoses on the seafloor, encircling the piling and releasing walls of bubbles that scatter and absorb sound waves.

If whales or dolphins are spotted too close to the turbines during construction, all operations must stop, as long as it is safe to do so.

The environmental impact statement also warned that the installation could have a serious impact on North Atlantic right whales because their numbers are critically

A specialized ship at the Portsmouth Marine Terminal in Virginia is loaded with sections of "monopile" that will support the wind turbines being built offshore. (Courtesy of Dominion Energy)

low and estimated at 360 individuals, according to the National Marine Fisheries Service. Even one right whale death caused by a ship strike or auditory disorientation could have an outsize effect on the species' chances of survival.

Nevertheless, the National Oceanic and Atmospheric Administration says there is no scientific evidence that right whale deaths and injuries, which have spiked since 2017, are linked to offshore wind turbines. Where the causes of death or injury are known, vessel strikes and entanglement with fishing gear have been the primary causes.

To avoid vessel strikes, Dominion is training project personnel to spot and identify marine mammals. While construction is underway, the utility will have nine protected-species specialists on three boats keeping watch. All boats involved in the project must travel at 10 knots in or near the project area. The utility will also suspend construction activity from Nov. 1, when right whales begin migrating to their calving grounds off the Carolinas and further south, to April 30, by which time most have returned to foraging territory off New England.

The beleaguered right whale has some unexpected allies — a trio of conservative groups, all known to question or reject climate change science. The Heartland Institute, National Legal and Policy Center and Committee for a Constructive Tomorrow filed a federal lawsuit in March, saying the federal government failed to show that the wind farm would not harm right whales. They sought an injunction to halt construction, but District Court Judge

Biologist Alex Wilke studies how whimbrel migration patterns interact with offshore wind sites. (Bryan Watts/Center for Conservation Biology)

Loren L. AliKhan denied the request on May 24. The groups say they hope to overturn that decision and will continue their push to stop the project.

Filling the knowledge gap

Brendan Runde's fish-tagging visit to the demonstration turbines was part of just one study by the Nature Conservancy. Runde and his team have tagged fish to track their movements during construction using two dozen data receivers on the sea floor. They have also, like Dominion, deployed underwater microphones to measure construction sounds.

In the future, Runde says, when the turbines are operating and sending electricity ashore, the tagging and tracking work may show if fish — some of which use Earth's magnetic field to guide their migration — are affected by electromagnetic fields around the underwater transmission cables.

Another important avenue of research has been how the turbines might pose a collision threat to migrating sea birds because the wind farm is on the Atlantic Flyway, a broad migration path plied by as many as 200 species of shorebirds and seabirds.

Researchers say that the majority of those birds hug the coast, passing just a mile or two offshore and are therefore not threatened by the wind farm. Some birds, however, travel much farther offshore and may be at risk.

Researchers from the Nature Conservancy and William & Mary University's Center for Conservation Biology have for several years been tagging and electronically tracking whimbrels — one of many seabirds that use the flyway. Whimbrels are of particular concern because they use the Eastern Shore as a refueling stopover on their extraordinarily long annual roundtrip, back and forth between South America and as far north as the Arctic Circle.

Nature Conservancy biologist Alex Wilke says the team is still compiling tracking data and will continue to do so through 2026. Scott Lawton, an environmental technical advisor for Dominion, says there have been no reported bird collisions with the demonstration turbines since they were completed in 2020.

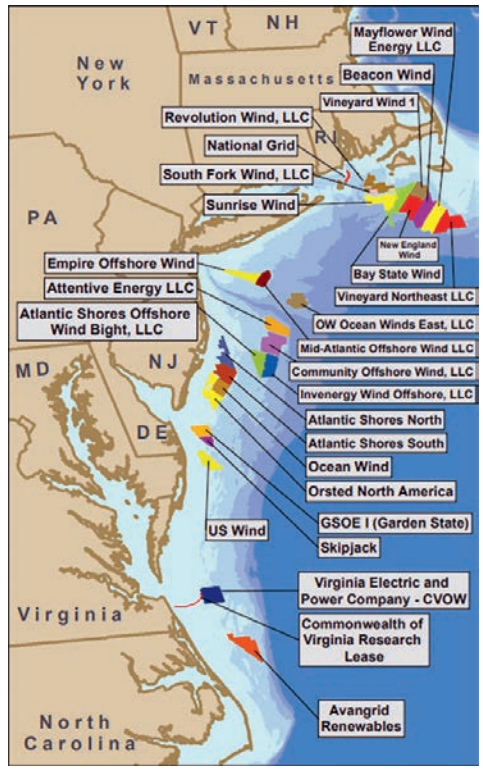
Dominion plans to install bird-perching deterrents on the turbines and shields on lights, to avoid upward illumination, and to track and report any bird deaths. The company will also avoid cable installation onshore from April 1 through Aug. 31, when birds are nesting and breeding.

Disturbance of seafloor habitat is unavoidable, BOEM's environmental impact statement said. The total footprint would have been 204 acres in the original construction plan, but the alternative plan adopted by Dominion reduced the disturbance by 15% for turbine pilings and 21% for cable installation. The company has also committed to monitoring the status of certain fisheries, like black sea bass, during and after construction.

Recreational anglers are also interested in the results of the fish-tagging study. So far, they only know what they've seen firsthand.

"We've already seen that some fish have found those turbines and decided it's a good place to hang out all summer," said Scott Gregg, a charter captain and board member with the Virginia Saltwater Sportfishing Association. "It's not quite the hotbed that we look for them to become, but it's definitely more than open ocean. It gives us another place to fish."

The commercial fishing community is much less enamored of the project, which



This map shows the offshore wind leases and project areas along the northeast coast of the U.S. as of August 19, 2022. (Bureau of Ocean Energy Management)

will not only close fishing grounds but also pose a collision risk to vessels when visibility is poor. Dominion has agreed to compensate both recreational anglers and commercial fishing operations for any tangible losses caused by the wind farm.

Meanwhile, construction of the turbine foundations will continue apace into the fall, though Dominion has not said how many turbines it expects to have installed by the end of the construction period.

Research will also continue, this year and beyond — much of it coordinated by the Regional Wildlife Science Collaborative for Offshore Wind, a consortium of environmental groups, offshore wind companies and federal and state agencies. The collaborative has developed and is coordinating a master "science plan" to explore the impacts of offshore wind on ocean ecosystems and wildlife — from marine mammals, sea turtles and finfish to migrating birds and bats.

And Runde, for his part, plans to run his study through this summer.

"We're hoping that the results of our study are useful to inform future monitoring mitigation requirements in records of decision, environmental impact statements, environmental assessments, things like that," Runde said. "So CVOW was part of really the first wave of offshore wind [in the Atlantic], and it's not going to slow down." ■

In changing seascape, scientists learn by listening to dolphins

Research aimed at reducing human impact on animals traveling in and out of the Bay

By Whitney Pipkin

You can learn a lot about dolphins by listening. That's what researchers from the University of Maryland have gathered over the past several years as studies originally spawned by proposed wind energy projects have led to a much broader understanding of Atlantic bottlenose dolphins that frequent the Chesapeake Bay.

The hundreds of dolphins that come to the Bay and its rivers every summer will, in the coming years, likely encounter more and more offshore wind farms as they make their way up the Atlantic Coast. Scientists have been using underwater recording devices called hydrophones to monitor the comings and goings of marine mammals, so that offshore wind projects can schedule construction periods outside of their peak traveling seasons. The monitoring will also help them understand how the presence of turbines affects the animals over time.

But by having hydrophones in the water, continuously monitoring species for months on end, scientists have made other discoveries.

Under a project called TailWinds, a team has been monitoring the presence of marine mammals off Ocean City, MD, for about a year. The project is funded by U.S. Wind, Inc., which is developing a lease area for as many as 22 wind turbines in these deeper offshore waters.

Using hydrophones there and elsewhere, researchers have identified about 1,500 "signature whistles" belonging to individual dolphins. Scientists say these specific whistles are developed in the first year of a dolphin's life as the mother calls to her nursing calf and the calf recognizes that call as a sort of name.

"We were surprised by how many we detected off Ocean City that are also in the Chesapeake Bay," said Helen Bailey, an adjunct professor at the University of Maryland Center for Environmental Science.

Bailey is the founder of the Chesapeake DolphinWatch program, which was inspired in part by the hydrophone work, but also by the desire to better understand where and when dolphins are traveling in the Bay. Begun in 2017, the citizen science project employs a smartphone app that the public can use to report dolphin sightings. The number of sightings has grown by hundreds each year, with more than 1,500 reported to the app in 2023.

Researchers Caroline Tribble (left) and Amber Fandel of the TailWinds project set up underwater listening equipment that will allow them to detect dolphins and even identify certain individuals by their "signature whistles." (University of Maryland Center for Environmental Science)

"It's interesting because I thought at some point it would just plateau. But it keeps growing," she said. "I think it's reflecting a continued growth of the network [of citizen scientists] and the use of the Bay by bottlenose dolphins."

Bailey has also been working with TailWinds, which has collected a year of baseline data so far, with a focus on black sea bass as well as whales, porpoises and dolphins.

Before this, Bailey monitored marine mammals off the pier at the Chesapeake Biological Laboratory on Maryland's Patuxent River in 2017. That's when she began to see just how many dolphins are coming into the Bay.

Since then, researchers using hydrophones and other identification and tracking methods along the Atlantic Coast have been scrambling to manage a fire hose of data about the whereabouts of dolphins and other marine mammals.

Bailey said specialized software has helped the team sift through hours of hydrophone recordings to look for patterns that identify certain individuals. Taken together, the work has confirmed that the Atlantic bottlenose dolphins that visit the Bay are traveling from as far south as North Carolina and as far north as Delaware and New Jersey.

Researchers working within the Bay, such as the Potomac-Chesapeake Dolphin Project, have confirmed through their own observations and hydrophone recordings that dolphins use the Bay for mating, giving birth and feeding, and that they travel farther up into tributaries than previously understood.

Because the dolphins are so widely traveled, what happens off the coast — including new energy projects — could affect their behavior.

Decades ago, Bailey began studying how loud noises, such as the pile-driving construction that is involved in anchoring wind turbines to the seabed, affect the behavior and health of marine mammals. As a doctoral student, she conducted research for a new wind farm off Scotland's coast that focused on harbor porpoises.

"Generally, we found that there was a period where the animals might be found farther from the turbines to avoid [the noise], but then they come back afterward," Bailey said.

There is evidence that, after construction, the wind turbines' underwater structures actually attract dolphins and other marine mammals — because their underwater structures become artificial reefs that attract the fish they feed on.

But underwater pile driving is one of the loudest activities humans can do in marine environments, second only to seismic surveys conducted during oil and gas explorations in some areas, Bailey said. In Scotland, they found the pile-driving sounds could be heard up to 50 miles away in the air, and even farther in the water.

Because water molecules can carry sound farther, one method that dampens underwater noise during wind turbine construction is the use of perforated air hoses that create a curtain of bubbles around the structures. The extra air helps reduce the amount of noise that escapes the immediate area.

Excess underwater noise can also have a cumulative impact on the animals. Bailey published a paper last year that found excess noise makes it hard for dolphins to communicate, causing them to raise the volume of their calls much like humans might do in a noisy restaurant.

"These animals are already dealing with almost constant vessel noise," Bailey said. "In the last 100 or so years, their soundscape has completely changed. They do adapt their calls." ■

Leader in environmental education says we can do better

Award-winning scientist is passionate about sharing her field with youth

By Jeremy Cox

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

As a Black woman working as a marine scientist, Symone Barkley says her presence in the traditionally white, male field sends a message.

"You can be a scientist no matter what you look like or where you come from," said Barkley, an education specialist with the National Oceanic and Atmospheric Administration's National Ocean Service, based in her hometown of Baltimore. "For me, being a scientist means working outside some days, and other days it means sitting in front of a computer. I'm still a scientist. It might mean me wearing gold hoops and my hair out and curly. And other days, my hair might be in braids."

Barkley earned a bachelor's degree in marine and environmental science from Virginia's Hampton University and a master's in natural resources from Delaware State University. She recognized early in her graduate work that her passion was rooted in sharing scientific knowledge with the public.

She has devoted her adult life to environmental education. She was a recipient of the North American Association for Environmental Education's 30 Under 30 Award, which recognizes young leaders in the field worldwide.

Among the duties she performs in her position at NOAA, Barkley hosts the podcast series, *Planet NOAA,* which spotlights scientific endeavors within the federal agency. On the advocacy side, she is the chief learning officer for a nonprofit called Black in Marine Science, which seeks to amplify Black voices and encourage a new generation to embrace the field.

Barkley talked about her role in attracting more people of color into the marine sciences and how schools can incorporate more environmental education into their teachings. This interview has been edited for length and clarity.

Question: Where does your passion for marine science comes from?

Answer: I was able to become a volunteer at the [National] Aquarium. I remember getting this really large binder that included facts about every exhibit. I had to learn about every exhibit because I was stationed on the floor. And when guests come through the building, they will be asking me questions. And I was expected to know the answers. … I was ecstatic about it. And I still have the binder.

Symone Barkley, an education specialist with the National Oceanic and Atmospheric Administration, says that schools need to do a better job prioritizing environmental education. (Dave Harp)

Q: Working at the National Aquarium, how much did young people seem to know about the environment?

A: You know, kids always know more than you think. That's something that I feel like [older] people underestimate. It's just about how we talk about it with them and asking the right questions.

Q: What do you think about environmental education in America today? Is it adequate?

A: No. I think we have a long way to go. One thing we don't see a lot is a requirement to talk about [environmental] topics in the curriculum across the country. When I go to science teacher conferences like the National Science Teaching Association's, we have a lot of science teachers who want to talk more about the environment, but their state curriculum doesn't have a whole lot of it, or they are not allowed to talk about certain things.

Q: Why can't they talk about certain things?

A: In some states, maybe we can't say "global warming," but we can say "climate change," right? Things get a little sticky. And recently, as we've been talking about environmental justice, sometimes it seems like that's a political topic. To me, if we're talking about environmental education, environmental justice has to be included.

We can't skate around the conversations about [marginalized] communities being more impacted by air pollution, or by heat, or by any of these other factors due to them being pushed into certain areas or having lower socioeconomic status. I don't really see us moving forward and making any progress if we don't have these conversations with the students now.

Q: So, what's the solution to improving environmental education?

A: I think that we have to give ourselves a little bit of flexibility. We need to be encouraging teachers and school districts to incorporate more field experiences. We don't see field trips often, especially at the high school level, [to natural settings]. The senior class goes to an amusement park or something for graduation.

Q: Only 241 people have won the 30 Under 30 Award, which you did. They're from 47 different countries. What has that done for you?

A: One of the things I'm most proud of is that after I was a recipient of the 30 Under 30 Award, I was able to apply to a funding opportunity called Changemakers. I applied with the idea that I would create STEM kits for students in Baltimore.

This was launched in 2020. It was really great timing because students weren't going to school [because of the pandemic], so there were lots of families and lots of teachers looking for ways to engage students at home. I will say that they were received very, very well.

Q: Are these kits still available?

A: I took a little bit of a break because I had a baby, but my kits are about to come back out. And I'm really excited to get back out there.

Q: What is the goal behind the group Black in Marine Science?

A: Black in Marine Science is a nonprofit focused on inspiring the next generation of marine scientists. It's to say that, while we are underrepresented in this field, we are here. We were formed in 2020, and there are over 300 members from countries around the world. It's a statement to say that we exist, we want to be in this work, we want to stay in this work, we're going to support one another in this work, and we deserve to be here just like everyone else.

Q: What do you say to young people, especially young people of color, who want to pursue a career in marine science?

A: Come on y'all, we're ready! This is probably the best time because we are energized. Everyone's excited. Everyone is here to welcome you with open arms. We're here to give you all of the support you need. ■

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

Explore the watery delights of PA's Seven Tubs

Top photo: Thousands of years ago, melting glaciers cut a watery gorge in what is now the Seven Tubs Recreation Area in northeastern Pennsylvania. (Ad Crable)

Inset photo: A pedestrian bridge over Wheelbarrow Run provides an accessible bird's-eye view of the falls and chutes at Seven Tubs. (Ad Crable)

By Ad Crable

Seven Tubs Recreation Area, a small but breathtakingly beautiful gorge in northeastern Pennsylvania, sculpted ages ago by glacial meltwater, has been reopened. It was closed in 2023 to allow the state to repair damages caused by a sudden glut of visitors during the COVID pandemic.

Now, after $1.5 million in infrastructure improvements by the Pennsylvania Department of Conservation and Natural Resources, visitors can have a safer, more pleasant visit to the area's potholes, chutes, cliff walls, waterfalls, emerald green wading pools and forest trails.

"We were counting the days and kept driving by, wondering when it was going to open," said regular visitor Kristy Joseph on a bright morning a couple of weeks after Seven Tubs reopened with no fanfare on April 6.

"There are beautiful areas all around this part of Pennsylvania, but [here] you see the tubs and how the rock is so smooth and carved over the years. I love this trail because of the diversity of it," she said.

Seven Tubs is in the upper reaches of the Susquehanna watershed, just east of Wilkes-Barre. The name refers to the series of burnished chutes carved by the movement and melt of glaciers through gritty sandstone. Today, the water gushes through narrow slices of carved sandstone walls.

You can peer down from slate steps into Wheelbarrow Run from every possible angle on the short but rugged yellow-blazed Seven Tubs Trail that traces the rim on both sides of the creek. The total length of the loop is about a half-mile.

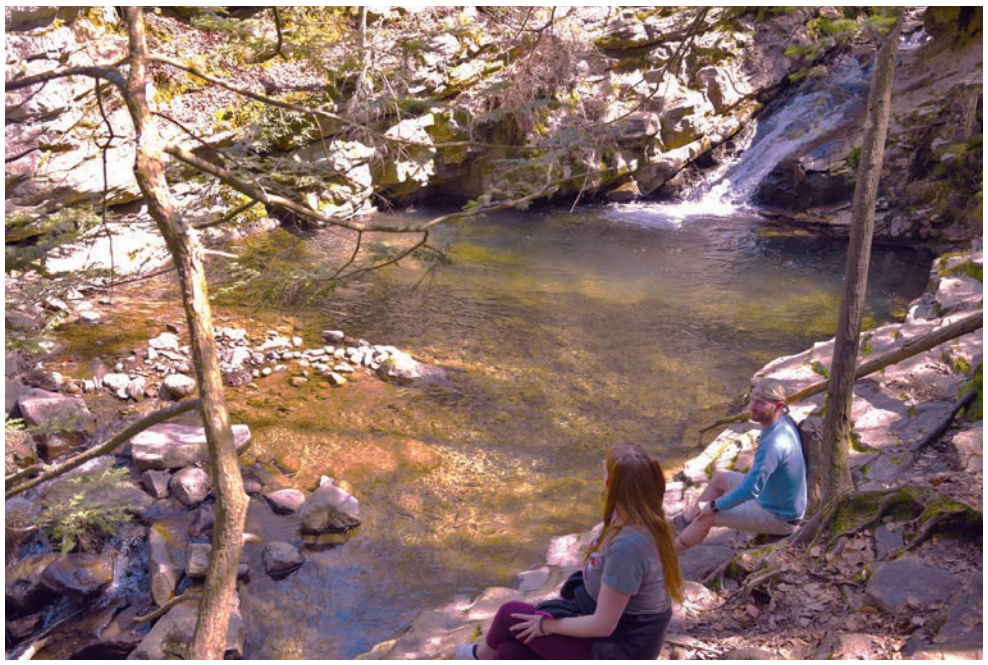
If sheer drops are a little beyond your comfort zone, an expansive wooden pedestrian bridge across the stream is a mere 100 yards from the parking lot on a paved, handicapped-accessible trail.

Here, at the bottom of the gauntlet of chutes, you can see a couple of the most remarkable plunge pools, as well as a washboard-like slide over bedrock that forms a large pool by merging with Laurel Run.

Want something a little more ambitious? The 2-mile yellow-blazed Audubon Loop Trail veers from the chutes near a footbridge and railroad tunnel and meanders beyond the 123-acre natural area — into Pinchot State Forest through peaceful mountain woodlands laced with plenty of mountain laurel, hemlock, birch, pine and oak trees.

The trail reaches Laurel Run, not quite as frothing as its Wheelbarrow Run tributary just downstream. But it serves up a pleasant series of riffles and clear pools that are popular with waders in the summer. The trail meets up with the Seven Tubs Trail at the pedestrian bridge.

Though not featured in Seven Tubs promotional literature, there are two waterfalls a short hike from the overflow parking area that are popular with those in the know.



Visitors enjoy a tranquil moment alongside a pool at the foot of a waterfall in Pennsylvania's Seven Tubs Recreation Area. (Ad Crable)

From the lot, walk directly across the Seven Tubs access road and pick up a wooded trail marked by boulders. Turn right, following the trail as it parallels the access road. Follow it to the bottom of the hill. Both waterfalls will be a short hike to the right.

One of the cascades flows down bedrock. The second is significantly higher and forms small plunge pools as the water tumbles to catch up with the stream below.

Seven Tubs has been a coveted escape for locals since at least the late 1800s — known then as Whirlpool Mountain Falls. The Central Railroad of New Jersey built Wilkes-Barre Mountain Park on 20 acres near the mountain summit.

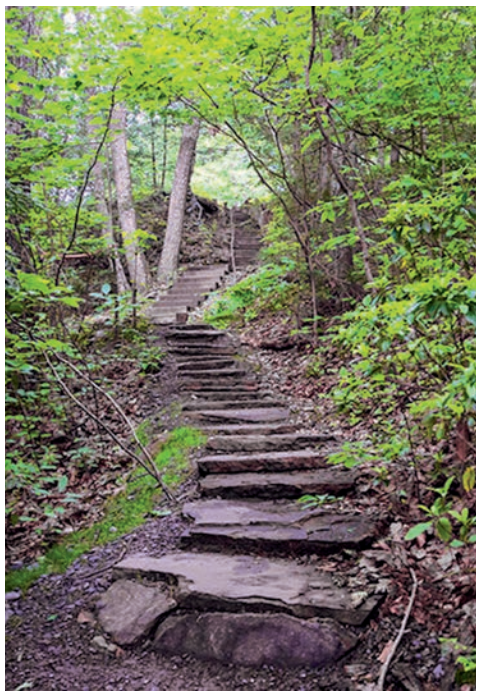
The park featured pure spring water, picnicking, dancing platforms, swings, athletic fields, small pavilions and a lookout tower into the vast valley. Everything was tied to the nearby waterfalls and chutes that were a popular summertime escape from the heat.

The first picnic on the grounds took place in June 1883, hosted by the Wilkes-Barre Centennial Boys. Visitors arrived by train.

At some point, the park shut down. The natural area was again opened to the public in the 1960s when a community leader purchased the Whirlpool Mountain Falls site. Luzerne County became overseers in 1979.

But oversight and maintenance were slight, and the natural area became ripe for vandalism, littering and other abuse.

"I was here when I was in high school," said Tony Menendez, 65, of Wilkes-Barre, when I met him on the trail after Seven Tubs reopened. "It was popular to come here to have parties. Because of the trashing and partying, when we went down the stream into the tubs you had to wear sneakers or you'd cut your feet on glass bottles. The state has been better stewards of this area."



A staircase made partly of local stone climbs through Seven Tubs' wooded and rocky terrain. (Courtesy of DiscoverNEPA)

The state Department of Conservation and Natural Resources took over 626 acres in 2014 and added them to Pinchot State Forest. But the agency wasn't ready for the enormous number of people that arrived during and even after the COVID-19 years. At times, staff had to provide day-long traffic monitoring, closing access until parking spots opened up.

"We did have issues with loud noise [and], copious amounts of litter," said Tim Latz, assistant district forester for Pinchot State Forest. Picnicking was banned to reduce overcrowding and related litter problems.

On April 6, 2023, Seven Tubs was closed until further notice for "critical repairs" and a more sustainable overhaul. Now, the narrow access road from Route 115 has been repaved and made one way. There are two paved parking areas to accommodate 59 vehicles, including ADA spots.

The popular pedestrian bridge, where dozens of iconic images of the chutes are made daily, was sanded to remove carvings and graffiti.

Unsightly and smelly pit toilets that on occasion were tipped over have been replaced by a concrete, more environmentally friendly vaulted concrete bathroom.

Members of the Pennsylvania Outdoor Corps placed silt "socks" under the heavily used Seven Tubs Trail to prevent erosion and erected more durable stone steps.

If Seven Tubs isn't popular enough, it is in the process of being linked as a northernmost terminus to the D&L Trail.

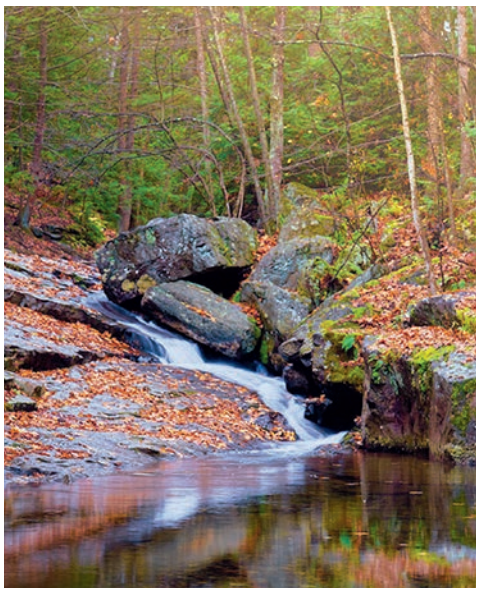
Since its designation in 1988 as part of the Delaware & Lehigh National Heritage Area, the public-private D&L Trail has become an ever-growing series of historic pathways. It stretches for 165 miles from Bristol, PA, near the Delaware Canal, through the coal regions in the northeastern part of the state. The routes, which seem to be most heavily used by bicyclists, follow and celebrate the transportation routes of early canals and railroads that carried coal to market.

A 7-mile section is being built from Wilkes-Barre to near Seven Tubs. Though not yet open, the new stretch will make it possible to hike or ride a bike from Seven Tubs onto the D&L Trail.

DCNR's Latz thinks the Seven Tubs makeover strikes the right balance of making the area more accessible to visitors while protecting the natural beauty that makes it so special.

"It isn't just water that kinds of runs through a canyon," he said. "It's unique in that it is very accessible and close to population and transportation centers. You've got your daily dog walkers. Some people just like to come out and listen to the water or sit in it. We have trout fishermen.

"It's a unique geologic feature with a water feature mixed in. It just has that beautiful aesthetic, and it captivates people." ■



Fall leaves on massive boulders make for a picturesque scene at the foot of a Seven Tubs waterfall. (Courtesy of DiscoverNEPA)

VISITING SEVEN TUBS

The entrance to Seven Tubs Recreation Area is at 900 Bear Creek Blvd. in Wilkes-Barre, PA, a short drive off Interstate 81. It is open daily year-round, though it can be closed briefly during heavy snow.

For information, visit the state's website for Pinchot State Forest, where you will find a brochure and map for Seven Tubs. You can also contact the Pinchot Forest District at 570-945-7144 or by emailing FD11@pa.gov.

Seven Tubs can get quite crowded during the day, especially during warm weather. Morning hours are best. If a wading pool on Laurel Run is crowded, there are plenty of others.

Wading in the cool, clear pools is popular. So is riding the chutes by the seat of your swimsuit or on boogie boards. But there have been injuries. Diving or jumping off rocks or cliffs is prohibited.

Also off limits are open fires, charcoal grills, camping, organized picnicking, biking, unleashed dogs and loud music. Visitors must carry out their own trash.

Other notable public natural features in the area include Bear Creek Preserve, Ricketts Glen State Park (22 named waterfalls), and Lehigh Gorge State Park and rail-trail. For information, go to *visitluzernecounty.com*.

Keeping the Chesapeake spirit alive beyond 2025

By Anna Killius & Martha Shimkin

Flowers grow along the wetland edge of a marsh gut in lower Dorchester County, MD. (Dave Harp)

Over 40 years ago, the first Chesapeake Bay Agreement pledged a cooperative approach to improve the water quality and living resources of our shared estuary — marking the beginning of the Chesapeake Bay Program partnership.

Our overarching goals have seen many refinements over four decades. But what has remained unchanged is the immense and unyielding spirit of the people working to achieve it. After all, it is the people who are the agents and beneficiaries of the change we seek for our watershed.

In the past year, we have had a front row seat to this spirit in action. In 2022, the Bay Program's Executive Council — the top executives from each Bay jurisdiction, the chair of the Chesapeake Bay Commission, and the administrator of the U.S. Environmental Protection Agency — charged the program with charting a course for the partnership that "prioritizes and outlines the next steps for meeting the goals and outcomes of the Watershed Agreement leading up to and beyond 2025."

Why 2025? Nearly half of the 2014 Watershed Agreement's time-bound outcomes identify 2025 as our target. For several of these, we are not on course, yet we remain committed to ambitious progress.

As co-chairs of the steering committee taking on the "Beyond 2025" effort, we have had the honor of convening our partners at this pivotal time to reflect on our progress, our challenges and how we can collectively define our future.

In revisiting the bedrock elements of the Watershed Agreement, we have found that it remains a strong foundation. Not only is this a testament to its original drafters and signatories, but to its principle of continuous learning and adaptation.

Under the agreement, the Bay Program has celebrated sustainable management of the Bay's blue crab fishery, the world's largest oyster restoration effort and thousands of miles of reopened streams and rivers for migrating fish. Furthermore, Virginia and Pennsylvania are dedicating record levels of resources and assistance to farmers implementing conservation practices.

West Virginia and Maryland have invested in sewer treatment upgrades, improving their local rivers and streams while preventing pollution from reaching the Bay. New York and Delaware have prioritized delivering their incentive programs, ensuring projects bring benefits for the Bay and, more importantly, for local communities.

And for the first time in more than 50 years, you might find folks going for a leap into the Anacostia, a river on the rebound with help from the District of Columbia's stormwater achievements.

This progress is rooted in decades of building our understanding of the natural processes and human impacts on the Chesapeake ecosystem, resulting in an astounding web of connections and a truly grand challenge to address. The difficulties are many and growing, making our work more complex.

As a partnership, it is appropriate to take stock of progress made and benchmarks missed, of emerging issues and new learnings, then to adjust the work we do.

Together, we are identifying strategies we believe will leverage our successes and build on the scientific knowledge that underpins our work. These strategies can help us close the gap between progress made and progress needed to deliver a healthy, resilient resource for the people of the watershed.

As the signatories of the first Bay Agreement knew, the complexity of this challenge requires a diverse set of partners, working at the federal, state and local levels — a vast social ecosystem to steward a vast natural one.

It is equally important to ensure that the people at the heart of the partnership are set up for success, with a culture that fosters innovation, decision-making and balance across our many roles and responsibilities. Thus, we are taking this opportunity to consider how we, as partners, can better work together. Ideas for improving the work we do and the way we work together is our goal for the steering committee, so that we can more effectively meet the commitments of our longstanding partnership.

In the coming months, as we prepare recommendations for the Executive Council, we welcome your thoughts on our recommendations.

Look for the Beyond 2025 Steering Committee's draft report on the Bay Program's website at *chesapeakebay.net.* Feedback can be submitted by email to *comments@chesapeakebay.net* by Aug. 30.

The Bay watershed is an irreplaceable treasure to all who work its lands and waters, enjoy its many resources or simply call it home. The Chesapeake spirit, the spirit of partnership, lives in its people. Together, we chart our course and keep this spirit alive. ■

Anna Killius is executive director of the Chesapeake Bay Commission. Martha Shimkin is director of the U.S. Environmental Protection Agency's Chesapeake Bay Program Office.

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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.

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Federal leadership sorely needed for 2025 and beyond

By Ann Mills & Nancy Stoner

Right now is a pivotal moment for the unifying environmental issue in our region: the restoration of the Chesapeake Bay and its rivers and streams.

For more than a decade, federal agencies, the six states in the Bay watershed, the District of Columbia and hundreds of nonprofit organizations have worked collaboratively toward a 2025 deadline to meet goals for a healthier Chesapeake Bay. While we will not fully meet most of those goals by next year, we have made notable progress in reducing pollution to the Bay.

And we can point to some major successes, such as reestablishing the Chesapeake's historic oyster reefs and upgrading sewage treatment plants throughout the watershed.

But the remaining challenges are daunting, and there's no clear roadmap yet for the next phase of Chesapeake Bay restoration. Still, there is plenty of reason for hope.

Thanks to the work of President Biden and Congress, an influx of federal funding from legislation like the bipartisan Infrastructure Investment and Jobs Act, along with increased appropriations for the U.S. Environmental Protection Agency's Chesapeake Bay Program, has the potential to turn the tide and get the restoration on track. It's vital that federal agencies coordinate to ensure those investments lead to the greatest possible benefits for the nearly 19 million people in the Bay watershed.

Meanwhile, we're happy to say, EPA Administrator Michael Regan has committed to reviving the Chesapeake Bay Federal Leadership Committee, which will convene this fall for the first time since 2015.

To understand the significance of this, consider that the Chesapeake's restoration touches nearly every other issue facing our region — from climate change to fisheries to development to agriculture and, of course, tourism.

Success requires six states and the district working together in lockstep on initiatives to improve local waterways and communities throughout the watershed. This includes helping farmers adopt conservation practices that boost stream health, planting trees along trout streams, working with communities to increase access to greenspace, upgrading wastewater treatment plants and much more.

Anglers try their luck from the end of a fishing pier at Virginia's Westmoreland State Park on the Potomac River. (Bob Diller/CC BY 2.0)

Federal investments have mobilized further support with increased funding, capacity and expertise from state agencies, nonprofits, universities and community leaders.

In addition to the EPA, there are numerous federal departments working with Bay watershed states toward meeting Chesapeake Bay restoration goals. They include the departments of Agriculture, Commerce, Defense, Homeland Security, Interior and Transportation — each department playing a critical role in the overall effort.

President Barack Obama created the Federal Leadership Committee in 2009 through a Chesapeake Bay restoration executive order. The committee guided the restoration effort for six years, culminating in the 2014 Chesapeake Bay Watershed Agreement among the federal government, six Bay watershed states and the District of Columbia. The agreement set clear goals for Bay restoration with a 2025 deadline.

We were both honored to serve on this team, which played a pivotal role in ensuring broad and consistent federal leadership of the restoration effort. But the committee has not met for nine years, and we think the time is right for its second act.

Young paddlers enjoy kayaking at Bear Creek Lake State Park in the James River watershed west of Richmond. (Virginia State Parks)

Successes so far in the Bay's restoration are largely because of collaboration among many partners toward common goals. This laser focus helps investment and resources make the biggest difference for the Bay. It improves the lives of the watershed's residents; boosts local economies; ensures safer and cleaner water for people; and protects habitat for fish, birds and other aquatic and terrestrial species.

President Obama's 2009 executive order was a historic moment that set the modern-day Bay restoration partnership in motion. Echoing President Ronald Reagan's words from a quarter century earlier, Obama recognized the Chesapeake as "a national treasure" and called on the federal government to lead a renewed effort to restore and protect the Bay and its landscapes, habitats and wildlife. Even in these divisive political times, restoring and protecting the Chesapeake continues to be a bipartisan endeavor.

Now, as we approach 2025, we've reached another important moment for the Chesapeake Bay region. Federal leadership is once again key to making the next chapter in the cleanup effort successful.

We applaud the EPA for its recommitment to taking on a leadership role in the Bay restoration effort and ensuring federal agencies and departments use their collective resources, capacity and expertise. As we embark on the next phase of restoration, we need the federal agencies to join forces and set a bold new vision for clean water in the region. With federal investments still coming and the 2025 deadline approaching, it is time to seize the moment and build on current momentum. ■

Ann Mills is the former U.S. Department of Agriculture deputy undersecretary for Natural Resources & Environment, a former member of the Chesapeake Bay Federal Leadership Committee and current executive director of the Agua Fund. Nancy Stoner is the former acting assistant administrator for water at the EPA, a former member of the Chesapeake Bay Federal Leadership Committee and current president of Potomac Riverkeeper Network.

Glass eels, tundra swans and other migration marvels

By Tom Horton

These glass eels, plus one yearling, were captured in a creek near Ocean Pines, MD, by biologists Alexis Park and Keith Whiteford. (Dave Harp)

The brackish tidal creek, draining freshwater from a remnant crease of swamp transecting suburban sprawl, is in full spring mode.

Spawning river herring thrash in the shallows. Ospreys hover, cormorants dive, willows and maples mint new green, and pine pollen hazes forest pools.

The people driving past on this busy two-lane road near Ocean Pines, MD, take scant notice. Maybe the sight of Alexis Park and Keith Whiteford going over the guardrail and down the steep creek bank in hip waders draws a glance. But no driver would imagine what summons the two Maryland Department of Natural Resources biologists here each spring.

They come to sample the fallout just reaching us from a magnificent detonation of life in the previous year, a hyper-fecund event more than a thousand miles from the Chesapeake Bay in the depths of the Sargasso Sea.

South of Bermuda, east of the Bahamas, the only sea bounded by no land — only by four major ocean currents — the Sargasso Sea is a vast, slow-turning gyre of water estimated at 2 million square miles. And that's where silver eels go to spawn, pouring from every creek of every river of every coast of Europe and the Americas, from Greenland to Venezuela.

Their destiny, too remote and deep to have ever been witnessed, is to spawn and die, billion upon billion, each female releasing tens of millions of eggs. Then the new larvae, resembling tiny, transparent willow leaves, begin a slow, yearlong drift borne on currents back toward the coasts.

Approaching the continental shelf, they become "glass eels" — 2-inch-long transparent wrigglers, now with the ability to swim, and with olfaction that can sense parts per trillion, orienting them toward freshwater from the land.

Indeed, freshwater pouring out of this remnant of Maryland swamp, piped through a fine mesh trap, is the "bait" that Park and Whiteford use to attract the baby eels thronging in from the Atlantic.

They expect the trap to net as many as 250,000 glass eels. But the influx of eels is occurring everywhere, and that is the merest smidgen of what's moving into the Chesapeake region and the hemisphere. Still, it tells them that eels here are at relatively healthy levels, even increasing in the last couple of decades.

Along with Dave Harp and Sandy Cannon Brown, I'm tracking eels this spring for a new *Bay Journal* film portraying the essential Chesapeake, the fundamental rhythms that sustain and enrich North America's greatest estuary — the mixing place where 40-odd rivers collide with the sea.

The word "estuary" comes from the Latin *aestuare,* which connotes movement. It means "to heave … to boil … to be in commotion."

Chesapeake tides of gentle amplitude, averaging a foot or two between high and low, flow in and out every six hours or so. And simultaneously, a wedge of heavier, salty ocean constantly licks north up the Bay's deep channels, as a flood of lighter, fresher water from the rivers moves always seaward.

This two-layered movement, unknown to science until the mid-20th century, in turn affects the movements and distribution of Bay species, from oysters and blue crabs to the young of many fishes.

And to a grander, geologic cadence, whole Chesapeakes come and go, wither and blossom as long Ice Ages and shorter warming epochs alternately bind up the seas in polar ice, then release them to gorge the continental fringes.

Overlaying all of this, lavishly embroidering our estuary and the lands of its six-state watershed, stitching them into webs of life from Argentina to Alaska, Sargasso to Hudson Bay, is what I'd call the "migration-shed."

Dave Harp is training his camera on just a few aspects of this, the mysterious journeys of the American eel being one. Come this autumn we'll be on Deer Creek on the Susquehanna River searching for the mature silver eels that, after 10–15 years of Chesapeake residence, are preparing to make their one-way trip to the Sargasso Sea.

Harp was out for days in the wet and snow over the winter, filming tundra swans, one of the largest long-distance migrators of the bird world. They spend a good portion of their lives on the wing, moving from breeding grounds across Alaska's North Slope and the Yukon each fall into the Chesapeake and North Carolina — a 9,000-mile round trip.

In May we were tramping the salt marshes and beaches of the lower Delmarva Peninsula with biologists from the Nature Conservancy, collecting vital data on a variety of shorebirds, from willets to whimbrels, plovers to dunlins, red knots to ruddy turnstones.

Some, like the curved-beaked whimbrels, may be airborne without stopping for up to five days, arriving at the lush marshes and mudflats of our region famished from their winter haunts in South America. For several weeks they will refuel here, nonstop, chowing down on fiddler crabs. Then, one spring evening, something in them stirs, and they are aloft by the thousands, not to alight before reaching breeding grounds that stretch from Hudson Bay to far northwest Canada's Mackenzie River Delta.

I find it both inspirational and a little scary that such an odyssey is utterly dependent on a few little patches of spring banquet from the Carolinas and Virginia, where the whimbrels and other shorebirds can eat their fill.

This fall you'll also find us amid blazing fields of goldenrod, dripping with gaudy monarch butterflies, guzzling nectar on their annual movement from across North America to wintering roosts in central Mexico.

In November, not long after the last monarch has passed through, and as the silver eels stream from the Chesapeake's mouth toward Sargasso depths, there will come the lovely, wild hallooing of "swan-fall" — the descent of the tundra swans from on high to grace our winter.

Such gifts from afar, these are — symbols of renewal and hope, and reminders of our obligation to protect our little portions of the great webs of life. ■

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.

CHESAPEAKE CHALLENGE

— Kathleen A. Gaskell

How bright are you when it comes to sun safety?

B

C

Did you know that a suntan is the result of your skin producing melanin, a pigment, to protect itself from injuries caused by the sun's ultraviolet (UV) rays? When the damage exceeds the melanin's ability to block those rays, a sunburn occurs. This quiz tests your knowledge of sun safety. Be sure to check the answers on page 36. Some of them may surprise you!

1. True or false? The terms sunscreen and sun block are often used interchangeably, but in fact they function differently. Products sold as sunscreen absorb UV rays, while sun blocks work by reflecting UV rays.
2. T or F? The SPF (sun protection factor) of a sunscreen or sun block is a measure of how many times longer it will protect you from sunburn than your skin's natural defenses.
3. T or F? The UPF (ultraviolet protection factor) on clothing measures the amount of UV radiation that can still reach skin through the fabric.
4. T or F? An established tan prevents skin cancer.
5. T or F? Tanning beds can cause premature wrinkles and cancer.
6. T or F? The use of self-tanning products reduces the need for sunscreen or sun block.
7. T or F? Sunlight reflected off sand, pavement, water or snow cannot contribute to sunburn.
8. T or F? You should protect yourself from overexposure when the sun's UV rays are strongest. This is between 10 a.m. and 4 p.m.
9. T or F? Even "water resistant" sunscreen/sun block should be applied every two hours when swimming or sweating.
10. T or F? Broad-spectrum sunscreens and sun blocks are best because they work against both varieties of ultraviolet rays, UVA and UVB.
11. T or F? An umbrella will fully protect you from the sun's rays at a sandy beach.
12. T or F? Sunscreen takes time to be effective. Apply it at least 30 minutes before exposure.
13. T or F? Wear a balm with at least SPF 15 to protect your lips.
14. T or F? Overexposure to the sun's rays can cause cataracts and damage immune systems.
15. T or F? People with dark skin people don't get sunburned.
16. T or F? Read prescription labels carefully because some medications make it possible to develop a severe sunburn in just minutes.

Title image: *Matt Niemi/CC BY-NC-ND 2.0*

A *A noon sun shines through a break in the clouds. (Path slopu/CC BY-SA 4.0)*

B *A sunny day brings visitors to a beach along Virginia's York River. (Bill Dickinson/CC BY-NC 2.0)*

C *Deer take shelter in the shade of a tree. (Lee Haywood/CC BY-SA 2.0)*

D *Oyster shells contain melanin and darken when exposed to sunlight. (Clint Budd/CC BY 2.0)*

E *A zebrafish produces its own sun block. (Oregon State University)*

D

Saving their skin

Ultraviolet (UV) rays show no partiality. If an animal has skin, it's more than likely that its skin can tan or burn. So how do beasties burn-proof themselves?

Creature coverups: Feathers, fur, hair, wool and scales provide a protective barrier between UV rays and their skin.

Hide their hides: When the sun is particularly intense, many animals take refuge in the shade or burrows.

Sweat it out: Hippos protect themselves from sunburn by secreting a blood-colored liquid that absorbs ultraviolet rays.

Fade to black: The melanin in shark skin turns from dark brown to black when exposed to UV rays. Theoretically, sharks can get sunburned, but they spend most of their time far enough underwater to be out of reach of harmful rays.

Bathing behemoths: In addition to having thick skin, elephants and rhinos take dust and/or mud baths to protect their hides.

Shell yes! Oyster shells contain melanin and will darken when the creature is exposed to UV rays.

Fishing for a solution: In 2015, scientists discovered that zebrafish produce gadusal, a compound that protects them from UV rays. The genes responsible are present in nearly all vertebrates — birds, reptiles, amphibians and fish, but not mammals! But only the zebrafish's genes produce gadusal. Scientists are trying to unravel the mystery, in hopes of making a sunscreen for humans that does not pollute the marine environment.

E

Beachgoers enjoy a day on the Bay shore, with a view of the Chesapeake Bay Bridge, at Maryland's Sandy Point State Park. (Dave Harp)

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A small replica of the Statue of Liberty stands on a derelict bridge support in the Susquehanna River near Dauphin, PA. (Michele Danoff)

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A bushel of blue crabs awaits the steamer. (Dave Harp)

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BULLETIN BOARD

BULLETIN BOARD GETS NEW ADDRESS

After more than 30 years compiling and writing Bulletin Board, **Kathleen Gaskell** is retiring and will finally be able to attend some of the events that she has publicized over the years. The new address for submitting items to Bulletin Board is: bboard@bayjournal.com

VOLUNTEER OPPORTUNITIES

WATERSHEDWIDE

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

Scoop & Paddle Potomac cleanups
At Potomac Conservancy's *Scoop and Paddle* events, volunteer kayakers remove litter from the water. All experience levels welcome. Registration required. Info: potomac.org (under Events menu), 301-608-1188, info@potomac.org.
- *Boyds, MD:* 9–11 am July 20. Car accessible.
- *Kingman & Heritage Islands, DC:* 5:15–7:15 pm Aug. 2. Half of event takes place on land, half on water in kayaks. Car, bike, bus accessible.

PENNSYLVANIA

Middle Susquehanna volunteers
The Middle Susquehanna Riverkeeper needs volunteers in these areas:
- *Sentinels:* Keep an eye on local waterways, provide monthly online updates. Web search "Susquehanna sentinels."
- *Water Sampling:* Web search "Susquehanna Riverkeeper survey."
- *The Next Generation:* Many watershed organizations are aging out. Younger people are needed for stream restoration work, litter cleanups. Individuals, families, Scouts, church groups welcome. Info: MiddleSusquehannaRiverkeeper.org/watershed-opportunities.

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

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

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

VIRGINIA

Leopold's Preserve
The White House Farm Foundation has several opportunities at Leopold's Preserve in Broad Run. Register: leopoldspreserve.com/calendar, click on date. Info: WHfarmfoundation.org.
- *Conservation Corps:* 8:30–11:30 am Fridays. Ages 13+ Maintain trails, restore habitat, remove invasive plants, clean up trash.
- *Trail Maintenance Workday:* 8:30–11:30 am and/or 1–3 pm July 20 & Aug. 17. Join one or both shifts. Ages 13+ (ages 13–17 w/adult).

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

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

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

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

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

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

MARYLAND

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

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

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

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

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

Submission Guidelines

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

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

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

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

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

Answers to CHESAPEAKE CHALLENGE on page 31

1. T	2. T	3. T	4. F
5. T	6. F	7. F	8. T
9. T	10. T	11. F	12. T
13. T	14. T	15. F	16. T

BULLETIN BOARD

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

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

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

National Wildlife Refuge at Patuxent
Opportunities at the National Wildlife Refuge at Patuxent near Laurel include:
- *Wildlife Images Bookstore & Nature Shop:* Work a few hours a week, half day or all day 10 am–4 pm Saturdays; 11 am–4 pm Tuesdays–Fridays. Run register, assist customers. Ages 18+ (17 & younger w/parent). Visit the shop in National Wildlife Visitor Center, ask for Ann; email wibookstore@friendsofpatuxent.org.
- *Kids' Discovery Center:* Help to develop curriculum activities or become a docent. Info: Barrie at 301-497-5772.
- *Monarch Magic:* Adults & ages 16–17 w/adult registration on file. Learn about volunteering with the *Monarch Butterfly Team* by attending a Monarch Butterfly Team Overview. Call Barrie 301-497-5772 to sign-up for the next presentation for potential docents and/or butterfly-care providers.

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 July, August and September at Ruth Swann Memorial Park in Bryans Road. Meet at Ruth Swann Park-Potomac Branch Library parking lot. Bring lunch. Info: ialm@erols.com, 301-283-0808 (301-442-5657 day of event). Carpoolers meet at Sierra Club Maryland Chapter office at 9 am; return at 5 pm. Carpool contact: 301-277-7111.

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

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

EVENTS / PROGRAMS

VIRGINIA

Let's Go Adventures series
Virginia State Parks' *Let's Go Adventures* series teaches first-time participants the skills to confidently participate in a range of outdoor activities. Learn the basics of each activity, how to select & use proper equipment, Leave No Trace Principles, park etiquette, safety guidelines. Except for kayaking ($15 w/park admission fee), all adventures are free w/park admission fee. Space is limited. To register/learn about upcoming sessions: VirginiaStateParks.gov/lets-go-adventures.

Let's Go Camping
- *Hungry Mother State Park, Marion:* 10–11:30 am July 23 & 1–2:30 pm July 26.
- *Powhatan State Park, Powhatan:* 2–4 pm Aug. 3.
- *Machicomoco State Park, Hayes:* 11 am–12:30 pm Aug. 31.

Let's Go Kayaking
(Ages 10+ Boats, paddles, provided)
- *Pocahontas State Park, Chesterfield:* 4–8 pm Aug. 12.
- *Occoneechee State Park, Clarksville:* 9 am–5 pm Aug. 18.

Let's Go Fly Fishing
- *Natural Tunnel State Park, Duffield:* 9 am–12 pm & 2–5 pm July 19.
- *Hungry Mother State Park, Marion:* 1–4 pm July 24 & 9 am–12 pm July 25.
- *New River Trail State Park, Max Meadows:* 9 am–5 pm July 28.
- *Caledon State Park, King George:* 1–4 pm Aug. 23.
- *Occoneechee State Park, Clarksville:* 10 am–2 pm Sept. 8.

Let's Go Orienteering
- *Hungry Mother State Park, Marion:* 1–2:30 pm July 23 & 10–11:30 am July 24.
- *Grayson Highlands State Park, Mouth of Wilson:* 10 am–12:30 pm July 27.
- *Caledon State Park, King George:* 10–11:30 am & 12:30–2 pm Aug. 24.

Let's Go on an Archery Adventure
- *Hungry Mother State Park, Marion:* 1–3 pm July 25 & 10 am–12 pm July 26.
- *Caledon State Park, King George:* 10 am–12 pm & 1–3 pm Aug. 25.

Let's Go Hiking
- *Grayson Highlands, Mouth of Wilson:* 2–4 pm July 27.

Leopold's Preserve
Take a walk at Leopold's Preserve in Broad Run. All programs are free. Registration required: leopoldspreserve.com/calendar, click on date.
- *Naturalist Walk - Things that Fly!:* 10 am–12 pm July 14. Look for birds, butterflies, dragonflies, damselflies.
- *Naturalist Walk - Bats & Bugs:* 7–8:45 pm Aug. 7. Learn about bats while observing them catching their dinner midflight.
- *Hike with a Naturalist:* 10 am–12 pm first Wednesday of each month through November. Join Leopold's Preserve, the White House Farm Foundation and Bull Run Mountains Conservancy.

MARYLAND

Eden Mill Nature Center
Attend an event at Eden Mill in Pylesville. Preregistration required at edenmill.org. Info: edenmillnaturecenter@gmail.com
- *Guided Sunrise/Sunset Canoe Trips:* 5:45–8:15 pm Thursdays and 9–11:30 am every third Saturday through Sept. 26. Strictly ages 6+ All equipment provided. $15.
- *Star Walk:* 8:30–10 pm July 27. Ages 8+ with registered adult. Hikers will engage their senses to experience a night on Earth while marveling at the universe beyond. $12.

Beach Comb at Piney Point Museum
The Lighthouse Museum at Piney Point invites the public to learn about *Beach Combing* 12–3 pm (families, children) & 2–3 pm (adults) Aug. 10. Free with museum admission. Registration requested to ensure there are enough materials for participants. Rain/shine unless weather is dangerous. Info: 301-994-1471.

Youth Fishing
The Department of Natural Resources invites youths, ages 3–15 to learn basic angling skills at a free fishing event 9 am July 20 at South Pond in Worcester County. Registration required: Lee Phillips at 443-944-1095.

Patuxent Research Refuge
Patuxent Research Refuge offers free public programs on its North Tract [N] and South Tract [S] units in Laurel. No registration except where noted. List special accommodation needs when registering: 301-497-5887. Info: 301-497-5772, www.fws.gov/refuge/patuxent-research/visit-us, www.fws.gov/refuge/patuxent-research/events.
- *Kids' Discovery Center:* 9 am–12 pm (35-minute time slots, on hour) Tuesdays-Saturdays [S]. Ages 3–10 w/adult. (Neither baby-proofed nor appropriate for ages 3 & younger.) Nature exploration; free booklet. July: *Ospreys, Herons, Egrets*. August: *Insects/Dragonflies*. September: *Water Birds/Ducks & Geese*. Group arrangements possible. Registration urged: 301-497-5760 (This number is only for this program.).
- *Free Butterfly/Pollinator-Support Workshops, Demonstrations, Native Plants* [S]. For new listings, registration links: https://www.fws.gov/refuge/patuxent-research/events. All ages.
- *Monarch Magic:* Drop-in/independent exploration 9 am–4:30 pm, Tuesdays–Saturdays. Staffed: Saturdays 1 pm-4:30 pm (through October except Labor Day weekend) [S]. All ages. Exhibits/video focus on monarch life cycle and migration. Live animals when available.
- *Family Fun:* Drop-in/independent exploration. 9 am–4:30 pm, Tuesdays-Saturdays. Staffed 10 am–1 pm July 19–20 & Aug. 9–10. July/August: *Color in Nature*; September: *Bird Migration* [S]. All ages. Hands-on learning activities, games, crafts.
- *Wingspan Game Days:* 10 am–1 pm July 26, Aug. 3 [S]. Ages 12+ Play this award-winning board game about birds. Experienced/inexperienced players welcome; instruction provided as needed. Games provided; personal sets also welcome. Registrants sign in at front desk.
- *How to Help & Attract Pollinators:* 2–3 pm Aug. 17 [S]. All ages. Learn how to invite pollinators, including butterflies, to your balcony/deck/yard. Free "starter" native plants; short walk to on-site "potted" and "in-ground" pollinator gardens. Registration requested; walk-ins possible.

RESOURCES

MARYLAND

Free pumpout adapter kits
The Department of Natural Resources is offering state boat owners and marinas free adapter kits to help empty holding tanks securely at area pumpout stations. The kit has a plastic adapter that screws into the existing waste discharge deck fitting, instructions, protective gloves, storage tube, QR code to a list of pumpout stations in Maryland. Info: Web search "MD DNR free pumpout kit" or contact Jennifer Jackson at 410-260-8772, pumpouts.dnr@maryland.gov. DNR also offers an online map of pumpout stations, (web search "MD online pumpout map") and clean boating tip sheet, (web search "MD clean boating").

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 email report.

VIRGINIA

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

Get lost in some good books about the Bay and natural world

By Cathleen Anthony

I always have my nose stuck in a book, but summer really lends itself to carefree reading. Camping, hammock time in the backyard, beach days — wherever you go, the too-hot afternoons and the long hours of daylight make reading one of the best summer pastimes. I have not read all of these books personally, but many were featured at a Chesapeake Collective art project at last year's Chesapeake Watershed Forum.

The Chesapeake Collective is a creative initiative that began in 2014 as part of the annual Watershed Forum, but now has a life of its own. It is the foundation for the type of social movement needed to meet our collective restoration goals. The collective encourages the use of shared spaces for uplifting unique voices and cultivating thoughtful conversations. The 2023 project, titled "Books We Love," built a shared library for conference attendees to further elevate environmental inspiration across text and time. Visit the Alliance for the Chesapeake Bay's website, *allianceforthebay.org*, and search "Chesapeake Collective" to learn more about it.

Then, hit up your local library and lose yourself in a book this summer.

A Walk in the Woods: Rediscovering America on the Appalachian Trail
by Bill Bryson
Memoir, humor, travelogue, 1998

Bryson is, first and foremost, a comedic writer — not an expert hiker. If you read this book looking for advice about traveling the Appalachian Trail, you won't find it. About 75% of thru-hiking attempts on the roughly 2,200-mile trail are unsuccessful, and Bryson falls squarely in that majority. But I appreciate the realistic way he describes his attempt; I have no delusions of ever being a successful AT hiker. I like reading about other people's experiences while surrounded by nature in my own backyard.

Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge and the Teachings of Plants
by Robin Wall Kimmerer
Non-fiction, Indigenous American philosophy, 2013

Braiding Sweetgrass is highly recommended by the Alliance for the Chesapeake Bay staff. Since publication, it has exploded on all the top lists of environmental books, and for good reason. Kimmerer's book provides extensive knowledge and perspective on ecology and ethnobotany that has been overlooked, downplayed or blatantly disregarded in the Western mainstream environmental field. It also addresses the spiritual aspect of our connection to living things.

Chesapeake Requiem: A Year with the Watermen of Vanishing Tangier Island
by Earl Swift
Nonfiction, 2018

This is the quintessential book about the modern Chesapeake Bay, its unique culture and all of the challenges it faces. Tangier, VA, is a town of only a few hundred residents located 12 miles offshore in the Chesapeake. The island is rapidly shrinking, both in population and actual land. Despite being a stronghold of the blue crab industry, Tangier is the proverbial canary in the coal mine when it comes to climate change impacts. Residents of the island have ties to the nature of the land in ways most Americans cannot fathom. *Chesapeake Requiem* asks a good question: What is our measuring stick for determining when to save a community?

The Water Knife
by Paolo Bacigalupi
Science fiction, climate fiction, 2015

Water in the Western U.S. is a complicated business. In these more arid landscapes, the Colorado River often fails to reach its outfall at the Pacific Ocean, and Denver pulls its water across the continental divide. Wars have been fought over access to water. *The Water Knife* takes that concept into a parched near future, where climate change refugees struggle to be able to cross state borders, and assassin-terrorist-saboteurs called Water Knives work for nefarious organizations to secure control of water sources.

Last Child in the Woods: Saving Our Children From Nature-Deficit Disorder
by Richard Louv
Nonfiction, 2005

When it received the Audubon medal in 2008, *Last Child in the Woods* was lauded for "sounding the alarm about the health and societal costs of children's isolation from the natural world." Nearly 20 years have passed since the book was first published, and one could argue that the disconnection between youth and nature has worsened. However, with increasing thanks to this book, so has awareness and the effort to get kids outside again.

Beautiful Swimmers: Watermen, Crabs and the Chesapeake Bay
by William Warner
Nonfiction, 1976

If all you know about blue crabs is how delicious they are, then this might be the book for you. Awarded the Pulitzer Prize for nonfiction the year after it was published, *Beautiful Swimmers* explores all aspects of the iconic critter: its life stages, how to pick a crab and illustrations of equipment used for harvesting. It also goes into the history and traditions of the people who work the crab boats.

This is far from an exhaustive list of recommendations. So find something that works for you and spend time this summer exploring the natural world from the comfort of a good chair. ■

Cathleen Anthony is the Pennsylvania projects coordinator for the Alliance for the Chesapeake Bay.

Photo: A man enjoys a book on a summer day. (Ryk Venema/CC BY-ND 2.0)

A little beach music: the comeback of the laughing gull

By Alonso Abugattas

If you've ever been to an Atlantic Coast beach in summer and listened to the raucous calls of laughing gulls all day, perhaps while guarding your french fries from their thieving ways, you might be surprised to learn that these birds were once on the brink of extinction. By the late 1800s and very early 1900s, the coast-hugging laughing gull (*Leucophaeus atricilla*) had been all but wiped out by hunters and poachers who profited from their feathers and eggs.

At the beginning of the new century, a series of federal laws — the 1900 Lacey Act, followed in 1913 by the Weeks-McLean Act and finally the Migratory Bird Treaty Act of 1918 — afforded enough protection to laughing gulls that they gradually recovered.

Fast forward to this century, and the birds are not only no longer threatened but have become the most abundant seabirds breeding in the eastern U.S., with 528,000–538,000 breeding pairs, according to the North American Waterbird Conservation Plan.

In fact, laughing gulls are so numerous that they are culled (a polite word for shot) by the thousands near large airports to minimize collisions with planes. Because they will sometimes eat other birds' eggs, they are also culled near nests of endangered bird species, such as least terns.

Their nasally high-pitched laugh-like call is familiar to anyone who has spent more than a few minutes on an Atlantic Coast beach in the summer. This time of year — their breeding season — they are easily distinguishable from other gulls by their jet-black hoods. Contrasting starkly with the black hoods are bright white crescents above and below the eyes, like clumsily applied eyeliner.

There is no difference in plumage between the sexes, and the males are only slightly larger on average than the females and have slightly longer bills, which are red on both sexes in the breeding season.

A laughing gull in flight wears the jet-black hood of its summer breeding season. (watts_photos/CC BY 2.0)

They are considered midsize gulls, with a wingspan of 16–17 inches. Their bellies are bright white, and their backs are dark gray, as are the tops of their wing — except for black wing tips, which often have small white dots.

In winter, adults transition to mostly white heads, often with a bit of a smudge where the black hood used to be, and their bills turn black. Immature birds have scaly gray-brown plumage at first, then molt into an overall gray look in their second year. They reach sexual maturity and adult plumage in their third year.

Occupying our beaches, estuaries and salt marshes — but also pretty much everywhere it can find a meal — *L. atricilla* is also versatile opportunist. If begging for scraps where humans gather doesn't suffice, these gulls will venture into agricultural fields, following tractors, or gather at parking lots and landfills. Or they'll follow fishing vessels, ready to snatch discarded bait or chum.

An adult laughing gull's non-breeding plumage is only a smudgy remnant of its summertime black hood. (Greg Schechter/CC BY 2.0)

They can also snatch insects out of the air.

Like most other sea birds, laughing gulls dine on horseshoe crab eggs that are laid on beaches by the billions in the spring. They occasionally eat the eggs and chicks from other birds' nests, though nowhere near as frequently as larger gulls do.

Finally, laughing gulls are "kleptoparasites," sometimes stealing food outright from other birds and gulls (including their own kind). Perhaps most comically — and there are videos of this — some laughing gulls will steal fish right out a pelican's mouth, often standing on the larger bird's back as it floats in the water.

A juvenile laughing gull, with the scaly gray-brown plumage of its first year. (Rhododendrites/CC BY-SA 4.0)

While mostly diurnal, laughing gulls sometimes forage at night with the help of streetlights.

L. atricilla is a late nester by gull standards — arriving here and points north in May and June, after wintering along the coast as far south as Peru. (Some stay year-round in Florida and along Gulf Coast.) They are quite social nesters and can form huge colonies of up to 25,000, often mixed with other shorebird species. These large colonies can attract the attention of other predators, including larger gulls. Herring gulls, in particular, eat laughing gull eggs and chicks.

Laughing gulls compete with one another for ideal nest sites, preferring locations as high as possible and in the middle of the colony to avoid flooding and predators, respectively. Once paired, both sexes participate in nest building, though sometimes single males will build nests on their own to get the attention of potential mates.

Females usually lay three eggs, and the parents share incubation duty. Chicks hatch in 19–22 days and, while they are quite mobile, they stay near the nest, depending entirely on their parents to feed them. Both parents initially feed their young half-digested food.

After 35–40 days, the chicks fledge and begin to find sustenance for themselves. In ideal circumstances, these birds can live up to 20 years.

In cases of predation or other nest failures, laughing gulls might make a second nesting effort, but for the most part they produce only one brood per year, and a pair may stay together for several years. Both males and females attract mates with ritualistic head tosses and facing-away displays. Come August and September, they'll start heading south again.

Laughing gulls have recovered extremely well. They are quite adaptable, can feed on so many things besides fish or mollusks, and have no trouble living near people. Indeed, for many of us, they are the soundtrack of a day at the beach. ■

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

Get to know a stream near you — and its connection to the Bay

By Kathy Reshetiloff

Now that summer is upon us and the heat and humidity has set in, many will seek out water for relief — though we're not all fortunate enough to have access to a Chesapeake Bay beach.

Chances are, however, there is a stream, creek or river close to where you live. So what does that mean? Plenty. We all live in a watershed. A watershed is all of the land drained by a specific waterway. The Chesapeake watershed includes all of the streams, creeks and rivers that flow into Bay.

Roughly 64,000 square miles in size, the Chesapeake Bay watershed includes parts of New York, Pennsylvania, Delaware, Maryland, Virginia and West Virginia and the entire District of Columbia. There are hundreds of thousands of miles of streams and creeks in the watershed. Virtually every resident in this watershed lives within a half-mile of flowing water that eventually makes its way to the Chesapeake Bay.

Like capillaries bringing blood and nutrients to vital organs in a body, streams are the lifeblood of a watershed. They flow over and through the landscape, carrying water, detritus (decaying organic matter), fish and other aquatic life downstream to larger bodies of water.

Streams also shape the landscape. Flowing water transforms land features, transporting and depositing soil from one place to another. Deposited onto a floodplain, these mineral– and nutrient-rich soils often become highly prized as farmland.

Streams are an important source of freshwater for our reservoirs and the Chesapeake. Literally countless small creeks and tiny streams feed five major rivers of the Chesapeake Bay basin — the Susquehanna, Potomac, Rappahannock, York and James. It's estimated that these rivers provide almost 90% of the Bay's freshwater.

Many wildlife species depend on these tiny waterways. Streams provide homes and breeding areas for small fish, insects, turtles, frogs and all manner of aquatic and semi-aquatic life. The fields, woodlands and wetlands along a stream are also important for amphibians, reptiles, birds and mammals, because they provide food, water, shelter and shade.

Barefoot youngsters dip for minnows in a creek near Reston, VA. (Planned Community Archives/ George Mason University/CC BY-NC 2.0)

People need streams too. A small creek is often one of the first "natural" places a child investigates, a seemingly wild area full of adventures. The sound of water flowing though the landscape and trickling over rocks is all but universally soothing. Streams offer us a place of refuge from the stress of our everyday lives. Streams connect us to nature.

Nationally, freshwater rivers and streams have been seriously damaged by activities on the land. Sediment from runoff and erosion are the primary sources of pollution in our waterways. Unnatural sources of pollution — chemicals and fertilizers — also damage our streams. It's estimated that in the U.S., because of pollution and loss of habitat, 33–75% of once-thriving aquatic species are rare, threatened or endangered.

The Chesapeake Bay watershed reflects this national picture. The quality of the Bay watershed has declined due to loss of natural habitats, including extensive stream systems so vital to the health of the Bay and its surrounding ecosystems.

Children wade in a neighborhood stream in search of minnows and other aquatic creatures. (U.S. Fish & Wildlife Service)

Many, if not most, of our streams have been altered by 300 years of agriculture and development. An estimated 50% of stream miles lack sufficient vegetative buffers that can slow and absorb runoff from farms and developed areas.

People tend to put boundaries around everything, but it is extremely hard to disconnect a smaller waterway from its downstream destination. The very nature of water makes this virtually impossible. We can learn a lot from this connectivity. If we realize that every tiny stream is merely an appendage of a bigger watershed, we soon learn that streams can either be the first point of destruction or the first line of protection.

What you can do

- Get to know your closest local waterway, whether it is a stream, creek or river. Get involved with local watershed associations.
- Treat the land and water as one. Remember that what you do on the land also affects local waterways. Cut back on the use of fertilizers, pesticides and herbicides — or better yet, stop using them altogether.
- Reduce the amount of pollution that runs off your property by installing a rain garden or rain barrels to capture stormwater. Wherever possible, replace asphalt or concrete surfaces with permeable surfaces like gravel or pavers. Redirect downspouts onto vegetation or gravel instead of driveways or sidewalks.
- Conserve water. In some households, as much as 40% of the water used each month finds its way into the landscape. Excess outdoor water use runs off the land, carrying nutrients, sediment and traces of toxic products into local streams. Reducing water use indoors means less water going to the sewage treatment plant or into a septic system.
- If your property includes a stream, creek or river, plant native vegetation along its banks to reduce erosion, intercept pollutants and provide important streamside habitat for wildlife. Contact wildlife or natural resource specialists for information about using native plants and creating wildlife habitats.

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